

PUBLIC NUTRITION

M.Sc. - 203



Directorate of Distance Education

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1**CONCEPT OF PUBLIC NUTRITION****NOTES****STRUCTURE**

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1.1 LEARNING OBJECTIVE

After studying this unit you will be able to:

- define the terms nutrition, health and public nutrition
- discuss the concept of public nutrition, its scope and future projections,
- explain the concept of health care and the three different levels at which it is available to the community,
- describe the health system as it operates in India,
- describe primary health care and the various components of primary health care, and
- define the role of the public, nutritionist in health care delivery

1.2 INTRODUCTION

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The rapidly changing global trends in the area of food consumption patterns, lifestyles and environment have a tremendous impact on the nutrition and health profiles of the communities. Though today's consumer is much better informed about various issues relating to his health, the information explosion also adds to the confusion in making the right choices and staying clear of misinformation and misconceptions. Therein, emerges the need for professionals with sound knowledge to ensure proper nutrition and positive health of the people they serve. This need is being felt more acutely in the current health scenario prevailing all over the world, though the specific issues may vary from country to country

In this unit, we will learn about concept of public nutrition, We would learn as to what public nutrition is all about and why do we want to study it? We will begin by explaining certain terms used in the area of public nutrition. We will also learn about the concept and essential component of health care and its delivery. This will help us to understand the role of public nutritionist in health care delivery.

1.3 UNDERSTANDING THE TERMS: NUTRITION, HEALTH AND PUBLIC NUTRITION

You must have used the terms nutrition and health often in your daily life, though not so often the term "public nutrition". You might be wondering why we want to learn about these terms. However, before study the course of public nutrition in detail, it is important for us to gain a good understanding of these terms - nutrition, health and public nutrition in a scientific way. Let us start with the term Nutrition.

Nutrition

Nutrition may be defined as the science of food and its relationship to health. It is concerned primarily with the part played by nutrients in body growth, development and maintenance. Good nutrition means, "maintaining a nutritional status that enables us to grow well and enjoy good health. The subject of nutrition is very extensive. Since our concern is with community aspects of nutrition, it is paramount to understand the other two terms i.e., health and public nutrition. Let us try to understand what health means.

Health

The most widely accepted definition of health is the one given by WHO (1948) in the preamble to its constitution, Box I gives the WHO definition of health

Box 1	WHO Definition of Health
It states "Health is a state of complete physical, mental and social well being and not merely an absence of disease or infirmity."	

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You should also note that this WHO definition has recently been expanded and includes "the ability to lead a socially and economically productive life". However, this concept of health is considered idealistic by many people and by using this yardstick very few, if any, would qualify as being healthy. But, if people consciously follow this goal, then it would enable most people to achieve a more positive state of health. In the absence of a better way of defining health, this definition of health continues to have universal acceptance. Let us now go over to the term public nutrition.

Public Nutrition

Public nutrition is concerned with improving nutrition in populations in both poor and industrialized countries, linking with community and public health nutrition and complementary disciplines.

You would note that public nutrition is an applied and very vast field. It includes many activities as follows:

- an understanding and a raising awareness of the nature, causes and consequences of nutrition problems in society,
- epidemiology, including monitoring, surveillance and evaluation,
- nutritional requirements and dietary guidelines for populations,
- programmes and interventions: their design; planning, management and evaluation,
- community nutrition and community-based programmes,
- public education, especially nutrition education for behavioural change,
- timely warning and prevention and mitigation of emergencies, including the use of emergency food aid.
- advocacy and linkage with, for example, population and environmental concerns, and
- public policies and programmes relevant to nutrition in several sectors, for example, economic development, health, agriculture and education.

So we saw that public nutrition is a very vast field and has many aspects to it. We will now study in detail about the concept, scope of public nutrition and the future projections of this field

1.4 PUBLIC NUTRITION

You must have heard of various study areas like "public health nutrition", "community nutrition" and "international nutrition" The concept of public nutrition is already established under these study areas, so then why do we want to have a course of study. We want to do this so that we develop clarity on our objectives and action and be effective in improving the nutrition situation of the population. Let us start with the concept of public nutrition.

1.4.1 Concept

It is widely quoted among applied nutrition professionals that "nutrition is not

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a discipline to be studied; it is a problem to be solved." If this is true, then by definition, solving nutrition problems requires multidisciplinary cooperation. The study of nutrition crosses boundaries from the most basic of laboratory sciences to an understanding of global economic and political interactions among nations. It is important for you to understand that nutrition problems in developing, as well as, developed countries cannot be solved in the laboratory or clinic alone. The constraints to populations achieving nutritional health fall in the economic, social, cultural and behavioural realms. Some of these are: the lack of access to food, its inappropriate distribution among and within households, and maladaptive food and health practices. The skills and knowledge needed to help address these constraints are quite different from those of the laboratory scientist or the medical practitioner. They require a different kind of training from that associated with the science of nutrition.

In a 1996 letter to *The American Journal of Clinical Nutrition*, Mason and others suggested the name "public nutrition" to define a new field encompassing the range of factors known to influence nutrition in populations, including diet and health, social, cultural, and behavioural factors and the economic and political context. The suggestion was based on the perception that the field already exists de facto, but that its recognition as a legitimate field of study would allow education and professional development to be more explicitly focused on its objectives. Like public health, public nutrition would focus on problem-solving in a real-world setting, making it, by definition, an applied field of study whose success is measured in terms of effectiveness in improving nutritional conditions.

The recognition that nutrition solutions often lie outside the domain of "nutrition" per se is not new. More recent approaches have been based on the assumption that nutrition problems will be solved by incorporating nutrition concerns into a wide variety of disciplines as they are translated into action, for example, when consumption issues are integrated into agriculture policies. This approach is correct if it can be made to work, but it is dangerous because nutrition then risks being the responsibility of no one. Putting nutrition under the domain of health, then it tends to medicalize the field, while putting it under agriculture may marginalize it. We need to remember that public nutrition has a distinct identity, incorporating the relevant aspects of the variety of disciplines that bear on the nutrition problem, as well as, incorporating scientific advances in the understanding of nutritional problems. Thus we saw that although public nutrition is recognized as a separate field of study, it does incorporate some elements of other disciplines which contribute to understanding of nutritional problems.

Let us now look at the scope of public nutrition.

1.4.2 Scope

Nutritional status is important as a determinant and correlate of health status and as a marker of individual welfare, in addition to being an outcome in its own right. A consequence of emphasizing nutrition as the focus of a programme and policy specialization may be that solutions then are too often linked to food, failing to integrate health concerns such as immunization, environmental sanitation,

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disease prevention and treatment, on the one hand, and poverty alleviation, entitlement and empowerment, on the other. Even in the area of food, many of the region's major food distribution programmes are not viewed primarily as nutrition programmes by those who run them, but as welfare or entitlement programmes.

This raises the question of whether the appropriate field of concentration is one of nutrition policies and programmes (public nutrition), or whether it would be better simply to add a nutrition focus to professional training in public health, economics, political science, or other relevant fields. The field of public nutrition is unique in requiring at least some understanding of the entire range of determinants of nutritional outcomes.

The study of these basic determinants extends into areas of economics, agricultural policy, health science and policy, and the social sciences, as well as, public policy and management. We need a multidisciplinary approach to solve nutrition problems. Figure 1.1 shows that we need to improve agriculture, education, community development and health to solve nutrition problems. However, we all tend to stay in our own boxes and thus confined to our area of specialty.

Agriculturalists assume the solution lies in the food supply, medical professionals assume the solution lies in health care or supplementation, nutritionists may assume the solution lies in nutrition education or in food supplements. In any given case, any of these might be appropriate solutions, but the field requires an empirical outlook to assess the entire range of possible interventions' and policy responses. A basic but thorough understanding of human nutrition and of the nutritional aspects of food, is also viewed as germane to address nutrition policies and programme.

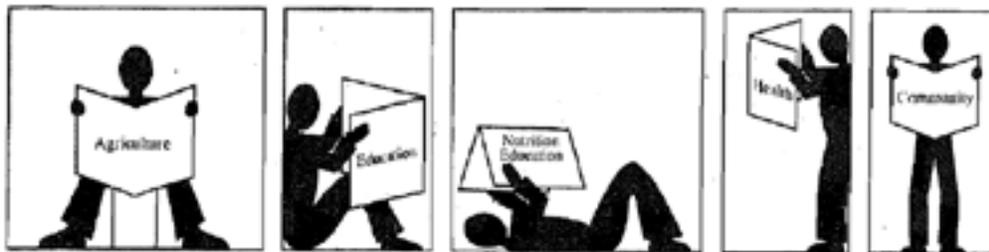


Figure 1.1 : Public nutrition: the need for cross disciplinary breadth in understanding nutritional problems

We should have a systematic introduction to the range of programmes and policies that have affected nutrition in various settings. This introduction should cover design and implementation issues, specific resource needs, and the conditions under which various programmes have been found to be more or less effective. Included in this introduction must not be only nutrition programmes, such as maternal and child health supplementary feeding, school meals, and nutrition education, but also areas outside nutrition, such as public health and environmental sanitation, household food and livelihood security, and food marketing. These programmes should be presented for their direct relevance and to illustrate forcefully the

point that nutrition solutions range well beyond the areas typically defined as nutrition. A great deal of knowledge has been developed through problem analysis, programme evaluations and cost-effectiveness studies; this is clearly an important knowledge base of the public nutrition .

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The two areas most commonly identified as important to public nutrition were economics and behavioural science. Public nutrition as an applied field, need not focus on econometric analysis or broad economic theory, but on some principles of economics as it applies to households (the household as a production and consumption unit, determinants of intra-household allocation, the value of time, the role of incomes, income sources, and local Prices in determining household food security). Some concepts of political economy - the political forces underlying the economic and social conditions that relate to the nutritional situation - are generally held to be central to effectiveness in the field. Understanding the social context of nutrition problems implies knowing the behavioural and cultural factors that can, directly and indirectly, affect the nutritional situation of a community (and, more broadly, the country).

Thus, we realize that public nutrition is a very wide field. As a public nutritionist, we require an understanding of many non nutritional determinants of nutritional outcomes, in order to solve nutritional problems of population. We also need to have a knowledge and understanding of programmes and policies which influence nutritional outcomes

These programmes arc both nutritional and non nutritional i.e. education, economics etc. in focus.

Let us now study the future projections in the area of public nutrition.

1.4.3 Future Projections

We discussed earlier that the field of public nutrition has existed for a long time, although not by this name. A heterogeneous network of professionals with distinct training and career paths, working in applied nutrition programmes and policy, continues to shape the field, incrementally, through dedication and effort. Although the need for a continuing supply of such persons, albeit with more targeted and appropriate training, is acknowledged widely, funding for the preparation of such individuals is increasingly , scarce. A comprehensive effort in public nutrition would need to address appropriate training to a critical mass of key individuals at each level of a country, Such a programme could achieve significant improvement in nutrition and create the human and institutional capabilities to sustain positive nutritional gains well into the twenty-first century

The appropriate training of applied nutrition professionals to work at the programme and policy levels hence, needs to be supported and recognized. Organizations prepared to fund this set of training activities will play a significant role in enhancing institutional effectiveness, strengthen regional capacity for providing ongoing human resource development, and contribute to the establishment of sustainable training programmes.

Thus, we can appreciate that, as the field of public nutrition gains increasing

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recognition, there are more and more opportunities for professionals in the applied field to publish and disseminate their work in the academic community. There are journals devoted to food policy and programmes and nutrition journals now commonly contain sections devoted to the policy and programme applications of nutrition science.

Check Your Progress Exercise 1

1. Define public nutrition

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2. Comment on the statement "Public nutrition: The need for cross disciplinary breadth in understanding nutritional problems. "

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In the next section, we would now learn that nutrition is an essential component of health care, so it is essential for us to learn what health care means. We will also learn how health care is delivered in our country and what is the role of public nutritionist in health care delivery. Let us begin with health care.

1.5 HEALTH CARE

Earlier in this unit, we learnt about the concept of health and what we understand by being in good health. Now we would learn about importance of imparting good health to people. We will study about concept of health care, levels of health care, primary health care and how health care is delivered in India.

Let us start with the concept of health care.

1.5.1 Concept of Health Care

We are aware of the fact that health is a fundamental human right. Thus, it becomes imperative for the State to assume responsibility for the health of its people. In order to achieve this objective, national governments globally are engaged in providing adequate health care to their people. Further, there are continuing efforts to improve these services.

Box 2 gives the definition of health case

Box 2	Definition of Health Care
Health care involves much more than just medical care and can be defined as " multitude of services provided to individuals or communities by agents of health services or professions, for the purpose of promoting, maintaining, monitoring or restoring health. '!	

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Medical case, which is by and large seen as the dispensation of services by physicians themselves or rendered at their instructions, thus becomes a part of the total health care services. Health care services are usually delivered at three levels. These are primary care, secondary care and tertiary care levels.

Let us review each of these levels in detail.

1.5.2 Levels of Health Care

It is customary to describe health care services at three levels. i.e. primary, secondary and tertiary.

Primary level care

This is the first level of contact of an individual, the family and the community with the national health system. It is possible to deal with most of the health problems of the community effectively at this level. In India, these services are provided through a network of Primary Health Centres (PHCs) and their SubCentres (SCs) spread all over the country. The functionaries involved in dispensing these services include the multipurpose health workers, village health guides and trained birth attendants (TBAs or Dais).

Secondary level care

More complex health problems of the community are resolved at the secondary level care through the district hospitals and the Community Health Centres. The latter are upgraded Primary Health Centres, which provide a variety of specialist facilities at the Block level. The Community Health Centres also act as the first referral level. This implies that patients can be directed to the next level of health care facility without first going to the district level hospital

Tertiary level care

This is the highest level of health care available to the community for dealing with their most complex health problems, which cannot be solved at the primary and secondary level. The institutions involved in providing the requisite facilities and care include Medical College Hospitals, All India Institutes, Regional Hospitals, Specialized Hospitals and other Apex Institutions. These institutions have highly specialized health personnel who dispense these services.

Figure 1.2 shows three levels of health care. First level-Primary health care includes promotive, preventive and basic curative health services, second level includes general hospital services and third level at tertiary health care includes specialized hospital services.

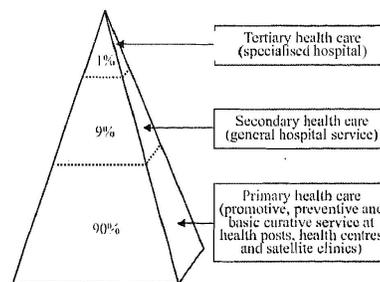


Figure 1.2: Levels of Health Care

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Since there are many people in this world, especially in the developing countries, who do not have access to adequate and quality primary health care, the concept of primary health care has received worldwide attention. We will now study about the concept of primary health care and its essential components as discussed during the international conference on Primary Health Care held at Alma Ata, USSR, 1978,

1.5.3 Primary Health Care

The international conference on Primary Health Care held at Alma Ata, USSR, 1978, focused universal attention on the concept of primary health care as the most effective means of achieving an acceptable level of health for maximum number of people in the community. It has been defined as: "Essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and family in the community through their full participation and at a cost that the community and the country can afford to maintain at every stage of their development in the spirit of self determination. Thus, defined, primary health care becomes a practical approach to provide essential health care at affordable cost to all the members of the community with their full participation. The basic tenets of primary health care rest on equitable distribution of resources, intersectoral coordination, appropriate technology and community participation. Though all factors are responsible for successful implementation of primary health care activities, community participation is perhaps the crucial determinant of success of any developmental program. It is the process by which Public Nutrition individuals and families assume responsibility for their own health and welfare and for those of the community and develop the capacity to contribute to their and the community's development. The declaration of Alma Ata conference on primary health care is highlighted in Box 3.

Box 3	Declaration of Alma Conference
<p>The declaration of Alma Ata stated that primary health care includes at least:</p> <ul style="list-style-type: none"> ● Education about prevailing health problems and methods of preventing and controlling them. ● Promotion of food supply and proper nutrition. ● An adequate supply of safe water and basic sanitation. ● Maternal and child health care, including family planning. ● Prevention and control of endemic diseases. ● Appropriate treatment of common diseases and injuries, and ● Provision of essential drugs. 	

As you may have read in the declaration, individual countries could add on more services to this list, but this is the minimum basic health care to be provided to the

population. Indian government has pledged itself to provide primary health care to its people by signing the Alma Ata Declaration.

Figure 1.3 gives essential components of primary health care and restates that the goal of primary health care is to provide comprehensive services to actual needs and priorities of the communities at an affordable prices. Immunization, adequate medical care, supply of water and adequate sanitation, educate people about the prevailing health problems, production of food, supply and proper nutrition are some of the components of primary health care as highlighted in Figure 1.3.

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Figure 1.3: Essential components of primary health care

Now that we know, what health care means, it is important for us to know how health care is delivered in our country. Read the next sub-section and find out

1.5.4 Wealth Care Delivery

The challenge that exists today in many countries is to reach the whole population with adequate health care services and to ensure their utilization. Rising costs in the maintenance of large hospitals and their failure to meet the total health needs of the community have led many countries to seek alternative models of health care delivery with a view to provide health care services that are reasonably inexpensive and have the basic essentials required by the population. Let us learn about the health system in India.

The Health System in India

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The country is divided into 28 states and 7 union territories for the purpose of administration. These are further divided into smaller administrative units called the districts, which are 593 in number at present. Within the districts are many smaller demarcated units. One of them is the community development block of which there are about 6000 in the country. Figure 1.4 gives administrative division of India around which the health system is based.

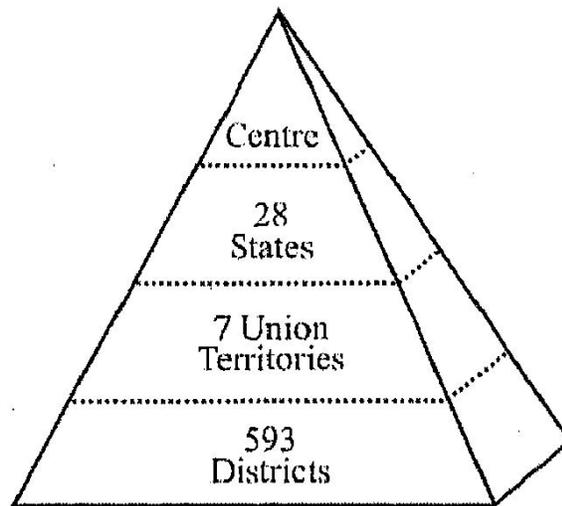


Figure 1.4: Administrative division of India

The main links in the health system comprise the Centre, State, District, Block and the village. Since, health is a state subject in India, the states have a considerable amount of independence in the delivery of health services to their people. Thus, each state has developed its own system of health care delivery. The centre is responsible for policy making, planning, guiding, assisting, evaluating and coordinating the work of State Health Ministries. Thus, it ensures universal coverage of the country with health services.

Let us review the health system at each of the following links - Centre, State, District Block, Subcentre and Village.

Let us start with the Centre.

A. Health System at the Centre

At the national or centre level the health system comprises:

- Union Ministry of Health and Family Welfare
- The Directorate General of Health Services
- The Central Council of Health

Figure 1.5 gives the organs of health system at Central level. It shows three main organs of health system as listed above. In addition, it shows that Directorate General of Health Services has 3 Bureaus - namely Bureau of Health Planning,

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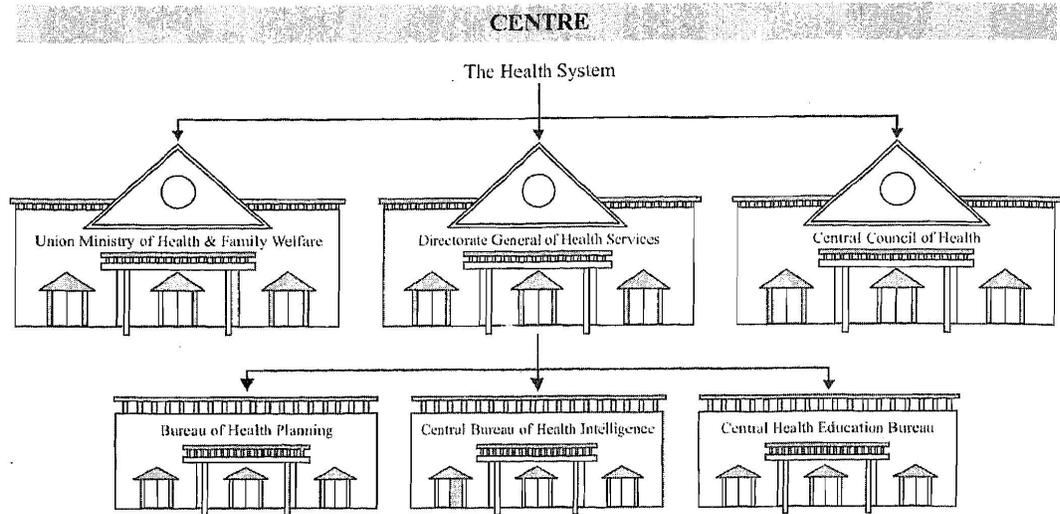


Figure 1.5: Organs of health system at central level

Let us look at each of these organs in detail, next.

- Union ministry of Health and Family Welfare is headed by a Cabinet Minister and a Minister of State, which are political appointments. The minister is assisted by the Secretary in the Department of Health and Family Welfare and the Special Secretary, Family Welfare. The functions of the Ministry include those which are mentioned in the Union List as the sole responsibility of the Centre as well as those mentioned in the Concurrent List which are the joint responsibility of both the centre and the states.
- The Director General (DG) of Health Services acts as the principle advisor to the Union Government in all matters pertaining to medical and public health area. Two additional Director Generals and several Deputy Director Generals assist the DG in performing the various tasks. Further, the Directorate has these Bureaus namely - Bureau of Health Planning, Central Bureau of Health Intelligence and Central Health Education Bureau, which have specified roles.
- Central Council of Health comprises all the State Health Ministers under the Chairmanship of the Union Health Minister.

Let us move on to the state level.

B. Health System at the State Level

Like the Centre, Minister of Health and Family Welfare is head of the Ministry and the Secretary in the Ministry is the bureaucratic head. The State Health Directorate, likewise has a Director of Health Services who is the Chief Technical Advisor to the State Government on all matters pertaining to health. All states also have a Family Planning Bureau, which is instrumental in the implementation of the family welfare programme. In addition, there are many specific health

programmes which come under the state health directorate. Figure 1.6 gives organization of health services at state level. Some of the specific programmes which come under State Health Directorate are malaria, tuberculosis, leprosy, blindness control, immunization and medical care.

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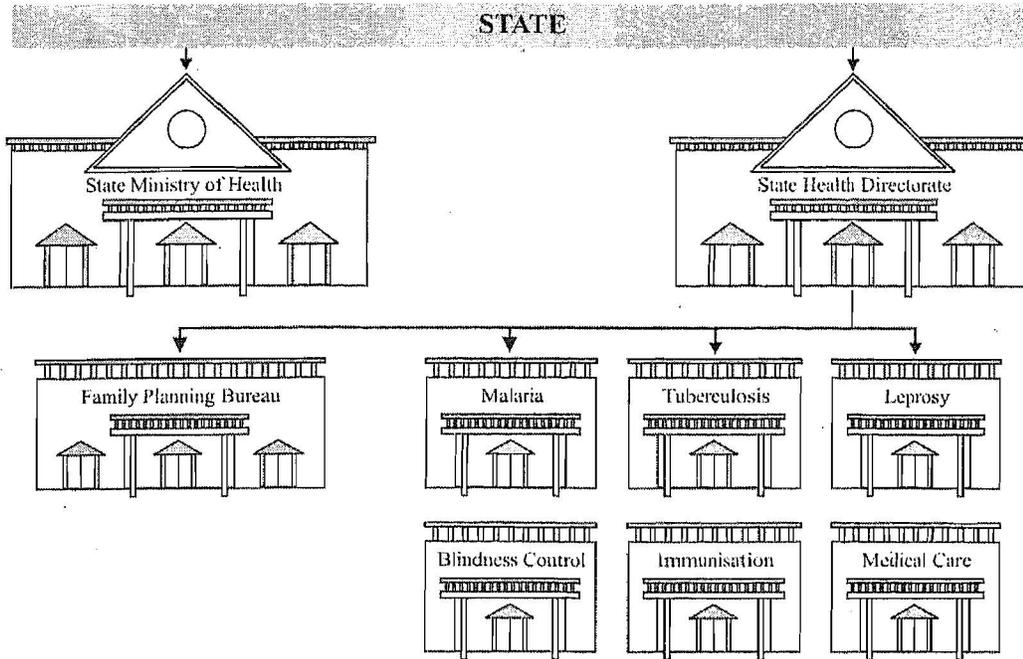


Figure 1.6: Organization of health services at state level

Let us now move on to the district level.

C. District Level of Health System

There are six types of administrative areas, namely - sub divisions, tehsils, community development blocks, municipalities and corporations, villages and panchayats in a district. The subdivision and tehsils are progressive divisions of a district where the tehsil may comprise 200-600 villages. The rural areas are also divided into community development blocks which comprise approximately 100 villages with about 80,000 to 1,20,000 population.

Each district has an administration head as a Collector. Most districts are divided into two or more sub divisions each in charge of an Assistant Collector or Sub Collector. The office of the Chief Medical Officer (CMO) of a district serves as the nerve centre to integrate all state financed health activities in the rural areas. The CMO is assisted by a "Superintendent for the District Hospital, a District Health Officer, a District Family Planning Officer and others in the field of malaria, T.B, leprosy, school health etc. However, there is no uniform pattern and this may vary from state to state. Figure 1.7 gives general organization of health services at district level and shows collector being the head administrator.

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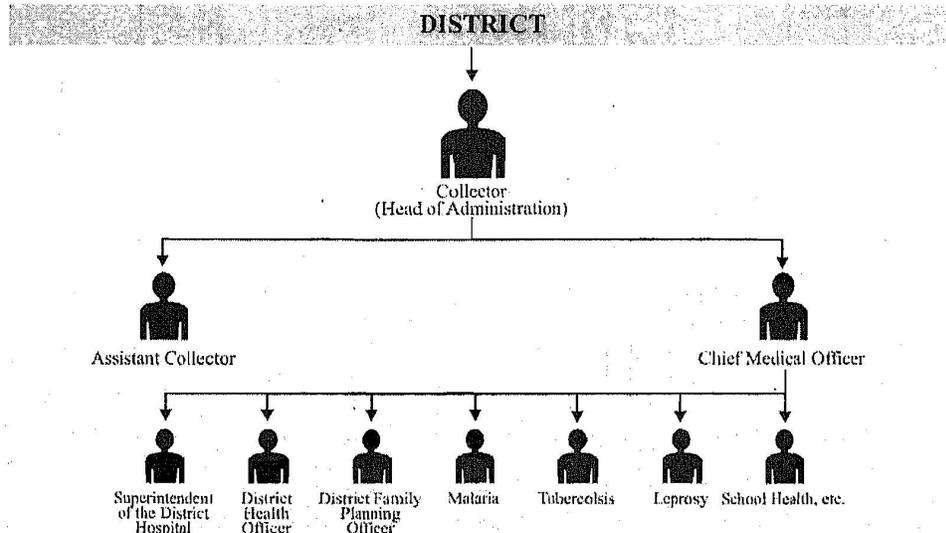


Figure 1.7: Organization of health services at district level

Next, let us review the health system at the block level.

D. Health System at the Block Level

A block is generally the limited of rural planning and development under the charge of a Block Development Officer. Rural areas are divided into Community Development Blocks which comprise approximately 100 villages and about 80,000 to 1,20,000 population.

As a part of the overall strategy to improve the basic health services provided to the community, the concept of Community Health Centre was evolved. This was proposed as a facility with 30 beds, X-ray and laboratory facilities, which would provide specialist services in surgery, medicine, obstetrics and gynaecology and pediatrics. Figure 1.8 shows Community Health Centre with different specialist services like gynaecology, pediatrics etc. The other distinguishing feature of a community health centre is the provision of a community health officer, a non-medical post, who would strengthen the protective and promotive aspects of health care. This has been achieved by upgrading the existing PHCs and it is envisaged that there will be one community health centre per community development block catering to a population of 1,00,000. The patients can be directly referred to the State level hospital or nearest medical college hospital.

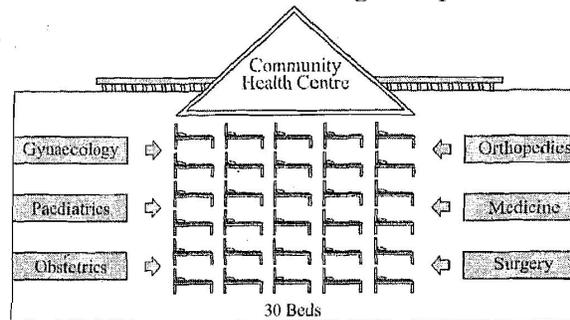


Figure 1.8: Community health centre

A primary health centre (PHC) was initially planned for taking care of the health needs of a population of or more, covering some 100 villages in each community

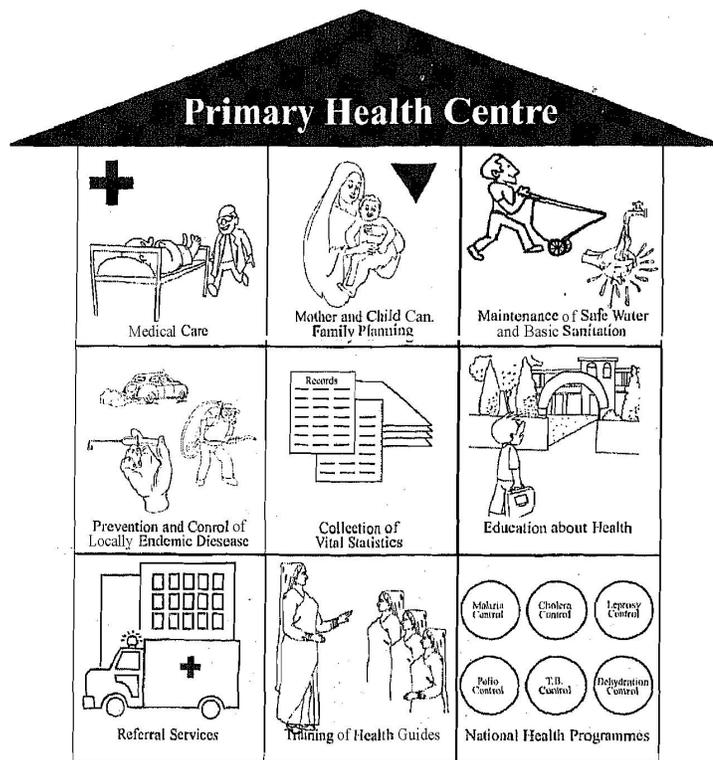


Figure 1.9: Functions of primary health centre

development block. The revised strategy, after the adoption of health for all by 2000 AD, is to establish a PHC for a population of 30,000 in the rural and 20,000 in the hilly, tribal and backward areas. The functions of the PHC cover both preventive and promotive aspects of health care and are illustrated in Figure 1.9. As you can see, they include medical care, family planning, collection of vital statistics and so on.

There are many types of staff who carry out these functions at the PHC. The staffing pattern at the PHC is given in Table 1.

Staff	No.
Medical Officer	1
Nurse Mid-Wife	1
Pharmacist	1
Health Worker (Female) ANM	1
Block Extension Educator	1
Health Assistant (Male)	1
Upper Divisional Clerk (U.D.C)	1

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Lower Divisional Clerk (L.D.C)	1
Laboratory Technician	1
Driver (subjects to availability of vehicle)	1
Class IV workers	4
Total	15

Table 1.1: Staffing pattern of a PHC

The male and female assistants supervise the work of the male and female health workers, respectively posted at the sub centres attached to the PHC.

Thus, we see that each community development block provides secondary level, as well as, primary level health care for its population. Box 4 highlights the health care delivery in a block and shows that there are 10,293 community health centres and 14,409, primary health centres in India.

Box 4	Health Care Delivery in a Block
	<p>Community Development Blocks Each Block has approximately 100 villages catering to 80,000 to 1,20,000 people each. Community Health Centres 1,0293 in India at present Primary Health Centres 10,409 in India at present</p>

E. Sub-Centre Level

A PHC in a block may not be able to cover the entire 30,000 population, so within the block, sub-centres are located to provide health care services to smaller population. A sub-centre is the formal outpost of the existing health delivery system at the periphery in rural areas. A sub-centre is established for a 5000 population in general and for a population of 3000 in hilly, tribal and backward areas. There is a male and female multipurpose health worker posted at each sub-centre. The services provided Public Nutrition at present include mother and child health care, family planning and immunization. It is proposed to enlarge these to include facilities for intrauterine devices insertions and simple laboratory investigations like routine examination of urine for sugar and albumin.

Let us move to the last level which is at the grass root level i.e. village level.

F. Health System at the Village Level

There are three functionaries at the village level who are responsible for taking

care of the health needs of the community. These are: 1) Village health guide, 2) Local dais, and 3) Anganwadi workers. Let us find out who they are and what they do.

1) Village Health Guide

This scheme was launched on October 2, 1977 as a part of the Rural Health Scheme. The Village Health Guide is not a government functionary, but a volunteer chosen from the community, preferably a woman, who serves as a link between the community and the formal health system. She is trained in primary health care at a suitable place and is expected to do community health work for 2-3 hours daily in the spare time for which she receives an honorarium of Rs 50 per month and drugs worth Rs 600 per annum. The Village Health Guide is capable of taking care of simple medical ailments and first aid and mother and child health including family welfare, health education and sanitation. Figure 1.10 shows village health guides taking care of a person.

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Figure 1.10: Village health guide

2) Local Dais

Under the natural health scheme, an extensive training programme has been undertaken by the government to train all traditional birth attendants (TBAs/ Dais) in the country to improve their knowledge and skills relating to maternal and child health. Thus, every village should have an access to the service of a trained birth attendant. This will ensure that home deliveries, which are still a norm in the rural areas, will be performed under safe and hygienic conditions which will reduce maternal and infant mortality.

3) Anganwadi Worker

Under the ICDS scheme, there is an anganwadi worker for a population of 1000. She is also an honorary part time worker selected from the community who is responsible for a package of services delivered at the anganwadi. These include supplementary nutrition, health checkups, immunization, non-formal preschool education, nutrition and health education and referral services. The beneficiaries include children below 6 years, pregnant and nursing mothers and women in the age group of 15-45 years. Along with the Village Health Guide, she constitutes the major link of the community with the health services.

Figure 1.11 shows Health service delivery system in India. It shows linkages between various functionaries and health institutions at various levels within the state.

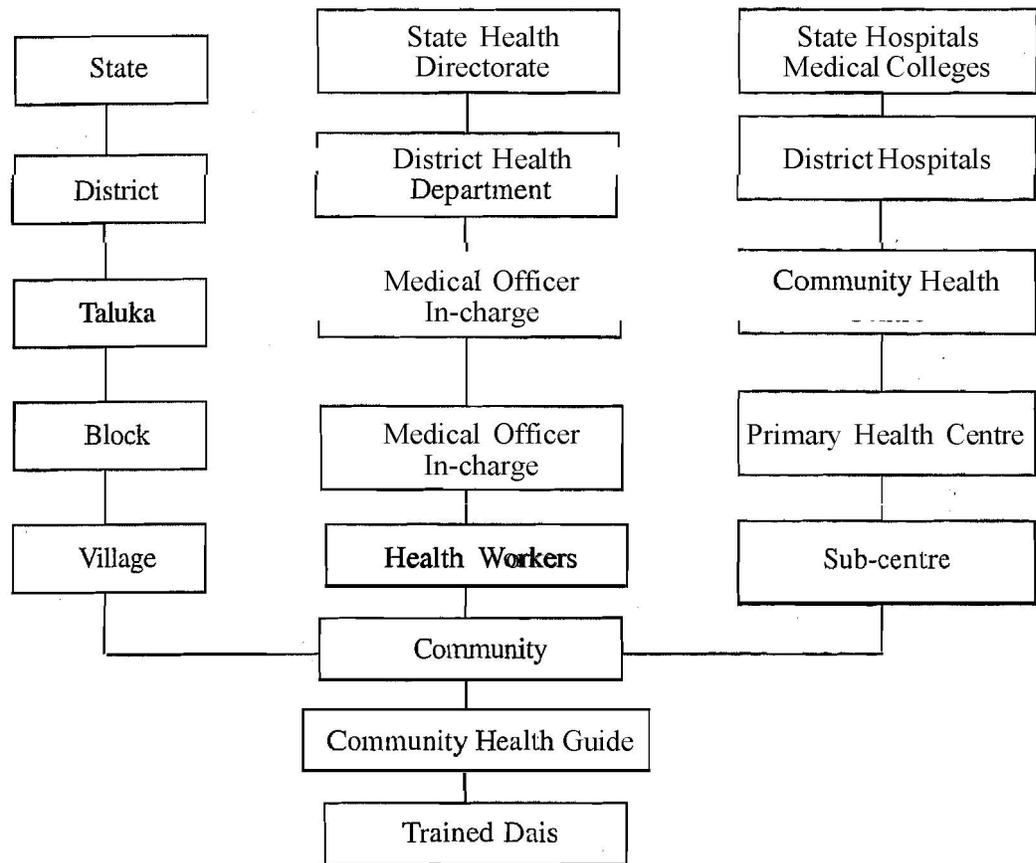


Figure 1.11: Health service delivery system in India

We can conclude that government of India tries to ensure universal coverage of health services for all with special focus on vulnerable population.

We have learnt about the concept and scope of public nutrition and we also learnt about health care and its delivery system in India. You might be wondering about the role of public nutritionist in health care delivery. We will find out about it in the next section.

1.6 ROLE OF PUBLIC NUTRITIONIST IN HEALTH CARE DELIVERY

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It is clearly evident from the foregoing discussion that nutrition is an important, though not the only, determinant of health of an individual. The root cause of many health problems of the community can be traced to faulty nutrition. It could be a lack, excess or an imbalance of certain nutrients in the diet, which compromises the nutritional status leading to health problems. Hence, nutrition can be viewed as a subset of the set, health. Since, attainment of health for all is a universal goal of all nations and communities, public nutrition has to be an integral part of any strategy designed to achieve this goal. As signatory to the Alma Ata declaration, primary health care becomes the major approach to achieve an acceptable level of health for maximum number of people in the community. It has already been stated that the promotion of food supply and proper nutrition is one of the eight basic essential services included in the primary health care. Thus, we can conclude that public nutrition is an essential component of health and health care.

The continuing changes in the health scenario of nations across the world present varied and newer challenges to the public nutrition professional who is intimately involved with providing nutrition support in all health care activities. The shift in accent on health promotion from the earlier one primarily on prevention and cure has added more responsibilities to all those engaged in health care of the community. Today, much of the ill health is related to lifestyle and environmental factors whereas a lot of the illness could be attributed to the causation of germs when the first movement for public health began. Though the latter has been contained in the developed and less successfully in the developing nations, the former situation continues to be of concern in the public health arena. The public nutritionist equipped with the knowledge of food, nutrition and health is eminently suited to participate in all the strategies of health promotion required to combat this situation. In the Indian context, where under nutrition is extensively present in the preschool children and pregnant and nursing mothers on the one hand and the threat from lifestyle related health diseases like Obesity and degenerative heart diseases show alarming trends on the other, the role of public nutritionist assumes tremendous importance along with responsibility. A public nutritionist can perform the following:

In the hospital-based set up, she is a part of the team delivering therapeutic and rehabilitative services to the patient. She is responsible for food service management, nutritional care of the patients including diet counseling and imparting nutrition education to various categories of medical personnel. The Directorate General of Health Services has recommended the appointment of at least an assistant dietitian for every 100 bed hospital with progressive increase in their numbers as the hospital beds increase.

There is a role for the public nutritionist in the national health set up at the centre as the Nutrition Advisor and Research Officer. At the State level, they can function as the State Nutrition Officers

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The public nutritionist can make a significant contribution in all the programmes of development undertaken by voluntary, non-government organizations. At the international level organizations like WHO, FAO and UNICEF provide opportunities for public nutritionists at the policy making, planning and implementation stages.

From the discussions above, you must have realized that public nutritionist can perform wide variety of functions ranging from health promotion, curative services to advocacy and programme planning. So are you ready to take on this role! This course in Public Nutrition will equip you with the necessary knowledge and skills to function as effective public nutritionist.

1.7 LET US SUM UP

We learnt in this unit that public nutrition is concerned with improving nutrition in populations in both poor and industrialized countries, linking with community and public health nutrition and complementary disciplines. The challenge that exists today in many countries is to reach the whole population with adequate health care services and to ensure their utilization. We also saw that rising costs in the maintenance of large hospitals and their failure to meet the total health needs of the community have led many countries to seek alternative models of health care delivery with a view to provide health care services that are reasonably inexpensive and have the basic essentials required by the population.

Next, we learnt that primary health care is a comprehensive and alternative approach to the delivery of health services to the community, in such a way that it is more economical and effective with full involvement of local communities. The main links in the health system comprise the centre, state, district, block and the village.

The continuing changes in the health scenario of nations across the world, present varied and newer challenges to the public nutrition professional who is intimately involved with providing nutrition support in all health care activities.

The public nutritionist equipped with the knowledge of food, nutrition and health is appropriately suited to participate in all the strategies of health promotion required to combat this situation. Finally, we saw that in the Indian context, where under nutrition is extensively present in the preschool children and pregnant and nursing mothers on the one hand and the threat from lifestyle related health diseases like obesity and degenerative heart diseases show alarming trends on the other, the role of public nutritionist assumes tremendous importance along with responsibility.

1.8 GLOSSARY

Curative services	: The services provided to a person which would enable him to lead a socially and economically productive life.
Epidemiology	: study of diseases or conditions in population.

Health guide	: a volunteer from the community itself, given orientation training in health to act as a community level worker.
Promotive services	: the services provided to the members of the community to promote health and healthy habits
Referral services	: The services available at the next higher level of health institutions.

Concept of Public Nutrition

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1.9 CHECK YOUR PROGRESS

- 1). Explain the concept of health care and the three different levels at which it is available to the community.
- 2). List the essential components of primary health care.
- 3). What are the health facilities available at the following:
 - i) Sub-centre
 - ii) Village level
- 4). Summarize the activities performed at the PHC level.
- 5). Define the role of the public nutritionist in health care delivery.

2

PUBLIC NUTRITION : MULTIDISCIPLINARY CONCEPT

NOTES

STRUCTURE

- 2.1 Learning Objective
- 2.2 Introduction
- 2.3 Multiple Causes of Public Nutrition Problems
- 2.4 Multidisciplinary Approach to Solving Nutrition Problems
- 2.5 Role of Agriculture in Nutrition
- 2.6 Distribution of Food Products
- 2.7 Storage of Food Products
- 2.8 Application of Science and Technology to Improve Food Supply
- 2.9 Food and Nutrition Security
 - 2.9.1 Understanding the Concept of Food and Nutrition Security
 - 2.9.2 Determinants of Food Security
 - 2.9.3 India's Food Security System
- 2.10 Food Behaviour
- 2.11 Let Us Sum Up
- 2.12 Glossary
- 2.13 Check Your Progress

2.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- discuss multiple causes of malnutrition and the multidisciplinary approaches to solve these problems,
- describe the influence of agricultural and horticultural production, storage, distribution and science and technology on food consumption and nutritional status of the population,
- explain food and nutrition security and the underlying economic and social conditions as related to food security, and
- define food behaviour and describe the social, cultural and psychological determinants of food behaviour.

2.2 INTRODUCTION

We have read in Unit 1 that public nutrition is concerned with improving nutritional problems of population. We also learnt that public nutrition requires knowledge of many disciplines and involvement of multiple sectors for addressing nutrition problems of population. Thus, policies and programmes planned to address dietary and nutrition problems may draw upon disciplines well outside the traditional boundaries of nutrition. For example, evaluation of the nutritional effectiveness of a supplementary feeding programme or predicting the nutritional consequences of changing price policies may require inputs from economics, behavioural sciences etc. In this unit, we will study about multiple causes of malnutrition and will also examine the multidisciplinary approaches and their intersectoral linkages to solve nutritional problems, Since there are many disciplines which need to be involved in addressing the problems of malnutrition, in this unit we will limit ourself to the role of agriculture and the related issues. We will learn how agricultural and horticultural production, distribution and storage of food products influence food consumption and nutritional status of population. We will also learn how application of science and technology in agriculture can improve food production. Further, we will introduce the concept of food and nutrition security and how various factors i.e. gender, economic etc have an impact on food and nutrition security. We will conclude the unit by discussing the food related behaviours and its multiple determinants.

2.3 MULTIPLE CAUSES OF PUBLIC NUTRITION PROBLEMS

We read in Unit 1 that the field of public nutrition is unique in requiring at least some understanding of the entire range of determinants of nutritional outcomes. To clearly understand what causes nutrition problems, it is necessary to consider the operation and interaction of various determinants of nutrition at different levels in society. The food — health — care conceptual framework portraying causal factors and their interaction is depicted in Figure 2.1. Figure 2.1 shows causes of malnutrition at three levels - immediate causes, underlying causes and basic causes. Immediate causes exist at individual level, while underlying and basic causes exist at family and societal level, respectively. The multisectoral nature of malnutrition becomes obvious when we look at the underlying causes. These causes are numerous and usually inter related. The exact causes can be identified only in a particular context.

To simplify the analysis these may be grouped into three main clusters: basic health services and a healthy environment, household food security, and maternal and child care. Most underlying causes are themselves the result of unequal distribution of resources in society. This disparity has to be analyzed, understood and acted upon. Causes at this level are the basic or structural causes.

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OUTCOMES	Malnutrition, disability and death
Immediate Causes at Individual Level	<ol style="list-style-type: none"> 1) Inadequate dietary intake 2) Disease
Underlying Causes at Household/ Family Level	<ol style="list-style-type: none"> 1) Insufficient access to FOO 2) Inadequate maternal and child CARING practices 3) Poor water/sanitation and inadequate HEALTH services 4) Inadequate and/or inappropriate knowledge and discriminatory attitudes limit household access to actual resources
Basic Causes in Society	<ol style="list-style-type: none"> 1) Quantity and quality of actual resources — human, economic and organizational and the way they are controlled 2) Political, cultural, religious, economic and social systems including status of women, limit the use of potential resources 3) Potential resources : environment, technology, people

Adapted from UNICEF (1998) *The State of World's Children 1998*. Oxford University Press

Figure 2.1: Causes of Malnutrition — A Conceptual Framework

The study of these basic determinants extends into areas of economics, agricultural policy, health science and policy, and the social sciences, as well as public policy and management. So it is obvious that there are multiple determinants of nutritional problems and accordingly we need to adopt a multidisciplinary approach to solve the public nutrition problems. We will now study about the multidisciplinary approaches to solve nutritional problems.

2.4 MULTIDISCIPLINARY APPROACH TO SOLVING NUTRITION PROBLEMS

You must have realized by now that solving public nutrition problems represents a multidisciplinary challenge of large magnitude and therefore requires a multidisciplinary approach to find a solution. Science and technology have been able to make meaningful contributions to socioeconomic development only when they have acted in an interdisciplinary manner to solve the problems. Hence, there

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is a need to recognize the value of such an approach and give special attention to organizing activities that would involve teams of scientists (both social and natural), technologists, policy-makers and planners (including development economists) and the implementers of programmes to collectively look into the major problems of mankind and find solutions for them through co-operative efforts. The concerned disciplines should stimulate each other consciously and create a comprehensive and dynamic system capable of multidisciplinary action that could increase the pace of progress towards establishment of a more equitable and just social order in this world. This effort could convert the vicious cycle in which we are caught at present into dynamic development cycles. There are many kinds of disciplines which have an impact on nutrition. However, in this unit we would limit ourselves to the discipline of agriculture and science and technology as used to improve agriculture. In the coming section, we will study, how agriculture and horticulture production, storage, distribution of food products and science and technology influence food consumption and nutritional status of the population? And how can all these fields interact with each other and with other areas in order to benefit society? In the next section, we will try to find answers to some of these questions. Let us start with the role of agriculture in improving nutrition.

2.5 ROLE OF AGRICULTURE IN NUTRITION

You may be aware that nutrition is an important environmental factor that influences health and well-being of people. Consumption of diets adequate both in quantity and quality is a prerequisite for the maintenance of good nutritional status. Agricultural production that determines food availability is, therefore, an important determinant of food consumption, though not a critical one if food imports can be assured. Self-sufficiency in food production is of particular importance for developing countries, not only because they tend to have high rates of population growth, but also because such countries have malnutrition as a public health problem. The quantitative aspects of food production are undoubtedly of primary concern, but it cannot be forgotten that the qualitative aspects are extremely important, if optimal nutrition is to be provided. The interphase between agriculture and nutrition, therefore, acquires considerable practical importance. We will study issues related to food grains and horticultural products (fruits and vegetables) their storage and distribution and see how they affect the consumption pattern of population. Let us study the issues related to food grains.

Issues relating to food grains and green revolution

Food production in India has increased substantially over the years. One of the major achievements in the last 50 years has been the Green Revolution and self-sufficiency in food production. The green revolution has been most striking in the areas of wheat production where yields have increased consistently over the years to reach an average of 2755 kg/hectare in 1999-2000 from a figure of 827 kg/hectare in 1965-66. Coupled with an almost two fold increase in the area under cultivation over the same time period, the total production of wheat has increased fivefold.

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The rice yields have not been comparable though the area under rice cultivation has also increased, but at a much slower rate. In the case of coarse cereals, an almost stagnant area under cultivation leading to a production figure of around 20-30 million tonnes over the last three decades offsets the small increase in productivity.

The nutritional status of a population is largely determined by the quality and quantity of food consumed by the individual members. The per capita availability of food is an important, though not the sole, determinant of the pattern of consumption. This is a function of food grain production and growth of the population. The Indian population has been growing at the rate of a little over 2% per annum since 1971. The food grain production increased at an annual rate of 3.2% during 1950-65, with higher rates for rice and wheat and lower ones for coarse cereals and pulses as can be seen in Figure 2.2. The post Green Revolution era records the maximum growth in wheat (5.3% per annum) but low output of almost all other crops. Thus, in spite of an overall matching pace of growth between population and food production, gains in per capita availability of foods have not been impressive.

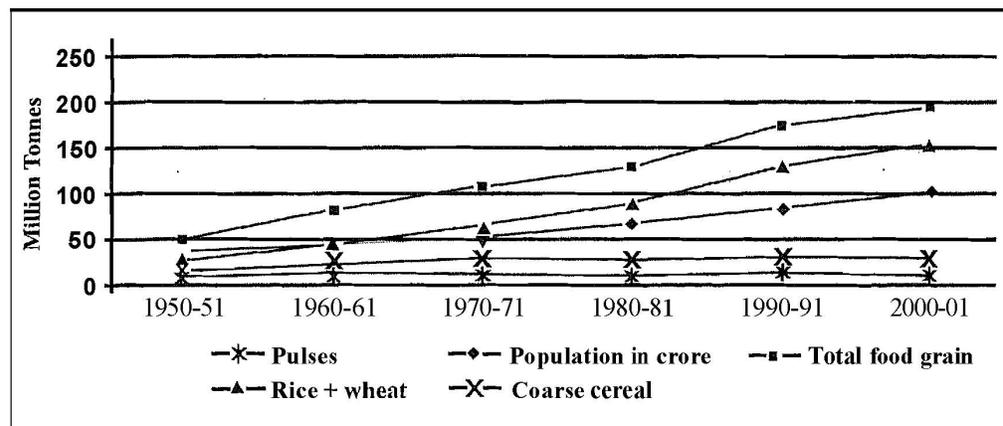


Figure 2.2: Trends in production of important food items

Source : Agricultural Statistics at a Glance, MIO Agriculture

At the national level, food production appears to be sufficient to meet the country's needs. In actual practice, however, food consumption does not follow normal distribution but is skewed. In the last two decades, there has been a progressive decline in pulse consumption, especially among the poor segments of the population. A large number of families with a daily income of Rs.2 or less consume diets that do not provide enough energy, and of these, a proportion do not get enough proteins - a finding that explains widespread PEM among young children. The primary reason for such inequitable distribution is lack of purchasing power. The impressive stocks of food grains, held in recent years, is, in fact, a reflection of this low buying power and consumption. Stocks would have been far less impressive if people could have afforded to buy what they needed. Wages and incomes have gone up over the years but they do not seem to have kept pace with the rising costs of even essential food commodities. Data collected by

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the National Nutrition Monitoring Bureau show that food consumption has not changed significantly over the last few years. To illustrate, pre-school children constitute one of the most nutritionally vulnerable segment of the population and their nutritional status is considered to be a sensitive indicator of community health and nutrition. There, has not been a substantial improvement in their nutrient intake, particular: the energy intake over the last two decades as can be seen in Table 2.1.

Due to increased agricultural production in the country, food grain imports have progressively come down and, during recent years, have all but stopped. The agricultural situation has also been able to prevent the serious widespread famines that used to occur in earlier years. Both are no mean achievements. But increased production seems to have made a little impact on the widespread chronic malnutrition in the country, with all its health and developmental implications.

	1-3 years			4-6 years		
	1975-79	1988-90	1996-77	1975-79	1988-90	1996-77
Protein (g)	22.8	23.7	20.9	30.2	33.9	31.2
Energy (Kcal)	834	908	807	1118	1260	1213
Thiamin (mg)	136	117	133	159	153	205
Riboflavin (mg)	0.5	0.52	0.40	0.76	0.83	0.70
Niacin (mg)	5.08.	5.56	4.60	0.48	0.52	0.60
Vitamin C	15	14	15	20	23	25

Table 2.1: Average nutrient intakes among pre-school children

In spite of huge buffer stocks, 8% of Indians do not get two meals a day and there are pockets where severe undernutrition takes their toll even today. Every third Child born is underweight. About 50% of the preschoolers suffer from undernutrition. Micronutrient deficiencies are widespread. Undernutrition associated with HIV/AIDS will soon emerge as a public health problem. Alterations in lifestyle and dietary intake have lead to increasing prevalence of obesity and associated non-communicable diseases. In the new century, the country will have to gear itself to prevent and combat the dual burden of under and overnutrition and associated health problems.

Increased agricultural production is a key factor in ensuring adequate food supplies. The agricultural policy of a country will have to take care of the relevant aspects of its nutrition policy, if the food needs of the population have to be met. Imbalances in production of different commodities have to be corrected and more importantly, food has to be made available at a cost that the great majority can afford. Until such time, adequacy of agricultural production will be more apparent than real. It must not be forgotten that factors outside agriculture also have a role in influencing nutrition

Thus, from our discussion above, it is evident that although food grain production has considerably increased at national level over the last 50 years,

we have large number of people in our country who do not consume diets with adequate calorie and protein intakes. Next, let us now look at issues related to horticultural products and how they influence consumption levels of population

Issues related to horticultural products

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We know that vegetables and fruits constitute an integral part of the predominantly vegetarian Indian dietary pattern. They provide the much-needed variety to the otherwise prosaic, ubiquitous cereal pulse meal pattern practiced in most Indian homes. An area of 12 million hectares comprising 7% of the total cropped area of the country is utilized for growing horticultural crops. Out of this, 12% is under vegetable cultivation. India became the largest producer of fruits in 1993 (31.9 million tonnes) after overtaking Brazil (31.2 million tonnes). It ranks second to China in vegetable production with a figure of 90.8 million tonnes during 1999-2000.

However, per capita consumption of these in the country is very low. Consumption of adequate quantities of vegetables, especially, green leafy vegetables is essential for meeting the dietary requirements of vital micronutrients. Besides, vegetables also provide several phytochemicals and fibre. At present, there is an insufficient focus on the cultivation and marketing of low cost locally acceptable green leafy vegetables, yellow vegetables and fruits. As a result, these vegetables are not available at affordable cost throughout the year. Health and nutrition education emphasizing the importance of consuming these inexpensive but rich sources of micronutrients will not result in any change in food habits unless the horticultural resources in the country are harnessed and managed effectively to meet the growing needs of the people at an affordable cost. Horticultural products provide higher yields per hectare and sell at higher prices. The processing, storage and transportation of horticultural products in a manner so that there is no glut and distress sales will make their production economically attractive to farmers and improve availability to the consumers.

Thus we may conclude that horticultural products are not available to the population at affordable costs throughout the year. This affects the consumption level of these items and contributes to poor quality diets. You would also like to know that even when food is available, it may not be equitably distributed amongst different members of the family. This brings us to the next issue related to distribution of food. Let us read about it now.

2.6 DISTRIBUTION OF FOOD PRODUCTS

We learnt earlier that we have buffer stocks of food grains in our country. These stocks do help to combat acute transient food scarcity, caused by natural disasters like floods and droughts. Early warning systems are in place and food can be rushed to areas of threatened distress fairly rapidly. What is proving more difficult is the task of combating chronic mild/moderate undernutrition in a large number of poor households. Inequitable distribution of available food among different segments of the population and even within the family is one of the major factors responsible

for undernutrition/ overnutrition. Good governance and health and nutrition education hold the key to improving equitable distribution of food based on need. However, it is not just distribution but the proper storage of food which is also important. This will influence the food availability and food consumption pattern of people. Let us look at the issues related to storage of food products next.

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2.7 STORAGE OF FOOD PRODUCTS

After the food has been harvested, it reaches the consumer after undergoing through various processes to make it acceptable and palatable to the consumers. Efforts to augment the food resources of the community can fulfill the goals of meeting the food and nutritional requirements of the population, only if they are matched with technologies to prevent and reduce the post harvest losses caused by a variety of physical, biological and mechanical factors. Such losses include not only the quantitative aspects but also the deterioration in quality of foods, which may render them inedible for human consumption or lead to serious health consequences, if consumed.

After production, food goes through various activities like preprocessing, transportation, storage, processing and packaging and marketing as illustrated in Figure 2.3, before it .

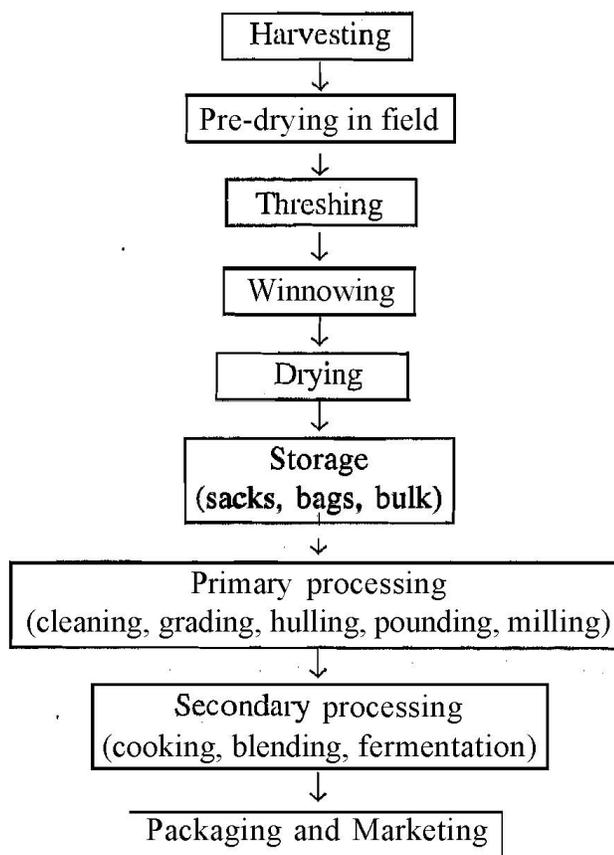


Figure 2.3 - Flow chart for post harvest system of food commodity

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reaches the consumer in the community. The magnitude of losses incurred will depend upon the nature of the food commodity - whether perishable, semi perishable or more stable, as well as, the intensity of the physical and biological factors. It is well recognized that socioeconomic and political forces, regulations and other bureaucratic procedures slow down the passage of food from the producer to the consumer. An accurate estimate of such losses is difficult to measure though figures adding up to a staggering 40% or more have been reported from several countries in the developing regions.

Various studies have reported food losses during different operations such as 1-5% loss in harvesting, 1-6% loss in frying, 2-7% loss in transportation, 2-5% loss in storage, 2- 6% loss in threshing and 2-10% loss in milling and premilling in paddy crops in India. Thus, storage of food is an important link in the chain of events leading to the ultimate delivery of food at the consumer level.

Thus, we see that post harvesting losses may account to 40% or more after the food is produced and reaches the consumer. Next thing which comes to our mind is that if we reduce the post-harvesting losses, we will have more food available to the people. So, how can we reduce these post harvesting losses? We can do that by using innovative techniques offered by science and technology. Let us find out about it in the next section.

2.8 STORAGE OF FOOD PRODUCTS

The solution to food and nutrition problems requires a sound understanding of the interface aspects, in which agricultural scientists, food technologists, nutritionists and others concerned would constantly interact with each other to ensure a multidisciplinary system and work as an interdisciplinary team in a concerted manner. Only through such programmes of action can the total agro-economic system contribute to bringing about the socio-economic transformation of the developing countries, and provide the stimulus that can overcome poverty through acceleration of the development process. The problems involved in bridging the wide gap between the national nutritional needs of the developing countries and available food supplies can be approached by the following lines of action, which can be taken up simultaneously: (a) increasing food production through better agricultural technology (b) ensuring effective conservation and utilization of foods through the application of modern technology.

The last 30 years have witnessed spectacular increases in food-grain production in India. A sizeable buffer stock has also been built up to face the increases shortages out of uncertain production levels. Breeding of new food-grain varieties has been directed to increasing per hectare yields and resistance against field-borne microorganisms and insect pests

Advances in food technology and nutrition have, however, given some insight into the desirable features that need to be considered in breeding programmes. The impressive growth in food-grain production during the last 30 years has resulted from increases in the area under cultivation for food-grain crops, improvement in

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per hectare yield, introduction of high-yielding varieties, particularly of wheat and rice and provision of irrigation and other inputs. Maximum productivity has been sought by judicious water-management practices, appropriate cropping systems (double, triple, and multiple) under dry and irrigated conditions, improved dry land agriculture (mulching, recycling runoff water to provide supplementary irrigation, and choice of crop compatible with season), intercropping, multilevel cropping and mixed farming practices.

About 70 percent of food grains produced in India are retained for rural-level consumption and the rest moves along a chain of agencies before it reaches the consumption points. Post-harvest conservation by modern procedures is, therefore, a crucial need to prevent the dissipation of national efforts to raise food production levels. The incidence of bunt in wheat, chalky grains in rice, and gibberella infection in maize, and the impairment of processing qualities as a result of pre-harvest infection have engaged the attention of scientists in recent years. The expertise in food conservation built up during the last 30 years has found increasing application, but basic information to evolve varieties with desirable storage, processing, and nutritional or organoleptic qualities is important in meeting future needs. Variable production levels in different years emphasize the need for varieties that give maximum yields during processing and suffer minimum losses during post-harvest handling and storage.

Post harvest losses especially in vegetables and fruits are presently in the range of 20- 30 percent. They contribute directly to higher costs and reduce availability of these commodities. Precision farming and processing based on science and technology are both intellectually stimulating and economically rewarding as they would enable the micronutrient needs of the population to be met through a sustainable food based approach. Thus we see that the application of modern scientific methods can improve the food supply and make more food available to the consumers. This brings us to the next issue of how consumers can feel more secure in terms of food availability, accessibility and consumption. We will cover this issue in detail in the next section. But first let us review what we have learnt so far by answering the questions given in check your progress exercise 1.

Check Your Progress Exercise 1

1. How can a multi sectoral approach help to solve nutritional problems?
.....
.....
.....
2. Read the following statements carefully. State if they are true or false correct the false statement.
 - a. In spite of having sufficient food stocks at national level, large number of people still do not consume diets with adequate calories and protein.
.....
.....
.....

b. India ranks only second to China in vegetable production, hence per capita consumption of vegetables is very high in India.

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c. Distribution of available food among different segments of the population and even within the family fairly equitable and not an issue for undernutrition/ over nutrition.

.....
.....
.....

d. Post harvest losses especially in vegetables and fruits are presently in the range of 20-30 percent.

.....
.....
.....

3. How can science and technology help improve food supply?

.....
.....
.....

2.9 FOOD AND NUTRITION SECURITY

In the previous section, we learnt about the trends in production of food grains in the country and their relationship to population growth reflected in per capita availability, The concept of food security at the national level essentially implies how well a country is equipped to provide sufficient food to its population. We will now learn what we mean by the term food security and the factors, which determine food security. We will also study about India's food security system.

2.9.1 Understanding the Concept of Food and Nutrition Security

Food security may be defined as a physical and economic access by all people, at all times, to sufficient food to meet their dietary needs for a productive and healthy life. The most widely quoted definition of food security is that of the World Bank: "Access by all people at all times to enough food for an active, healthy life. " The concept of food security aims at removing the imbalance between the demand and supply of food. Thus, it is not merely availability of food for direct consumption, but also includes the means to buy it. Although national food security is important as providing a foundation, what is more important is food security for each and every household and within it to every member of the family. A household is food secure when it has access to food that is adequate in terms of quality, quantity, safety and cultural acceptability for all its members. We also want to ensure that family members keep up in good health after consuming the food. This brings us

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to the issue of nutritional security. Let us understand this concept.

Understanding nutrition security

Food security is a part of the broader concept of nutrition security. A household can be said to be nutritionally secure if it is able to ensure a healthy life for all its members at all times. Nutritional security can be briefly defined as a balance between biological requirements in energy and nutrients and the quantity and quality of foods consumed. Nutritional security thus, requires that household members have access not only to food, but also to other requirements for a healthy life, such as health care, a hygienic environment and knowledge of personal hygiene. Food security is a necessity but insufficient condition for ensuring nutrition security. There are some factors that determine food and nutrition security. What are they? Let us find out in the next section

2.9.2 Determinants of Food Security

We learnt above that there is also a qualitative aspect to food security, which compels the perception of food not only as a square meal or two but the exquisite balance of calories, proteins and micronutrients that enables women to stay healthy and bear healthy babies, toddlers to grow to their best potential, adolescent girls to grow up healthy, elderly to live quality healthy life and adult men and women to work to their optimum productivity. A national balance sheet pointing to comfortable food stocks and adequacy in food grain production does not constitute food security and nutritional adequacy at the household or individual level. Though national granaries may be filled and markets stuffed with food, it does not follow that all people have adequate access to it. More than food production, food security is related to who consumes food and who has the purchasing power to buy it. It is also about what kind of food is eaten, when and by whom. It is about how the food is prepared, stored and administered with what level of knowledge. Equally, it is about how well a food is absorbed and what reinforcement it receives from the surrounding quality of health, hygiene, sanitation and the physical, as well as, cultural environment. Food security essentially is the combined product of four factors:

- Food availability,
- Food access,
- Food utilization, and
- Vulnerability

Let us study these factors in detail:

- 1) Food Availability:** It depends on the quantum and quality of crops, livestock, fishery and other food sources, as well as commercial imports or food assistance. Food available is achieved when sufficient quantities of food are available to all individuals within a country.
- 2) Food Access:** Food access is linked to its affordability. Food access is ensured when households and all individuals within them have adequate resources to obtain appropriate food for a nutritious diet. The poor and the marginalized

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sections need assisted external intervention to enable them to purchase food.

3) Food utilization: It is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water and adequate sanitation. Effective food utilization is directly influenced by dietary patterns and preferences, nutrition knowledge and caring practices at the community, household and individual level, Intra-household distribution of food is determined by gender and age preferences and adversely influences access to food by women and children,

4) Vulnerability: It is the fourth critical variable and defines the risk factor to which a person, family, community or nation is exposed on account of extraneous and intrinsic contextual reasons. Children, adolescent girls, expectant and nursing mothers and those who inhabit disaster prone and harsh climatic regions are more at risk than others of not getting sufficient and adequate food.

Having learnt about the factors above, the disturbing truth is that those who are food insecure suffer not only from the poor access of food but also its poor utilization, Over the past decade, UN agencies and the Government of India (GOI) have built convincing evidence to show how nutritional practices, disbursement of food within the household and physiological absorption undermine the impact of what is consumed, There are several determinants which impact the various aspects of food and nutrition security, We focus our discussion on the main determinants as follows:

- Inappropriate caring and feeding practices
- Gender discrimination
- Unsafe water and sanitation
- Natural disasters

A preview on these determinants follows:

- Inappropriate caring and feeding practices

Data from National Family Health Survey (1999) shows that 47% of the children below three years suffer from some form of malnutrition in India. It also shows that more than 50% pregnant women and nearly three quarters of the children suffer from anaemia and a significant number from Vitamin A and iodine deficiency, so it becomes clear that the food basket, as it exists today, is not being wisely constructed, tapped, processed or absorbed, Indian malnutrition, as elsewhere, is unmistakably linked to Inappropriate caring and feeding practices. In turn, these practices are a product of uninformed caregivers, overwhelmingly women. Conversely, where female literacy is high, there is a proportional decline in the level of malnutrition, Let us look at the next determinant.

- Gender discrimination

Of the detrimental factors, that affect food security, gender discrimination is the most pervasive and vicious. The fact that households and society favour males with higher quality and quantity of food intake, grooming women to eat last and least is the key reason for greater female deaths among under five year old children, as also higher rates of malnutrition, morbidity and mortality among

women. The Indian sex ratio (census 2001) continues to favour males (933 females per thousand males). Among girls 0-6 years, the ratio is worse (927 females per thousand males).

- Unsafe Water and sanitation

Safe water and sanitation may seem tenuous in their link to food security but their impact is unquestionable. With 19% Indian population still without any source of safe water and 84% without access to sanitation, the security of food gets quickly questioned if not eroded.

- Natural disasters

Disaster prone settings also shape the intensity and prevalence of food insecurity. These consist of poor who are exposed to recurrent natural disasters, which undermine their already low food intake and nutritional status and accentuate their vulnerability to food insecurity.

The concept of food security showing the variables central to its attainment is shown in Figure 2.4. The figure shows that food security is related to education/skill levels, gender and nutrition knowledge, in addition to the provision of enough food supply. It is also related to unhygienic living, lack of health infrastructure and health care.

Ultimately, it is related to failure of governance at various levels.

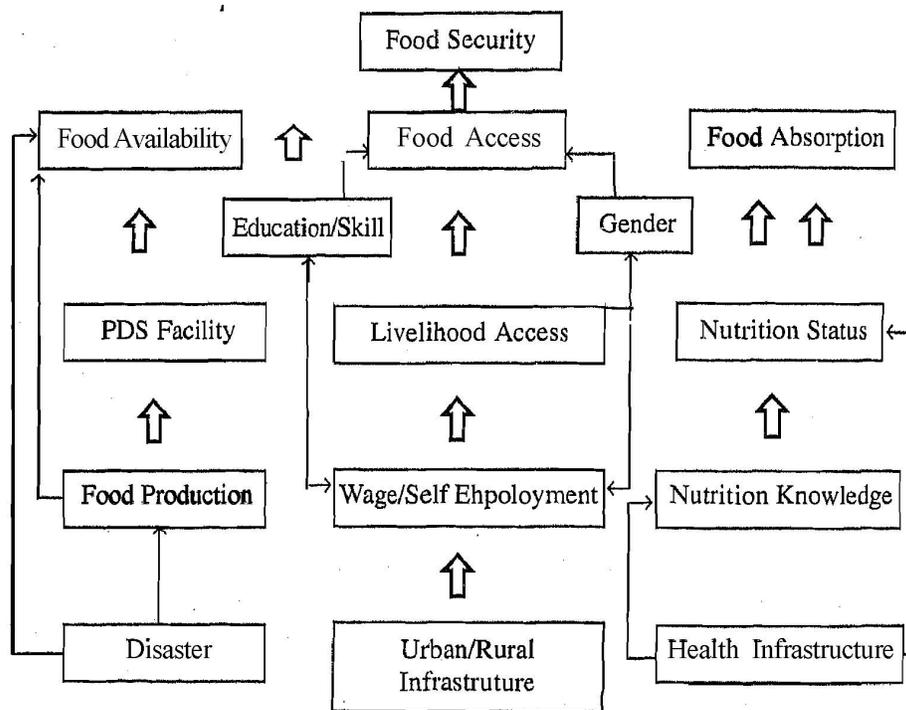


Figure 2.4 : Food security — concept diagram

Source : Adapted from Food Security Atlas of Rural India.

Thus we saw that, countering food insecurity is not only a challenge of providing more food to the least privileged Indian households but of making a concerted convergent attack on gender bias and climatic, environmental, social and other

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discriminatory factors. Let us now study how India is making attempts to cope up with large problem of food insecurity of its people.

2.9.3 India's Food Security System

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The importance of optimal nutrition for health and human development has been well recognized by the GOI. At the time of independence, the country faced two major nutritional problems. The first problem was threat of famine and the resultant acute starvation and the lack of an appropriate food distribution system. The second problem was chronic energy deficiency due to

- Low dietary intake because of poverty and low purchasing power,
- High prevalence of infection because of poor access to safe drinking water, sanitation and health care, and
- Poor utilization of available facilities due to low literacy and lack of awareness.

The major public health problems were chronic energy deficiency, kwashiorkor, marasmus and micronutrient deficiencies such as goiter, beriberi, night blindness and anaemia. After independence, the country adopted multisectoral, multipronged strategy to combat these problems and to improve the nutritional status of the population. Improving the health of its people became a very important issue, and it was even included in the Constitution of India as follows:

Article 47 of the Constitution of India states that "the State shall regard raising the level its people and improvement in public health among its primary duties. Thereafter, successive Five-Year Plans laid down the policies and strategies for achieving the goals of improving the nutritional and health status of people of India, The Green Revolution ensured that: the increase in food production stayed ahead of the increase in population. The country has now moved from chronic shortages to era of surplus and export in most items. The country is self-sufficient in food grain production and currently there is a buffer stock of over 60 million tones. Along with the steps to achieve adequate production, initiatives were taken to reach foodstuffs of right quality and quantity to the right places and persons at the right time and at an affordable cost. Box 1 the initiatives to improve nutritional status of the population during the last five decades. As you can see, these include increasing food production and distribution, nutrition education, food supplementation, improved health services and measures to improve household food security e.g. increasing incomes,

Box 1	Initiatives to Improve Nutritional Status of the Population during the Last Five Decades
	<ul style="list-style-type: none">• Increasing food production — building buffer stocks• Improving food distribution — building up PDS• Improving household food security through:<ul style="list-style-type: none">improving purchasing power,food for work programme, anddirect or indirect food subsidy.

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- Food supplementation to address special needs of vulnerable groups - ICDS, Mid Day Meals
- Nutrition Education through ICDS
- Efforts of the health sector to tackle:
 - adverse health consequences of undernutrition,
 - adverse effects of infection on nutritional status, and
 - micronutrient deficiencies and their health consequences

Thus, we saw how GOI is making efforts to improve food and nutrition security situation of the people of India. In Unit 10 later in this course, we will study about various programmes implemented by GOI to improve food and nutrition security. Unit 12 and 13 focuses on strategies to combat public nutrition problems in our country.

So far in this section, we learnt that nutrition security is affected by kind of food consumed by individuals, its preparation and storage. In other words, the specific actions taken by individuals in relation to food. This brings us to the next section i.e. what do we understand by behaviours related to food. Let us examine what we mean by food behaviours and the factors which affect the food behaviours.

2.10 FOOD BEHAVIOUR

Food is not merely a means to survival but the fuel that drives the human body the economic engine. What influences what we decide to eat when any food is in front of us? All such actions encompass what is termed as our food related behaviour. Let us first look at the meaning of word "behaviour". The word behaviour refers to all the activities of people singly or collectively. Usually, the word refers to a positive or social activity. Therefore, from a nutritionist's point of view, the response of man to food is termed as food related behaviour or food habits. There are many factors which affect the food behaviour. These are:

- Physiological and socio psychological factors,
- Cultural factors, and
- Social factors.

Let us examine these factors in detail

- Physiological and socio psychological factors

Food related behaviour depends on a combination of biochemical factors, mainly, physiological aspects and socio-psychological factors. Hunger and satiety are physiological functions, which are dependent on the internal stimuli. These two zones of biological difference are influenced by non-physiological factor called the appetite control. This factor is dependent on the environment in which man lives and determines the food practices. The cultural and social values, the economic conditions and educational levels or other personal factors are reflected in the food practices habits of its people. Let us look at the cultural factors next.

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- **Cultural factors**

Food habits vary from one cultural set up to another because each group in its own evolution sets up a complex pattern of standardized behaviours. Individuals within a culture respond to the approved behavioural pressures by selecting, consuming and using those foods that are available. Those food habits and customs, which have become meaningful to the group, are carefully held and not quickly changed. Regional culture communities are not the only sub cultures of India. For each sub culture, there are a number of religions and caste communities who have their own distinctive cultures. The diets of Hindus in Gujarat and UP may have differences but there are similarities of ingredients or even taste. Often the diets of Scheduled Castes are decidedly non-vegetarian as opposed to that of Brahmins and Banyas. Not only are there differences between the higher and lower castes but also in the same caste with different social status.

Festivals and fests can provide an opportunity of good nutritious food. Even the poor who cannot afford, consume good foods on such occasions. Abstinence from some kinds of foods before or during a festival has been practiced throughout the recorded history across the globe. Many North Indians abstain from animal foods like egg, meat and fish during Hindu festivals like "Navratas". The examples present above must have given you a good idea about the cultural influence on food behaviour. Let us look at the social factors now:

- **Social factors**

Sociology of foods and nutrition should have as one of its aims to clarify the manner in which food becomes a functional element in the social system. Food is often used to promote an individual or group's welfare, interpersonal sociability and feeling of belongingness. Often the place given to nutrition is considerably below than that given to prestigious items in expenditure. Use of ghee has often played quite a havoc with the nutritional balance of some people in north India. A pregnant mother among the north Indian farmers may be given plenty of ghee during her pregnancy. She may be expected to live on a sweet preparation of ghee, pulse flour and jaggery in rural areas.

Further, it is of specific significance in the Indian population where sequential eating patterns are observed. Who should be served first in the family? What should be the priority? The head of the family eats first, then all other men, sons, daughters and finally the wife and the mother. All the good items in the menu, which are limited, are given to men of the house and children. Such unequal distribution of meals affects the availability of food items and thereby nutrients. Another important factor that has had an influence on the food related behaviours is urbanization. This has led to changes in family structure, increase in number of smaller household units, increase in the number and proportion of working-women, increase in mobility and ethnic diversity. All this has influenced*food habits of families.

For most of human existence, people's food supplies consisted only of what nature placed before them. But in today's technological society a greater variety

of food items is available than could ever have been imagined. Thus, we conclude that our food behaviours are shaped not only by productivity and availability but also by social and cultural influences. All these factors are resulting in a paradigm shift in food related behaviour. We end our study on food behaviour here. Recall your understanding on the topic by answering the check your progress exercises given next.

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Check Your Progress Exercise 2

1. Define food and nutrition security. Generate any four factors determining food security.

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2. List three factors which affect food behaviour.

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2.11 LET US SUM UP

In this unit we learnt that there are multiple causes of malnutrition and accordingly need a multidisciplinary approach to solve nutrition problems.

We learnt how agricultural products including horticultural products, the storage and distribution of these food items affect the nutrition of people. Then we had a brief insight about food security and tractors affecting it. You would recall that food security is defined as physical and economic access by all people, at all times, to sufficient food to meet their dietary needs for a productive and healthy life. It is a combination of the product of four factors: Food availability, food accessibility, utilization and vulnerability. Inappropriate caring and feeding practices, gender discrimination, unsafe and sanitation and natural disasters determine food and nutrition security. The response of man to food is termed as food related behaviour or food habits. There are many factors which affect the food behaviour. These are: physiological and socio psychological factors, cultural factors and social factors.

2.12 GLOSSARY

- Bunt infection** : fungus that destroys kernels of wheat by replacing them with greasy masses of smelly spores.
- Gibberella infection** : fungal infection in maize causing rotting of the plant.

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Green Revolution

: a significant increase in agricultural productivity resulting from the introduction of high-yielding varieties of grains, the use of pesticides, and improved management techniques.

Organoleptic

: relating to the senses (taste, colour, odour, feel).

Phytochemicals

: hundreds of substances produced naturally by plants to protect themselves from disease. Their 'promoting human health' properties are still under many have antioxidant activity.

2.13 CHECK YOUR PROGRESS

- 1). How can a multi sectoral approach help to solve nutritional problems?
- 2). How can science and technology help improve food supply?
- 3). What are the Determinants of Food Security.
- 4). What are factors which affect the food behaviour.

3**NUTRITIONAL PROBLEMS-1****NOTES****STRUCTURE**

- 3.1 Learning Objective
- 3.2 Introduction
- 3.3 Protein Energy Malnutrition (PEM)
 - 3.3.1 Different Forms of PEM
 - 3.3.1.1 Kwashiorkor
 - 3.3.1.2 Marasmus
 - 3.3.1.3 Marasmic - Kwashiorkor
 - 3.3.1.4 Sub-clinical PEM
 - 3.3.2 What is the Prevalance of PEM?
 - 3.3.3 What Causes PEW
 - 3.3.4. What are the Consequences of PEM?
 - 3.3.5 How do we Treat PEM?
 - 3.3.6 How to Prevent and Control PEM?
- 3.4 Micronutrient Deficiencie
 - 3.4.1 Vitamin A Deficienc
 - 3.4.2 Iron Defici ncy Anaemia (IDA)
 - 3.4.3 Iodine Defi iency Disorders (IDD)
 - 3.4.4 Zinc Defici ncy
- 3.5 Let Us Sum Up
- 3.6 Glossary
- 3.7 Check Your Progress

3.1 LEARNING OBJECTIVE

After studying this unit, you should be able to:

- describe the public health significance of PEM, vitamin A deficiency, iron deficiency anaemia, iodine deficiency disorders and zine deficien
- identify cases of PEM and vitamin A deficiency
- detect iron deficiency anaemia and .iodine deficiency disorder

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- explain the causes and consequences of vitamin A deficiency, iron deficiency, anaemia, iodine deficiency and zinc deficiency
- provide the treatment of PEM, vitamin A deficiency, iron deficiency anaemia and iodine deficiency disorders
- describe methods of prevention of vitamin A deficiency, iron deficiency anaemia and Iodine deficiency disorders, and
- educate the families and communities on prevention of PEM, vitamin A deficiency, iron deficiency anaemia and iodine deficiency disorders

3.2 INTRODUCTION

You may recall studying about the macronutrients and micronutrients in Advanced Nutrition Course (MFN-004). Macronutrients we learnt, are carbohydrates, fats and proteins and micronutrients are vitamins and minerals. In this unit and the following unit we will learn about the deficiency diseases associated with these macronutrients and micronutrients in the body.

Nutritional deficiencies are widely prevalent in India in the rural areas, particularly among the poor families. You might have come across in your day-to-day life or read in popular publications about nutritional disorders occurring due either to deficiency of macronutrients i.e. energy and proteins or micronutrients like vitamin A and B complex. Human beings require balanced diet to live, thrive and survive to carry out various activities. Any imbalance or inadequacy in foods and nutrients could cause ill health, lead to nutritional disorders and even cause death. This unit focuses on the nutritional problems of public health consequence.

3.3 PROTEIN ENERGY MALNUTRITION (PEM)

Protein Energy Malnutrition (PEM) is the deficiency of macronutrients or energy and protein in the diet and forms the most important nutritional deficiencies of public health significance. It is a nutritional disorder, which affects all the segments of population like children, women and adult males particularly from the backward and downtrodden communities.

There are many different forms of PEM. Let us learn about these.

3.3.1 Different Forms of PEM

The term PEM is used to describe a wide range of clinical conditions ranging from the very clinically detectable fluid forms to the mildest forms in which growth retardation is the major manifestation. It is widely prevalent in the developing countries of Asia and Africa. According to estimates, there are about 200 million children suffering from various forms of PEM in the world. India contributes almost 40% to the total malnourished population in the world.

PEM occurs in three clinically distinguishable forms, viz. kwashiorkor, marasmus and marasmic-kwashiorkor. In addition, a large number of children

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suffer from various sub-clinical form's of PEM like underweight, stunting (short stature) 'and wasting (thinness). In fact, the proportion of clinical cases of PEM in a given community reflects only the proverbial "lip of iceberg". In other words, for every clinical case there are many more children suffering from sub-clinical PEM. Box 1 lists different types of PEM.

Box 1	Different Types of PEM	
Clinical forms	Sub-Clinical forms	
Kwashiorkor	Underweight	
Marasmus	Wasting	
Marasmic kwashiorkor	Stunting	

We will first study about the clinical forms of PEM and then go over to sub-clinical PEM. Let us start with the first clinical form of PEM i.e. Kwashiorko

3.3.1.1 Kwashiorkor

Kwashiorkor is an African word, meaning a "disease of the displaced child", who is deprived of adequate nutrition. It is one of the most important florid forms of PEM occurring ,mostly in children between the ages of 1 and 3 years, when they are completely weaned (taken off the breast). The three essential manifestations or signs of kwashiorkor are:

- Oedema (swelling of feet),
- Growth failure, and
- Mental changes.

In addition, there may be changes in hair and skin associated with infection and micronutrient deficiencies. Refer to Figure 3.1 which illustrates the clinical forms of PEM. Frequent infections, particularly diarrhoea and respiratory infections, aggravate the condition. Most of the children with severe PEM would have recovered from a recent attack of measles.

Let us review the above clinical signs of kwashiorkor in detail:

- **Oedema:** Oedema refers to accumulation of fluid in the tissues and usually begins with a slight swelling in feet gradually spreading up the legs. Later, hands and face may also have oedema. If oedema is present, a depression is formed when you apply pressure with your thumb on the lower part of shin or the dorsal pan of foot for about half a minute.
- **Poor growth:** Growth retardation is the earliest manifestation of kwashiorkor, The child will be lighter and shorter than its normal peers of same age. The children with kwashiorkor weigh about 80% or less of their normal peers. This is usually verified by comparing the body weight of the child with that of normal children of same age group. Sometimes, in cases of gross swelling, the body weight may be relatively higher. The child will also be wasted (thinner),

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which sometimes could be masked in the presence of extensive swelling of the body. The child's arms and legs will appear thin as a result of wasting.

- **Mental changes:** You would find a kwashiorkor child to be unusually apathetic with absolutely no interest in the surroundings. The child will also be irritable and prefers to stay at one place and in one position.

The signs discussed above are essentially present in a child suffering from kwashiorkor. Other signs which may be present are:

- **Hair changes:** In kwashiorkor, the hair loses its healthy sheen and becomes silkier and thinner. It takes coppery red colour (referred to as 'discoloured hair'). You could easily pluck small tufts of hair without causing any pain (referred to as 'easy pluckability') just by passing your hands through the hair.
- **Changes in skin:** In many cases, dermatosis (changes in skin) is seen. Such changes are common in areas of friction. Dark pigmented patches, akin to sun-baked and blistered paint, are, at times, present (known as 'flaky-paint dermatosis'). These desquamated patches may peel off leaving bleeding patches resembling sunburns.
- **Moon face:** The cheeks may seem swollen with fluid or fatty tissue and often be slightly sagging. You should not mistake with the chubby cheeks of a normal and healthy child.
- **Micronutrient deficiencies:** Almost all the children manifest anaemia (due to iron deficiency) of some degree. Eye signs of vitamin A deficiency are also common in more than a quarter of children with kwashiorkor. Manifestations of vitamin B complex deficiency are also noted in many cases.
- **Water and electrolyte imbalance:** The total body water and especially the extracellular fluid volume are increased in all forms of PEM. At the same time, there may be clinical signs of dehydration, particularly sunken eyes, loss of skin turgor, dry mucosa. As for the electrolytes, total sodium is increased although in some cases the serum sodium and osmolarity are seen to be reduced. This is obvious in patients who have oedema and signs of dehydration. As for potassium it is usually deficient and magnesium deficiency is reported.
- **Infections:** There may be lower respiratory tract infections associated with diarrhoea/dysentery.

Figure 3.1(a) illustrates a kwashiorkor child. Look up Box 2, as well which summarizes the various signs of kwashiorkor.



(a) A typical case of kwashiorkor



(b) A marasmic child

Figure 3.1: Clinical forms of PEM

Box 2	Signs of Kwashiorkor
<ul style="list-style-type: none"> ● Oedema ● Underweight (<80% of normal weight for age) ● Apathy and irritability ● Moon face ● Hair and skin changes ● Micronutrient deficiency 	

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Let us now move on to the next clinical form of PEM i.e. marasmus

3.3.1.2 Marasmus

Marasmus, the other end of the same spectrum as kwashiorkor, is common in children below the age of 2 years. The characteristic manifestations, as illustrated in Figure 3.1 (b) are:

- Severe growth retardation
- Extreme emaciation
- Old man's or monkey's face, and
- Loose and hanging skin folds over arms and buttocks.

As you may have noticed in Figure 3.1(b), a typical case of marasmus can be described as a bonny cage having nothing but "skin and bones". You would notice that the marasmic children are so weak that they may not have even energy to cry, which most often is barely audible. The child is extremely wasted with very little subcutaneous fat with the skin hanging loosely particularly over the buttocks.

In fact, when you hold the marasmic child in a standing position, you can see the loose skin folds hanging prominently, unlike in any normal child. For the given age, the children will be generally below 60% normal or < Median - 3SD of the standards. We will learn about these standards later in this unit. Unlike in kwashiorkor, oedema is absent and there are no skin and hair changes.

However, frequent diarrhoeal episodes leading to dehydration and micronutrient deficiencies of vitamin A, iron and B-complex are common. Box 3 lists the signs and symptoms of marasmus.

Box 3	Signs and Symptoms of Marasmus
<ul style="list-style-type: none"> ● Extreme muscle wasting - "skin and bones " ● Loose and hanging skin folds ● Old man's or monkey faces ● Absolute weakness 	

3.3.1.3 Marasmic Kwashiorkor

Sometimes, in areas where PEM is common, malnourished children exhibit the features of both kwashiorkor and marasmus. Such changes could occur during the transition from one form of severe PEM to another. For example, a marasmic child can develop oedema after a severe bout of infection or a kwashiorkor child, when loses oedema may develop this condition. Such a child is considered as suffering from 'marasmic kwashiorkor'. These children will have extreme wasting of different degrees (representing marasmus) and also oedema (a sign of kwashiorkor). They may also manifest some hair changes and often diarrhoea. Box 4 lists the signs and symptoms of marasmic kwashiorkor, So it must be evident that there is a continuous spectrum of signs from oedematous kwashiorkor through varying degree of marasmus associated with oedema. For your reference we have included the main features of PEM in children in Table 3.1.

Look up Box 4 for the signs,of marasmic kwashiorkor

Box 4	Signs and Symptoms of Marasmic Kwashiorkor
	<ul style="list-style-type: none"> ● Extreme muscle wasting - "skin and bones" ● Loose and hanging skin folds ● Old man's or monkey's face ● Absolute weakness ● Oedema

Besides the specific and essential features discussed in Table 3.1 a number of biochemical changes have been discussed in the blood, urine, gastrointestinal secretions, endocrine functions and tissue composition ,in PEM. The changes that are most important in diagnosis and treatment are summarized in Table 3.2

Features	Marasmus	Kwashiorkor
Essential Features		
1. Oedema	None*	Lower legs, sometimes face, or generalized*
2. Wasting	Gross loss of sub cutaneous fat, "all skin and bones"*	Less obvious; sometimes fat, blubbery
3. Muscle wasting	Severe*	Sometimes
4. Growth retardation in terms of body weight	Severe*	Less than in of Marasmus
5. Mental changes	Usually none	Usually present

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Variable features		
1. Appetite	Usually good	Usually poor
2. Diarrhoea	Often (past or present)	Often (past or present)
3. Skin changes	Usually none	Often, diffuse pigmentation; occasional "flaky paint"* or "enamel" dermatosis
4. Hair changes	Texture maybe modified but n dyspigmentation	Often sparse-straight and silky; dyspigmentation grayish or reddish
5. Moon face	None	Often
6. Hepatic enlargement	None	Frequent, although it is not observed in some areas.

Table 3.1: Features of PEM in children

*The most characteristics or useful distinguishing features.

Biochemical Changes	Marasmus	Kwashiorkor
Serum albumin	Normal or slightly decreased	low*
Urinary urea per g of the creatinine	Normal or decreased	low*
Urinary Hydroxyproline Index	Low	Low*
Serum free amino acid ratio	Normal	Elevated*
Anaemia	May be observed	Common iron and folate deficiency ma be associated
Pancreatic secretions	Reduced enzymatic activity	Reduced enzymatic activity

Table 3.2: Biochemical signs specific to PEM

* The most characteristic or useful distinguishing features

As you may have noticed in Table 3.2, serum albumin and also serum total protein are markedly decreased in kwashiorkor. It is important to note that serum albumin level is one of the most useful biochemical indicators of PEM. We will

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learn more about this biochemical indicator later in Unit 9. As for the changes in urine, the hydroxyproline excretions in urine, is proposed as an indicator of the rate of growth in children with PEM. The index is essentially constant between the age of 6 months and about 5 years. It is low in malnourished children. Further the urinary excretion of creatinine decreases in relation to the reduction in the muscle mass. Hence, in both kwashiorkor and marasmus the creatinine excretion is low.

We have learnt about clinical forms of PEM. Now let us learn about sub-clinical PEM.

3.3.1.4 Sub-clinical PEM

You have already learnt that clinical forms of PEM represent only a small proportion of the total cases of PEM in a community in rural India. Growth retardation is not only an important and objective manifestation of PEM, but is also the first response to rehabilitation in such cases. Anthropometry (body measurement) is extensively used to detect various degrees of sub-clinical forms of PEM. Body weight is, by far, the most sensitive and frequently used parameter of nutritional status particularly in preschool children (1-5 years). Several methods have been suggested for classification of PEM in children based either on body weight alone or in combination with standing height] recumbent length.

The following classifications based on body weight are commonly used in India

1. Gomez classification
2. Indian Academy of Pediatrics (IAP) classification, a
3. Standard deviation classification

Let us elaborate on each of these now.

1) Gomez classification

It will be of interest to you to learn that in Mexico, a child specialist named Gomez and his co-workers proposed a classification expressing the body weights of children as percentage of normal values (standards) for age. They proposed that young children could be divided into 4 grades of malnutrition. They observed, based on their hospital observations, a marked difference in mortality of children suffering from second and third grades of malnutrition. The advantage is that it would be possible to prioritize actions based on the classification given in Table 3.3

% Weight for age of NCHS	Type of undernutrition	Grade of undernutrition
2 90	Normal	Normal
75 - 89.9	Mild	I
60 - 74.9	Moderate	II
< 60	Severe	III

Table 3.3: Gomez classification for weight for age

All those with severe degree of malnutrition need the attention of a trained nutrition worker. Children in second and third grades of malnutrition require nutrition supplementation.

2) Academy of Pediatrics (IAP) Classification

In India, the classification of children, which is extensively used to group children into various grades of malnutrition is the one proposed by the Indian Academy of Pediatrics. Growth charts based on this classification 'are used in the largest national nutrition intervention programme, Integrated Child Development Services (ICDS), for growth monitoring of children. The nutrition subcommittee of IAP considered that children with body weights more than 80% of NCHS standards should be as normal and suggested the classification given in Table 3.4

Weight for age (NCHS standard)	Grade of undernutrition
>80%	Normal
70 - 79.9	I
60 - 69.9	II
50- 59.9	III
< 50	IV

Table 3.4: IAP classification for weight for age

According to this classification, all the children in grades II, III and IV are included as beneficiaries in ICDS supplementary feeding programme

3) Standard Deviation (Z score) classification

Statistics teaches us that when normal values of any variable are distributed as per their frequency of occurrence, they follow normal distribution encompassing values within two standard deviations (SD), of mean/median (Average). On this premise, all the children with weights less than median -2SD of normal weight for age (NCHS standards) are considered as suffering from undernutrition. The following criteria given in Table 3.5 are used to classify children into various degree of undernutrition based on mean/median and SD.

Weight for age criterion	Grade of undernutrition
>Median - 2SD	Normal
<Median - 2SD to Median - 3SD	Moderate
< Median - 3SD	Severe

Table 35: SD classification for weight for age

You have learnt about different forms of PEM. You must be now wondering how common is the occurrence of PEM in our communities. i.e. what is the prevalence of the problem. We will now discuss that in the next section.

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3.2.2 What is the Prevalence of PEM?

The extent of a disease is measured in terms of prevalence rate, which indicates the number of individuals with a particular disease (numerator) at a particular point of time in a specified number (usually per 100 population of a community) (denominator). The prevalence of kwashiorkor and marasmus, which was about 4% in the early sixties, has declined substantially over the period. As per the recent surveys conducted by the National Nutrition Monitoring Bureau (NNMB), the prevalence of kwashiorkor and marasmus is about 1%. However, as judged by weight for age, about a half of children under the age of 5 years suffer from sub-clinical PEM. About 60% of these children had stunting (short stature). National Family Health Survey results reveal that about 47% of the children under the age of 3 years, who are considered as at risk of developing PEM, are underweight. Thus, the problem of PEM in India is widespread and requires immediate intervention.

Since the problem of PEM in India is widespread and requires immediate intervention, next thing which must be coming to your mind is what causes it. Let us now learn what are its causes.

3.3.3 What Causes PEM?

Some of the causes of PEM are elaborated herewith:

Low Birth Weight

The beginning of PEM in children starts in rural India from the time of their birth. At least a third of the Indian children are born with low birth weights (<2.5 kg) clue to high maternal malnutrition (malnutrition in mother). You may be aware that the birth weight of a normal child is 3-3.4 kg.

Inadequate Breast Milk

Though prolonged breastfeeding of children is the rule in rural India, the amount of breast milk secreted in poor Indian mothers is lower than either normal women or those of developed countries. In other words, the infants may not be consuming adequate breast milk leading to inadequate nutrition.

Delayed Complementary Feeding

The mothers from poorer socioeconomic groups where PEM is more prevalent, delayed introduction of complementary foods (foods in addition to breast Ili-110 usually until the infant completes one year of age is a common practice. Thus, when breast milk is not adequate, delaying complementary feeding further aggravates the dietary inadequacy among such infants leading to PEM. Rural Indian women, due to ignorance, firmly believe that children should be given complementary foods only when they are able to pick and eat. After weaning (completely stopping breast feeding), the children are not given any special diet other than the adult diet. Young infants cannot consume these diets in adequate amounts due to its bulk. Early and abrupt weaning and introduction of diluted milk formulae is one

of the reasons for marasmus.

Primarily Energy Deficiency

Surveys on preschool children in different parts of the country reveal that PEM is primarily due to dietary energy deficiency arising as a result of insufficient food intake. The primary bottleneck in the dietaries of Indian children, who are given cereal-pulse based diets, is energy and not protein as, hitherto was believed.

Infections and Infestations

Childhood infections (viral/bacterial) and parasitic infestations are almost always associated with PEM. These cause anorexia (loss of appetite) leading to reduced food intake, interfere with nutrient absorption and utilization, and result in nutrient losses. The role of measles infection, frequent diarrhoea and acute respiratory infections in the onset of PEM is very important.

Ignorance and Poor Socioeconomic Status

Improper childcare, either as a result of lack of knowledge or lack of time for mother, could also contribute to the onset of PEM. PEM is mainly a disease of the poor and downtrodden. The mothers in these families are illiterate, work for their living and are largely influenced by the belief systems of the society, are superstitious and believe in spiritual healing etc. The families are generally large, and even if they spend their complete income on food with low purchasing power they would be unable to meet the requirements. Box 5 highlights causes of PEM.

Box 5	Causes of PEM	
Maternal malnutrition	Low purchasing power	
Low birth weight	Food taboos and superstition	
Faulty child feeding practices	Large families	
Dietary inadequacy	High female illiteracy	
Frequent infections		

We have seen that PEM is a nutritional disorder of public health significance. Let us now study what happens if PEM is not prevented and or treated. In other words, let us learn about the consequences of PEM.

3.2.4 What are the Consequences of PEM?

The consequences of PEM are most often long lasting and irreversible. The common consequences include:

- Irreversible growth retardation
- Increased susceptibility to infections
- Increased risk of mortality

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- Low cognitive performance

As a result of extensive PEM since early childhood, in India, there is irreversible growth retardation leading to short stature among adults. While children of well to do communities, where the problems of inadequate diet and ill health are not common, are as tall and heavy as those from developed countries, poorer children suffer from stunting, wasting and underweight. Studies in different parts of India reveal that in children suffering from various grades of PEM, their immunity (ability to fight infections) is reduced and as a result, the incidence of childhood infections like diarrhoea and respiratory infections is high. The children with severe forms of PEM are usually brought to the hospital with complications arising as a result of severe infections. The immunity in these children is low leading to lowered resistance to infections. Therefore, respiratory and gastrointestinal infections are not only common but their severity is also higher. Severe diarrhoea might lead to dehydration. Septicemia and bronchopneumonia in children with kwashiorkor and marasmus could be fatal. It should also be recognized that such infections could increase the risk of PEM leading to a vicious cycle of malnutrition and infection. The risk of mortality in moderate and severe PEM is higher, particularly when they are exposed to frequent infections. The work output of adults who are lighter also has been shown to be lower affecting the productivity of the nation.

We have learnt about the causes and consequences of PEM. Next, let us learn how we can treat PEM.

3.3.5 How do we Treat PEM?

Major objective of the treatment of PEM is to provide adequate energy and protein intake and control infections, if any. Mild and moderate forms of PEM can be and should be managed at home under the supervision of health professional, Severe forms of PEM should be referred to a hospital, particularly when associated with severe bronchopneumonia and diarrhoea. All the cases without any complications can be managed as outpatients in either a primary health center or a hospital. Here we will study the treatment of severe PEM. The key components of treatment are:

- **Diet**

Treatment of cases of kwashiorkor or marasmus involves mainly providing appropriate nutrition support. The child should receive a diet that provides adequate amounts of energy and protein. Both of these are required in larger quantities than normal requirements for rapid recovery. The child should be given the following concentrations:

Energy : 170 - 200 kcal per kg of body weight

Protein : 3 - 4 g/kg of body weight

Initially, milk based liquid diet, using either fresh milk or dry skimmed milk powder, is recommended. A milk formula could be prepared in one litre of clean water by adding dried skimmed milk powder: 90 g, sugar: 70 g and vegetable oil: 50 g. About 100 ml of reconstituted preparation would provide 100 kcal and 3 g of protein. The formula should be given to the children at the rate of 100-150 ml per kg of body weight. As dried skimmed milk powder does not contain any

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vitamin A, it should be enriched with vitamin A. Sugar or vegetable oil can be added to increase the energy content.

In the beginning, the child may refuse to accept any feeds due to loss of appetite. Under such situations, the diet could be given with a spoon. In extreme cases, gastric intubation (feeding through tube) may be resorted to. With improvement in appetite, the child would start eating the diet readily, at which time gradually solid foods can be introduced. In older children special diet based on cereal, pulse, dried skim milk powder and sugar/jaggery can be given. Addition of vegetable oil would increase the energy density of the recipe.

- **Vitamin and mineral supplements**

All cases of severe PEM require multivitamin preparation to meet the increased demands during recovery. Iron (60 mg) and folic acid (100 mg) may be given daily to correct anaemia.

Oral rehydration

Since diarrhoea is very common in severe PEM, correction of dehydration is the first step in the treatment. Homemade (salt-sugar mixture) or commercial oral rehydration solution (ORS) can be administered to correct dehydration. The WHO recommends that the ORS formula should contain sodium chloride: 3.5 g, sodium bicarbonate: 2.5 g, potassium chloride: 1.5 g and glucose: 20 g. It should be dissolved in a litre of clean water and given to the child in small quantities at frequent intervals at the rate of 70-100 ml/kg body weight. Intravenous fluids are required only in severe dehydration.

- **Control of infections and infestations**

Appropriate antibiotics should be started immediately since infections are the immediate cause of death in many children. Children with intestinal infestations LIC giardiasis and ascariasis should be treated.

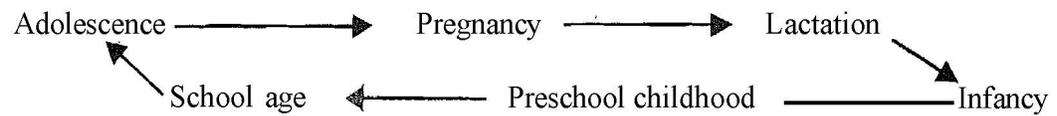
Clinical progress

Normally, clinical improvement is evident within a week with the disappearance of oedema, The appetite improves almost dramatically and the child starts gaining weight, after initial loss of body weight. The mother should be advised about the diet precisely. It would be better to involve her in the preparation of suitable recipes during the child's stay at the hospital.

We have learnt so far about the treatment of a child suffering from PEM. Have you heard the old proverb - "prevention is better than cure". So it becomes extremely important that we make sincere efforts to prevent and control PEM. Let us now see how this could be done.

3.2.6 Wov to Prevent and Control PEM?

Any programme aimed at prevention of PEM should be holistic and comprehensive considering the family as a unit. Since the effects of undernutrition are cumulative, currently it is being emphasized that 'life cycle approach' as illustrated in Figure 3.2 should be adopted.

**NOTES****Figure 3.2: Life cycle approach**

It is generally recommended that the entry point into the life cycle is the adolescent who will be the future mother and should be given adequate attention. Their nutrition should be ensured and the family should be educated against the practices like adolescent marriages and pregnancies so that they would be prepared to be healthy women of tomorrow to be able to handle pregnancy, lactation and child care effectively. At all levels, the advice should include both health care and nutrition. Given below are some of the measures which should help in prevention of PEM.

Ensure proper diet

PEM is preventable. It is a disease of the poor and the ignorant that suffer from social inequalities. Therefore, a holistic approach is necessary to prevent and control PEM. The most critical aspect is to ensure that the child is fed adequate quantities of diet containing all the nutrients daily. Therefore, the communities should be made aware that it is in their hands to ensure that their children and other members of the family consume adequate diets daily.

Increase purchasing power

The Government of India formulated the National Nutrition Policy and prepared National Plan of Action to bring down the prevalence of moderate and severe malnutrition. We will study about the National Nutrition Policy later in Unit 10. Here we should know that along with direct nutrition intervention, socio economic development, aimed at poverty alleviation to increase the purchasing power of the rural and urban poor, should become an important component of control programme. The essential components of any control programme are: supplementary feeding, Immunization, control of minor infections, promoting food security, nutrition communication, poverty alleviation, and empowerment of women. These components are described in details later in Unit 12 and 13 in this course. However a brief review is presented herewith.

- **Supplementary feeding**

Supplementary feeding has remained an important component to control undernutrition. Considering the dietary inadequacy in the diets of poor rural families, various programmes provide daily supplementary food providing about 300 kcal of energy and 8-10 g of protein per child under various feeding programmes. Of the direct intervention programmes of the government, Integrated Child Development Services (ICDS) is the largest being implemented by the Department of Women and Child Welfare of the Government of India in over 4000 projects all over the country with emphasis on backward and tribal areas.

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Supplementary feeding is an important component of ICDS. Other components are Immunization, growth monitoring, and treatment of minor illness, non-formal preschool education, and nutrition education to the mothers. The Department of Health ensures immunization of children, distribution of six monthly massive doses of vitamin A and iron and folic acid tablets and treatment of minor ailments.

● **Promoting food security**

Public distribution of food grains through a network of ration shops, particularly to reach the population below the poverty line, so as to improve availability, access to food grains at affordable prices is an important step to improve food and nutrition security of the poor.

● **Poverty alleviation**

There are a number of development programmes aiming at employment assurance to the landless and other labour with a focus on increasing the purchasing power. We will study about these programmes later in Unit 10, section 10.8.

Behavioural change communication

One of the reasons for the widespread prevalence of PEM in our country is ignorance due to illiteracy, particularly among the females. Therefore, there is a need to change the behaviour in these women through effective communication programmes. Person-to-person communication, cooking demonstrations, and mass media like television and radio are some of the tools that are available. We should convince the community, particularly the mothers about the need for proper diet to children for normal growth and to prevent them developing PEM. She should be made aware that the main reason for PEM is shortage of food either as a result of poverty or due to inequitable intrafamily distribution of foods. You should be equipped to give advice on complementary feeding and be able to inform the mothers as to the types of foods that could be given to young children. Box 6 highlights essential components of prevention of PEM.

Box 6	Essential Components to Prevent PEM
	<ul style="list-style-type: none"> ● Supplementary feeding, ● Immunization, ● Control of minor infections ● Promotion of food and nutrition security ● Behaviour change communication ● Empowerment of women and ● Poverty alleviation

Eradication of PEM requires concerted efforts not only on the part of the government but also continuous and active community participation. Integration, convergence, commitment and community participation are the clinical pillars of

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any prevention strategy.

In this section, we learnt about signs, causes, prevalence, treatment and prevention of PEM. In the next section, we will discuss the micronutrient deficiencies. But before that, let us recapitulate what we have learnt so far. Answer the questions given in the check your progress exercise 1.

Check Your Progress Exercise 1

1. What are the different clinical forms of PEM?

.....

2. Record in the format below differences between kwashiorkor and marasmus.

Manifestations	Kwashiorkor	Marasmus

3. What are the different classifications used to detect sub-clinical forms of PEM

.....

4. Indicate the criteria used for the following classifications based on weight for age

Grade of PEM	Indian Academy of Paediatrics	Gomez
Normal		
I		
II		
III		
IV		

5. What are the main principles in the treatment of severe PEM?

.....

6. What steps do you recommend to prevent and control PEM?

.....

3.4 MICRONUTRIENT DEFICIENCIES

In the previous section, we learnt about macronutrient deficiencies i.e. protein

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energy malnutrition in children. We are now aware that this is an important problem of public health significance affecting millions of young Indian children belonging to poverty stricken rural communities. In addition to this, deficiencies of specific micronutrients like vitamin A, iron and iodine affect large segments of population. We have studied earlier that micronutrients are nutrients which, although required in minute quantities, are essential to maintain the normal metabolism and function. Some people also call 'them 'super nutrients', indicating their importance and also signifying the dreaded ill effects of their deficiencies in the communities. Of all the micronutrient deficiencies, those of vitamin A, iron and iodine affect millions of populations and contribute to high morbidity and mortality. Apart from these, deficiencies of micronutrients such as, zinc, selenium and molybdenum, though do not manifest as overt problems, can lead to functional changes.

Box 7 lists common micronutrient deficiencies

Box 7	Common Micronutrient Deficiencies
<ul style="list-style-type: none"> ● Vitamin A deficiency ● Iron deficiency anaemia ● Iodine deficiency disorder ● Zinc deficiency 	

We will now discuss these micronutrient deficiencies in detail'. Let us begin with Vitamin A deficiency

3.4.1 Vitamin A Deficiency

Vitamin A deficiency (VAD) is a major public health problem, and the most vulnerable are preschool children and pregnant women in low income countries. In children, VAD is the leading cause of preventable severe visual impairment and blindness. An estimated 250 000 to 500 000 VAD children world over become blind every year, and about half of them die within a year.

Vitamin A, we know, is essential for maintenance of healthy epithelium and normal vision. Deficiency of vitamin 'A' manifests in the form of eye lesions, which are grouped under 'xerophthalmia', can be either mild leading to night blindness and changes in conjunctiva (white of the eye) or in severe form causing damage to cornea (black of the eye) leading to irreversible blindness. We will learn about these ocular manifestations, prevalence, causes, treatment and prevention of vitamin A deficiency in this section

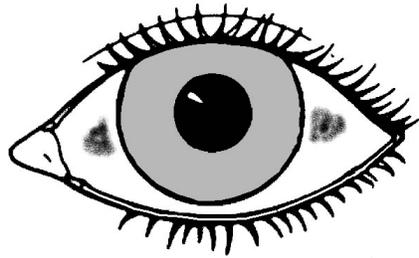
Let us begin with the signs and symptoms of vitamin A deficiency

Clinical Features of Vitamin A Deficiency

The clinical features or the ocular manifestations specific to vitamin A deficiency

are described here with and illustrated in Figure 3.3.

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(a) Bitot Spot



(b) Bitot Spot with the xerosis of conjunctiva



(c) Keratomalacia

Figure 3.3: Clinical manifestations of xerophthalmia

Night Blindness

Night blindness is the earliest symptom of Vitamin 'A' deficiency. You may recall studying in the Nutritional Biochemistry Course (MFN-002) and the Advance Nutrition Course (MFN-004) that reduction in the supply of vitamin A aldehyde i.e. retinal to the rod cells of the retina results in the impairment of dark adaptation. Under such situations, the affected child cannot see properly in sunlight particularly after the sunset. Often, an attentive mother can recognize the child's inability to see the plate of food or toys in ill-lit room. Pregnant women often experience deficiency symptoms, such as night blindness, that continues into the early period of lactation. In most part of the country, there is a local term for the condition, example in Hindi, it is called as "Rathaundi".

Bitot's Spots

As the deficiency progresses, dirty white, foamy and raised spots are formed on the surface of the conjunctiva, generally on the outer side of the cornea as you may observe in Figure 3.3(a). These spots are accumulation of denuded conjunctival epithelial cells. They stain black in the eyes when applied 'Kajal'. You would notice that the spot is quite superficial and more or less readily reinoved by direct inking or by lacrimination in a crying.

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Conjunctival Xerosis

Conjunctiva in nonnal children is bright white, smooth and glistening. Conjunctival xerosis is characterized by dryness of the conjunctiva, after exposure to air for 10-15 seconds by keeping eyelids drawn back, which also becomes thick, rough and wrinkled. In case of an affected child, The changes associated with conjunctiva include: dryness (the literal meaning of "Xerosis"), unwettability, loss of transparency, wiinkling and pigmentation. Refer to Figure 3.3(b) which illustrates the conjunctival xerosis along with bitots spot.

Corneal Xerosis

This is a sign of severe vitamin 'A' deficiency, in which the cornea loses its normal smooth and glistening appearance and becomes dry and rough. The child tends to keep the eyes closed, particularly in bright light due to photophobia (inability to see in bright sun) and hence, the condition may be missed during the clinical examination, if not observant.

Corneal Ulcer

Corneal xerosis, if not treated promptly, leads to ulceration of the cornea. Initially, the ulcer may be shallow, and if it becomes deep, it may lead to perforation resulting in prolapse of contents of the eyeball. These lessions are more common in the lower central cornea.

Keratomalacia

This is a condition of rapid destmction and liquefaction of full thickness of cornea, leading 10 prolapsed of iris, resulting in permanent blindness. Usually keratomalacia consists of characteristic softening of the entire thickness of a part, or more often the whole of the cornea leading to def01mation or destruction of the eyeball. It is painless but the corneal structure just melts into a cloudy gelatinous mass, dead-white or dirty yellow in colour. Extrusion of the lens and loss of the vitreous may occur. In infective conditions, the eye will be red and swollen. Figure 3.3(c) illustrates keratomalacia.

Corneal Scar

The corneal ulcer, on healing, leaves a white scar, which may vary in size depending upon the size of the ulcer. When the scar is big or positioned centrally blocking the pupillary region, normal vision is affected.

In addition, to the above mentioned manifestations, thickening of the hair follicles (follicular hyperkeratosis) is a cutaneous manifestation of vitamin A deficiency. From the description above it must be clear that xerophthalmia represents the ocular consequences of vitamin A deficiency that includes various manifestations, about which we have learnt above and the same are classified by WHO as given in Table 3.6,

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Classification	Primary signs
XI A	Conjunctival Xerosis
XI B	Bitot's Spots
XI 2	Corneal Xerosis
XI 3A	Corneal Ulceration
XI 3B	Keratomalacia
	Secondary signs
X N	Night blindness
X F	Fundal changes
X S	Corneal scarring

Table 3.6: WHO classification for assessment of vitamin A status

The classification presented above may be summarized as

- Stage XN is the earliest stage, involving night blindness owing to impaired dark adaptation,
- Stage XI A is corneal xerosis caused by reduction of goblet cell mucus,
- The appearance of Bitot's spot, a foamy excrescence on the temporal surface of the conjunctiva, constitutes the advancing stages (XIB),
- X2 consists of simple drying of the cornea,
- When the cornea undergoes the liquification process of keratomalacia, corneal ulceration, or both, it is classified as X3
- The situation is classified as X3A if <1/3 of the corneal surface is involved
- Past involvement leaves a corneal scar (XS), and
- A globe destroyed by advanced keratomalacia is xerophthalmic fundus (XF).

The discussion above focused on the signs and symptoms of vitamin A deficiency. Let us now learn how common the problem of vitamin A deficiency is i.e. the prevalence of vitamin A in our country.

Prevalence of Vitamin A deficiency

The World Health Organization (WHO) has recommended a set of prevalence criteria (both clinical and biochemical) for defining the vitamin A deficiency (VAD) problem of public health significance among children under 6 years of age in the community. This criteria is given in Table 3.7. The prevalence of any one or more indicators signifies public health problem

Indicator/Criteria	Minimum prevalence (%)
Clinical	
Night Blindness	>1.0
Bitot's spot (X 1B)	>0.5

Conjunctival xerosis with Bitot's spot (XI)	>0.0
Corneal xerosis/ulceration/keratomalacia (X2, X3A, X3B)	>0.01
Xerophthalmia related Corneal scars (XS)	>0.05
Serum retinol (vitamin A) < 0.35 μ mol/l(10 μ g/dl)**	>5.0

Table 3.7 : Prevalence criteria for defining the vitamin A deficiency problem of public health significance among children under 6 years of age

Proposed prevalence of night blindness in pregnant women >5% (IVACG, 2001)

Proposed to be > 15% with serum retinol < 7.0 μ mol/l (IVACG, 2001)

Surveys by National Nutrition Monitoring Bureau (NNMB) and the Indian Council of Medical Research (ICNIR) reveal that about 0.7% of preschool children have Bitot spots. As you would note from the Table 3.4, that as per WHO, prevalence of Bitot spots more than 0.5% in children under the age of 6 years is an indication that vitamin A deficiency is a public health problem requiring intervention. During the last two decades, the extent of Bitot spots in children showed a decline from about 2% to about 0.7%. The contribution of vitamin A deficiency to total blindness has come down significantly during the last 4 decades. Globally, data suggest that among the children under 5 years of age affected by VAD, some 3 million have ocular lesions of xerophthalmia and 100 to 140 million present only subclinical manifestations, yet live with a greater risk of mortality and of developing severe infections.

We have learnt about the signs and symptoms and the criteria for assessing the public health significance of xerophthalmia and vitamin A deficiency. Next, you must be wondering what is its etiology? Let's find out

Causes of vitamin A deficiency

Some of the causes of vitamin A deficiency are given below

Inadequate diet

An Indian child is born with poor stores of vitamins and minerals due to maternal malnutrition. Diets of pregnant women are deficient in several nutrients, including vitamin A. The concentration of vitamin A in breast milk is low among undernourished mothers and the most poor mothers delay complementary feeding beyond the age of one year and foods containing vitamin A are seldom given. The daily intake of vitamin A is about 100 mg while the recommended intake is 400 mg of retinol. The exclusively vegetable based diets, therefore, contain β -carotene and little or none of preformed vitamin A, except from breast milk.

- **Poverty and ignorance**

Low purchasing power of the communities and their consequent inability to meet the nutrient requirements and traditional wrong beliefs and ignorance are also important causes. Low cost β -carotene and iron rich foods like dark green leafy vegetables and fruits like papaya are not given to children and pregnant women

due to the belief that consumption of green leafy vegetables leads to diarrhoea in children and papaya when consumed by pregnant women can cause abortions.

● **Infections**

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During acute infections, vitamin A intake in preschool children is reduced due to impaired appetite and impaired vitamin A absorption as in acute diarrhoea and respiratory infection, and, consequently, serum levels of vitamin A are significantly reduced during acute infections. An infective episode of diarrhoea and respiratory infection and an attack of measles can aggravate vitamin A deficiency. Vitamin A deficiency is often associated with ascariasis and giardiasis

You learnt about the causes of vitamin A deficiency. Let us now look at how we can treat vitamin A deficiency

Treatment of vitamin A deficiency

All forms of vitamin A deficiency are treated with a massive oral dose of vitamin A in oil (200,000 IU), immediately after diagnosis. The health workers may refer all cases of corneal xerophthalmia, after first administering vitamin A, to medical doctor. Secondary infections should be controlled with suitable antibiotics. If necessary, a second dose may be given 48 hours after the first dose. Since more than 90% of the cases of keratomalacia are associated with severe clinical protein energy malnutrition (kwashiorkor or marasmus), the patients should also be treated for the same. A schedule recommended by WHO for treatment of individuals with corneal xerophthalmia is given in Table 3.8.

Timing of dose	Children (0-5 months)	Children (6-12 months)	Children over 12 months, male adolescent and male adults
Immediately on diagnosis	50 000 IU	100 000 TU	200 000 IU
The following day	50.000 IU	100 000 IU	200 000 IU
Subsequent contact (at least 2 weeks later)	50 000 IU	100 000 IU	200 000 IU

Table 3.8: Treatment of xerophthalmia in all ages

In women of reproductive age group with night blindness or bitots spots, a daily dose of 10 000 IU or a weekly dose of 25 000 IU of vitamin A for at least 4 weeks is the recommended treatment schedule. In population with a high prevalence of HIV infection (>10%), neonates should be given an extra dose of 50 000 IU at birth.

We have learnt that vitamin A deficiency is a condition of public health significance. Let us now understand what we can do to prevent vitamin A deficiency

Prevention of vitamin A deficiency?

Since dietary inadequacy is the major cause for micronutrient deficiencies, the

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most rational approach to prevent these deficiencies would be to ensure adequate amounts of the nutrients in the daily diets of the population at risk. There are two basic approaches to achieve this: i) long term programmes for promotion of adequate intakes of foods rich in micronutrients, and ii) supplementation of specific nutrients either as medicinal doses or through food fortification to meet immediate needs. In view of the serious nature of the problems, many countries have been adopting short-term measures, which though are interim in nature. Some of these measures by which we could prevent vitamin A deficiency are highlighted next.

Supplementation

Administration of large doses of vitamin A to children at risk has been the most popular approach to control nutritional blindness. Extensive field trials carried out by NIN, Hyderabad have demonstrated the feasibility and effectiveness of this approach. The Government of India has launched vitamin A supplementation programme on a national scale, as early as in 1970. The programme is now in operation in all the States in the country, targeted to about 30 million preschool children. Under this programme, sponsored by the Department of Health and Family Welfare, Government of India, one teaspoonful of oil-miscible vitamin A syrup containing 200,000 IU of vitamin A is given once every 6 months to children between the ages of 9-36 months. The programme is implemented through the sub-centre — primary health centre complex of the States. Paramedical personnel (ANM/MPHW), under the supervision of the P HC Medical Officer, carry out the actual distribution of vitamin A.

Food Based Approach

Although nutrient supplementation is a simple and effective intervention, it is only a short-term measure. It must be combined with dietary intervention or food based approaches for long lasting effects. What are these food based approaches? A detail discussion on this approach is presented later in Unit 12 in this course. Here in the context of vitamin A deficiency, fortification as a food based strategy has been used. Fortification of sugar has been in operation in Central American countries with reasonable success. In India, sugar may not be the suitable vehicle for the most needy segments of population who are very poor and cannot afford the same. Home gardening, another food based approach, has been found to be a feasible long-term strategy, to increase production and consumption of leafy and other vegetables and fruits by the community to control vitamin A deficiency. The Departments of Agriculture and Social Forestry are making efforts in this direction.

The Indian Council of Agricultural Research (ICAR) has established 101 Krishi Vigyan Kendras or Farm Science Centres so far in various parts of the country to impart training in agriculture technologies to farmers. In the past, the major thrust was on cereal and millet production. It is only in the recent years that horticulture production is receiving emphasis. Women Extension Workers are trained not only in agriculture technologies, but also in home gardening and preparation of recipes based on locally available nutritious foods.

Nutrition Education

Ignorance, you may recall studying earlier, is an important determinant of vitamin A deficiency. There is, therefore, a need to increase the awareness of the community about the significance of proper diet in the prevention of vitamin A deficiency. Although education is a component of all health and nutrition programmes, this has been one of the weakest links. The health functionaries are either not properly oriented or do not have the necessary audio-visual tools to impart nutrition education. Multi-media approach involving communication experts will have to be adopted for success of nutrition education efforts. Food and Nutrition Board, through its network of 67 centres has been imparting education and training in nutrition, as well as, on home-scale preservation of fruits and vegetables. However, efforts made, so far, have not been adequate. Education programmes adopting social marketing (by applying marketing principles to education campaigns) approach have been shown to be effective in changing the behaviour of community. Box 8 highlights in brief different strategies to prevent vitamin A deficiency

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Box 8	Prevention of Vitamin A Deficiency
<ul style="list-style-type: none">• Supplementation with large doses of vitamin A• Treatment of infections and infestations• Home gardening• Behavioural change communication	

In the above section, we learnt about signs, prevalence, causes, consequences, treatment and prevention of vitamin A deficiency. We will now move on to iron deficiency anaemia. But first let us review what we have learnt so far

Check Your Progress Exercise 2

1. Which are the three major micronutrient deficiencies affecting large segments of population.

.....
.....

2. List the importance of Vitamin A in our body,

.....
.....

3. List the manifestations of mild and severe forms of vitamin A deficiency

.....
.....

4. List three causes of Vitamin A deficiency

.....
.....

5. List four different strategies to prevent Vitamin A deficiency

.....

.....

We will now learn about signs, prevalence, causes, consequences, treatment and prevention of iron deficiency anaemia

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3.4.2 Iron Deficiency Anaemia (IDA)

Iron deficiency anaemia (IDA) is the most common micronutrient deficiency in the world, particularly in the developing countries like India. Estimates suggest that as many as 4-5 billion people i.e. 66-80% of the world's population, may be iron deficient; 2 billion people i.e. over 30% of the world's population are anaemic

Anaemia occurs when haemoglobin (a pigment that gives red colour to the red blood cells) production is considerable reduced, leading to a fall in its level in the blood. Mostly anaemia is due to iron deficiency. The other causes of anaemia may include folate and vitamin B₁₂ deficiency or anaemia of chronic diseases. Iron deficiency and anaemia reduce the work capacity of individuals and entire populations, bringing serious economic consequences and obstacles to national development. For children, health consequences include premature birth, low birth weight, infections and elevated risk of death. Later physical and cognitive development is impaired, resulting in lowered school performance. For pregnant women, anaemia contributes to 20% of all maternal deaths. Iron deficiency affects more people than any other condition, constituting a public health condition of epidemic proportions, So then let us get to know about iron deficiency and anaemia. We begin with the signs and symptoms of IDA.

Signs and symptoms of iron deficiency anaemia

Since the level of haemoglobin is reduced in the blood, it causes paleness (pallor) on certain parts of the body. Initially, such paleness can be seen ,in conjunctiva and in the roof of the mouth. Since haemoglobin is important for carrying oxygen in the body, anaemic individuals develop breathlessness even on milder exertion. These manifestations exist among adults, especially in pregnant and lactating women. The nails of finger and toes become papery thin and bend upwards to assume shape of spoon. This condition is known as "koilonychia". In severe cases of anaemia particularly among pregnant women, oedema (swelling of feet) is also present. Blood examination for haemoglobin estimation is the best way for the diagnosis of anaemia. Box 9 gives the manifestations of iron deficiency anaemia

Box 9	Manifestations of Iron Deficiency Anaemia
<ul style="list-style-type: none"> ● Paleness of conjunctiva ● Paleness of tongue ● Paleness of mucosa of soft palate ● Low haemoglobin ● Swelling of feet in severe anaemia ● Koilonychia 	

We have reviewed the signs and symptoms of iron deficiency anaemia. Let us now learn how common the problem of iron deficiency anaemia i.e. the prevalence is

Prevalence of iron deficiency anaemia

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We can find out about the prevalence of anaemia if we know what percentage of population is suffering from anaemia. The WHO has recommended different cut-off levels of haemoglobin below which an individual is considered as anaemic. These are indicated in Table 3.9. These values are dependent on age, sex and physiological status.

Group	Cut-off for Haemoglobin (g/100 ml)
Children < 6 years	11
Children > 6 years Adolescents	
Non-pregnant and non-lactating adult women	12
Pregnant women	11
Lactating women	12
Adult males	13

Table 3.9: WHO haemoglobin cut-off criteria

Assessment of anaemia is based on estimation of these criteria for cut-off values for haemoglobin. You probably know that women of child bearing age, including adolescent girls, are at the highest risk of developing anaemia followed by preschool children, school children and adult men. A number of sample surveys carried out recently in our country showed that 60-80% of pregnant women had haemoglobin levels below 11 g/dl about 10 percent had severe anaemia with less than 8 g/dl. Even among preschool children, about 40-50% were anaemic. In the villages near Kolkata, where hookworm infestation was common, more than 90% of the population was anaemic.. These data clearly indicate that in India there is a need to cover the entire population in the intervention programme designed to control anaemia.

So far we have looked at the signs and symptoms and prevalence of iron deficiency anaemia. Let us elaborate on what causes iron deficiency anaemia

Causes of iron deficiency anaemia

Anaemia is a condition in which the blood cannot carry enough oxygen. This may be because there are fewer red blood cells than normal, or because, as mentioned above, there is not enough haemoglobin in each cell. Iron is the main component of haemoglobin. Lack of dietary iron is the world's leading nutritional deficiency and the most common cause of anaemia. Let us get to know about the causes in greater details.

● **Inadequate dietary intake**

The commonest cause of anaemia is dietary inadequacy of iron. The dietary intakes are usually half of the recommended dietary allowances in every age and

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physiological group. In Indian communities, since cereals form the major source of iron, poor bioavailability of iron from the habitual diets is an important cause of iron deficiency. Isotope studies have shown that iron absorption ranges between 2-6 percent, depending upon the type of cereal in the diet. Phytates and tannins present in Indian diet interfere with iron absorption to a significant extent. The chemically determined iron content of the Indian diets is apparently high (15mg/1000 calories), but 30% of it is unabsorbable contaminant iron. The true dietary iron content is, therefore, only 10 mg/ 1000 calories, which can meet the iron requirement of adult men and children less than 6 years, provided their dietary intake meets the energy requirements. However, in order to meet the iron requirements of women in the reproductive age group, either the bioavailability of dietary iron should be improved or additional iron must be supplemented.

Poverty and ignorance

Low purchasing power of the communities and their consequent inability to meet the nutrient requirements, even after spending 80-90% of their income on foods is an important factor contributing to prevalence of nutritional deficiencies. Animal foods help in increasing the bioavailability of iron, but their consumption is low due to the high cost. In addition, due to traditional beliefs and ignorance, locally available inexpensive sources like green leafy vegetables are not fully utilized. Similarly, the utilization of medical and health services is also poor. Box 10 lists different causes of iron deficiency anaemia

Box 10	Causes of Iron Deficiency Anaemia
<ul style="list-style-type: none"> ● Dietary Inadequacy ● Poor bioavailability of iron ● Presence of absorption interfering substances in diet ● Poverty and ignorance 	

Having studied about the causes, let us now learn what happens if iron deficiency anaemia is not prevented or controlled, that is, what its consequences are.

Consequences of iron deficiency anaemia

The consequences of anaemia, particularly in women and children, are quite serious and have far reaching implications as already discussed above. Some of these are listed as follows:

Maternal and perinatal mortality

Severe anaemia in pregnancy is associated with increased risk of maternal and perinatal mortality and foetal wastage. It is estimated that at least 80,000 women die due to anaemia every year.

● **Low birth weight**

In addition, maternal anaemia contributes to high incidence of premature delivery

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and low birth weight and mortality.

- **Physical work and mental performance**

Generally, quite often, women neglect milder forms of anaemia, but there is now evidence showing that even a moderate reduction in haemoglobin can lower resistance to infection and reduce work capacity.

- **Poor cognitive performance in children**

Anaemia in infancy and childhood is associated with poor cognitive abilities and behavioural changes. Box 11 highlights various consequences of IDA.

Box 11	Consequences of Iron Deficiency Anaemia
<ul style="list-style-type: none">● Maternal and perinatal mortality● Low birth weight and prematurity● Reduced physical work capacity● Poor cognitive performance in children	

We have learnt about consequences of iron deficiency anaemia. Next, how do we treat this problem. Read the next section and find out

Treatment of iron deficiency anaemia

Oral iron is the preferred method of treatment of IDA. The dosage is decided depending on the severity of the condition. Generally, in moderate to severe anaemia, 2 tablets of fersolate (each equivalent to 100 mg of elemental iron) are given. In view of side effects like gastric irritation, constipation, black stools and at times joint pains, many patients discontinue treatment. They should, therefore, be advised to consume the tablets after food. In very severe anaemia with very low levels of haemoglobin (< 5- 7 g/100 ml), packed cell transfusion is recommended. This mode of treatment should be considered only after proper evaluation of the subject. Sometimes, parenteral iron therapy is advised when oral iron is not tolerated or in late pregnancies. In view of the risk of some systemic and allergic reactions, this should be given preferably in hospitals.

We have now seen that iron deficiency anaemia is a very common problem in women and children. It thus becomes very important that we learn about different measures to prevent it. The next section focuses on this aspect.

Prevention of iron deficiency anaemia?

As in the case of vitamin B12 deficiency, correction and prevention of dietary inadequacy of iron are important sustainable methods of prevention of iron deficiency anaemia. However, this is a long-term strategy requiring not only improvement in increasing availability of iron in the diets but also changing behaviours of community. In view of the widespread extent of iron deficiency anaemia, alternate methods are required to control anaemia. A mix of approaches

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is necessary. The available methods of prevention and control of anaemia are:

- Supplementation
- Food fortification
- Public Nutrition
- Dietary diversification
- Education (behaviour changes)
- Health care
- Let us review each of these details.

Supplementation

Supplementation with low doses of iron is necessary to prevent anaemia in particular groups of people. Fortified foods and a good diet are not enough if a person is iron deficient and anaemic. Consumption of supplement in the form of pills and syrup will raise iron levels and normalize a person's iron stores. Thereafter, dietary improvement and consumption of fortified foods will prevent iron deficiency. Taking cognizance of the wide spread prevalence of nutritional anaemia, the Government of India launched the 'National Nutritional Anaemia Control Programme' in 1970 to prevent and control nutritional anaemia. A detailed discussion on this programme is presented later in Unit 10. You will learn that the beneficiaries are pregnant women, lactating women, preschool children and family planning acceptors. Under the programme, all the beneficiaries receive one tablet, containing iron and folic acid commonly referred to as folifer tablets, daily for 100 days. While the adult beneficiaries get tablets containing 100 mg of elemental iron and 0.5 mg (500 µg) of folic acid, the children receive 20 mg of elemental iron and 0.1 mg (100 µg) of folic acid. Each beneficiary should receive a total of 100 tablets. In the case of children, each year, 100 tablets are given.

Although the national programme has been in operation for over 30 years, the prevalence of anaemia continues to be very high due to poor implementation of the programme due to the following reasons:

- inadequate and irregular supplies,
- poor coverage due to lack of supervision,
- orientation of health functionaries, and
- absence of nutrition education to the illiterate community.

Fortification

Food fortification is one of the alternatives that ensure consumption of the nutrient regularly in daily diet. Fortification is addition of iron to food items that are regularly consumed by at-risk groups of population. However, the food item should be: centrally produced, inexpensive, consumed in uniform quantities daily, should not alter either the cooking quality of the food item or the taste or colour of the food. At present, of all the food items, salt satisfies these criteria and, hence, could be a suitable vehicle for fortification with iron. Studies conducted at the

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National Institute of Nutrition clearly indicate the feasibility of fortification of salt as a simple method to prevent and control iron deficiency anaemia. Other food items that are being fortified are wheat flour and breakfast cereals, Infant weaning foods are also fortified with iron, as milk is a poor source of iron. In India, the national nutrition policy recommends implementation of food fortification as a method of control of anaemia. Since iodized salt is already being distributed in different parts of the country, the technology of fortification of salt with both iodine and iron has been successfully developed at the National Institute of Nutrition, Hyderabad. Field trials are in progress.

Dietary diversification

It aims to ensure that deficient populations have access to foods rich in iron and also foods rich in vitamin C (since vitamin C helps the body absorb iron). Since the deficiencies of micronutrients are common, what is needed is a strategy, which is self-sustaining, and provides multiple nutrients at a cheaper cost to the needy population. Home gardening and horticulture is an important strategy, which could be easily adopted by the population to whom raising gardening is a daily practice. It does not require large area and, in fact, an area, which can accommodate two cots, is more than adequate to produce nutritious foods for an average family. The advantages of horticulture approach are that it does not require external help and improves the household nutrition security.

Behaviour change communication

In communities that are illiterate and consequently ignorant of the consequences of nutrition disorders and the relationship between diet and disease, increasing awareness of the community about the nutrition needs and various methods of prevention is an important method of control of anaemia. This calls for a change in the behaviour of the community particularly the women. Unfortunately, in all the health and nutrition programmes, education and communication are the weakest components. Use of multimedia particularly the mass media such as television and radio could contribute significantly to the control of anaemias. The health and ICDS functionaries now commonly adopt interpersonal communication. The education efforts should be persuasive, repetitive and supported by adequate audio-visual aids. Street plays and folk arts are also increasingly being used now a days.

Strengthening the public health measures

Parasitic infestations and protozoal infections cause iron deficiency through loss of blood or destruction of red blood cells. Preventing and treatment of malaria and diarrhoea could help in controlling anaemia significantly. Simultaneous education of the community about methods of protection against these would help in the control of anaemia. Box 12 lists various methods of prevention of iron deficiency anaemia

Box 12	Methods of Prevention of Iron Deficiency Anaemia
<ul style="list-style-type: none"> ● Supplementation with iron and folic acid tablets ● Food fortification ● Education on dietary practices 	

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Disease prevention

In the above section, we learnt about signs, prevalence, causes, consequences, treatment and prevention of iron deficiency anaemia. We will now move on to iodine deficiency disorders after answering the questions given in the check your progress exercise 3.

Check Your Progress Exercise 3

1. What is anaemia? List four signs and symptoms of iron deficiency anaemia
.....
.....
2. Fill in the blanks:
 - a) Women of child bearing age, including adolescent girls, are at the risk of developing anaemia.
 - b) A number of sample surveys carried out recently showed that.....% of pregnant women had haemoglobin levels below 11 g/dl.
 - c) The most common cause of iron deficiency anaemia is inadequacy of iron.
 - d) Absorption of iron in the usual Indian vegetarian diet is around..... percent.
 - e) foods help in increasing the bioavailability of iron, but their consumption is low due to the high cost.
- 3) Answer the following briefly
 - a) List four main consequences of iron deficiency anaemia
.....
.....
 - b) Why does prevalence of iron deficiency anaemia continue to remain high in India?
.....
.....

Let us now learn about Iodine deficiency Disorders

3.4.3 Iodine Deficiency Disorders

Iodine is a micronutrient required for the normal mental and physical growth and development of man. Iodine deficiency is a naturally occurring ecological phenomenon that is present in many parts of the world. IDD affects over 740

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people, of the world's 30% of the remainder are at risk. About 60 million people our country are estimated to suffer from goitre and another 3 million from cretinism. About 200 million populations are at developing iodine deficiency disorders. Traditionally endemic goitre belt in our country across the entire sub- Himalayan belt from Jammu and Kashmir to Arunachal Pradesh, In addition, a number of r— regions have been identified in Andhra Pradesh, Karnataka, Kerala, Maharashtra and Madhya Pradesh.

The iodine deficiency disorders (IDD) includes a spectrum of disabling conditions affecting the health of human beings starting from foetal life through adulthood resulting from inadequate dietary' intake of We will explain this term in more detail in the next few paragraphs. us begin our study on IDD by getting to know the and symptoms of this disabling condition.

Sips and symptoms of iodine deficiency disorders

Before we discuss signs and symptoms of iodine deficiency disorders, let us first understand we need iodine in our body. Iodine is required in our body for synthesis of thyroxin, which you may how is the hormone produced by the thyroid iodine intake falls below the recommended levels, the thyroid is no longer able to synthesize sufficient amounts of thyroxine hormone. One Of fractures of deficiently disorders is goitez Thyroid gland in its efforts to produce the required thyroxine) in presence of iodine deficiency, swells up leading to of the thyroid as illustrated in Figure 3.4. This condition is known as goitre, "which is a cosmetic problem. The real health problems are because of functional failure of thymid in different stages of individual Let us to know about these problems.

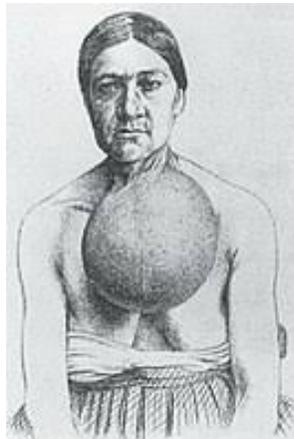


Figure 3.4: Goitre

Iodine deficiency in the mother interferes with the development of the unborn child. In many cases, iodine deficiency can cause abortions, congenital abnormalities and increased perinatal mortality. The major effect of foetal iodine deficiency is endemic cretinism. It is characterized by growth failure, mental deficiency, deaf mutism and spastic paralysis of legs. Inadequate production of thyroid hormone leads to hypothyroidism. Hypothyroidism is the principal factor responsible for the damage done to the developing brain and the other harmful effects known collectively as iodine deficiency disorders (IDD). Populations residing in iodine deficient areas exhibit low intelligence, lack of initiative and poor decision making

capacity. Box 13 highlights various signs and symptoms/manifestations of IDD.

Box 13	Manifestations of IDD
<ul style="list-style-type: none"> ● Goitre ● Abortions, Congenital abnormalities, ● Increased perinatal mortality ● Cretinism 	

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You have learnt about signs and symptoms of IDD. We hope having gone through the discussion above the whole spectrum of disabling conditions caused due to IDD must be clear. Let us now look at the prevalence of IDD.

Prevalence of IDD

We can determine the prevalence of IDD by conducting population surveys. Most of the population surveys are based on clinical assessment of goitre and cretinism, which are the two classical features of iodine deficiency. Before we discuss the prevalence of IDD, let us find out the WHO criteria for classification of goitre size. For clinical assessment of goitre, a standard technique based on palpation of thyroid is used through which goitre size can be assessed. Table 3.10 gives the WHO criteria for classification of goitre size. The sum of grades 1 and 2 provides Total Goitre Rate (TGR). IDD is considered to be a public health problem, if the TGR is more than in 10% of the children aged 6-12 years in an area.

Grade '0'	No goitre (Neither palpable nor visible, palpable but the size is less than the distal phalange)
Grade 'I'	Not visible when neck is in normal position, but palpable (The size of the enlargement of the gland should be more than the size of the distal phalange of the thumb of the subject.
Grade 'II'	Visible from the minimum distance.

Table 3.10: Classification of goitre

Now let us look at the prevalence of goitre and cretinism in India. Out of 208 districts surveyed by the Directorate General of Health Services of Government of India in the country, 182 districts have been found to be endemic for goitre, the prevalence ranging from 10% in Ranchi district to 96% in some districts of Mizoram. It is estimated that, today, among the 200 millions living in endemic areas, more than 54 million people in India are suffering from endemic goitre and 8.8 million from different grades of mental/motor handicaps. In the villages of Uttar Pradesh and Bihar where the goitre prevalence was high, deaf-mutism, mental retardation and other clinically detectable defects attributable to environmental iodine deficiency

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were found in 4% of the children.

Epidemiological assessment of IDD also requires a measure of dietary iodine, which is provided by urinary iodine excretion. Determination of iodine in random urine samples, which is more convenient, provides a good indication of the level of iodine nutrition. Urinary iodine content of 10 mg/dl is normal. In some of the areas, despite prevalence, which is indicative of endemicity, urinary iodine levels are in the normal range.

It must be evident to you that IDD is widely prevalent in our country. Let us now review the causes of IDD.

Causes of iodine deficiency disorders

We have studied above that iodine deficiency is a naturally occurring ecological phenomenon that is present in many parts of the world. The main cause of iodine deficiency in soils is leaching by floods or high rainfall. Mountainous regions including the Himalayas therefore have some of the highest prevalence of iodine deficiency. Iodine deficiency also occurs due to flooding; for example, in India around the Ganges. In areas of endemic iodine deficiency, the water and foods (plants and animals grown there) have low iodine content. Let us now get to know about the causes next.

- **Environmental deficiency of iodine:** The ultimate causative factor is deficient intake of iodine. Iodine occurs in soil and sea as iodide, the ions of which are oxidized by sunlight to elemental iodine (which is volatile). Iodine in the atmosphere returns to soil by rain. The return of iodine, however, is slow and small in amount compared with original loss. In hilly slopes, repeated flooding leaches out the iodine from soil or erodes topsoil causing iodine deficiency in the soil. All crops grown in this soil will, therefore, be iodine deficient. As a result, human and animal populations, which are totally dependent on food grown in such soil, become iodine deficient.
- **Goitrogens:** Certain chemical substances like thiocyanates, phenols, disulphides, flavanoids etc, found in the environment, can interfere with iodine metabolism. These substances are known as goitrogens, which could cause goitre. Common foods such as cabbage, sorghum, finger millets and mustard contain goitrogens. Although excessive intake of such foods can cause goitre, this appears to be of secondary importance in the etiology of endemic goitre, at least in India. Let us now review the consequences of IDD.

What are the consequences of IDD?

As discussed earlier under signs and symptoms, the consequences of IDD include: mental retardation, other defects in the development of the nervous system, goitre, physical sluggishness, growth retardation, reproductive failure, increased childhood mortality and lowered economic productivity. Cretinism is the result of iodine deficiency during pregnancy, which adversely affects foetal thyroid function. Neurological cretinism is characterized by poor cognitive ability, deaf mutism, speech defects, and proximal neuromotor rigidity. It is much more prevalent than myxoedematous cretinism which includes hypothyroidism with dwarfism.

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Maternal iodine deficiency during pregnancy is associated with a higher incidence of stillbirths, abortions and congenital abnormalities. Iodine deficiency has been called the world's major cause of preventable mental retardation. So then what can be done to prevent this disabling condition? Read find out

Prevention of IDD

Many approaches to reduce iodine deficiency have been formulated. Some of these are reviewed herewith:

Iodized salt distribution: Since IDD is due to reduced uptake of iodine by human body from the environment, the control measures essentially aim to ensure sufficient intake of iodine by persons living in iodine deficient environment. The oldest and the commonest control measure is fortification of common salt with potassium iodate. In India, the efficacy of iodized salt in the control of endemic goitre was first established in Kangra Valley of Himachal Pradesh. Subsequently, the Government of India launched the National Goitre Control Programme, in 1962, to supply iodized salt in endemic areas. Although the programme has been in operation for the last three decades, it has gained momentum only recently. Available evidence indicates that iodized salt consumption is quite safe even in non-endemic areas.

- **Communication campaign:** A mass communication campaign is needed to create awareness in the community about the consequences of IDD and the benefits of iodized salt. The community should be made aware of the ill effects of iodine deficiency and the advantages of iodized salt. They should be encouraged to consume iodized salt daily.
- **Double fortified salt:** Since iron deficiency anaemia and iodine deficiency disorders often co-exist, the most effective approach to control these public health problems would be simultaneous fortification of salt with iron and iodine. The technology for double fortification of salt has been successfully developed at NIN. Laboratory studies have shown satisfactory results with respect to stability and bioavailability of iron and iodine. Large-scale community trials are underway for field-testing the double fortified salt
- **Iodized GI:** The other approach employed as a specific measure for women and children in hyper-endemic areas is injection of iodized oil. Intramuscular injection of iodized oil has been used for tackling goitre and cretinism in hyper-endemic areas in many countries of the world. The advantage of the injection procedure is that a single dose of 1 ml will provide protection for 3-5 years. Though, it has been found to be effective, the high cost and the difficulty in reaching all the victims of IDD make this approach less practicable. The use of disposable syringes, as a result of the risk of hepatitis-B and HIV AIDS, is now mandatory. Box 14 highlights methods of prevention and control of IDD.

Box 14	Prevention and Control
<ul style="list-style-type: none"> ● Iodized salt ● Iodized oil injection 	

- Double fortified salt
- Mass communication

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We have just learnt about manifestations, prevalence, causes, prevention and control of iodine deficiency disorders. Finally, let us now learn briefly about zinc deficiency

3.4.4 Zinc Deficiency

Evidence suggests that nearly one-third of preschool children in lower-income countries have stunted growth, and that a considerable proportion of this growth failure is likely attributable to zinc deficiency

Zinc is a cofactor for a large number of 200 metalloenzymes, which regulate several cellular functions of the body. Zinc is essential for cell division and growth, stabilization of bio-membranes, protection against free radical damage, immune function and its possible role in testosterone production. Zinc, in the recent past, has attained an important place as an important trace element. We will briefly study here the signs and symptoms and the consequences of zinc deficiency and the recommended daily requirements for zinc.

Consequences of zinc deficiency

Signs of zinc deficiency are the result of suppression of one or more of its biological functions. The clinical features of zinc deficiency are nonspecific and the disorder is of slow onset from the age of weaning. Poor appetite is the earliest clinical feature of zinc deficiency leading to growth retardation. Its characteristic manifestations are skin lesions, loss of hair, failure to thrive and diarrhoea. Zinc deficiency can occur in several pathological conditions like chronic alcoholic liver disease, sickle cell anaemia and chronic malabsorption like celiac disease.

The severity and manifestations of frank zinc deficiency may vary at different ages. In infants up to 2 months of age, diarrhoea is a prominent symptom. Early zinc deficiency leads to cognitive function impairment, behavioural problems, mood changes, memory impairment, problems with spatial learning, and neuronal atrophy (optic and cerebellar). Skin problems become more frequent and gastrointestinal problems, anorexia, and mood changes less frequent as the child grows older. Alopecia (hair loss), growth retardation, blepharconjunctivitis (inflammation of eyelids and conjunctiva), and recurrent infections are common findings in school-aged children. Chronic non-healing leg ulcers and recurrent infections occur among the elderly.

Adverse consequences of maternal zinc deficiency on pregnancy outcome include intrauterine growth retardation, low birth weight, poor foetal neurobehavioral development and increased neonatal morbidity. Adverse maternal outcomes include preterm delivery and pregnancy induced hypertension. Figure 3.5 summarizes the consequences of maternal zinc deficiency. Outcomes observed in randomized, controlled zinc supplementation trials are highlighted in the Figure, indicating greater confidence in their association with zinc deficiency. Outcomes (which are not in italic) are those derived from observational studies of

human maternal zinc status and pregnancy outcome, and their association with zinc deficiency can be considered only tentative

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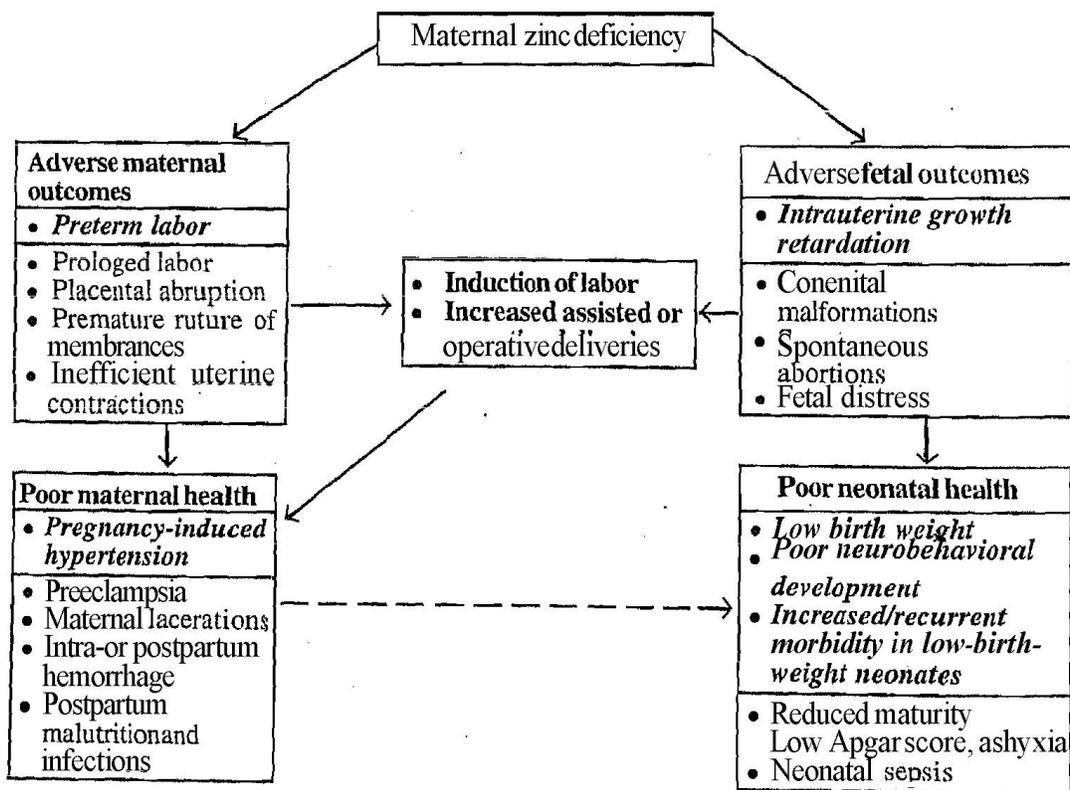


Figure 3.5: Possible consequences of maternal zinc deficiency birth outcomes and maternal and perinatal health.

Source: International Zinc Nutrition Consultative Group (IZiNCG) Technical Document #1

Considering the likely common occurrence of zinc deficiency and the critical roles of adequate zinc nutrition in supporting normal growth and development, preventing morbidity from common infections, and possibly reducing child mortality, it is important that we review the zinc requirements. Table 3.11 gives the estimated physiologic requirements for absorbed zinc during childhood by age group and sex, and during pregnancy and lactation, as developed by expert committees of the WHO and as reviewed by IZiNCG.

WHO			Revision suggested by Zinc		
Age sex	Reference weight (kg)	Physiologic requirement (mg/day)	Age sex	Reference weight (kg)	Physiologic requirement (mg/day)
6-12 mo	9	0.84	6-11mo	9	0.84
1-3 yrs	12	0.83	1-3 yrs	12	0.53
3-6 yrs	17	0.97	4-8	21	0.83

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6-10 yrs	25	1.12	9-13 yrs	38	1.53
10-12yrs,M	35	1.40			
10-12 yrs,F	37	1.26			
12-15yrs,M	48	1.82			
15-18 yrs M	64	1.97	14-18 yrs, M	64	2.52
15-18yrs,F	55	1.54	14-18 yrs, F	56	1.98
Pregnancy -	2.27		Pregnancy	-	2.68
Lactation -	2.89		Lactation	-	2.98

Table 3.11: Estimated physiologic requirements for absorbed zinc during childhood by age group and sex, and during pregnancy and lactation, as developed by expert committees of the WHO and as reviewed by IZiNCG

Zinc occurs in a wide variety of food sources, but is found in highest concentrations in animal-source foods, particularly in the organs and/or flesh of beef, pork, poultry, fish and shellfish, and with lesser amounts in eggs and dairy products. Zinc content is relatively high in nuts, seeds, legumes, and whole-grain cereals, and is lower in tubers, refined cereals, fruits, and vegetables. Average ranges of zinc content (mg/ 100 g fresh weight) and zinc density (mg/100 kcal) in a variety of food sources are summarized in Table 3.12.

Food	Zinc content	
	mg/100 g	mg/100 kcal
Lives, kidney (feef, poultry)	4.2-6.1	2.7-3.8
Meat (beef, pork)	2.947	1.1-2.8
Poultry (chicken, duck, etc.)	1.8-3.0	0.6-1.4
Seafood (fish etc.	0.5-5.2	0.3-1.7
Eggs (chicken, duck)	1.1-1.4	0.7-0.8
Daily (milk, cheese)	0-4-3.1	0.3-1.0
Seed, nuts (sesame, pumpkin, almond, etc.)	2.9-7.8	0.5-1.4
Beans, lentils (soy, kidney bean, chicken, etc.)	1.0-2.0	0.9-1.2
Whole-graincereal (wheat, maize, brown rice, etc.)	0.5-3.2	0.4-0.9
Refind cereal grains (white flour, white rice, etc	0.4-0.8	0.2-0.4
Bread (white flour, yeast	09	0.3
Tubers	0.3-05	0.2-0.5
Vegetables	0.108	0.3-3.5
Fruits	0-0.2	0-0.6

Table 3.12: Zinc content, zinc density of commonly consumed foods

Leucocyte zinc, eiythrocyte zinc, hair zinc and saliva zinc are some of the indices suggested, for assessment of Zn status, though they not considered to be good indices. Though zinc deficiency is not a public health problem, some

protagonists recommend zinc supplementation particularly to children. So far, there is no agreement on this aspect. Finally, because of the likely widespread occurrence of zinc deficiency, especially in low-income groups, and the important health consequences of this condition, efforts are needed to define more precisely the risk of zinc deficiency in vulnerable populations and to develop programs to control this condition where necessary.

3.5 LET US SUM UP

In this unit you learnt about the macronutrient and micronutrient deficiencies in our body. Protein Energy Malnutrition (PEM) is a macronutrient deficiency or a deficiency of calorie and protein. Of all the micronutrient deficiencies, those of vitamin A, iron and iodine affect millions of populations and contribute to high morbidity and mortality. Let us summarize each of this deficiency as follows

- PEM forms the most important nutritional deficiencies of public health significance. The term PEM is used to describe a wide range of clinical and subclinical conditions in the child. Although the prevalence of severe forms of clinical conditions i.e., kwashiorkor and marasmus has declined substantially over a period of time, the prevalence of subclinical forms of PEM remains very high. About 47% of children <3 years of age remain underweight.
- Vitamin A deficiency manifests in the form of eye lesions, which are grouped under Xerophthalmia. Causes of Vitamin A deficiency are poor diet, poverty, ignorance and infections. Vitamin A deficiency can be prevented through food based approach (which includes improving diet through food fortification and home gardening), supplementation, treatment of infections and behaviour change communication.
- Iron deficiency anaemia is the commonest micronutrient deficiency in the world. Women of child bearing age, including adolescent girls, are at the highest risk of developing anaemia followed by preschool children, school children and adult men. Consequences of iron deficiency anaemia include maternal and perinatal mortality, low birth weight and prematurity, reduced physical work capacity and poor cognitive performance in children. Iron deficiency anaemia can be prevented by supplementation, food fortification, dietary diversification, behaviour change communication and appropriate health care.
- Iodine is required for the synthesis of thyroid hormone. Iodine deficiency leads to range of disorders affecting fetus, newborn, school children and adults. The manifestations of iodine deficiency disorders include goitre, abortions, congenital abnormalities, cretinism, deaf mutism and low intelligence. Consumption of iodized salt is one of the most cost effective and feasible strategy to prevent iodine deficiency disorders

3.6 GLOSSARY

Bronchopneumonia : inflammation of lungs

Bronchopneumonia	: inflammation of lung
Congenital	: by birth
Deaf mutism	: a person who is deaf and dumb
Endemic	: localized to certain region
Septicemia	: blood poisoning

3.7 CHECK YOUR PROGRESS

- 1). What is the Prevalence of PEM?
- 2). What are the Different Types of PEM ?
- 3). How do we Treat PEM?
- 4). What are the Clinical problems due to Deficiency of Vitamin A ?
- 5). Why does prevalence of iron deficiency anaemia continues to remain high in India?

4**NUTRITIONAL PROBLEMS-2****NOTES****STRUCTURE**

- | | |
|-----|---|
| 4.1 | Learning Objective |
| 4.2 | Introduction |
| 4.3 | Vitamin Deficiency |
| | 4.3.1 Beriberi |
| | 4.3.2 Ariboflavinosis (Riboflavin Deficiency) |
| | 4.3.3 Pellagra |
| | 4.3.4 Folic Acid and B Deficiency |
| | 4.3.5 Scurvy |
| | 4.3.6 Rickets and Osteomalacia |
| 4.4 | Fluorosis |
| 4.5 | Lathyrism |
| 4.6 | Let Us Sum Up |
| 4.7 | Glossary |
| 4.8 | Check Your Progress |

4.1 LEARNING OBJECTIVE

After studying this unit, you should be able to:

- describe the significance of common deficiencies of vitamins B-complex, C and D,
- understand the problem of fluorosis and lathyrism in Indian population
- identify cases of these nutritional problems,
- enumerate their causes and consequences, and
- educate the families and communities about the methods of their prevention.

4.2 INTRODUCTION

In the previous unit, we learnt about protein energy malnutrition and the commonly occurring micronutrient deficiencies of vitamin A, iron and iodine. These nutritional deficiencies are widely prevalent in India and other developing countries. They cause illness and death in a large number of people, especially

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in women and children. Other micronutrients found in food, including vitamins such as thiamine, niacin, riboflavin, folate, vitamins C and D can also significantly affect health when dietary deficiencies exist. As a public nutrition professional, it is very important for us to know about these problems. In this unit, we will learn about the deficiency diseases caused when there is a lack of these vitamins in the diet. We will also learn about fluorosis and lathyrism. However, these are not vitamin deficiency diseases. Fluorosis is caused by excess (f fluoride in water. Lathyrism is caused by neurotoxin present in kesari dal. These diseases cause many complications in our body. So it is important for us to learn about them.

4.3 VITAMIN DEFICIENCIES

We already know that vitamins are very essential to support growth and development in our body. They are not synthesized by our body and so need to be supplied in the daily diets in small quantities to satisfy the requirements and maintain good health. B-complex vitamins and Vitamin C being water-soluble are not stored in the body, are easily excreted and hence, their deficiencies are generally encountered. In addition, deficiency of a fat soluble vitamin - vitamin D is also encountered in some areas. Box 1 lists clinical deficiency related to each vitamin.

Box 1	Clinical Deficiency Related to the Vitamins
Vitamins	Clinical deficienc
Thiamine (B ₁)	Beriberi
Riboflavin (B ₂)	Aliboflavinosi
Niacin	Pellagra
Folic Acid and B ₁₂	Megaloblastic and Pernicious anaemia
Ascorbic acid (vitamin C)	Scurvy
Vitamin D	Rickets and Osteomalacia

Let us elaborate upon each of the vitamin deficiency in detail. We shall begin with deficiency of thiamine i.e. beriberi. We will study about the manifestations, cause, prevention and treatment of thiamine deficiency

4.3.1 Beriberi

Beriberi, which is caused by the deficiency of vitamin B₁ (i.e. thiamine), was once a major disease problem in many parts of the developing world, including India. Today, the prevalence of beriberi has been greatly reduced. Beriberi occurs in people whose staple diet consists mainly of polished white rice, which contains little or no thiamine. Therefore the disease has been seen traditionally in people in Asian countries (especially in the nineteenth century and before) and in chronic

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alcoholics with impaired liver function.

Bontius (1642) and Nicolaas Tulp (1652) were the Dutch physicians, who gave the first clinical descriptions of beriberi. Tulp's description of beriberi was a detailed one, but interestingly he had no clues that it was a dietary deficiency disease. This discovery came more than two hundred years later, In fact, thiamine deficiency, which causes damage to central and peripheral nervous system and the heart, has been known well before even the vitamin (vitamin B₁) was discovered in the year 1926. The disease is now rather rare. Let us learn about the manifestations of this disorder.

Manifestations

A brief review of the manifestations of thiamine deficiency is also presented in the Advance Nutrition Course (MFN-004) in Unit 8. We suggest you look up the unit now. You would realize that beriberi is of different types described as cardiac beriberi (wet beriberi), dry beriberi and infantile beriberi. The severity of deficiency depends upon the degree and duration of deficiency. The early clinical features are anorexia and dyspepsia, associated with heaviness and weakness of the legs. There is tenderness of the calf muscles on pressure with complaints of 'pins and needles' pain and numbness in the legs. The knee jerks are usually sluggish but occasionally slightly exaggerated. The subjects feel weak and get easily exhausted while working. A brief description of the different types of beriberi mentioned above follows.

Cardiac beriberi is the wet type and the signs and symptoms are of ventricular failure characterized by difficulty in breathing, particularly on physical exertion, palpitation, cyanosis and oedema. Remember, oedema is the important feature of wet beriberi. It may develop rapidly and involve not only the legs but also the face, trunk and serous cavities.

Dry beriberi is milder form of the disease with polyneuropathy with clinical signs characterized by numbness, burning sensation - commonly referred to as 'pins and needles' in the limbs, tenderness of muscles, muscle cramps and weakness in limbs, The muscles become progressively wasted and weak and walking becomes difficult. The emaciated subject needs the help of sticks to stand and walk and finally becomes bed-ridden, If not treated, the patients will die

Infantile beriberi, seen among breast-fed infants, perhaps, is due to low thiamine in mother's milk. Two types of infantile beriberi are known. These are: (i) cardiovascular type, and (ii) neuritic type. Let us get to know about them.

i) The cardiovascular type (wet): It manifests itself in babies between the ages of 2 and 4 months. The onset is acute with classical signs and symptoms of congestive cardiac failure, tachycardia (rapid heartbeat), dyspnoea (difficulty in breathing), enlargement of the heart, 'elevated venous pressure, enlarged tender liver, dependent oedema and oliguria (infrequent urination). In some infants, cyanosis and pulmonary oedema may develop rapidly and death may ensue in a matter of few hours.

ii) The neuritic type (dry): It shows typical manifestations of peripheral

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neuropathy, tenderness of calf muscles, diminished tendon jerks, hyperaesthesia, is rare in children, but a pseudo-meningeal form, (cerebral or Wernicke's syndrome) tends to occur in older infants between 8 and 10 months of age. The accent is predominantly on the C.N.S. with sensorial alteration (irritability, apathy, drowsiness and coma) signs of raised intracranial tension, staring expression and varying degrees of neurologic deficit

Having studied about the manifestations, it is important to understand that if not attended to immediately, beriberi can lead to loss of speech, convulsions, coma and ultimately death. In chronic alcoholics, thiamine deficiency is characterized by encephalopathy (disease of the brain), which manifests as confusion, polyneuropathy, and certain changes in eyes. It may cause forgetfulness, depression and delirium. For your recapitulation Box 2 lists types of beriberi.

Box 2	Types of Beriberi
<ul style="list-style-type: none">● Cardiac Beriberi● DIY Beriberi● Infantile Beriberi● Poly neuropathies	

Next, let us learn about the causes of beriberi.

Causes

Some of the important causes of beriberi are consumption of highly polished rice and improper cooking practices such as throwing away the excess water after cooking the rice. You must have read in the Advanced Nutrition Course (MFN-004) that the thiamine requirements are related to the quantity of calories consumed by an individual viz 0.5 mg per 1000 calories/day. Consumption of foods of higher energy with lower thiamine content leads to lower vitamin energy ratio. The at-risk groups include children, adolescents, athletes and elderly. Deficiency of thiamine is also very common among chronic alcoholics. So then what measures can we adopted to treat and so prevent this disorder? Read the next section and find out

Treatment

The specific treatment of beriberi is the administration of thiamine. Parenteral administration of thiamine in doses of 10-20 mg twice or thrice a day gives dramatic results. Care is required as it can lead to anaphylactic (hypersensitivity) reactions. Oral administration of 5-10 mg of thiamine for longer durations is preferred. Larger doses are wasteful.

Let us next review how beriberi can be prevented.

Prevention

In the community, there are several possible approaches to the prevention of beriberi. Diversification of the diet or the encouragement of the use of parboiled or undermilled rice i.e. avoiding excess milling and the consequent high polishing of rice are logical approaches. Similarly, adopting proper cooking practices such as not using and throwing excess water for cooking of rice would help in the retention of thiamine. Parboiling and hand-pounded rice are good sources of vitamin B I. The communities should be educated to consume foods regularly, which are rich in thiamine (such as whole grain cereals, raw and hand-pounded or parboiled rice, pulses, wheat germ etc.) and should be encouraged to avoid excessive consumption of alcohol.

After thiamine, next let us learn about the manifestations, cause, prevention and treatment of deficiency of riboflavin i.e. ariboflavinos

4.3.2 Ariboflavinosis (Riboflavin Deficiency)

Riboflavin is one of the important B-complex vitamins, the deficiency of which is encountered in our communities frequently. Surveys carried out in different areas of the country indicate that it is prevalent among the poorer groups of population of all ages, particularly among children and pregnant and nursing women. It is also common in elderly population.

Riboflavin, we know, is involved as a cofactor in a number of the respiratory enzymes (flavin adenine dinucleotide (FAD), and flavin mononucleotide(FMN)), which are involved in energy metabolism. Thus it plays a major role in intermediary metabolism. The dietary deficiency of this vitamin, therefore, leads to a condition called ariboflavinosis, characterized by mouth lesions. Let us learn about its manifestations in greater details.

Manifestations

Lesions in mouth and tongue, skin, corneal and haematological changes, characterize the deficiency of riboflavin. The commonest signs are angular stomatitis (cracks at the angles of the mouth), glossitis (sore tongue) and cheilosis (ulcers on lips) as illustrated in Figure 4.1. Angular stomatitis may progress to fissures at the angles of the mouth. Sometimes, fungal infection may supervene. In glossitis, the tongue is acutely inflamed and papillae (projections) on the tongue become hypertrophic (prominent), sometimes, the papillae also get atrophic (decrease in size), producing bald tongue. The hypertrophic papillae produce the classical magenta red tongue and as the disorder advances, the papillae get atrophic. In cheilosis, one of the features of chronic deficiency, mucous membrane of the lips denudes and ulcers are formed. Nasolabial dyssebaceae, a seborrheic type of dermatitis involving facial skin is also often seen in ariboflavinosis. Rarely, eye symptoms like photophobia (inability to see brightness) are also reported. Corneal vascularization may also occur in riboflavin deficient. Box 3 summarizes the manifestations of riboflavin deficiency

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a) Angular stomatitis b) Glossitis c) Cheilosis

Figure 4.1: Manifestations of riboflavin deficiency

Box 3	Manifestations of Riboflavin Deficiency
<ul style="list-style-type: none">• Angular stomatitis• Glossitis• Cheilosis• Nasolabial Dyssebaceae	

Let us learn about the causes of riboflavin deficiency, nex

Causes

Die'tary inadequacy is usually the cause of riboflavin deficiency. Inadequate consumption of pulses, nuts and milk products, which the households belonging to the low socioeconomic groups cannot afford, is the main reason for the wide spread riboflavin deficiency in the country. Alcoholism, malabsorption, tuberculosis, hyperthyroidism and chronic infections are also associated with ariboflavinosis. Certain drugs can also induce it.

So then how can ariboflavinosis be treated? Let's find ou

Treatment

Oral administration of 5-10 mg of riboflavin daily is often satisfactory to treat riboflavin deficiency. In subjects suffering from rnalabsorption, parenteral riboflavin may be given

Let us learn how we can prevent riboflavin deficienc

Prevention

Improvement of diets to ensure adequate riboflavin daily is the most rational solution to prevent riboflavin deficiency. For poorer populations, foods providing riboflavin like pulses, nuts and milk products are expensive. Supplements of riboflavin to vulnerable segments like ' pregnant women are often recommended

Next, let us move on to the deficiency of niacin i.e. pellagra. We will study about

the manifestations, cause, prevention and treatment of pellagra.

4.3.3 Pellagra

Pellagra was considered to be an infectious disease until the early 20th century. It was only in 1917 that Joseph Goldberger succeeded in proving that the disease was caused by nutritional deficiency

Pellagra is a disease that occurs when a person does not get enough niacin (one of the B complex vitamins) or tryptophan (an amino acid) in their diet. It can also occur if the body fails to absorb these nutrients. Pellagra, due to niacin deficiency, was very common in countries like Mexico where maize was the staple. Niacin was demonstrated to be anti pellagra factor in 1937. What are the manifestations of pellagra? The next section focuses on this aspect.

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Manifestations

Pellagra is seen generally in individuals in the age group of 20 and 50 years, in both the sexes. To start with, it may manifest with nonspecific symptoms like weakness, limited capacity for work, loss of appetite, nausea, early fatigue and some gastrointestinal disturbances, anxiety and sleeplessness. It is sometimes reported that considerable proportion of patients attending mental hospitals may be suffering from pellagra. The classical manifestations of niacin deficiency are dermatitis, diarrhoea and dementia (commonly referred to as 3 Ds) and can lead to death (the fourth D).

The dermatological changes, called "pellagra", are usually the most prominent. Dermatitis in pellagra is seen typically in areas exposed to sun (photosensitive). It is seen on the exposed parts of the body like the upper and lower extremities, face and neck as can be seen in Figure 4.1(a). It may be symmetrical and bilateral (on both the sides). The lesions are aggravated by exposure to skin. The lesion starts with erythema resembling sunburn, which is symmetrically distributed on the parts of the body exposed to direct sunlight-the backs of the hands and forearms up to the rim of the sleeves ("pellagra gloves"), the feet and legs up to the edge of the trousers or skirt, the forehead, and on the nose and cheeks in a butterfly distribution. The skin lesions on the neck appear in the form of necklace, generally referred to as "Casal's necklace" as illustrated in Figure 4.2(b).



(a) Skin lesion



(b) Skin lesion the neck

Figure 4.2: Manifestations of pellagra

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Pellagra patients usually complain of nausea, excessive salivation, a burning sensation in the epigastrium, and diarrhoea. Diarrhoea, due to inflammation of gastro-intestinal tract could be bloody in nature. In fact, the mucous membrane of the gastrointestinal tract is inflamed causing enteritis and gastitis. Signs of B-complex deficiency like glossitis are very common in pellagra. The mouth is sore and the tongue is brilliant or beef red in colour and swollen. Cheilosis and angular stomatitis are seen in niacin deficiency, though these may, in part, be a result of a simultaneous riboflavin deficiency

As described above, early neurological symptoms associated with pellagra include anxiety, depression, and fatigue. Later symptoms include apathy, headache, dizziness, irritability and tremors. In early cases the manifestations are psychoneurotic, later, lesions affect the nerves. Dementia, where due to derangement of mental functions, the patient suffers from insomnia, disorientation, confusion and even delirium. There may be changes in electroencephalogram

Box 4 summarizes the clinical manifestations of pellagra.

Box 4		Clinical Manifestations of Pellagra in Adults	
Body System		Typical lesions	
Skin		Initial changes: temporary redness like that of sunburn Hyper pigmentation and thickening of skin Dark red or purplish eruptions followed by desquamation Lesions are bilateral or symmetrical involving areas of friction and exposure i.e. face, neck, hands and feet	
Mouth		Gingivitis, stomatitis and glossitis, tongue is swollen and beefy red in colour	
Gastrointestinal tract		Diarrhoea	
Central Nervous System		Progressive dementia with apprehension and confusion in the early stages progressing to severe derangement.	

Let us now learn how pellagra is caused.

Causes

Pellagra is a disease closely associated with poverty, a low standard of living and poor environmental sanitation. The disease is associated with poorer communities whose staple is either maize or jowar. Maize has a low tryptophan content and a relatively low niacin content which, in addition, is in the bound form so that only about 30% is bioavailable. Tryptophan, the amino acid, is the precursor of nicotinic acid. You may recall studying in the Advance Nutrition Course (MFN-004) that 60 mg of tryptophan is equivalent to 1mg of nicotinic acid. The daily requirement of niacin are thus affected by the quantity and quality of protein in the diet, particularly the tryptophan content. In communities depending on

jowar as staple, pellagra is attributed to metabolic changes caused by excess of amino acid leucine. Pellagra is also observed in alcoholics and those suffering from malabsorption.

Let us learn how pellagra can be treated.

Treatment

The patients with pellagra can be treated with a diet containing adequate amounts of protein, amino acid tryptophan or niacin. Oral administration of 100-300 mg of nicotinic acid every day is adequate except in cases with severe diarrhoea. Patients should also receive other B-complex vitamins, particularly riboflavin and pyridoxine to take care of neurological manifestations. The response to treatment is dramatic in the case of mental symptoms, which show improvement in 2-3 days. Three to four weeks treatment is required for curing skin changes. However, prevention is better than cure. So then let us study how we can prevent pellagra.

Prevention

Replacement of the staple from jowar or maize with cereals containing good quality protein can prevent pellagra. Development and propagation of strains of jowar that are low in leucine could be one of the approaches. In areas which are endemic to pellagra, fortification of foods with niacin is another alternative. Fortunately, with changes in the quality of diet, particularly reduction in the consumption of maize and jowar, pellagra has been averted, to a large extent, in India.

Let us now learn about the deficiency of folic acid and Vitamin B₁₂ deficiency. We will study about the manifestations, cause, prevention and treatment of these deficiencies

4.3.4 Folic Acid and B₁₂ Deficiency

Folic acid and vitamin B₁₂ are essential for the synthesis of nucleic acids and amino acids. In the recent past, folic acid is considered to be important to prevent neural tube defects in foetus. In this context it is important for us to study about the deficiency conditions associated with this vitamin. On the other hand nutritional deficiency of B₁₂ is rare. Let us review the symptoms, causes, prevention and treatment of folic acid and Vitamin B₁₂ deficiency

Clinical Manifestations of Folic Acid and Vitamin B₁₂ Deficiency

The deficiency of folic acid the water-soluble vitamin of B-complex group leads to megaloblastic anaemia. Megaloblastic anaemia, you may recall studying earlier in the Applied Physiology Course (MFN-001) in Unit 2, is a blood disorder characterized by anaemia, with red blood cells that are larger than normal, usually resulting from a deficiency of folic acid or of vitamin B₁₂. Though not as common as iron deficiency anaemia, folic acid deficiency is observed in as high as 40-50% of anaemia in pregnant women. Both peripheral smears of blood and bone marrow show macrocytes (larger RBC) as shown in Figure 4.3. The white cell count may also be less.

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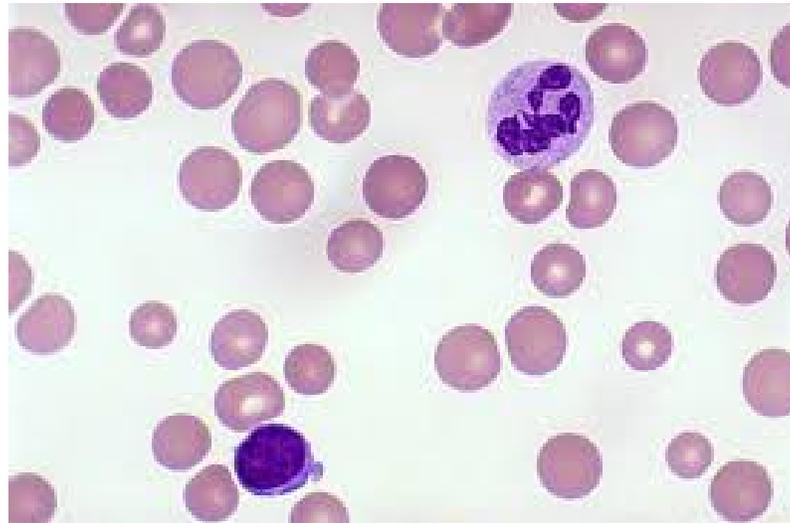


Figure 4.3: Large oversized red blood cells seen in megaloblastic anaemia

Vitamin B₁₂ deficiency, on the other hand, leads to what is known as pernicious anaemia, which is a type of megaloblastic anaemia, which could be, considered as genetic in nature. Pernicious anaemia is caused by a lack of intrinsic factor, a substance needed to absorb vitamin B₁₂ from the gastrointestinal tract. Vitamin B₁₂ in turn, is necessary for the formation of red blood cells. Inadequate vitamin B₁₂ gradually affects sensory and motor nerves, causing neurological problems to develop over time. Because vitamin B₁₂ is needed by nerve cells and blood cells for them to function properly, deficiency can cause a wide variety of symptoms, including fatigue, shortness of breath, tingling sensations, difficulty in walking, and diarrhoea. In adults, it may lead to peripheral neuritis and some psychotic changes. In children, who are breast fed for prolonged periods, anaemia occurs as a result of dietary deficiency of the vitamin. Growth retardation and mental apathy are some of the manifestations.

Let us review what causes folic acid and B₁₂ deficiency

Causes of Folic Acid and Vitamin B₁₂ Deficiency

Dietary deficiency is the main reason for folic acid deficiency. Folic acid is available in green leafy vegetables, liver, meat and pulses. However, considerable destruction of the vitamin occurs during cooking. Its deficiency can occur when there is impairment of absorption of folic acid like in pregnancy. Increased demands during infancy due to growth and pregnancy, prolonged use of anticonvulsants, infections and infestations may be important causes. On the other hand, Vitamin B₁₂ deficiency occurs due to the absence of intrinsic factor in gastric mucosa. Intrinsic factor is a protein the body uses to absorb vitamin B₁₂. When gastric secretions do not have enough intrinsic factor, vitamin B₁₂ is not adequately absorbed, resulting in pernicious anaemia and other problems related to low levels of vitamin B₁₂.

In addition to pernicious anaemia, other causes of vitamin B₁₂ deficiency include :

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- Nutrition (since vitamin B₁₂ is available only in animal foods, its deficiency is possible in pure vegetarians (vegans). In countries like India, the vitamin appears to be derived mostly from faecal contamination of foods. Further poor diet in infant or poor maternal nutrition during pregnancy can be a cause for this deficiency)
- Infection (intestinal parasites, bacterial overgrowth)
- Gastrointestinal disease (stomach removal surgery, celiac disease (sprue), Crohn's disease)
- Drugs (neomycin, tuberculosis, treatment with para amino salicylic acid etc.)
- Metabolic disorders (methylmalonic aciduria, homocystinuria)

Let us next learn how these deficiencies can be prevented

Prevention of Folic Acid and Vitamin B₁₂ Deficiency

Supplementation with folic acid along with iron is one of the strategies being adopted by the government to prevent and control anaemia due to folic acid deficiency. The details of the programme, you may recall studying in Unit 3 earlier under the micronutrient deficiencies - iron deficiency anaemia. The most rational approach to prevent folic acid deficiency is to improve the daily diets by ensuring foods rich in folic acid like green leafy vegetables, pulses and meat products. As for vitamin B₁₂ deficiency, consumption of as little as 250 ml of milk every day would suffice to prevent vitamin B₁₂ deficiency

Let us get to know about the deficiency of Vitamin C i.e. scurvy next. We will discuss about manifestations, causes, treatment and prevention here as we have, done for the other deficiency diseases above

4.3.5 Scurvy

Scurvy was endemic during the Middle Ages causing damage to armies in Europe and is, perhaps, one of the oldest diseases known to the humanity. It was considered to be due to poor intakes of fresh foods. What are the characteristic features of scurvy? Let us look at the features of scurvy next.

Manifestations

The characteristic clinical features of scurvy are spongy-bleeding gums (refer to Figure 4.4(a), petechial haemorrhages, joint pains, fatigue, depression and tenderness of bones. Common symptoms include pinpoint bleeding around hair follicles, along the gums, and under the nails, as seen in Figure 4.4 (b). In neonates, vitamin C deficiency is characterized by tenderness of lower extremities and haemorrhages in costochondral cartilages, fever and irritability. Bleeding into muscles and nail beds is observed. Radiological evaluation (X ray) confirms the diagnosis. Vitamin C deficiency can lead to reduced ability to fight infections, reduced capacity for healing and mild anaemia.

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(a) Bleeding gums

(b) Pinpoint bleeding under the nails

Figure 4.4: Manifestations of vitamin C deficiency

Having studied about the clinical manifestations of scurvy let us next get to know what causes scurvy.

Causes of Scurvy

The deficiency of ascorbic acid is not as common as it used to be before. However, vitamin C is heat-labile and water-soluble. Hence, faulty cooking practices, inadequate consumption of fresh vegetables and fruits are the major reasons for vitamin C deficiency.

Citrus fruits, amla, guava and green leafy vegetables are good sources of ascorbic acid. You would note from the discussion that there are common causes of vitamin B complex and Vitamin C deficiency.

These are listed in the Box 5.

Box 5	Causes of Vitamin B-complex and C Deficiency
<ul style="list-style-type: none">● Inadequate intakes● Faulty cooking practices● Malabsorption● Prolonged use of drugs● Alcoholism● Increased demands	

Let us learn how we can treat scurvy.

Treatment

Scurvy in children is cured by 10 - 25 mg of vitamin C 2-3 times a day. It may take 2-3 weeks for complete treatment. Let us review how we can prevent scurvy.

Prevention

Scurvy is no more a public health problem in India, However, the role of vitamin C in promoting iron absorption and as a potent antioxidant has been recognized. Regular intake of fresh vegetables and fruits is the most rational and sustainable method of preventing vitamin C deficiency. The common sources of vitamin C that are readily available are: citrus fruits such as lemon, orange, guava, amla and tomato.

Let us learn about the deficiency of vitamin D i.e. Rickets and Osteomalacia. Here again, we will learn about manifestations, causes, treatment and prevention of vitamin D deficiency

4.3.6 Rickets and Osteomalacia

Rickets has been known to be a nutritional disease for over 100 years and cod liver oil was known to prevent it. In India, rickets is not seen in community surveys, although it is seen in hospitals. Let us learn about the symptoms of rickets and osteomalacia.

Manifestations

Rickets occurs generally in growing children, who are not adequately exposed to sunlight. The signs and symptoms of the deficiency are mainly due to inadequate mineralization. While in the children it is known as rickets, in adults it is referred to as osteomalacia. The bones are soft and easily bend and therefore, deformities are common. In growing children, swollen and painful growing ends of long bones (particularly visible and palpable at the ribs, wrists and ankles) characterize it. The bones cannot stand even normal mechanical stress. As a result, when the children start walking, they develop bowlegs and knock-knees. In the ribs, at costochondral junction, swellings, which appear like rosary, referred to as rickety rosary is found. Figure 4.5 illustrates some of these manifestations of vitamin D deficiency



(a) Knock knees (b) Swelling of the wrist (c) Rib beading (rickety rosary)

Figure 4.5: Manifestations of vitamin D deficiency

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In adults, osteomalacia manifests due to undennineralization and excessive bone loss, resulting in the extreme cases, fractures. Osteomalacia occurs due to calcium depletion in women of childbearing age due to multiple pregnancies and particularly among those observing purdah, like in Muslim communities. The women may complain of pain in bones of lower extremities, back ache and difficulty in Walking. Due to softness of bones, the bones become soft and can easily bend leading to bony deformities. Muscular hypotonia (low muscle tone), tetany and convulsions due to hypocalcemia occurs. Let us see what causes it.

Causes

It is due to inadequacy of vitamin D, considered as a prohormone. It gives rise to the honnone 1, 25-dihydroxy D3 the primary function of which is to regulate serum calcium. One of the main causes is inadequate exposure to sun. Infants who are solely breast-fed and not exposed to adequate. Sunlight and premature infants ale more prone to rickets. Osteomalacia can occur due to some gastro-intestinal disturbances and chronic renal diseases where there may be impairment of absorption of calcium and synthesis of vitamin D.

Let us learn about the treatment of rickets and osteomalacia.

Treatment

Treatment of both rickets and osleomalacia requires administration of vitamin D and ensuring adequate calcium intake. Let us know about the prevention.

Prevention

Adequate exposure to sunlight is absolutely essential for prevention of rickets and osteomalacia. Simultaneousfy, it should be ensured that the diets provide adequate amounts of calcium daily. The awareness among the communities should be increased so that the diets contain foods, which provide calcium. Among the foods, milk is the best food.

We will now learn about fluorosis and lathyrism in the nent section. But first let us recall what we have learnt so far.

Check Your Progress Exercise 1

1. List causes of:

a) Thiamine deficienc

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.....
.....

b) Niacin deficienc

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.....
.....

2. How can we prevent:

a) Folic acid deficiency

.....
.....
.....

b) Vitamin D deficiency

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.....
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4.4 FLUOROSIS

Fluorosis is endemic in several parts of India like in the States of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Punjab, Rajasthan and Tamil Nadu. An estimated 66 million people are at risk and 6 million people seriously afflicted. What is fluorosis? It is a crippling and painful disease caused due to consumption of excessive fluoride in water: According to scientific surveys, skeletal fluorosis in India occurs when the fluoride concentration in water exceeds 1 part per million (ppm), and has been found to occur in communities with only 0.7 part per million. Interesting isn't it! Let us look at the manifestations of fluorosis

Manifestations

Fluorosis manifests mainly as dental fluorosis and skeletal fluorosis. A review of these two manifestations follows.

Dental Fluorosis: It occurs in children - of both the sexes -exposed to high fluoride intake even before the dental mineralization is complete. It is characterized by mottling of teeth, which appears as yellowish or brown streaks or spots, as can be seen in Figure 4.6, particularly evident on the incisors. Sometimes, pitting (deeper depressions) may occur on these teeth. Dental mottling is irreversible and is confined to permanent teeth



Figure 4.6: Dental fluorosis

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Skeletal Fluorosis: This is a bone disease caused by an excessive consumption of fluoride. This is a slowly progressing condition and is not as clinically obvious as dental fluorosis. The clinical features include joint pains, musculoskeletal dysfunction, restricted mobility of spine and deformities of flexion type. The disorder starts with vague nonspecific symptoms like pain in the joints, followed by stiffness and restriction in the movements of spine. In the later stages there may be spinal deformities with vertebral column becoming rigid with inability even to bend. In the recent past, severe deformities known as genu valgum, an adult form of exaggerated knock-knees has been described in endemic fluorotic areas. Experts suggest, that crippling skeletal fluorosis might occur in people who have ingested 10-20 mg of fluoride per day for 10-20 years Isn't that alarming

So it is clear that fluorosis can affect young and old, men and women alike. Let us then learn what causes fluorosis

Causes

It is mainly due to very high content of fluorides in drinking water. Foods also contribute significantly to fluoride content of the diet. Cereals and vegetables grown in areas, which are endemic for fluorosis, contain higher amounts of fluoride. It is reported that as much as 85% of the total fluoride intake is contributed by food. Poor socioeconomic conditions and poor nutritional status may be associated with fluorosis. Remember, fluoride can enter the body through drinking water, food, toothpaste, mouth rinses and other dental products; drugs, and fluoride dust and fumes from industries using fluoride containing salt and or hydrofluoric acid

Let us now learn how we can prevent fluorosis

Prevention

Ensuring that the drinking water has safe levels of (1 ppm) fluoride is the best solution for controlling endemic fluorosis. Supply of water from rivers, dams, canals and other sources of surface water is one of the methods adopted extensively in areas, which are highly endemic. Another method is defluoridation (removal of fluoride) of water by appropriate treatment of water. Several domestic methods are suggested of which 'Nalgonda technique' and 'Prashanti Technique' are perhaps simple and acceptable. While in the first method, lime and alum are added to water, in the latter, activated alumina is used for passing water. Commercial defluoridation is very expensive and is not practiced frequently. Education of communities to avoid use of fluoride rich toothpastes, pesticides and fertilizers is important.

Finally, we move on to lathyrism.

4.5 LATHYRISM

What is lathyrism? You may recall studying about lathyrism in the Food Microbiology and Safety Course (MFN-003) in Unit 7, Certain foods of Leguminaceae family contain toxic amino acids, which pose serious health problems to mankind.

Of them, *Lathyrus sativus* (Kesari dhal) could be considered to be of public health significance, in view of the serious crippling consequences due to continued consumption of the pulse. The disease attributed to the consumption of this food is referred to as lathyrism. Lathyrism, causes upper motor neuron degenerative disease, leading to paralysis. Let us elaborate on symptoms of lathyrism.

Manifestations

The disease, seen among young adults in their most productive age, is insidious in nature. It is characterized by altered gait, severe pain in the lumbar region of the back, spasticity and paralysis. The earliest symptom is muscular spasms in the calf. This is followed by stiffness and heaviness in limbs, muscular cramps, involuntary tremors and ultimately typical stiff legged scissors gait. In the initial stages the affected may be able to walk with the help of a single stick, which progresses to two-stick stage and finally to crawling stage

Let us learn what causes it.

Causes

The disease is caused due to exclusive consumption of kesari dhal over a long period of time. The pulse contains a toxic amino acid known as beta-oxalyl amino alanine or BOAA, which is a neurotoxin. In parts of Madhya Pradesh and contiguous areas of Uttar Pradesh and Bihar, the labourers receive kesari dhal as wages, particularly during drought seasons. *L. sativus*, which is grown as a mixed crop along with wheat, being a hardy, survives despite damage to wheat crop. As a result, the labourers solely depend on kesari dhal rotis for their survival, ultimately suffering from the crippling condition. Let us see how we can prevent it.

Prevention

In most of India, gradually, cultivation of kesari dhal crops has declined over time because of ban on its sale under Prevention of Food Adulteration Act. In addition, distribution of cereals at affordable rates through public distribution system has helped in total dependence of the labour on kesari dhal. In the long run, development of genetically modified low toxin levels of *L. sativus* would help not only in controlling lathyrism but also in improving the availability of pulses. The toxin, being water soluble, can be removed by parboiling. At the domestic level, steeping of the pulse in boiled water and drying the same, removes most of the toxin. Education of the communities to adopt such simple household methods would help in the control of the unreversible paralytic condition.

With this we end our study of the nutritional problems which are of concern and can be of concern to us. Do answer the questions given here under the check your progress exercise 2 and check your understanding about the nutritional problems learnt in the last section.

Check Your Progress Exercise 2

1. List key manifestations and causes of fluorosis

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2. How can we prevent fluorosis

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3. What is the cause of lathyrism?

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4. List "the three stages of lathyrism.

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4.6 LET US SUM UP

In this Unit we learnt that there are other nutritional problems which may occur in large number of people in developing countries either due to poor diet or other environmental conditions. These are deficiency of some B-complex vitamins thiamine, riboflavin, niacin, folic acid and , as well as, deficiency of vitamin C and vitamin D. Fluorosis and lathyrism although not vitamin deficiency, cause complications in the human body. Next, we studied that most of Vitamin B-complex deficiencies and vitamin C deficiencies are due to faulty cooking practices, malabsorption, prolonged use of dings, alchoholism and increased demands due to physiological changes in the body. Another nutritional disorder is fluorosis which is endemic in several parts of India like in the States of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Punjab, Rajasthan and Tamil nadu. It is due to consumption of excessive 'fluoride in water. Finally, we read about lathyrism. Lathyrism is a disease which is caused due to exclusive consumption of kesari dhal over a long period. It can lead to paralysis. In India; 4here is a ban on the sale Of kesari dhal under Prevention of Food Adulteration Act,

4.7 GLOSSARY

Cyanosis	: bluish discolouration of skin due to the presence of oxygen-Deficit blood
Delirium	: disordered state of mind involving incoherent speech and excitement.
Hyperaestheisa	: a state of enalted or morbidity increased sensibility of the body or a part of it.
Neurotoxin	: any poison that acts on nervous system.

Palpitations

: rapid strong or irregular heart beat.

Nutrition
Problems - 2

4.8 CHECK YOUR PROGRESS

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- 1). Explain the cause of Beriberi disease. What are the treatment methods of it?
- 2). What is Ariboflavinosis? Define the cause and treatment method.
- 3). Define Causes of Folic Acid and Vitamin B12 Deficiency.
- 4). What are Causes of Scurvy ?
- 5). List the three stages of lathyrism ?

5

HEALTH ECONOMICS AND ECONOMICS OF MALNUTRITION

NOTES

STRUCTURE

- 5.1 Learning Objective
- 5.2 Introduction
- 5.3 Health Economics
- 5.4 Malnutrition and its Economic Consequences
 - 5.4.1 Causes of Malnutrition
 - 5.4.2 Consequences of Malnutrition
 - 5.4.3 Indicators of Nutrition
 - 5.4.4 Interventions in Malnutrition and Government Expenditure on Interventions
- 5.5 Economics in Nutrition
 - 5.5.1 Food Security
 - 5.5.2 Food Production
 - 5.5.3 Food Pricing
- 5.6 Economic Evaluation of Malnutrition
- 5.7 Let Us Sum Up
- 5.8 Glossary
- 5.9 Check Your Progress

5.1 LEARNING OBJECTIVE

After studying this unit, you should be able to:

- After studying this unit, you will be able to:
- explain the concept of health economics,
- describe economic consequences of malnutrition,
- discuss economics of nutrition,
- explain the food security and issues related to food production, and
- enumerate the concept of economic evaluation of malnutrition.

5.2 INTRODUCTION

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In the earlier units on nutritional problems, we learnt that there are many causes of malnutrition, socioeconomic cause, being one of them. When economic condition of the people is poor, they have inadequate access to food and health services, which contributes to poor nutritional status. We also studied that some micronutrient deficiencies like anaemia and iodine deficiency compromise on mental and physical work capacity, which leads to lowered productivity of individuals at work. This, in turn, leads to reduction in wages earned and poor economic condition. So we can see that poor economic status contributes to malnutrition and malnutrition contributes to poor economic status. There is a mutual cause and effect relationship between malnutrition and economic status. In this unit, we are going to explore this relationship in detail. We are going to study about economics of health and economic consequences of malnutrition. Since nutrition is a determinant of health, we will discuss about nutrition economics under which we will focus our discussion on food resources and their efficient utilization to improve nutritional status of individuals. At the end, we will explore the concept of economic evaluation of health/nutrition interventions.

5.3 HEALTH ECONOMICS

Health economics concentrates on application of the principles and rules of economics in the sphere of health. In broad terms, it includes analysis and evaluation of health policy and the health system from an economic perspective. In particular, it includes health system planning, market mechanisms, demand and supply of health care, economic evaluation Of individual diagnostic and therapeutic procedures, determinants of health and its evaluation, and evaluation of the performance of health care systems in terms of equity and efficiency. The process involves calculating the cost incurred to tackle the problem and the consequences, which arise because of the problem. A decision is then taken in where to invest so that maximum benefits are achieved with the existing resources. In general the costs and consequences from a health perspective are given in Table 5.1. It shows various direct, indirect and tangible costs involved in managing the problems. It also shows the consequences like morbidity, mortality and pain suffering as a result of the occurrence of problems.

Cost of managing the health problems	Consequences of health problems
Direct — Capital-land, building — Operating-staff, overheads Indirect — Production loss	Physical functioning — Morbidity, and Mortality — Disability Resources use Cost averted by health care system in the form of treatment — Productivity loss averted

Transportation — Boarding & lodging Intangible — Pain, Suffering, Grief	Social and emotional functioning — Pain, Suffering, Grief Changes in quality of life, Friends and Family
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Table 5.1: Cost of managing health problems and consequences

Analysis and evaluation of health policy and system is important because it helps us to plan the targeting of health resources required for alleviating the problems. We already know that there are multiple causes of malnutrition, so just focusing on health resources will not help solve the problems. Since nutrition is a determinant of health, focus on food resources becomes very critical. We will discuss food resources in detail under nutrition economics in section 5.4 later. Now let us review the economics aspects of causes and consequences of malnutrition.

5.4 HEALTH ECONOMICS

What is malnutrition? Malnutrition can be defined as a pathological condition resulting from a relative or absolute deficiency or excess of one or more of the essential nutrients. From a nutritional standpoint, the condition can fall under the Following 4 categories as shown in Table 5.2. These categories are undernutrition, overnutrition, imbalance of nutrients and specific deficiencies of nutrient

S.No.	Type	Nutrient intake
1.	Undernutrition	hadequate
2.	Overnutrition	Excess
3.	Imbalance	Disproportionate
4.	Specific deficien	Relative or absolute lack of an individual nutrient

Table 5.2: Classification of malnutrition based on nutrient intake

Let us now understand the causes of malnutrition before we explain the consequences of malnutrition. We have read about causes of malnutrition in Unit 3. We will recapitulate these now.

5.4.1 Causes of Malnutrition

The causes of malnutrition are classified as immediate (individual level), underlying (household or family level) and basic (societal level) causes as highlighted in Figure 5.1 whereby factors at one level influence other levels. Each of these factors is essential, but is not sufficient in itself to achieve nutrition security. One of the important factors, which act at the individual level, is the socio-economic

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status. Other factors at the individual and household level include availability or accessibility of food, poor knowledge about balanced diet etc. You would note here that poverty affects almost every factor acting at the individual level as shown in Figure 5.1. For example, you can see in Figure 5.1 that when people do not have enough money, they may not be able to purchase enough food for their families and/or access health services which leads to malnutrition. The problems at the societal level include that of educational status, performance of agricultural sector, policies related to food imports contributing to malnutrition.

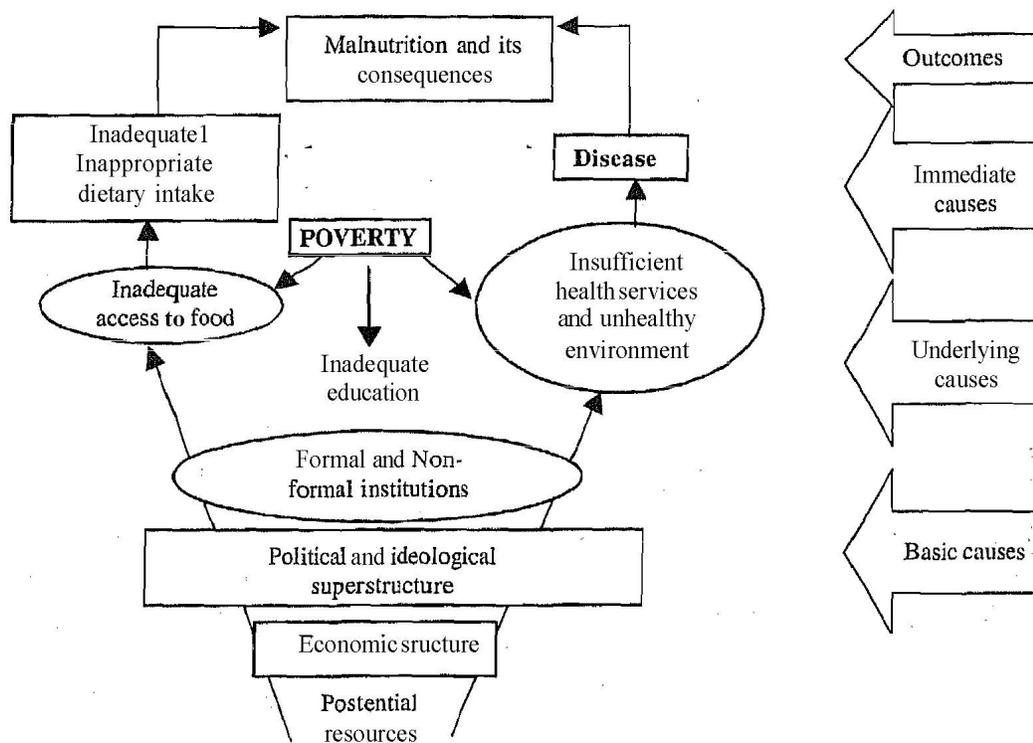


Figure 5.1: Malnutrition and its causes

You must have heard many times that cause of hunger is poverty. However, hunger also leads to poverty. So poverty and hunger have mutual cause and effect relationship. That is, poverty leads to hunger and hunger leads to poverty. Let us see how.

Poverty and hunger - mutually causes, devastating effects

Measures Of food deprivation, nutrition and poverty are strongly correlated. Countries with a high prevalence of undemourishment also have high' prevalence of stunted and underweight children. In these countries, a high percentage of the population lives in conditions of extreme poverty. In countries where a high proportion of the population is undernourished, a comparably high propostion struggles to survive on less than US\$ 1 Per day. While poverty is undoubtedly a cause of hunger, hunger can also be a cause of poverty. Hunger often deprives impoverished people of the one valuable resource they can call their own: the

strength and skill to work productively. Numerous studies have confirmed that hunger seriously impairs the ability of the poor to develop their skills and reduces the productivity of their labour.

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Hunger in childhood impairs mental and physical growth, crippling the capacity to learn and earn. Evidence from household food surveys in developing countries shows that adults with smaller and slighter body frames caused by undernourishment earn lower wages in jobs involving physical labour. Other studies have found that a 1 percent increase in the Body Mass Index (BMI, a measure of weight over height square) is associated with an increase of more than 2 percent in wages for those toward the lower end of the BMI range.

Micronutrient deficiencies can also reduce work capacity. Surveys suggest that iron deficiency anaemia reduces productivity of manual labourers by up to 17 percent. As a result, hungry and malnourished adults earn lower wages. And they are frequently unable to work as many hours or years as well-nourished people, as they fall sick more often and have shorter life spans. This then brings us to the issue of economic consequences of malnutrition. We have read about consequences of malnutrition in Unit 3. We will recapitulate this here and then study about economic consequences of malnutrition. Let us first recapitulate consequences of malnutrition.

5.4.2 Consequences of Malnutrition

Malnutrition manifests itself in terms of illness and death in all age groups. Children, pregnant women, nursing mothers and elderly are particularly vulnerable to the effects of malnutrition. Let us closely look at the effects of Malnutrition in children.

Malnutrition contributes to more than half of child deaths worldwide.

Fifty-six percent of deaths among pre-school children in the developing world are due to the underlying effects of malnutrition on disease, but conventional methods of classifying deaths by cause have misleadingly attributed only about five percent of child deaths to malnutrition.

The risk of death rises as the grade of malnourishment increases among children from mild to moderate to severely malnourished.

It was previously thought that only severely malnourished children were increased risk of dying, but recent studies show that even mild and moderately malnourished children are at increased risk of death because of their poor nutritional status. On average, a child who is severely underweight is 8.4 times more likely to die from infectious diseases than a well-nourished child. Children who are moderately underweight and mildly underweight are 4.6 and 2.5 times, respectively more likely to die than well-nourished children. It is estimated that the vast majority (83%) of all malnutrition related deaths worldwide occur in children who are mildly and

moderately underweight because of their total number. Programmes directed only at treating severe malnutrition, therefore, will have only a minor impact on child mortality rates.

The synergistic contribution of malnutrition to child mortality is consistent across populations and can be estimated at the country level from weight- for-age prevalence data.

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Analysis show that the quantitative relationship between malnutrition and mortality is remarkably consistent across various populations representing diverse ecological, disease and cultural environments. The percentage of all malnutrition-related deaths that occur in mildly and moderately malnourished children can also be estimated from weight-for- age prevalence data,

As discussed earlier, malnutrition affects vulnerable population across all age groups. Table 5.3 summarizes consequences of malnutrition in the other vulnerable population like pregnant and lactating mothers adults and older adults.

Common nutritional disorders	Consequences
<i>Pregnant and Lactating mothers</i>	
PEM, IDD, VAD, IDA, Folate deficiency, calciu deficiency, blindness,	Insufficient weight gain in pregnancy Maternal anaemia, maternal mortality, Increased risk of infection, night Low birth weight leading to high risk of infant death
<i>Intergenerational cycle</i>	
PEM, IDD, VAD, IDA, Folate deficiency, calcium deficien	Deficiencies passed on to the child wh may then pass them on to the subsequent generation
<i>Adults</i>	
PEM, obesity, IDA and diet related diseases	Thinness, Lethargy, Obesity, Heart disease, Diabetes, cancer, hypertension Anaemia.
<i>Elderly</i>	
PEM, IDA, Obesity, osteoporosis, diet related diseases.	Obesity, diabetes, cancer, spine and hip fractures, anaemia and thinness.

Table 5.3: Consequences of malnutrition

The discussion above focussed on the consequences of malnutrition across pregnant and lactating women, children, adults and older adults. We may conclude that when people have illnesses as a result of malnutrition, it compromises on their work productivity. Let us now study effects of malnutrition on economic productivity of people or, in other words, economic consequences of malnutrition.

Economic consequences malnutrition

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Figure 5.2 explains the economic consequences of malnutrition. You would note from the Figure 5.2 that the economic productivity of the individual, influences the household income, which influences the household food availability and food allocation in the family. When household real income falls as a result of low economic productivity, families have less food available for different members of the families. Thus food consumption for the different members of the family falls. In our culture, it is mostly the women and the children who suffer the most as a result of poor availability of food at home compared with other members of the family. Poor food consumption contributes to low nutritional status of the family members especially the mother and the child. Mothers with poor nutritional status have low capacity to take care of the child, This insult to the child has long term consequences in terms of growth, cognitive capabilities, morbidities and mortality etc. This results in loss of productivity in school. For adults, poor nutritional status leads to reduced stamina and endurance and low physical capacity at work, thus contributing to reduce economic productivity. So this loss of productivity influences economic status of the family that can further deteriorate or prevent improvement of the nutritional status. This vicious cycle persists unless strong steps are taken to increase the household real income and improve the nutritional status.

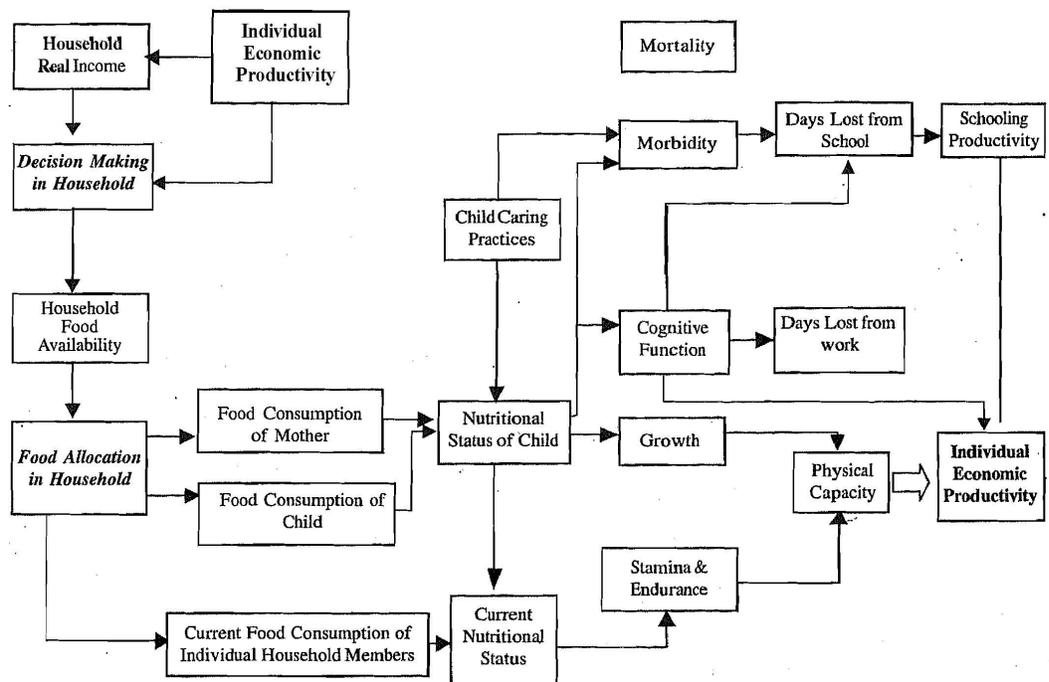


Figure 5.2: Economic consequences of malnutrition

We can now conclude that loss in the productivity of individuals lead to a loss in productivity of the nation as a whole and so nations cannot progress. This brings us to the issue that we need to assess and analyze the situation and plan and implement interventions to improve the nutrition situation. For doing this, we need to come up with some indicators which can help us track changes in the

situation as we move towards our goals. We will now study about the "indicators" in detail.

5.4.3 Indicators of Nutrition

We will begin our study on this topic by first understanding what we mean by an indicator. An indicator is a "specific and measurable statistical construct for monitoring progress towards a goal" are used to monitor a given characteristic (e.g. health status) of a population or to make comparisons with a different population or the same population at a different point in time. Indicators are therefore specific measures for assessing progress towards goals. The indicators may fall under the following categories:

1. Macro indicators for sector-wide monitoring and evaluation,
2. Meso indicators for regional or cross-agency policy monitoring and evaluation, and
3. Micro indicators for agency program monitoring and evaluation.

Figure 5.3 depicts the three types of indicators.

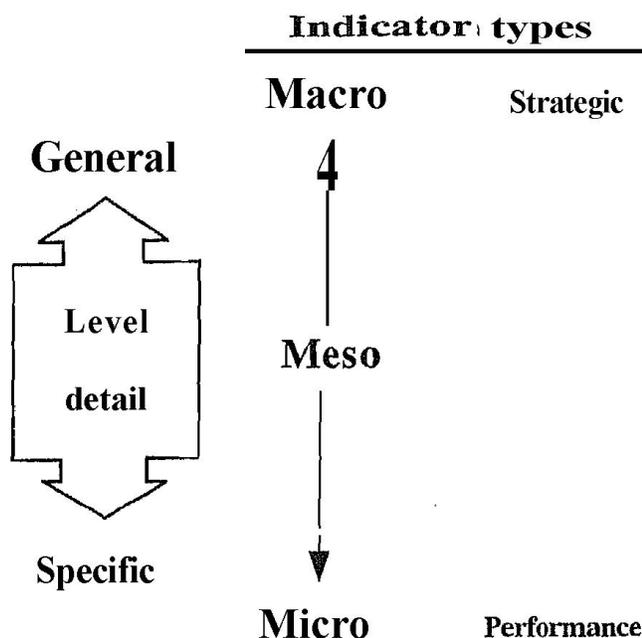


Figure 5.3: Types of indicators

As you may have noticed in Figure 5.3, the indicators may fall under three categories. Macro indicators are used at strategic levels while micro indicators are used at performance levels. From the previous sections it is clear that many factors contribute either directly or indirectly to the nutritional status of individuals. So choosing an indicator will depend on what we want to analyze. We can have indicators related to 1) government policies, 2) individual information on food/ income etc, 3) food and nutrient intake 4) nutritional status, and 5) health status. A few of the indicators are enumerated below:

1. Indicators related to Government policies
 - a. Nutrition policy

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- b. Nutrition interventions: feeding programmes (e.g. school meals)
 - c. Percent free school meals (eligibility, uptake): is this a marker of nutritional health or a marker of social or health inequalities?
 - d. Food availability, e.g. foods stocked in shops used: range, availability
 - e. Food accessibility
 - i) Food prices, e.g. relative cost of healthier food, money for food, shopping capacity, domestic storage capacity etc.
 - f. Food security -International and National
 - g. Food stocks- e.g. amount of emergency food supplies
 - h. Food subsidies
 - i. Food budget standards define
2. Indicators at the individual level : Number of individuals who have gone hungry through lack of personal food supply, amount of expenditure on food, percent of disposable income spent on food and cost of 1 kcal etc. are some of the indicators that can be used at individual level.
3. Food and nutrient intake
- a. Direct: national, regional, household and individual
 - b. Dietary diversity (may be different within country compared with between countries)
 - c. Food balance sheets
4. Nutritional status
- Biomarkers, Anthropometry and Energy balance Malnutrition
5. Health status
- a. Morbidity and mortality rates
 - b. Macronutrients and micronutrient deficiencies Having looked at some of the indicators, let us now review some of the interventions in malnutrition.

5.4.4 Interventions in Malnutrition and Government Expenditure on Interventions

We have studied about the causes of malnutrition at various levels. Similarly interventions for malnutrition should be carried out at various levels. There are several interventions aimed to reduce malnutrition.

Here, we will familiarize you with some government programmes aimed to reduce malnutrition in vulnerable groups. Table 5.4 gives a list of various government programmes and their beneficiaries.

As you move on to later in this course, you will find that each of these programmes has specific goals and objectives for e.g. national nutritional anaemia control programme is aimed towards eliminating iron deficiency anaemia and so on.

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Programme	Beneficiary
ICDS	Children 6 months — 6 years pregnant mothers + lactating women
National nutritional anaemia control program (NNACP)	Children I-II yrs Pregnant mothers + lactating women Family planning acceptor
National IDD control program	Entire population
National prophylaxis against nutritional blindness (VADCP)	Children 0-3 yrs
Mid Day Meal Programme	Primary school children
Targeted Public Distribution	60 million poor families System
Antyodaya Anna Yojana	10 million poorest BPL families
Annapurna Scheme	10 kg food grains per month free to senior citizens
Swarna Jayanthi Gram Swarozgar Yojana	Poor families above poverty line
*Jawahar Gram Samithi Yojana	Preference to S.C/S.T., freed bonded labourers, parents of child labourers
"Employment Assurance Scheme	Rural poor, employment on demand during lean agricultural season
Food for Work Programme	8 drought affected states

Table 5.4: Programmes for control of malnutrition in India

These programmes have now been merged into Sam puma Gramin Rozgar Yojana

You will be suprised to know that India spends far less on nutrition programmes than what is needed to reduce the extent of malnutrition among children under five years of age and pregnant and lactating women. If we consider the nutrition expenditure as a percentage of gross national product (GNP) then, from 1985 to 1990, the average annual expenditure by the states and GOI on direct nutrition programmes (mainly ICDS and NNflv1P) amounted to only 0.15 percent of gross national product (GNP). Government spending on direct nutrition programmes increased in the 1990s, as a result of the expansion of ICDS and of the NMMP in 1995 and amounted to about 0.19 percent of GNP in 1998. This is still less when compared with other developing countries. For example, Sri Lanka, a country recognized to have achieved considerable success in reducing the level of malnutrition, spent about 1 percent of its GNP on direct nutrition programmes during the mid 1980's (World Bank, 1993). Given the magnitude of malnutrition, India should be prepared to spend a minimum of 0.5 percent of GNP on direct nutrition programmes, more than double the current spending. Although we have not counted the important contsibutions of economic growth and employment, agriculture, women's programmes, education, health, water and sanitation to improved nutrition, India is not spending enough on direct nutrition programmes

by any standard. Thus we see that India needs to increase its spending on nutrition programmes.

This brings us to the issue of food resources and how proper planning and targeting of food resources can help in combating malnutrition. We will study about this under the purview of economics of nutrition. Now let us answer the questions given in check your progress exercise I and recapitulate what we have learnt so far.

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Check Your Progress Exercise 1

1. What do you mean by health economics?

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2. Explain economic consequence of malnutrition.

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3. Enumerate on the government spending on major direct and in direct nutrition programmes.

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5.5 ECONOMICS IN NUTRITION

We mentioned earlier that nutritional problems affect the productivity of the individual, which, in turn affects the productivity of the nation. This results in a great loss for the nation. Many factors influence the nutritional state of an individual community. e.g. amount of food production, food storage, food pricing, subsidies, food distribution, targeted public distribution, government policies etc. You would be surprised to know that over the past three decades, the world has produced more grain per capita but yet in any given year of that recent history, several million people have died from hunger-related, causes. On any given day, perhaps a billion individuals are restricted by their economic circumstances to consume less food than they would like, and hundreds of millions have their growth and physical activity limited by inadequate food consumption. Therefore, planning the food resources adequately can largely prevent malnutrition. Ensuring equitable distribution of the available food resources is a multisectoral challenge. The discipline of economics' hence tries to analyze this relationship, so that the existing food resources can be used efficiently. The issues that are covered by nutrition economics include:

1. Quantities of food commodities and their development in time (Food Production Systems).

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2. Prices of food commodities and their development in time.
3. Share of nutrition expenditures in total expenditures and their development in time.
4. Development of total expenditures on food in stable prices.
5. Statement of the nutrition need according to the demographic structure of the population.
6. Transfer of commodities into biological, nutritious values and their development in time.
7. Construction of balances between the nutritious values and the nutrition needs.
8. International comparisons.
9. Construction of the recommended food/dietary allowances (RFA/RDA).
10. Estimates of the future demand of food dietary commodities.

The different aspects of nutrition economics and their interactions are illustrated in Figure 5.5.

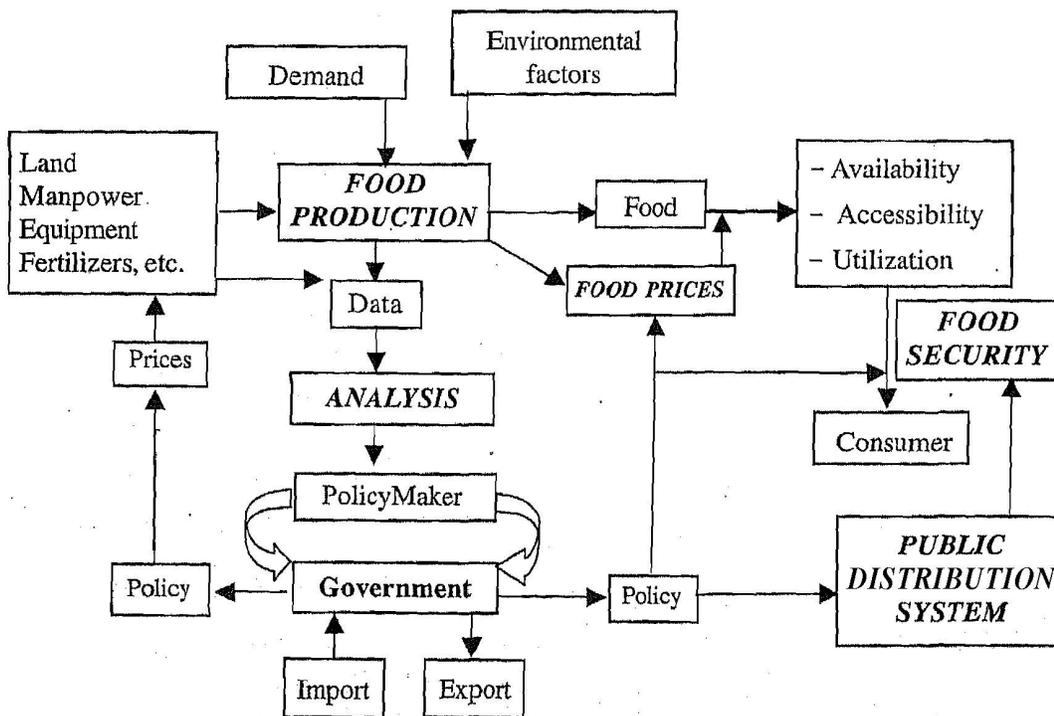


Figure 5.5: Different aspects of nutrition economics and their interaction

As is evident food production is determined by demand for food and inputs like land, manpower and fertilizers etc. The data from food production is analyzed for policy formulation. Food production also determines food prices which influences food security of people.

In the following section, we will cover the first two, major aspects, of nutrition economics.

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These aspects are:

- 1) Quantities of food commodities and their development in time (Food Production Systems), and
- 2) Prices of food commodities and their development in time.

However, before we discuss these major aspects, we will first explain food security. This is because, improving food security is a pre-requisite for combating malnutrition. We have already learnt about the concept of food security in Unit 2, we will just recapitulate this here.

5.5.1 Food Security

You were introduced to the concept of food security in Unit 2. Food security, we learnt, is access by all people at all times to enough food for an active healthy life. In 1983, the FAO Committee on World Food Security, formalized the definition in 1983 and incorporated following three specific goals for food security which include:

- 1) ensuring adequacy of food supplies,
- 2) maximizing stability of supplies, and
- 3) securing access to available supplies to all who need them.

Food security can be at the individual level, household level and at the community level. In a given situation, food insecurity can result from the following three causes. These are related to availability, accessibility and appropriate utilization of the food.

- **Food availability:** This refers to availability of necessary types of food in sufficient quantity, to the individual. The sources may be from domestic production, imports or donors. In other words, the food should be within the reach of the individual.
- **Food Access:** Individuals have adequate incomes or other resources to purchase or barter to obtain levels of appropriate foods needed to maintain consumption of an adequate diet/nutrition level.
- **Food utilization/consumption:** This refers to how food is properly used, i.e. food preparation, food handling, food storage, balanced diet, nutritional care of vulnerable groups etc. Let us get familiarized with another term i.e. nutrition security.

Nutrition security can be briefly defined as a balance between biological requirements in energy and nutrients and the quantity and quality of food consumed. Nutritional status is the outcome indicator of nutritional security. On the other hand, indicators for food security are data related to number of under-nourished, food production data, consumption and distribution etc.

It is obvious that many factors contribute to food insecurity. In a developing country like ours, it can be achieved only through sustained economic growth.

There are many initiatives, which have a potential to improve nutritional status of the population? These include:

Increasing food production- building buffer stocks

Improving food distribution- building up the Public Distribution System (PDS)

Improving household food security through:

- improving purchasing power,
- distribution of food to the needy people, and
- direct or indirect food subsidy.

Food supplementation to address special needs of the vulnerable groups - Children, pregnant women and the elderly.

Nutrition education

The contributions from the health sector to tackle

- adverse health consequences of under nutrition,
- adverse effects of infection and unwanted fertility on the nutritional status, and
- micronutrient deficiencies and their health consequences

So we see that improving food security at various levels is one of the many initiatives to improve nutritional status of the population. Many aspects of nutrition economics contribute to improved food security. For example, if food production is increased, there will be increased availability of food supply contributing to improved food security as already illustrated in Figure 5.5. Let us now go back to two major aspects of nutrition economics. 1) Quantities of food commodities and their development in time (Food Production Systems), and 2) Prices of food commodities and their development in time (Food Pricing)

We will begin our study with first aspect of nutrition economics i.e. Food production.

5.5.2 Food Production

We know that agriculture comprises the major source of food production. This is very true in a country like ours where the majority of the population lives in the rural area and farming is the primary mode of subsistence. Improvements in the agricultural sector will hence result in overall improvements of the rural economy. This improvement provides employment opportunities for a large population, The extent of food production is influenced by various factors. The factors may operate from the individual level (e.g. procurement of land, availability of manpower, management of manpower, purchase of equipment etc.) to the policy level (food pricing, subsidies, imports and exports. etc). Environmental factors also play an important role. An understanding of the interaction of these factors is essential for the economist, to decide on the allocation of resources. If you go back to Figure 5.5, you would note that it shows interaction between various factors. It shows that inputs like land, manpower, equipment and fertilizers and demand for food determine the food supply /production. The data on food production is analyzed to develop policy by the government. Food production also determines the prices of food in the market, which affects the food availability and accessibility consumers. Let us now understand some issues related to food production, These are:

- factors influencing food production
- analysis of food production,
- understanding the response of farmers, and
- developing a strategy.

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Let us consider the first issue - factors influencing food production

A. Factors influencing food production

Appropriate food production involves getting an adequate output (i.e. food) using appropriate inputs. An essential requisite for this includes labour work-force and good management skills to efficiently use the inputs. If we have skilled labour force and if we can manage the inputs efficiently, the food production will increase. In addition to these two factors, production also depends on: a) environmental, and b) technical factors. Let us study these factors in detail:

a) Environmental factors:

You probably know that no agricultural region has a constant climate throughout the year. This is true even in the tropical areas. The variations in climate influence the cultivation patterns. For example, cultivation of rice necessitates adequate supply of water and the dry season is hence unfavourable for rice cultivation. In addition, there may be shortage of labourers in certain seasons. Elimination of these seasonal bottlenecks will improve the food production. On the other hand, too much mechanization will displace hired labour and prevent social gains. One also has to understand that agricultural data also is subject to seasonal variation. So policy makers have to analyze the data and formulate policy, having in mind the seasonal variation in agricultural working pattern.

Seasonality brings in an element of risk and uncertainty for the farmer. These causes the farmer to invest in crops, which are less influenced by changes in climate. It also discourages him to invest more on technical inputs. The distribution of arable land has important economic consequences. Issues related to food/fertilizer transportation and food storage influence the availability and accessibility of food to the consumer. Let us next examine the technical factors in detail.

b) Technical Factors

Improvement in technology has a significant impact on productivity. Improvements may occur in seed production, fertilizer production, food processing, transportation etc. Agricultural research is an expensive investment. So only few farmers have the resources to carry out research. Advances in biotechnology have been more popular in land-scarce societies and advance in mechanization have dominated the land-rich societies,

In our discussion above, we have seen how environmental and technical factors contribute to food production. We can collect various data on food production and do the analysis of the data. It can be related to capital, labour or prices. The

analysis of data can help us predict information related to supply and prices etc. Let us now consider the second issue of food production- analysis of food production.

B. Analysis of food production

The agricultural sector is known for its diversity and heterogeneity of decisions right from the farm to the entire marketing system. As mentioned earlier, an element of uncertainty prevails for the farmers. It is important for analysts to know how the for in-level decisions are made so as to bring appropriate changes in policies. Analysts are ready to address the basic production decisions farmers must make to function effectively year in and year out: what crops to produce, what combination of inputs to use to produce them, and what total output to produce.

The supply curve as illustrated in Figure 5.6 is a very convenient conceptual and empirical tool which summarizes a great deal of complicated producer decision making in a simple two-dimensional diagram. The supply curve is an essential tool in economists understanding of price formation in market economies, The supply curve is a graphical representation of the relation between two factors - the capital and the labour.

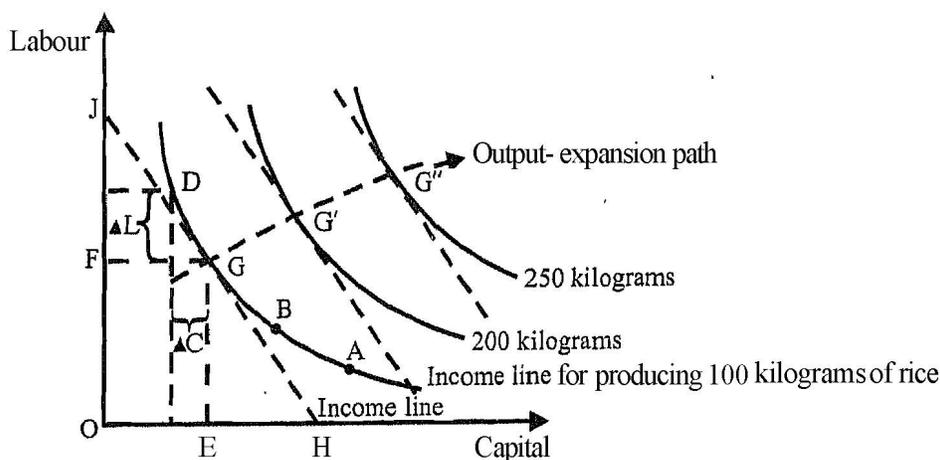


Figure 5.6: The supply curve

The supply curve depicted in Figure 5.6 has the capital plotted along the X-axis and the labour along the Y-axis. Various curves are obtained for different combinations of capital and labour and the appropriate one chosen for a given setting. Figure 5.6 illustrates four alternative techniques: hand labour (point D), oxen (point G), a small tractor (point B), and large mechanized equipment (point A). The isoquant connecting these points portrays the possible technical alternatives for growing 100 kilograms of rice. The appropriate combination of labour and capital is determined by the prices of the inputs.

Thus, we see that using a simple empirical tool like a supply curve, food production at various combination of labour and capital can be predicted which can help economists in understanding of price formation in market economies. Location of the supply curve is affected by the government policies, which in turn affects the food production. Although government policy may be favourable

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to the farmers, it is important to understand how the farmers will react to a particular situation. We will now look at the third issue related to food production i.e. understanding farmers' response.

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C. Understanding the response farmers

Understanding the response of the farmers by the government also influences the food production. Government policy influences the location of the supply curve directly through investments that lower marginal costs of agricultural production and indirectly by influencing the decision of the farmer, as price policies alter the incentives to use more intensive techniques of farming to produce more output. Though Government can bring changes in the policy, it is important to know how the farmers may react to the situation. This issue can be addressed only by careful attention to exactly which question is being asked, coupled with specific statistical analysis of country or regional data.

Describing the agricultural sector in statistical terms is complicated by agriculture's unique characteristics. Annual production statistics by crop for the entire country can be obtained but this doesn't reflect the decisions taken by the individual farmers. Moreover each farm setting is unique in its own sense. A model, which may be successful in one area, may not work in another area. This necessitates to collect data (e.g. village-level surveys etc.) from a variety of ecological settings (i.e. different types of agricultural lands). To serve this purpose, the arable land is divided into Agro climatic zones, where similar ecological zones are grouped together. Data is collected from selected areas of each zone. The data may cover the following issues:

- how farming systems are likely to respond to policy changes,
- type of crops grown,
- farm-size distribution,
- farm prices, yields, profitability data

the ratio of commodity prices received by farmers to the price paid for a key input such as fertilizer provides a rough assessment of how tightly the agricultural sector is being squeezed by low economic incentives relative to other regions and countries.

comparing regional prices with international prices.

The data is organized in the form of a tableau. An economic analysis of such data is carried out and ideal solutions to farming are found. Thus we see that food production will vary depending upon how farmers response to policy of the government. India being such a diverse country, each farm-setting is unique. Therefore, survey is required for different settings and data is analyzed to understand many issues related to production and prices.

We have seen earlier that it is essential to understand the factors influencing food production, analyze food production data and understand farmers' response. Last and the fourth issue of food production, then becomes, that an appropriate

strategy is developed which would help in bringing an improvement in rural economy. Let us see how and why we do that briefly

D. Developing a strategy

It is necessary to develop a strategy that results in improvement in the rural economy. This could be achieved by framing policies which can pump more money into the rural sector. This would also result in improvement of employment opportunities in the rural areas. It can thus be concluded that, for successful food production, it is necessary to understand the decision making process of the farmers and the policy formulated accordingly.

So we studied about the four issues related to food production. These are factors influencing food production, analyses of food production, understanding the response of farmers and developing a strategy, A thorough understanding of these issues is important before making a policy change and planning an intervention to improve food production in the county.

We will now study the second major aspect of nutrition economics i.e. Food pricing.

5.5.3 Food Pricing

The pricing of the food products bought by the consumer is subject to multifarious factors. Each of the factors as discussed below can affect the pricing both in the interest of the consumer and against it, An overview of these factors will help one understand the umpteen tasks faced by the policy makers in achieving at a decision which will be in the best interest of the consumer, as well as, will help in positively towards the burden of the malnutrition in the community.

The costs of storage, transportation, processing- which are known as the marketing transformations - are an integral component of food price formation. The storage at the non-harvest season can increase the prices due to logistic reasons or due to the wish of the storage-marketer to look for some gains during the non-harvest season. The transportation costs may rise with the increase of the distance between the production point and the final consumer. Also, poor conditions of the roads and communication will contribute into the increase of the price. Processing, e.g. the milling of the rice before selling it to the consumer will increase the price, but then consumer also prefer it more as compared to the raw unmilled rice directly from the farm.

Seasonality by virtue of the harvest and the non-harvest seasons will affect the pricing. Pricing will increase with the demand, e.g. local food habits will determine the pricing of a grain in respect to its acceptability in the local population.

Increasing the prices of the seeds, fertilizers, pesticides, and other farm related equipments will increase the prices of the grain. but at the same time these things if are under subsidy from the government, can help in decreasing the prices. Markets do not always function in the best interests of a broad cross section of society. Highly unequal financial bargaining power is often brought to the exchange relationship between seller and buyer. In the absence of any price

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regulatory body, all the middlemen involved right from the level of the production to the level of the consumption may have a wishful interest in the pricing. Thus, more is the number of the middlemen in the path, more the prices will increase.

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A shortage of food means high prices in a market economy, with only the well-to-do able to purchase it. A food shortage in a socialist economy means rationing, with perhaps little choice about what the poor can eat. Competition and the number of market participants affect the logic of decision-making behaviour. For competition to be effective, however, there must be an adequate number of participants on both sides of the exchange relationship so that no single agent can significantly influence the outcome of the exchange. Farmer's range of choice at the initial point of sale is the first step in understanding how competitive price formation is likely to be. The more agents there are competing to buy the farmer's grain, the better the information available to the farmer about the prevailing price and the easier it is to switch from one buyer to another whose terms are relatively better. At the opposite end of the marketing chain, where consumers buy foods if many alternative retail stalls offer similar commodities and services, the freedom of consumers to choose one retailer over another prevents excess profits from high margins accruing to the retail-marketing agents.

Government induced subsidy directly to a commodity will help in decreasing the prices. International markets affect the prices in an intricate way. Actually the domestic markets are in an effect only a networking between the various international markets, so it is not astonishing to find the price getting affected as a result of the international price correlation.

The cost of the labour involved at every stage will increase the prices. Tax levied by the government will also increase the prices. Thus, we see that there are many factors, which influence the price of the food commodities. Food commodities available at affordable prices by the poor can go a long way to improve the food security of vulnerable population and thus help improving their dietary intakes.

In the above section, we studied about economics of health and nutrition. we looked at various health and food resources required to improve nutritional status of population. We also analyzed various economic consequences of malnutrition. Now we will review how we can efficiently plan and allocate these limited resources to alleviate the large problem of malnutrition. Thus, in the next section, we will explore the concept of economic evaluation of malnutrition. But before moving on to this topic let us check our understanding on the subject so far by answering the questions given in check your progress exercise 2.

Check Your Progress Exercise 2

1. What is Food Security? Enumerate the three causes for food insecurity.
.....
.....
2. Define the term nutrition security and list any four initiatives to improve nutritional status.
.....

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.....
3. Explain in brief the factors responsible for food pricing.
.....
.....

4. What are the various issues related to food production and explain any one in brief?
.....
.....

5.6 ECONOMIC EVALUATION OF MALNUTRITION

You must be familiar with a proverb frequently used in the field of economics, which says- "resources are limited and wants are unlimited". This can be applied to the area of programme planning also for alleviating malnutrition. Shortage of resources is constantly faced by programme planners where they try to make the best use of the limited resources using it for the programmes which will yield the best results. Taking into consideration the scarcity of resources, especially in developing countries, it becomes important for the decision makers to strike the most favourable balance between the health benefits achieved and the cost incurred. At some point, the society must decide one programme in preference to an alternative. The term 'opportunity cost' describes the link between the scarcity of resources and sacrifices made by the society

So how 'do we know which intervention is better than the other in terms of the health benefits or which is least expensive strategy for achieving the same health outcome? We can find that out by conducting an economic evaluation. Economic evaluation in the health care sector consists of comparing two or more health care interventions in terms of their cost and consequences as described earlier in Table 5.1. There are two objectives of economic evaluation. These are:

- 1) To introduce resource consideration into analysis and to assess the opportunity cost of new procedures and programmes (preventive, diagnostic, therapeutic, rehabilitative)
- 2) To develop a framework within which the costs of the new procedures or programmes can be compared to their benefits

Depending upon what objective we want to achieve, we can conduct three types of economic evaluation:

- cost-effectiveness analysis,
- cost-utility analysis, and
- cost-benefit analysis

Let us discuss these briefly

- **Cost effective analysis:** Cost effective analysis provides for the choice of least expensive strategy at the least cost. Here the outcome is measured in terms of natural units e.g. life-years gained, number of children prevented

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from developing malnutrition etc.

- **Cost utility analysis:** Cost utility analysis provides for measurement of health outcomes for a given cost. The health outcomes are measured quantitatively, as well as, qualitatively. These can be quality-adjusted life years (QALY) or health years equivalent (HYEs).

Cost-benefit analysis: Cost benefit analysis is a useful tool to establish the priority of a particular health service action. In this, both inputs and outputs are measured in monetary terms. Cost benefit analysis is probably most useful for health programmes that have a major impact on economic development.

You would note here that the first step for economic evaluation is to estimate the cost of intervention that is being used for control or prevention. The process of identification, measurement and valuation of costs associated with each alternative are identical in all three methods.

These resources with the use of health care technology yield improvements in health, which can be measured in terms of benefits, utilities and effects

So we can conduct any type of economic evaluation depending upon what our objectives are for use of resources and measurement of benefits, Policy makers to make decisions regarding allocation of limited resources generally use economic evaluation. But have you ever wondered what does it cost to a nation on a yearly basis when we have several people suffering from malnutrition? We use the term "annual productivity loss" to calculate this loss to the nation. Let us find out more about it in the next section.

Annual productivity loss

The above section dealt with optimum use of resources and the kind of health benefits obtained with the use of those resources to prevent and control malnutrition. When people suffer from malnutrition or any specific micronutrient deficiency, their productivity at work decreases. For example, when they have iron deficiency anaemia, their work capacity may reduce and they may be more susceptible to infection. With the result, they are more likely to produce at less than optimal level or miss out from work due to sickness. Missing out time from work is known as productivity loss. Nowadays, there is a constant pressure on health care research personnel to calculate productivity loss due to health consequences. Productivity loss can be measured using 3 parameters which include productive life expectancy, average annual wage for an adult and average rate of employment.

Thus, the formula given for calculation of annual productivity loss is:

Annual productivity loss = $(n * p * w * e) + (d * pe * w * e)$ where,

n = no. of adults suffering from deficiency disorder

p = productivity loss due to disorder

w = annual wage

e = employment rates

d = death due to disorder

pe = productive life expectancy

The assumed productivity loss (p) due to different deficiency disorder is given in Table 5.5 and can be used in the formula above.

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Nutrient	Deficiency disorder	Assumed productivity loss (%)
Calories	CED	10%
	Obesity (CEE)	?
Iron	Anemia	20%
Iodine	Mild iodine deficienc	5%
	Cretinism	50%
Vitamin	A Partial blindness	25%
	Total blindness	50%

Table 5.5: Productivity loss due to different deficiency disorders

In the table above productivity loss due to obesity is not included, because there is no data so far. Let us understand the concept of productivity loss with the help of an example. We can take the case of anaemia and calculate the annual productivity loss as follows:

Let us assume

Productive life expectancy (years) = 15.6
 Annual wage for an adult = Rs.3500
 Average rate of employment = 75%
 No. of adults suffering from anaemia = 5000000 (hypothetical figure)
 No. of deaths attribute to anaemia = 10,000
 Annual productivity loss for anaemia of a given geographic area for the given year
 - 2625000000 + 409500000
 = 3034500000
 — Rs. 3 billion /year

This example of calculating annual productivity loss is based on hypothetical figures. You would be surprised to know that similar calculations done to estimate the cost of malnutrition for India for the year 1997 have amounted to Rs. 570.5 billion. Isn't that too much? If we eliminate malnutrition, then productivity of people of our country will increase and we would have a monetary gain of Rs. 570.5 billion in terms of increased goods and services and better quality of life for people. With this we end our study on the economics of malnutrition. We hope having gone through the concepts present in this unit you would realize what is the cost of malnutrition and how economic evaluation of malnutrition keeps to plan the targeting of resources for alleviating the problem.

Check Your Progress Exercise 3

1. Fill in the Blanks:

- a) benefit analysis is a useful tool to establish the priority of a particular health service action.
- b) Missing out time from work is known asloss.
- c) and are health outcomes measured quantitatively as well as qualitatively as part of the cost utility analysis.
- d) cost is the term which describes the link between scarcity of resources and sacrifices made by the society
- c) The full form of QALY is

2. Give the formula for annual productivity loss with complete expansion.

.....
.....
.....

5.7 LET US SUM UP

This unit focused on the economics of malnutrition. The major points emerging from this unit were:

- Health economics concentrates on application of the principles and rules of economics in the sphere of health. In broad terms, it includes analysis and evaluation of health policy and the health system from an economic perspective
- Malnutrition causes huge amount of economic losses to the nation. The causes of malnutrition are multifactorial and interventions have to be done at various levels.
- Nutrition economics deals with many issues relating to food resources such as food pricing, food production, food marketing and food storage etc. The discipline tries to analyze relationship between all these issues so that food resources can be adequately planned, equitably distributed and efficiently used to improve the nutritional situation of the people.
- Food security is access by all people at all times for enough food to lead an active health life. Food security can be at the individual level, household level and at the community level. In a given situation food insecurity can result from the following three causes: These are related to availability, accessibility and appropriate utilization of the food.

Economic evaluations play an important role to estimate the burden of a given public health problem and help in planning and policy malting.

5.8 GLOSSARY

Biotechnology : biotechnology describes the use of organisms and

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Isoquant	biological processes to provide food, chemicals and services to meet the needs of humans. : locus of all input combinations that yield the same level of output.
Pathological	: The branch of medical science that studies the causes, nature and effects of diseases.
Synergistic	: action of two or more substances to produce an effect that neither alone could accomplish.

5.8 CHECK YOUR PROGRESS

- 1). Explain the Causes of Malnutrition?
- 2). What is Ariboflavinosis? Define the cause and treatment method.
- 3). What do you mean by health economics?
- 4). What are Indicators of Nutrition ?
- 5). What is Food Security? Enumerte the three causes for food insecurity ?

6

POPULATION DYNAMICS

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STRUCTURE

- 6.1 Learning Objective
- 6.2 Introduction
- 6.3 Demography, Demographic Transition and Demographic Cycle
- 6.4 Population Trends in India
- 6.5 Population Structure
 - 6.5.1 Sex Composition of the Population
 - 6.5.2 Age Composition
 - 6.5.3 Fertility Behaviour
- 6.6 Vital Statistics and Implications of Vital Statistics in Population Growth
- 6.7 Population Policy
- 6.8 Relationship between Fertility, Nutrition and Quality of Life
- 6.9 Let Us Sum Up
- 6.10 Glossary
- 6.11 Check Your Progress

6.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- explain the concept of demography, demographic transition and demographic cycle,
- highlight the population trends and structure in India,
- describe the implications of important vital statistics on population growth and trends
- list the factors affecting population growth,
- discuss the concept of population control in India, and
- explain the implications of population growth on quality of life.

6.2 INTRODUCTION

In Unit 1, we learnt that public nutrition is concerned with improving nutrition situation of population. Units 3 and 4 focused on various nutrition problems existing in India and other developing countries. Unit 5 highlighted the economic cost of malnutrition. In this unit, we are going to study about human population who eventually suffer from these problems.

Why do we want to study about human population? We want to study about this because we want to know what changes are taking place in human population. For example, what are trends in population growth? What changes are taking place in structure and composition of human population? As a public nutritionist, we want to know about these aspects because this would help us estimate various needs of population such as food and health care needs, plan programme strategies and work towards solving the nutrition problems. In this unit, we are going to study about all these aspects.

6.3 DEMOGRAPHY, DEMOGRAPHIC TRANSITION AND DEMOGRAPHIC CYCLE

We know that population of different countries in the world is always changing. For some countries like India and China, the population is increasing at a very fast rate, while for others e.g. U.S., it is increasing at a slower rate, in some countries it is even declining e.g. in Sweden and Hungary. All the countries of the world pass through different stages in population growth and accordingly exhibit changes in population growth. In this section, we will learn about the different stages of population growth and how they affect the changes in population scenario. We will familiarize you with certain concepts which are frequently used in the study of population. These concepts are — demography, demographic transition and demographic cycle. Let us start with demography.

What is demography?

The scientific study of human population is termed as 'Demography'. It focuses attention on three readily observable human phenomena:

- a) Changes in population size (growth or decline),
- b) The composition of the population, and
- c) The distribution of population in space.

There are five major demographic processes, which are continually at work within the population namely, fertility, mortality, marriage, migration and social mobility. You would realize that these processes which determine the size, composition, distribution and development of the population.

The health of the population depends upon the dynamic relationship between the number of people, the space, which they occupy, and the skill that they have acquired in providing for their needs. There are continuous changes occurring in the structure; and composition of the population of most of the countries of the world. So then, where do we get all the information related to

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population? In India, we get our demographic statistics mainly from population censuses, National Sample Surveys, registration of vital events and demographic studies. July 11 is celebrated as the World Population Day. On July 11, 1999, the population of the world reached the mark of six billion people.

This brings up to the next issue of demographic transition. Let us get to know about demographic transition:

What is Demographic Transition?

The whole process of change with regard to population size and characteristics is called demographic transition. In order to understand this term better, let us learn about demographic cycle.

What is a Demographic Cycle?

It is a cycle which evolves as population grows in size. The history of world population suggests that there is a demographic cycle of five stages through which a nation passes. These stages of demographic cycle are enumerated herewith

a) First Stage

High Stationary - This stage is characterized by high birth rate and a high death rate neutralizing each other and hence the population remains stationary. India was in this stage till 1920.

b) Second Stage

Early Expanding - The death rate begins to decline but birth rate remains high, thereby resulting in increase in population.

c) Third Stage

Late Expanding - The death rate declines further and birth rate begins to fall. The population continues to grow because births exceed deaths. India appears to be in this stage at the moment where there is high growth with definite signs of slowing down.

d) Fourth Stage

Low Stationary - This stage is characterized by low death rate and low birth rate, as a result of which the population becomes stationary. This is also called the zero population growth. Most of the developed nations have undergone demographic transition shifting from high birth and high death rates to low birth and low death rates and are currently in this phase.

e) Fifth stage

Declining - There are more deaths than births resulting in decline in population. This is also called the negative growth phase. Some countries like Sweden and Hungary have entered this stage. Socially, this stage of demographic transition is not desirable as it results in total changes in age structure, leading to progressive aging of the population.

Thus, we have learnt so far that different countries are at different stages of demographic cycle and accordingly exhibit changes in the population growth. India is at the third stage where the population is still growing although the rate of growth seems to be slowing down. You may probably be aware that in India

we face a lot of problems due to excessive growth in population. So what are the negative effects of excessive growth in population? Let us review these.

Continuous and excessive growth of population is interpreted as major ill of contemporary national societies, both developing and industrialized. In the former case, rapid population growth is seen as a major barrier to the processes of development. In the latter, people are seen as polluters, herding into vast and expanding cities like Mumbai or Delhi and destroying natural environments.

Unlike the developed nations where they have witnessed demographic transition, the situation of most the developing societies, have few favourable attributes. Many countries, particularly in Asia have a high man-land ratio i.e. population density. The density Of population in India as per 1991 census was 273 and as per 2001 census is 324. With 2.4% of the world land area, India is presently supporting 6% of the world population. Currently about 800/00f the world's population is living in the developing countries. Out of the 90 million people added every year, all but six million will live in developing countries. One third of the population lives in China and India. India has the second largest population in the world. The total population of the country was 846.3 million on first March 1991 and as per 2001 census it has crossed 1 billion mark and is 1027 million.

Thus it is interesting to note that in the developing nations, as a result of applications of public health measures and improved medical case mortality rates have taken a steep downward trend, whereas, the birth rates have not declined correspondingly, thus causing mushrooming in population growth. The rampant population growth has been viewed as the greatest single obstacle to the economic and social advancement of the majority of people in the underdeveloped world, which is true for India.

We will now study how and in what way the population is growing in India. i.e. ,what are the population trends in India.

6.4 POPULATION TRENDS IN INDIA

In the population trends, we will study about the pattern of population growth in India. We will examine the population trends in terms of.

- How the overall growth in population has occurred in India? ,
- How the urbanization is affecting the population growth pattern in urban versus rural areas?, and
- What are the interstate variations in population growth rate?

Let us review these trends one by one.

How the overall growth in population has occurred in India?

The growth of population in our country is a recent phenomenon. The population had been fluctuating and growing very slowly until about 1921. The year 1921 is called the 'big divide' because the absolute number of people added to the population during each decade has been on the increase since 1921. The growth of

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population is a result of declining general mortality, infant mortality and increase in expectation of life at birth.

The period from 1921-51 was one of slow but steady growth. During the next four decades, mortality declined by nearly 57% from 22.811000 in 1951-61 to 8.911000 in 2001. The birth rate also declined during these years but at a much slower pace reaching a level of 24.811000 in 2001 from 41.7 in 1951-61. The decadal growth of population of India from 1901 to 2001 is shown in Table 6.1 and Figure 6.1.

Census Year	Total Population	Average Annual Exponential Growth Rate (Percent)
1901	238.4	-
1911	252.1	0.56
1921	251.3	- 0.03
1931	279.0	1.04
1941	318.7	1.33
1951	361.1	1.25
1961	439.2	1.96
1971	548.2	2.20
1981	683.3	2.22
1991	846.3	2.14
2001	1027.0	1.93
2025	1322.8"	

* Projections **Table 6.1: Population of India, 1901-2001**

As you can note from Table 6.1, India's population has grown approximately four times in the last century viz. from 1901 to 2001. We were 238.4 million in 1901 and as per 2001 census we have increased to 1027 million people. Further, the absolute addition to the population in the decade 1991-2001 was about 180 million which is almost equal

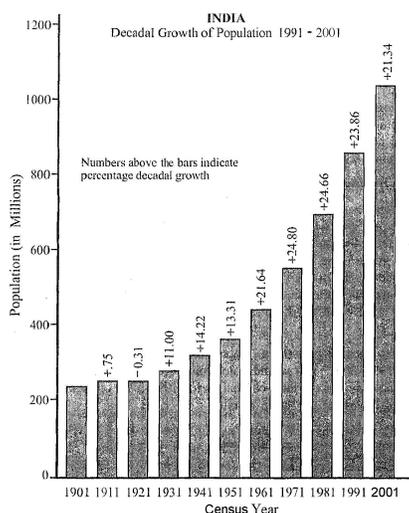


Figure 6.1: India - Decadal growth of population 1901-2001

to the population added during the three decades 1931-61. The average exponential growth rate of population has registered the sharpest decline from 2.72% during 1971-81 to 1.93% during 1991-2001. Figure 6.1 shows that percentage decadal growth has been rising steadily since 1921.

You must have heard or read about “urbanization” in T.V or newspaper, Let us find what do we exactly mean by urbanization and how this affects population trends.

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How the urbanization is affecting the population growth pattern in urban versus rural areas?

Urbanization is the process whereby larger and larger proportions of population live in urban areas. Urbanization can result by two ways, First, by accretion of population to already existing towns and second, by the transformation of a rural area into an urban area.

As per 1991 census, out of the total population, 215 million people were residing in urban areas and 621 million in rural areas. There has been a sharp increase in the urban population, during 1961-1991, which has increased about three times as against only two times in rural areas.

Growing urbanization is a recent and unstoppable phenomenon, in developing countries. With the advances in industrialization, more and more people are being attracted towards the industrial centres, The migration of people from countryside to urban areas constitutes a social crisis, which ultimately affects quality of life of people. Our country faces the emerging problem of growing urban slum population. Rural folks migrate to cities in search of employment and better social status. These migrants settle in cities in places where sub-optimal infrastructure for housing, electricity and sewerage system is available. Generally, slum populations have more young people and children and fewer elderly than the population as a whole. Slums on the whole have lower sex ratios than the cities in which they are located. Slum dwellers are very poor rural migrants, primarily from lower caste or disadvantaged communities, who are pushed to the cities through caste, kinship and village networks. You would realize that it is this group of people who are the most disadvantaged from nutrition, health point of view. Thus from our discussion so far, it must be clear, how population is rising at a faster rate in cities compared with rural areas. Different states in India have different growth rates of population and that affects population trends in India. Let us next review the interstate variations in population growth in our country.

What are the interstate variations in population growth rate?

There is a wide variation in the growth rate of different states, during 1991-2001 among the major states, six states Haryana, Madhya Pradesh, Bihar, Gujarat, Uttar Pradesh and Rajasthan recorded annual growth higher than 2.3%, whereas, thirteen states which recorded growth rate below 2% than the current national average. These states are Andhra Pradesh, Himachal Pradesh, Uttaranchal, Tripura, Assam, West Bengal, Chhattisgarh, Karnataka, Orissa, Kerala, Goa,

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Punjab and Tamil Nadu. The most populous states viz. Uttar Pradesh and Bihar have shown an insignificant decline in the growth rate

Figure 6.2 shows decadal growth of population in different states over the inter-censal period 1991-2001. You would note from Figure 6.2 that the highest decadal growth rate of population in the inter-censal period 1991-2001 of 64.41% was recorded in Nagaland and lowest of 9.42% in Kerala.

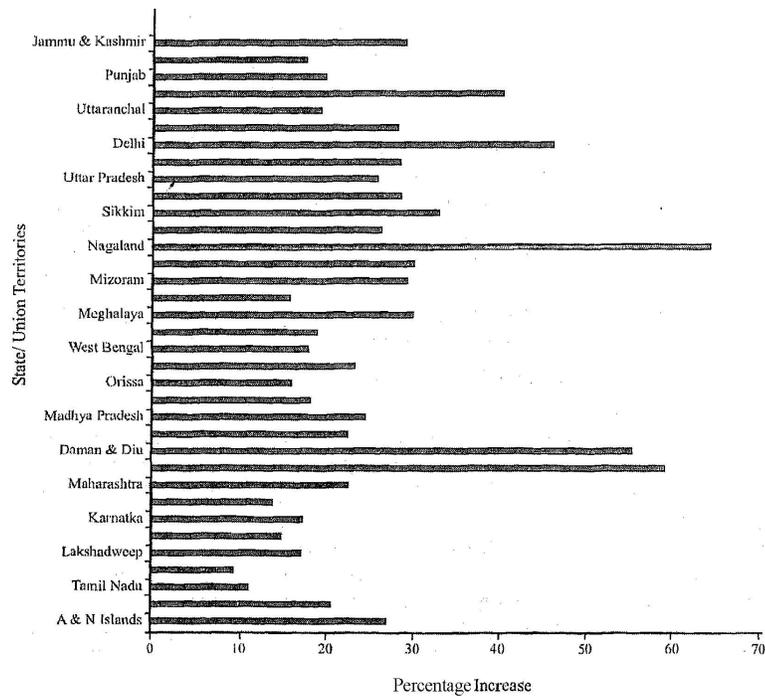


Figure 6.2 : Decadal growth of population 1991-2001

Therefore, over the period of ten years from 1991-2001, some states have shown higher population growth rates than others.

In this section, we studied about how and in what way population has grown in India as a whole and the pattern of its growth within India, i.e. in urban, rural, as well as, in different states. In the next section, we will study about the structure of population in terms of age, sex and fertility behaviour. But before that, let us check what we have learnt so far.

Check Your Progress Exercise 1

1. What do you understand by the term 'Demography'? What are the aspects it focuses on?

.....

2. List the stages of the demographic cycle through which a nation passes?

.....

3. Why is the year 1921 called the 'big divide'?

.....

We will now study about population structure. Under this, we will study about structure of population in terms of age and sex composition. We will also study about fertility behaviour because fertility behaviour affects the age and sex composition of the population, For example, in our society there is a preference for a male child. At times, after the birth of a daughter, couples continue to have children until they have a son. All these factors will have an effect on age and sex composition of the population and also the health/nutrition status.

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6.5 POPULATION STRUCTURE

The structure of population can be viewed as to how the population is coin posed of in terms of age and sex. The structure of population can also vary depending upon when and how many children women have i.e. their fertility behaviour. So we can study the population structure in terms of sex composition, age composition and fertility behaviour. Let us begin with sex composition of the population.

6.5.1 Sex Composition of the Population

Sex composition of human population is one of the basic demographic characteristics, which is extremely vital for any meaningful demographic analysis. The sex composition of the population is affected by sex ratio at birth, differentials in mortality conditions of males and females and sex selective migration. You must have read in the newspaper or heard over T.V., radio that the sex ratio is declining in India. So what do we mean by sex ratio? Let's find out

What is Sex Ratio.?

Sex Ratio is defined as "the number false per 1000 males". Sex ratio is an important social indicator to measure the extent of prevailing equity between males and females in a society at a given point of time. The sex ratio in India has been generally adverse to women, the sex ratio has also declined over the decades. Sex ratio is a crucial indicator of women's health status and survival. In India, ever since 1901, almost every census has recorded a decline in the sex ratio, except for a slight abatement 'of the trend during 3 940's consequent to the world war and a small improvement from 1971 to 1981. Table 6.2 depicts the sex ratio in the country from 1901 onwards.

Year	Females/1000 Males
1901	972
1911	964
1921	955

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1931	950
1941	945
1951	946
1961	941
1971	930
1981	934
1991	927
2001	933

Table 6.2: Sex ratio in India 1901-2001

There is a considerable variation in the sex ratios between the States and Union Territories. In 2001, Kerala had the highest sex ratio of 1058 followed by Chhattisgarh (990). The lowest sex ratio of 793 was observed in the Union Territory of Chandigarh. Along with some Asian neighbours like China, Bangladesh, Sri Lanka and Nepal, the sex ratio in India is lowest in the world. You must be curious to know Why the sex ratio is falling in India.

Let us now review this.

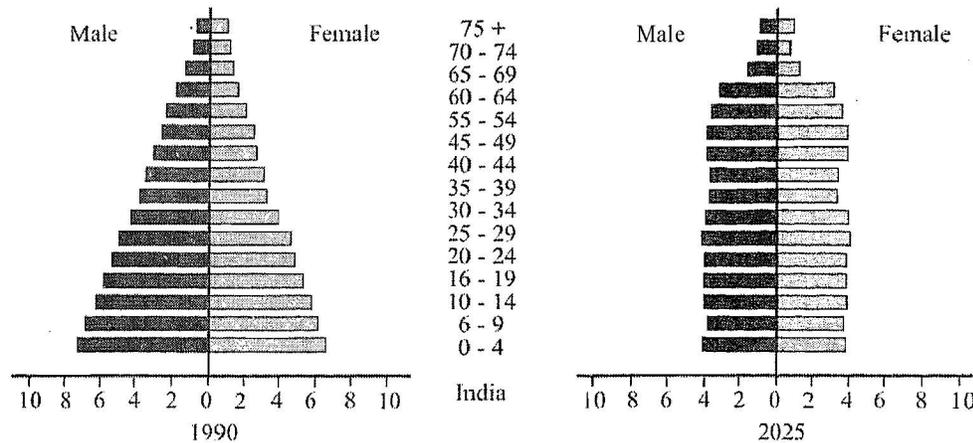
Why sex ratio falling India?

The females initiate their lives right from birth at a disadvantage. When one looks at the sex ratio in Indian children, it decreases from 977.60 in 0-4 years age group to 940.97 at 5-9 years and then 897.95 at 10-14 years of age. To understand this demographic distortion, various explanations are available like the sex selective feeding and child rearing practices, sex selective female abortions, female infanticide and female selective mortality. The age specific monality over 1972-2001 shows that though the rate has been falling for the population on the whole, the female deaths remain consistently higher. Also, when one looks at the age specific sex ratios, there are two depressions where the sex ratio drops well below the average for the following periods - first in the late childhood and adolescence and second during 30 to 40 years of age and 50-60 years of age, reflecting their perils of the reproductive periods and long periods of heavy work under adverse circumstances.

We discussed above that due to discriminatory practices against women, sex ratio is falling in India and that is influencing the sex composition of the Indian population. We are gradually moving towards having more men and less women as a part of our population. Let us now study about age composition as it influences the structure of the population

6.5.2 Age Composition

The age structure of a population is best represented as shown in Figure 6.3. This type of representation is called an 'Age Pyramid'. Figure 6.3 gives the age structure of Indian population in 1990 and 2025 (as projected).



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Figure 6.3: Age structure of population (Male and Female), 1990-2025 (percentages)

The age pyramid of India in 1990 as shown in the Figure 6.3 is typical of under-developed countries, with a broad base and a tapering top. In the developed countries, the pyramid generally shows a bulge in the middle and has a narrower base, reflecting a higher proportion of productive working population and a lower proportion of dependents. So who comprises dependents as per census? The child population (0-14 years) and elderly population (65 years and above) comprise dependents. The age group 0-14 years for children is further split into 0-4, 5-9 and 10-14 years, keeping in mind their different health and social needs.

There is another term which we need to know about, that is dependency ratio. The ratio of the combined age groups 0-14 years plus 65 years and above to the 15-65 years age group is termed dependency ratio. In India, the age structure of the population is changing so the dependency ratio is likely to decrease. The proportion of the population in the working age group of 15-59 years is likely to increase by 2025.

There is another transition known as "ageing transition" which is happening in our country. A sharp decline in death rates and an increase in life expectancy in post independence period is resulting in demographic transition, which can be called 'ageing transition'. In 1989, there were 37.1% and 4.3% people in the age category 0-14 years (children) and >64 years (elderly), respectively and 58.6% in the productive age category of 15 to 64 years. But by 2025 there will be 24.1% and 7.5% in 0-14 years and >64 years, respectively and about 68.4% in 15-64 years age group. Thus, the numbers of aged will approximately double registering more than four-fold increase in absolute numbers. Considering that the elderly are subjected to highest incidence of sickness along with young children and also higher levels of morbidity, it may pose as an economic burden for the country. This ultimately will result in reordering of the priorities with respect to health care. The working adult population will have to sustain and support the increasing elderly population.

In our discussion above we have described how the population structure in India is changing with respect to the age of the people. In the years to come, we will have more elderly people comprising the population compared to what we

have now.

Next, let us study about fertility behaviour, since this also affects structure of population.

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6.5.3 Fertility Behaviour

Actual bearing of children is termed as 'fertility'. A woman's reproductive period is roughly from 15 to 45 years - a period of 30 years. Information on fertility in India indicates that an average woman gives birth to an average of six or seven children, if her married life is uninterrupted. This has great implications on the nutrition and health status of women in our country.

The high fertility in India is attributed to universality of marriage, lower age at marriage, low level of literacy, poor level of living, limited use of contraceptives and traditional ways of life. Some of the factors which affect fertility are:

- 1. Age at marriage** - The age at which a female marries and enters the reproductive period of life has a great impact on her fertility. National data from Registrar General of India suggests that females who marry before the age of 18 gave birth to a large number of children than those who married later in life. Demographers have estimated that if marriages were postponed from the age of 16 years to 20-21 years of age, the number of births would decrease by 20-30 percent. Although, the mean age at marriage for girls has moved to 18 years in many states, but in rural areas of Madhya Pradesh, Rajasthan and Uttar Pradesh a substantial proportion of marriages continue to take place when the girl is around 15 years of age. This makes the girl child in India 'at risk' to disease and malnutrition.
- 2. Duration of married life** - Demographic studies indicate 10-25 percent of all births occur within 1-5 years of married life; 5-55 percent of all births within 5-15 years of married life. Births after 25 years of married life are very few. Therefore, family planning efforts should be concentrated in the first few years of married life in order to achieve tangible results.
- 3. Spacing of children** - Studies have shown that when all births are postponed by one year, in each age group, there was a decline in total fertility. Spacing of children may have a significant impact on the general reduction in fertility rates. The other big advantage is that we can also reduce the infant and child mortality. New observations from Demographic and Health Surveys (DHS) programme (2002) show that children born 3 to 5 years after a previous birth are healthier at birth and more likely to survive at all stages of infancy and childhood through age five than children born before 3 years of age
- 4. Literacy** - Women's literacy is one of the critical factors that determines and enables them to achieve their reproductive goals. Literacy improves awareness and enables women to access services, this improve their own well being, survival of their offspring and access to contraception. According to All India Study by Registrar General, Government of India (1982), the total fertility rate was 4.15 among the urban illiterate, as compared to 2.60 among the urban literate. In the rural areas, the corresponding figures were 4.73 and 3.50

5. **Economic status** - Operational research studies support the hypothesis that economic status bears an inverse relationship with fertility. The total number of children born declines with an increase in per capita expenditure of the household. People in the high economic group view having children as an investment, whereas, for poor people children are an asset and source of extra income.
6. **Caste and Religion** - The Registrar General, Government of India reported a total fertility rate of 5.03 among Muslims as compared to 4.46 among Hindus in rural areas in 1982. The total fertility rate among Christians was found to be 3.50 in rural areas and 2.09 in urban areas. Among Hindus, the lower castes appear to have a higher fertility than the higher castes.
7. **Nutrition** - There appears to be some relationship between nutritional status and fertility levels. Virtually, all well-fed societies have low fertility and poorly fed societies high fertility.
8. **Family planning** - It is an important factor in fertility reduction in a number of developing countries, family planning has been a key factor in declining fertility. Family planning programmes can be initiated rapidly and require only limited resources, as compared to other interventions for reduction in fertility.
9. **Cultural preference for son** - In our Indian society, the cultural preference for sons is strong and many couples have another child soon after the birth of a daughter continue having children until the birth of a son. This phenomena has been termed by some demographers as "son syndrome".
10. **Other factors** - Fertility is affected by a number of physical, biological, social and cultural factors such as place of women in society, value of children in society, widow remarriage, breast feeding, customs and beliefs, industrialization and urbanization, better health conditions, housing opportunities for women and local community involvement. Attention to these factors requires long-term government programmes and large amount of money.

So we have learnt how different factors affect a women's fertility behaviour. Depending upon how many children a woman has and at what time during her reproductive life, it will affect the structure of the population over a period of time. Reading through this unit, we came across certain terms like birth rate, death rate and fertility rate etc. These terms are a part of the vital statistics. It is important for us learn about vital statistics because they are frequently used in the study of population.

Let us now study about certain vital statistics in detail.

6.6 VITAL STATISTICS AND IMPLICATIONS OF VITAL STATISTICS IN POPULATION GROWTH

Vital statistics are data concerning the important events in human life such as births, deaths, marriages, migrations, etc within a population. We can monitor the data on vital statistics over a period of time and estimate the trends and

structure of population growth. Before we explain the implications of this data in population growth, we will familiarize you with the definitions of some of the important indicators related to birth, death, disease and fertility. These are briefly summarized in Table 6.3.

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Density of population	Number of persons living per square kilometer area
Infant mortality (IMR)	Number of deaths of infants under one year of age per 1,000 live births
Mortality rate/Death rate (CDR)	Annual number of deaths per 1,000 population
Birth rate (CBR)	Number of live births per 1 estimated mid year population in a given year
Fertility rate	The number of children that would be born per woman, if she were to live to the end of her child bearing years and bear children at each age in accordance with prevailing age specific fertility rates.
Sex ratio	Number of females per 1000 males.
Life expectancy at birth	The number of years new-born children would live, if subject to the mortality risks prevailing for the cross-section of population at the time of their birth.
Net reproduction rate (NRR) —	Average number of daughters that would be born to a woman if she experiences the current fertility and mortality pattern throughout her reproductive span (15-49 years).
Maternal mortality rate (MMR)	Number of death of woman from pregnancy related causes per 100,000 live births.
Under 5 mortality rate (U5MR)	Defined as the number of children dying below five years / 1000 live births
Urban population	Percentage of population living in urban areas as defined according to the national definition used in the most recent population census.

Table 6.3: Commonly used terms in vital statistics

We will now look at some of these different indicators and their implications on trends and structure of population growth. We begin with birth and death rates.

Birth and death rates

You studied earlier in this unit that in India, the birth rate is declining but at a

slow pace i.e. reaching a level of 2511000 population in 2001 from 41.7 in 1951. On the Other hand, mortality has declined by nearly 57% from 22.8 per 1000 population in 1951-1961 to 9.0 in 2002. This has resulted in considerable increase in life expectancy at birth for both the sexes. The life expectancy at birth has improved from 41.6 years in 1951 to 64.1 years in 2001 for males and corresponding values for females are 40.6 years and 65.6 years. You would also note that there are regional diversity in birth rates between rural and urban areas and amongst states in India.

Let us find out about this diversity.

Regional diversity - There are great differentials in the crude birth rate (CBR) between rural and urban areas. In rural areas, the birth rates are still alarmingly high. The birth rate in rural areas declined from 38.9 to 35.6 in 1981 and remained stable over the next four years and then dropped further to level of 30.9 (1991). The urban birth rate fluctuated between 27.0 in 1981 to 24.3 in 1991. The birth rates were higher in Uttar Pradesh 36.2, Madhya Pradesh 34.9, Rajasthan 34.0 and Bihar 32.0 than the national average of 28.7 in 1993. Kerala and Tamil Nadu recorded the lowest birth rates 17.4 and 19.5, respectively in 1993.

The factors associated with the low birth rates in Kerala are the high literacy rate (90.6% in 1991) especially of women (86.9%), low infant mortality rate and high level of utilization of health care facilities. It is worth noting that Kerala's birth and death rates are lower than those of China. Kerala is a success story in India's quest for population stabilization.

Let us review the implication of net reproduction rate on population structure.

Net Reproduction Rate

You studied earlier that Net Reproduction Rate (NRR) is the average number of daughters that would be born to a woman if she experiences the current fertility and mortality pattern throughout her reproductive span (15-49 years). NRR is a demographic indicator. NRR of 1 is equivalent to attaining approximately a 2-child norm.

Demographers believe that the goal of NRR 1 can be achieved only if at least 50 percent of the eligible couples are effectively practicing family planning. According to the National Health Policy (1983), the long-term goals were to reach NRR of 1 by 2000 A.D., which corresponds to achieving birth rate of 21, death rate of 9 and growth rate of 1.2. A crucial factor responsible for high fertility (3.6 in 1992 and 2.9 in 1998-99) in India is the young age of marriage for girls (19.20 years in 1984). Analysis of data from 1901 till date reveals a small rise in mean age at marriage from 13.1 years in 1901 to 19.20 in 1984. There are considerable regional variations with Kerala reporting the highest mean age at marriage of 20.9 years for females. Also, it is higher in urban areas than in rural areas.

Let us review maternal mortality ratio.

Maternal Mortality Ratio

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Childbirth, without proper antenatal care and attention during and after delivery has a high risk. The actual risk of an Indian woman dying from a maternity related cause could be far more than the developed world because of her larger number of pregnancies (five or six compared with one or two in the developed nations). India's maternal mortality ratio during 1980-99 was 4101100,000 and is about 50 times higher than many industrialized countries. The major causes of death in childbirth include post partum hemorrhage, eclampsia in last stages of pregnancy, infection from an untreated perineal tear and obstructed labour.

All these clinical causes of maternal mortality are related to maternal age, number of births and malnutrition, particularly anaemia. A woman giving birth to children at the optimum age of 20 - 35 years faces much lower average risk than women below 20 and over 35 years. It is also observed that maternal illness and deaths are significantly more with the fourth pregnancy onwards. The type of care received at childbirth is often critical for the health and survival of both the infant and the mother. Let us now review how infant mortality rate (IMR) and child mortality rate (U5MR) affects the trends in population growth.

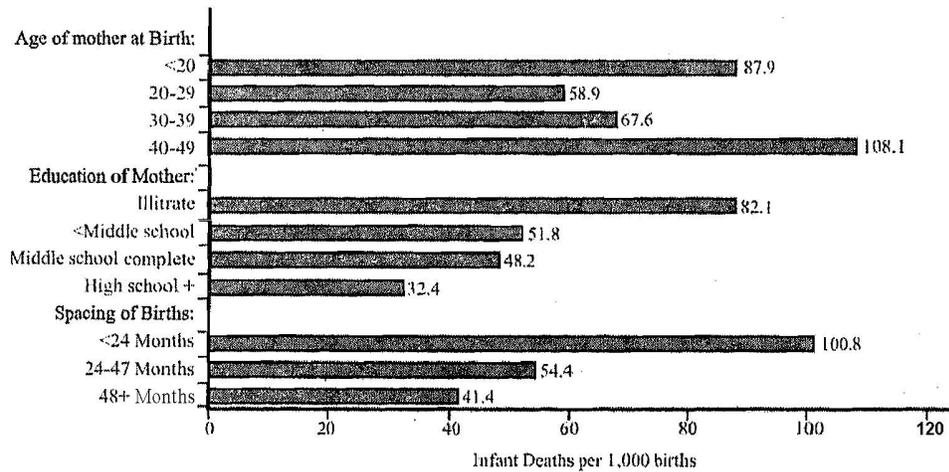
Infant mortality rate (IMR) and mortality rate (U5MR)

IMR and U5MR are sensitive indicators of a country's development and reflect the quality of life. The infant and under-5 mortality rate in rural areas of our country is substantially more than in the urban areas where most of the health facilities are available.

A large number of biological, medical, social and economic factors influence these two rates. The high rate also points to the downward spiral of the interplay between malnutrition and infections. There has been a decline in the level of IMR during 1971 to 1990 from 129 to 80, however even now it is alarmingly high.

You would also note large differences in the IMR and U5MR amongst the states. Major states having high child mortality rate are Madhya Pradesh (MP) (162), Uttar Pradesh (UP) (152), Rajasthan (149) and Orissa (148). The IMR in Orissa is 123 and for UP, MP and Rajasthan the IMR is above the national average. On the other hand, the state of Kerala, has achieved an IMR of 17, a figure comparable to that of any industrialized country. In Kerala, female literacy is high, medical, educational, transportation and communication facilities are available within 2 km, for a much large proportion of population while in Orissa and UP female literacy is low and there is inadequate development of health care, education, transportations and communication facilities.

Thus a high infant and child mortality reflects the poor state of public health, hygiene and environment sanitation in any country. Figure 6.4 illustrates the key infant mortality indicators, 1994-1998 as reported by National family Health Survey (NFHS - 2). You can see that infant mortality rate is very high when mother is less than 20 years of age, illiterate and has closely spaced child < 24 months of age.



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Figure 6.4: Key infant mortality indicators (1994-1998)

We hope from our discussion above you may have got good idea of how the monitoring of data on vital statistics can help in assessing and estimating the trends in population growth and structure. Let us take a break here and recapitulate what we have learnt so far. Answer the questions given in check your progress exercise 2.

Check Your Progress Exercise 2

1. What does a broad base and a tapering top of the 'age pyramid' of a country indicate?

.....

2. Define the following

a) Dependency ratio

.....

b) Net reproduction rate (NRR)

.....

3. Define sex ratio. What does an adverse sex ratio indicate

.....

4. List the factors which affect high fertility in India.

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In the section above, we studied about different types of vital statistics and their use in estimating population growth and structure. You are now aware that India's IMR, U5MR and maternal mortality ratio are very high when compared to other developing countries. India needs to greatly improve on these indicators to improve the quality of life of its people. Government of India has initiated many policy and programmes, aimed towards improving the health and welfare of mother and child in the country. We will learn about the National Policy and programmes on health and population next.

6.7 POPULATION POLICY

In this section, we will briefly review a series of population policy initiatives by Government of India, beginning 1976 till to date. Population policy refers to policies intended to decrease the birth rate or growth rate. Statements of goals, objectives and targets are inherent in population policy. In April 1976, India framed its first 'National Population Policy'. It called for an increase in the legal minimum age at marriage from 15 to 18 years for females, and from 18 to 21 years for males. The 1976 policy was modified in 1977 by the then New (Janata) Government. The new forms of compulsion and changed the programme's title to 'Family Welfare'. The statement however, endorsed the previous government's decision to raise the minimum age at marriage and the birth rate target of 25 per 1000 population by 1984 (which was not achieved).

In 1983, the country adopted the long-term demographic goals of reducing the Net Reproduction Rate to one by the year 2000. These goals known as National Demographic Goals were spelt out as follows:

the average size of the family would be reduced from 4.2 children to 2.3 children.

ii) The birth rate per 1000 population would be reduced to 21.

iii) The death rate per 1000 population would be reduced to 9

iv) The infant mortality rate would be reduced to 60 or less,

v) The effective couple protection rate would be raised to at least 60 percent.

All the National Demographic goals were not met and the Government of India came up with a new revised population policy which is explained herewith.

New Revised Population Policy

The Government of India, has evolved a more detailed and comprehensive National Population Policy in 1986, to promote it on a voluntary basis as a 'movement the people, by the people, the people. It has given family planning, the broadest possible dimensions which includes not only health and family welfare but also child survival, women's status and employment, literacy and education, socio-economic development and anti-poverty programmes. Some of the highlights of the policy are as follows:

1. Advancing the age of marriages of girls to 20 years through intensified publicity campaigns and appropriate amendments in the law,

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2. Promoting the two-child family norm,
3. Increasing female literacy rate,
4. Increasing demand for contraception to achieve a couple protection rate of over 56 percent by end of 8th plan,
5. Promotion of spacing methods,
6. Enhancing child survival through universal immunization and promotion of oral rehydration therapy,
7. Revamping the infrastructure and improving programme management at all levels,
8. Linkage with anti-poverty schemes like Integrated Rural Development Programme (IRDO), National Rural Employment Programme (NREP) etc.
9. Securing maximum involvement of non-governmental agencies, and
10. Raising a cadre of 'Women volunteer Corps' at the rate of one for every 60 families both in rural and urban areas. A Cadre of approximately 2 million such workers from within the community will be a major catalyst for social change.

In conclusion, the Government of India has outlined several action ideas in the latest population policy document, aimed towards overall improvement of the condition of women and children.

Having looked at Government of India's population policy and aim to improve the overall condition of women and children, we can now aim at improving the quality of life for this vulnerable section of society. So there is a relationship between fertility, nutrition and quality of life. As a public nutritionist, it would be useful to understand this relationship. In the following section, we will explore this relationship.

6.8 RELATIONSHIP BETWEEN FERTILITY, NUTRITION AND QUALITY OF LIFE

You may have noticed that in many developed countries, women have less children and these children are mostly healthy, that is, they have good nutritional status and the family enjoys a good quality of life. So there must be a relationship between these three. We would like to have the same scenario 'TO' India too. We will now study the relationship between fertility, nutrition and quality of life. Human Development Index developed by UNDP takes care of relationship between fertility components, nutrition and quality of life. Human development is a process of expanding human choices by enabling people to enjoy long, healthy and creative lives. It is a people-centered approach to policy making.

A child born today in a developing country can expect to live 16 years longer than a child born 35 years ago. The infant mortality rate has been more than halved since 1960. School enrolment has more than doubled. These are all part of measurement of human development index. If we want to compute the human development index (HDI), we require three indicators: longevity, as measured by

life expectancy at birth, educational attainment, as measured by a combination of adult literacy (2/3) weight and the combined first, second and third level gross enrolment ratio (1/3) weight) and standard of living as measured by Gross Domestic Product (GDP) per capita.

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The higher fertility in India is attributed to early and nearly universal marriage, larger family norm, preference for sons, low economic status, illiteracy, higher IMR, agrarian society, low urbanization and cultural resistance to change. Limiting the family size is a concern both at national and international level. The advocacy of family planning and family limitation is essential.

The family planning programme in India is an entirely voluntary programme though actively supported by extension education and persuasion. Over the years the programme has developed as an integral part of existing medical and health services particularly the maternal and child health services. This has greatly facilitated the expansion of family planning programmes, first because the antenatal, postnatal and paediatric clinics provide opportunities for its promotion and secondly, the health personnel in these clinics are already accepted by local communities. We have read in the beginning of this unit that population of India is rising, although, at a slower rate. You have also learnt that excessive population growth is an impediment to socioeconomic development and therefore affects the quality of life. So how does excessive population growth adversely affect the quality of life?

In a developing country like India, excessive population growth nullifies the efforts to improvement of the quality of life of the people. The physical, social and cultural needs of man, both in quantity and quality are, food, water, air, housing, clothing, education, employment, medical and health facilities, transportation and entertainment facilities. The increase in the number of people slows down the social and economic development. Another dimension of the population problem in the country is food insecurity, under nutrition and ill health, which is causing a steady deterioration of the physical and mental capacity of our human resources. So we must slow down on the population growth. How does a controlled population growth improve the quality of life?

A small family norm would go a long way in feeding children and caring for their social, economic and developmental needs. Also a reduction in child mortality would indirectly affect birth spacing. When an infant survives and is healthy, couples are less likely to have their next child very soon. Programmes for child health and family planning can work to encourage people to have longer, healthier birth intervals. The long term outcome of food security is ultimately reflected in an improvement in the life expectancy of the population. Increasing life expectancy is a pointer to improving food security in India. To cite an example in the state of Kerala, the percentage of population with chronic energy deficiency (CED) is 33.20 % and life expectancy at birth is highest 70.90 in 1990.

Thus we conclude that controlled population growth induces the social and economic development and the availability and accessibility of resources especially food, improves the mental and physical capacity of the people. This eventually improves the quality of life.

With this we end our study on population dynamics. We hope now you are in a better position to appreciate and relate the demographic process to the nutrition, health status of population groups.

Check Your Progress Exercise 3

1. What does a population policy refer to?

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2. Enumerate the highlights of the 1986 revised population policy.

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3. What do you understand by the term Human Development?

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4. Describe the effect of population growth on the quality of life of people.

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6.9 LET US SUM UP

In this unit we learnt that demography is a scientific study of human population. There is a demographic cycle of five stages through which a country passes. India is now passing through third stage or late expanding where the population is still growing at a high rate and birth rates have begun to fall. India's population has grown approximately four times from 1901 till 2001. Several factors have contributed to this growth which include growing urbanization, adverse sex ratio, high birth rate, high mortality rates among vulnerable section of our population. There is an urgent need to comprehend the implications of excessive population growth and its effect on the quality of life of the people and the development of the nation.

6.10 GLOSSARY

- CED** : refers to chronic energy deficiency produced within a territory during a specified period, regardless of ownership
- Eclampsia** : condition associated with hypertension, proteinuria, generalized edema, and seizures with pregnancy or the early post-partum.

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GDP : gross domestic product is defined as the total value of goods and services.

Obstructed labour : a term used during child birth. Labour is called obstructed when there is no progress despite strong uterine contractions.

Postpartum hemorrhage : excessive bleeding after the child birth.

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6.11 CHECK YOUR PROGRESS

- 1). What is demography?
- 2). What is a Demographic Cycle?
- 3). How the overall growth in population has occurred in India?
- 4). Why is the year 1921 called the 'big divide'?
- 5). Why sex ratio falling India?

ASSESSMENT OF NUTRITIONAL STATUS IN COMMUNITY SETTINGS-1

STRUCTURE

- 7.1 Learning Objective
- 7.2 Introduction
- 7.3 Nutritional Assessment —Goals and Objectives
- 7.4 Methods of Nutritional Assessment
- 7.5 Indirect Assessment of Nutritional Status
- 7.6 Direct Assessment of Nutritional Status
- 7.7 Nutritional Anthropometry
- 7.8 Methods of Assessing Nutritional Status in Individuals
- 7.9 Methods of Assessment of Nutritional Status of Community
- 7.10 Let Us Sum Up
- 7.11 Glossary
- 7.12 Check Your Progress

7.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- list goals and objectives of nutritional assessment,
- describe different methods of nutritional assessment,
- discuss indirect methods of nutritional assessment,
- explain the significance of nutritional anthropometry
- discuss various methods of anthropometric classification, an
- carry out some of the nutritional anthropometric methods.

7.2 INTRODUCTION

Earlier in Units 3 and 4, we have learnt about various nutritional problems prevalent in our community. It is important to know the extent and severity of these nutritional problems so that we can take appropriate steps towards eliminating these problems. The strategy to determine the extent and severity of nutritional problems is called nutritional assessment or assessment of nutritional status. In

this unit and the next Unit 8, we are going to learn about different methods of nutritional assessment.

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We have already learnt earlier that body weight is one of the most common indicators used to assess whether a particular individual is well nourished or not. Likewise, there are several other methods of measuring the nutritional status of the community. For example, in clinical practice, doctors identify children suffering from malnutrition by clinical examination. Some biochemical parameters like haemoglobin is estimated to assess the iron status among individuals. As a dietitian or nutritionist, you will be required to assess the dietary patterns of individuals or community groups as a means to assess nutritional status. Quite often, we also use certain vital health statistics like infant mortality rates, under 5 mortality rates to get a nutritional profile of our population. We shall learn about these methods i.e. anthropometrical, chemical, biochemical and diet survey in this unit and the next Unit 8. We shall start our study of nutritional assessment in this unit by focusing on nutritional anthropometry.

7.3 NUTRITIONALASSESSMENT-GOALS AND OBJECTIVES

We stated earlier that the strategy to determine the extent and severity of nutritional problems is called nutritional assessment or assessment of nutritional status. Before we discuss this further, let us first understand what we mean by the term nutritional status. Nutritional status, refers to the state (f health of an individual us it is affected by the intake and utilization of nutrients. Thus, nutritional assessment is done to assess the severity and magnitude of nutritional problems prevalent in communities due to faulty intake or utilization of nutrients. The major objective of such an assessment is to determine the type (what?), magnitude (the numbers affected) and distribution of malnutrition in different geographic areas (where?), identify the at-risk groups (who'?) and to determine the contributory factors (why?). In other words, the goal of the nutritional assessment of communities is to discover facts about nutritional situation and guide action to improve nutrition and health. Factual evidence of the exact magnitude of nutritional problems is essential to sensitize administrators and politicians to obtain allocation of material and human resources and plan appropriate intervention strategies. Also, in the formulation of a public health strategy to combat malnutrition, assessment of nutritional status of community is the first step. There are different methods of measuring nutritional status. Let us study what they are?

7.4 METHODS OF NUTRITIONAL ASSESSMENT

In our discussion so far we have studied as to why we do nutritional assessment. Next, let us get to know how we do nutritional assessment. There are certain methods which are used to conduct nutritional assessment. These methods can be

categorized as Direct Assessment and Indirect Assessment. We would learn about both these methods in this section. Let us study about direct assessment first

1. Direct Assessment

In direct assessment, we measure certain indicators on representative samples of community to determine nutritional status of community. In other words, we can directly take measurements like body weight or clinically examine or estimate haemoglobin levels on certain group of individuals. The representative samples of community can be taken with the help of nutrition survey. We will study about different methods of direct nutritional assessment a little later in this unit. Let us now look at Indirect assessment.

2. Indirect Assessment

Under the method of Indirect assessment, a variety of vital statistics are used to assess nutritional status. These are: 1) mortality rates among vulnerable groups of population like infant mortality rate or maternal mortality rate, and 2) morbidity rates of conditions like diarrhoea and respiratory infections etc. to find out whether the community is adequately nourished or not.

We will begin our discussion on methods of nutritional assessment by first learning in detail about indirect assessment and review some specific health statistics data used under this method to assess nutritional status of community. We will then go over to study about direct assessment. So then, let us get started with indirect assessment.

7.5 INDIRECT ASSESSMENT OF NUTRITIONAL STATUS

Nutritional status, we have learnt above, can be assessed by indirect methods such as mortality rates (i.e. infant, maternal and perinatal mortality rates), morbidity rates and other health statistics. Let us understand what we mean by mortality and morbidity rates. Mortality rate is defined as the number of deaths in a group of people, usually expressed as deaths per thousand while morbidity rate is defined as the number of people ill during a time period divided by the number of people in the total population. You may recall learning about these statistics in the previous Unit 6 in section 6.5. Generally, in such cases, data already collected in connection with other national surveys is utilized for the purpose. The principle is that malnutrition influences several morbidity rates and mortality rates. In addition, morbidity rates also influence the nutritional status of vulnerable groups of population particularly young children.

It should be recognized that quite often collection of accurate data on these rates is often beset with a lot of problems. Only institutions having sufficient expertise should collect such data. In India, sample registration scheme collects information regularly using standardized procedures through trained investigators on statistically adequate samples. They publish annual reports, which could be

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used for the purpose. Collection of morbidity data requires prospective surveys on a statistically adequate sample using standardized definitions and procedures. Morbidity surveys involve collection of data on a longitudinal basis visiting the selected households either weekly or at least fortnightly. The gap between two visits in a morbidity survey is called as reference period. It is recommended that this should never be more than a fortnight. Longer the gap, more will be the recall lapse by the persons providing information. Morbidities like diarrhoea, acute respiratory infections and measles are commonly associated with malnutrition. Higher incidence of these morbidities could be considered to lead to malnutrition. In addition, malnutrition could predispose to some of these morbidities, as the child's immunity (ability to fight infections) would have been affected during severe malnutrition.

Some of the specific indirect indicators used to assess nutritional status of community are: age-specific mortality rates, cause specific mortality rates and cause specific morbidity rates. Many times, data is also collected on ecological factors which affect nutritional status of community. Let us study each of these indicators in detail. We shall start with the mortality indicators first

7.5.1 Age Specific Mortality Rates

An age-specific mortality rate is a mortality rate limited to a particular age group. The numerator is the number of deaths in that age group, the denominator is the number of persons in that age group in the population. Age specific mortality rate is an important indicator of health status. In areas, where the prevalence of protein energy malnutrition is high, mortality among children between 1-4 years remains high. Though infant mortality rate (IMR) is considered as an indicator of health status, it is now recognized that the 1-4 year mortality rate is several folds higher in developing countries compared to developed countries due to high rates of protein energy malnutrition.

This is also evident by the fact that since independence there has been a considerable reduction in IMR (from about 160 to 60 per 1000 live births). The main reason for the high mortality among children 1-4 years is due to the combined effect of nutritional stress and high morbidity rates during this age period.

Now, where can we collect the data on age specific mortality rates

We can collect this data by consulting birth and death records, wherever available. In India, census data collected regularly every decade can also provide such information. Special surveys could also be organized if necessary expertise is available on statistically adequate and random samples. However, such surveys are laborious and time consuming and may not provide any additional information over direct methods of assessment. Let us look at the second indicator now. i.e. cause specific mortality

7.5.2 Cause Specific Mortality Rates

The cause-specific mortality rate is the mortality rate from a specified cause for a population. The numerator is the number of deaths attributed to a specific cause.

The denominator is the at risk population size at the midpoint of the time period.

Data on cause-specific mortality would be extremely useful to determine the nutritional status of communities indirectly. However, in India, such data is not available in all the areas and most often is not accurate. Such data can be obtained from health centers and hospitals. Mortality due to clinically identifiable malnutrition, if records are available, could be of help to assess indirectly the nutritional status of communities. Hospital admissions of clinical cases of nutritional deficiencies, particularly of severe protein energy malnutrition and keratomalacia, also are often used as an indicator of nutritional status of communities.

We looked at the indicators related to mortality. Now let us look at the indicator on morbidity i.e. disease.

7.5.3 Cause Specific Nutritionally - Relevant Morbidity Rate

Information on the prevalence/incidence of nutritionally relevant diseases like measles, diarrhoeas and acute respiratory infections also are indirect indices of nutritional status at the community level. In clinical settings, most often children with severe forms of clinical malnutrition have a history of suffering from some of these morbidities before developing malnutrition. In fact, in the earlier days, epidemics of malnutrition followed epidemics of measles and diarrhoeas. There are other diseases which also contribute to malnutrition. Some of these are intestinal helminthiasis, malaria and tuberculosis. These could also influence the extent of malnutrition in a community. In the present circumstances, the occurrence of AIDS could be an important determinant of malnutrition. Therefore, during the field visits, information on these diseases could be obtained from hospitals and health centers. The cause specific nutritionally relevant morbidity rates, therefore, serve as an important indirect indicator to assess nutritional status. Let us now study about some ecological factors which could indirectly indicate the possible nutritional status of communities.

7.5.4 Ecological Factors

Human malnutrition is recognized to be an ecological problem in the sense that it is the end result of several overlapping and interacting factors in the community's physical, biological and cultural environment. Information on food consumption, particularly infant and child weaning practices, beliefs and cultural practices, medical and health services; educational services and socioeconomic conditions of the community will be of use in the assessment of nutritional status at the community level. We can collect the information through field visits to the areas. Let us study about some of these factors in a little detail to see how they could affect malnutrition.

- **Breastfeeding and Complementary feeding**

Breastfeeding practices like exclusive breast feeding up to 6 months of age, feeding of colostrums to newborn children and introduction of complementary food at six months of age to infants are the most important factors which could improve the nutritional status of communities. In India, where the prevalence of malnutrition

continues to be high, colostrum is often discarded due to certain taboos (it is impure milk), complementary food is introduced only after the child completes the age of one year. In other words, the child is not getting adequate food even from a very young age.

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● **Food Consumption Practices**

Similarly, qualitative information on food consumption could be an indirect evidence for malnutrition in that community. For example, the practice of consumption of foods like pulses, green leafy vegetables and milk particularly among young children can indicate the state nutrition of the community. In addition, the practice of reducing food intakes and avoidance of foods during pregnancy, restriction of foods during certain diseases like during diarrhoea is indicator of poor dietary practices among the community.

● **Socioeconomic Factors**

Socioeconomic status determines nutritional status. Malnutrition is of higher magnitude among the poorer groups like scheduled caste and tribe communities people living in urban slums etc. Apart from poverty, the literacy - particularly female literacy - among these communities is very low leading to ignorance and food taboos. The living conditions of these groups is so poor that even if they spend all their incomes on foods, they still will not be able to meet the nutritional needs. The gender discrimination, particularly at the social level, could contribute to higher malnutrition among females.

● **Health Care Facilities and Practices**

The health care facilities as such in the rural areas are not satisfactory and even if they are available the community most often visits these facilities at a late stage. Most often, any visit to a health facility, which is situated at some distance means loss of wages for the household. In addition, the services are not satisfactory due to lack of accountability among the health functionaries. Assessment of environmental sanitation and hygiene practices also could indirectly indicate the possible nutritional status of communities. The information on these factors can be collected through rapid visits and collection of qualitative data.

From our above discussions, it is clear that factors such as feeding practices, food consumption patterns, socioeconomic factors and health care practices, can all influence nutritional status. Remember all these factors are indirect assessment methods, Thus we saw that we could use health statistics data and also collect information on ecological factors to indirectly assess nutritional status of community. We will now study how we could directly assess the nutritional status of the community, But first let recapitulate what we have learnt so far. Answer the check your progress exercise 1 given next.

Check Your Progress Exercise 1

1. Mention three main purpose of nutritional assessment.

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2. What are the different methods of nutritional assessment?

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3. List three health statistics data used for indirect nutritional assessment.

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4. List three ecological factors used for nutritional assessment.

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Now we move on the direct assessment of nutritional status.

7.6 DIRECT ASSESSMENT OF NUTRITIONAL STATUS

The last section focused on indirect assessment techniques of assessing nutritional status. We have also studied earlier that we can also directly assess nutritional status of community. We can directly reach out to the people and conduct nutritional assessment. How? We can do it in many ways. For example, we can ask people about their dietary intake, we can take their body measurement or conduct some biochemical tests. The commonly used methods are:

- i. Nutritional anthropometry,
- ii. Clinical examination for nutritional signs,
- iii. Biochemical estimation, and
- iv Dietary assessment.

In this unit, we will learn about the first commonly used method of assessment i.e. nutritional anthropometry in detail. About other methods, we will learn in the next unit i.e. Unit 8.

We stated in the beginning of this unit that we measure certain indicators on representative samples of community to assess the nutritional status of communities and these representative samples can be taken with the help of a nutrition survey. In the routine nutrition surveys, clinical examination and nutritional anthropometry form the most important components, since these are relatively simple in community situations and do not require any sophisticated equipment like biochemical estimations.

Before we discuss in detail about the different methods of direct assessment of nutritional status of community, let us learn as to how nutritional deficiency progresses, which would help us to decide the methods of assessment to be adopted to measure/ identify these changes.

Progression of Nutrition Deficiency Disorder

It is well recognized that the primary cause for nutritional deficiencies is

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inadequate dietary intakes for long periods. Such a dietary inadequacy, to start with, leads to changes in tissues and organs like muscles and liver progressing subsequently to biochemical changes, While the changes in tissues can be measured by examining the concerned tissues, examination of the blood and plasma or serum can identify biochemical changes. At this stage, the nutritional deficiencies are considered as sub-clinical as we cannot find any anatomical changes by naked eye examination. These subs clinical changes can be identified either by biochemical assessment or anthropometry, The anatomical changes in some of the organs of the body, like swelling in the body or changes in the eyes, can be diagnosed by clinical examination. Table 7.1 gives a chart indicating methods of assessment to be used as the nutrition deficiency progresses. It depicts that by conducting a dietary survey, we can assess dietary inadequacy and as the deficiency progresses, different methods of assessment will indicate changes at different levels in the body.

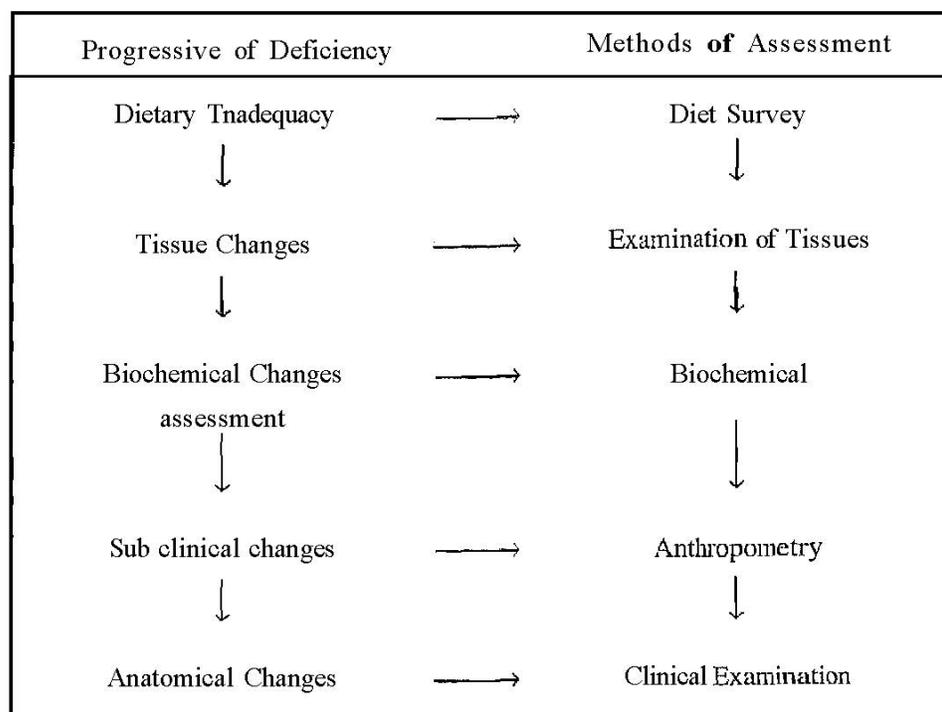


Table 7.1: Progression of nutrition deficiency disorder

It is important to recognize that the clinically diagnosable forms of nutritional deficiencies represent only the tip of the iceberg, the bulk of which is under water and is not visible. It is estimated that for every case of clinical form of protein energy malnutrition (kwashiorkor/marasmus), there are at least 5-6 cases of moderate to severe undemutrition. Thus, clinical examination measures only a small proportion of nutritional disorders and, therefore, other methods of assessment should be simultaneously used to determine the real magnitude of nutritional deficiencie . This is important not only to sensitize policy makers and administrators regarding the importance of malnutrition but also to plan the requirements for any intervention programmes.

With this basic understanding of the progression of nutritional disorders,

let us now learn what is nutritional anthropometry? What are its uses and what are the common measurements used in nutritional anthropometry?

7.7 NUTRITIONAL ANTHROPOMETRY

One of the most important physical changes that occur in undernutrition is growth retardation. Nutritional anthropometry is the tool which can assess even the early changes in growth failure.

What is nutritional anthropometry? Nutritional anthropometry is measurement of human body at various ages and levels of nutritional status. It is based on the concept that an appropriate body measurement reflects any morphological variation occurring due to a significant functional physiological change. It is an important component of any nutrition survey because it is simple, easily measurable by workers with limited educational qualifications and provides as much information on the nutritional status of individuals as biochemical parameters. What are the uses of anthropometry? Let us read and find out in the next sub-section.

7.7.1 Uses of Anthropometry

Nutritional anthropometry is a very useful tool. It helps in:

1. assessment of extent of undernutrition of vulnerable groups of population,
 2. monitoring of individual children at regular intervals (monthly or quarterly) to find out faltering in growth (deterioration/no change of growth) to help in early detection and initiating prompt remedial measures,
 3. identification of children who are at risk of undernutrition, to target and prioritize nutrition action programmes so as to control the extent of undernutrition,
 4. mid-term appraisal or terminal evaluation to assess whether intervention programmes have achieved the objectives, and
 5. assessing nutrition rehabilitation of malnourished children under treatment.
- Having gone through the points above you would now realize how important nutritional anthropometry is. We will now study about various body measurements used in nutritional anthropometry and how they are used in determining the nutritional status.

7.7.2 Common Measurements Used in Nutritional Anthropometry

The methods of the body measurement, you must realize, should be simple and provide practical information on community. These should be quick to measure, and the easiest to reproduce, simultaneously providing maximum information concerning a number of nutritional problems. The most commonly used measurements in routine surveys are:

- 1) Body weight,
- 2) Standing height or Crown-heel length,

- 3) Mid-upper arm circumference, and
- 4) Body Fat.

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Circumference of head and chest are also included in some surveys covering children less than five years of age. However, in view of their limited usefulness we will discuss only the four measurements mentioned above. You will now learn the relevance of the body measurements and the methods of their measurement. Let us start with the first measurement, that is, body weight

1) Body Weight

Body weight is the most widely used and the simplest reproducible anthropometric measurement for the evaluation of nutritional status of individuals. Why? Let's find out

Why body Weight'?

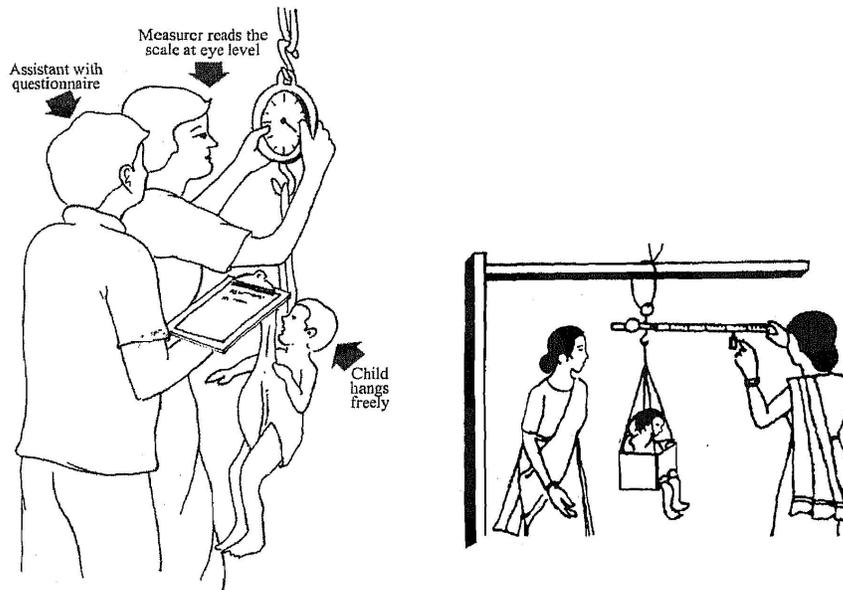
Body weight is a composite of all body constituents like body water, minerals, fat, protein, bone etc and indicates the body mass. One of the advantages of body weight is that its utility is perceived not only by the health personnel, but also by the community, both the educated and illiterate alike. It is not uncommon to find several mothers approaching doctors either because their children weigh less (in their perception) or are losing weight. Thus, it is easier for the health professionals to provide education to women about the need for proper nutrition by comparing body weights vis a vis the normal weights.

Serial measurements (repeated measurements at regular periods) of weight, as in growth monitoring, are more sensitive indicators of changes in nutritional status than a single measurement at a point of time. Growth monitoring, as you may be aware, refers to the regular measurement of growth which enables mothers to visualize growth, or lack of it, and obtain specific relevant and practical guidance to ensure continued regular growth and health of children. Body weight is sensitive even to small changes in nutritional status, caused by short duration childhood morbidities like diarrhoea etc. Rapid loss of body weight in children should be considered an indicator of potential malnutrition. Weight is indicative of short-term malnutrition.

On the other hand, weight may also be fairly quickly regained after appropriate intervention. Thus, body weight is also a good indicator of nutritional rehabilitation.

How do we measure body weight?

The choice of suitable weighing scales is very important to obtain accurate measurements of body weight. Two types of weighing instruments are available. These are 1) Salter Weighing scale, which is a spring balance, and 2) Beam or lever scales as shown in Figure 7.1 (a) and 7.1 (b), respectively. Salter weighing scale is light and portable and can be hung from a roof or a tree as shown in the Figure 7.1 (a). The child is placed in the sling and then the weight is recorded.



(a) Salter Scale

(b) Beam Scale

Beam or lever scales with an accuracy of 50 g or 100 g are preferable for taking body weight, as they are more accurate. In the case of birth weight the accuracy should be at 20 g. The commonly used 'bathroom type' weighing scales are spring balances. These are not recommended as the springs get stretched and inaccurate from frequent use. A comparative study of spring type and lever actuated weighing scales indicated considerable differences in weights. The errors in measurements using bathroom scales are quite high ranging between 0.5 to 1.5 kg in young children between 1-5 years of age. Beam balances are manufactured in India and have been found to be reliable and are currently in extensive use in ICDS projects. However, it should be recognized that all the weighing scales are tested for accuracy with known standard weights at regular intervals and put out of use as soon as the accuracy is lost. -Let us get to know about the technique of taking weight.

1) Technique

Weights should be taken as far as possible with minimal clothing, without shoes and without holding any support (in case of children they will be holding the hands of one of their parents/relatives). In the case of infants and noncooperative children, the weights could be taken with an elder person carrying the infant/child (usually the mother or caretaker) and subtracting the weight of the elder to get correct weight. In cold places, the subjects may be wearing heavy warm clothing as a protection against cold. In such situations, an average weight of the warm clothing can be obtained which can be subtracted from the weight of the individual.

Let us go over to the second method i.e. height.

2) Height

Length or height is a very reliable measure that reflects the total increase in size

of the individual up to the moment it is determined. Let us find out why height is used as an important measure to assess nutritional status.

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Why Height?

The height of an individual is influenced both by genetic (hereditary) and environmental factors. An individual's maximum growth potential is determined by hereditary factors (parent's height). The environmental factors, the most important being nutrition and morbidity, determine the extent of exploitation of that genetic potential. In other words, only when there is appropriate environment - optimal nutrition and good health care - an individual can achieve his/her maximum height. Inadequate dietary intake and/or infections reduce nutrient availability resulting in growth retardation. During periods of severe nutritional deprivation, growth of height slows down leading to stunting (short stature) in an individual. Thus, stunting is a consequence of chronic food deficiency

Since height is affected only by long-term nutritional deprivation, it is considered an indicator of chronic or long-duration malnutrition.

Next, let us learn about the techniques used for height measurement.

Technique

Standing height is measured by anthropometer rods, which are four-piece chromium plated portable metal rods with a headpiece with an accuracy of 0.1 cm. Some companies in Delhi and Hyderabad make such anthropometer rods. A vertical measuring rod or a wooden scale with accurate divisions could also be used. Figure 7.2 shows the instrument for taking standing height of children.

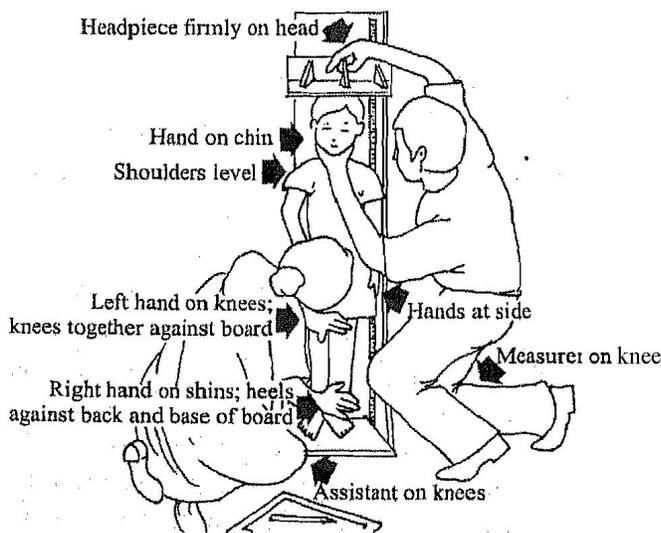


Figure 7.2: Child height measurement

Height is taken without shoes with the subject standing erect on a flat surface or the platform of the weighing scales, with the arms hanging naturally at the sides. The head should be held comfortably erect, with the lower border of the eye orbit

in the same horizontal plane as the external auditory meatus (hole of the ear). The headpiece of the anthropometer rod should be held, without much pressure, in the sagittal plane (central part of head).

In the case of infants and young children who cannot stand or those who do not cooperate, the height is measured with an infantometer. This is referred to as recumbent or crown-heel length, which is taken on children below the age of 24 months. Figure 7.3 shows the infantometer for taking recumbent length of the children.

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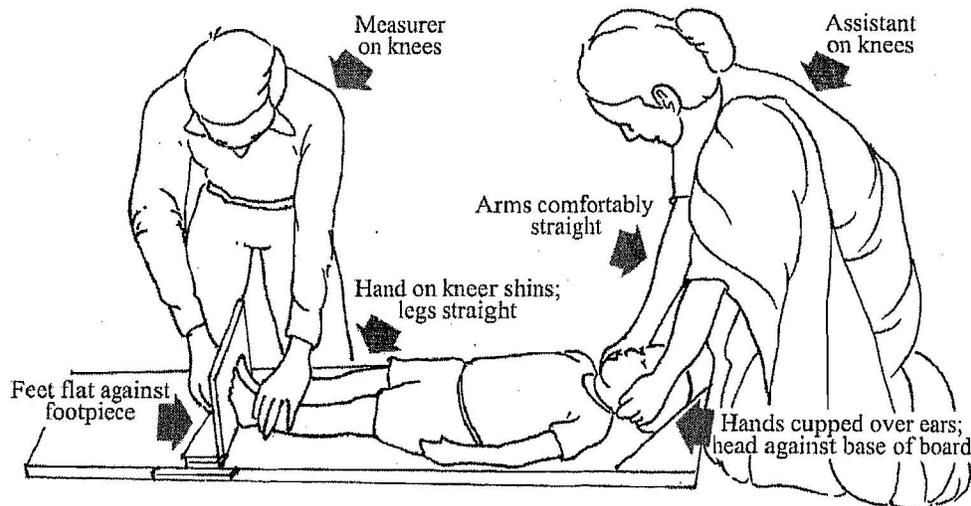


Figure 7.3: Child length measurement

The child should be laid on the infantometer board with his head touching the fixed headpiece. An assistant should hold the child's head in proper position. The investigator should ensure that the child's body is straight, and flat; should press the knees and ankles flat against the board and bring the movable piece of the board flat against the heels with optimum pressure. The measurement should be read while child is still in position. It is generally agreed that recumbent length measurements are greater than stature measurements.

Let us now go over to the third method i.e. mid-upper arm circumference as a measurement used in nutritional anthropometry.

3) Mid-Upper Arm Circumference (MUAC)

Mid upper arm circumference is a useful indicator of nutritional status of individuals and communities. How does this measure reflect the nutritional status? Let us find that out

Why Mid-Upper Arm Circumference?

Poor musculature and wasting are cardinal features of moderate and severe protein energy malnutrition in early childhood. Circumferences of mid-upper arm (MUAC) and calf are recognized to indicate the status of muscle development in

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the body. The mid-upper arm is heavily muscled and approximately circular. The mid-upper arm circumference is considered more feasible as it is easily accessible in any age and sex, and so is simpler and practical to measure. The MUAC may be useful not only in identifying malnutrition but also in determining the mortality risk in children. The measurements of MUAC correlate well with weight, weight for height and clinical signs of PEM. When measured along with fat fold at triceps, MUAC, in addition, can be used to calculate mid arm muscle circumference (fat free arm circumference). The assumption is that the cross-section of the mid upper arm circumference approximates a circle, and that the adipose tissue (fat) is evenly distributed around the area. Let us learn about the technique next.

Technique

The arm circumference is measured with flexible fibre glass tape up to 0.1 cm. It is taken on the left arm, while hanging freely by the side, at its mid point. The midpoint of the left upper arm is measured by taking first the length of the upper arm - between acromion process of scapula and the tip of ulna- by flexing the forearm at right angles. The midpoint is marked at half the length with a skin marking pencil/ball pen. The fiberglass tape is placed at the midpoint gently but firmly without disturbing the contours of the arm in any way. Figure 7.4 gives arm circumference insertion tape and correct tape position for arm circumference.

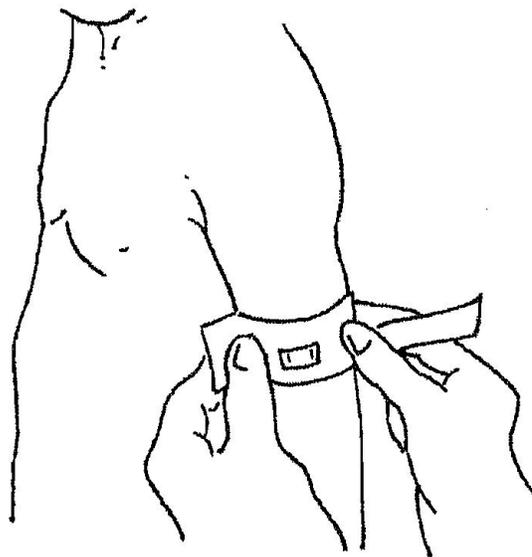


Figure 7.4: Measurement of mid upper arm circumference

Let us go to the fourth method of body measurement i.e. body fat

4) Body Fat

The adipose tissue is distributed over a large number of sites in the body. Subcutaneous fat constitutes the body's main store of energy (calorie) reserves. How does the measure of subcutaneous fat, then reflect the nutritional status. Let us find out next

Why measure fat?

Close association has been observed between fatness and calorie reserves, and between muscularity and protein status. This relationship can be used as a tool for assessing the gross nutritional status of persons at specific stages of life. Usually, in field circumstances, measurement of fat fold thickness at different sites is more feasible than the sophisticated densitometry or underwater weighing etc. The thickness of fat at various sites of the body has good correlation with measures of body fat as determined by autopsy, densitometry and radiography. Fat distribution in and around the body varies with age, sex, physiological, nutritional and health status and ethnicity. Of all the measures of fatness, fat fold at triceps is considered to be the simplest and most feasible in community surveys. In addition, fat folds are measured at subscapular and supreiliac regions. Let us learn about the technique of fat measurement next.

Technique

Fat fold at triceps is taken at the same point where mid upper arm circumference is taken. Skinfold calipers like the one shown in Figure 7.5 is used to measure skinfold thickness.

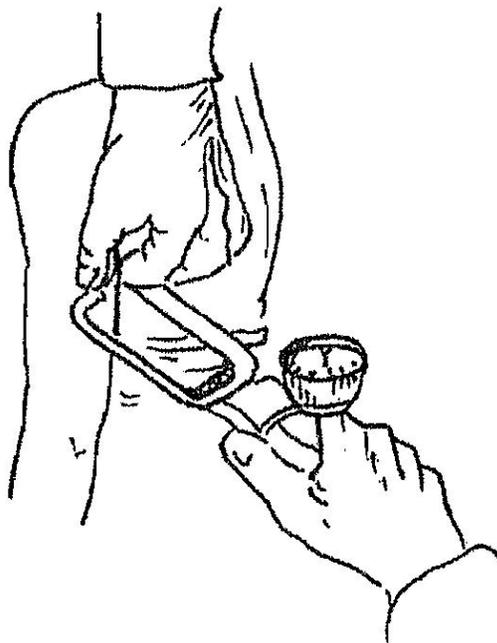


Figure 7.5: Measurement of fat fold using skinfold calipers

Various types of skin fold calipers (Harpenden/Lange skin fold calipers) are available in the market. These are mostly imported. One of the important factors to be considered while selecting the calipers is that the pinch area should be 20-40 mm² with an accuracy of 0.1 mm and should exert a constant pressure of about 10 g/ mm². The fat fold measured consists of a double layer of skin and fat. The measurement is made with the arm hanging loosely by the side. The fat fold parallel to the long axis is picked up between thumb and fore finger of the left

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hand without including any underlying muscle and the measurement taken with the calipers. An average of three measurements is recommended.

Now that we have learnt about how to take the correct body measurements, we should find out how we can assess nutritional status with these measurements. Before we move on to this topic, let us review what we have learnt so far, by answering the, questions given in check your progress exercise 2.

Check Your Progress Exercise 2

1. Mention various methods of direct assessment of nutritional status.

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2. List four uses of anthropometry.

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3. What are the common measurements used in nutritional anthropometry?

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Now, first, we would learn how to assess nutritional status in individuals (includes children and adults), then we will learn how to assess nutritional status in community.

7.8 METHODS OF ASSESSING NUTRITIONAL STATUS IN INDIVIDUALS

Before we learn about how to assess nutritional status in individuals and community, there are two more important aspects which we need to consider. These are correct age of the child and the growth reference values. Accurate age of the child should be assessed for comparison with known growth standards, which can only help in the diagnosis of undernutrition. Let us learn about how we can assess the correct age of the child and how do we select the growth reference values for comparison.

● **Age Assessment**

You probably know that persons living in the rural area and urban slums in India often are ignorant of their accurate age. More exact assessment of age (up to the month, if possible) is required particularly in children to assess protein energy malnutrition. Only a few can produce documentary evidence like either birth certificates or horoscopes. However, in India, fortunately the age assessment can be done fairly accurately with the help of a calendar based on local events. In India, several festivals take place almost every month. In the villages, the farmers also remember lunar months or the periods of sowing or harvesting of different

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crops. Before undertaking any nutrition survey therefore, a calendar of festivals and other events that have occurred during the previous 5-6 years is prepared and used to assess the age of children. The mother is asked to relate the birth of her child to one of the festivals or important local events, and the number of such events the child would have celebrated since birth is determined. With the help of such a calendar of local events, it is possible to assess the age fairly accurately. The age of older children is assessed in relation to the age of the younger child. The mother will be able to tell as to how old was the elder child when the younger child was born. In areas where the gap between children is so small, it is often not difficult to assess the age of older children, at least in terms of completed years

● **Growth Standards**

Once we have taken the weight and height of the children and assessed the correct age, we would want to compare these with a standard called reference data sets so that we are able to assess the grade or extent of malnutrition. These standards also known as "frame of reference" are obtained by measuring cross-sectionally (at one point of time) a statistically adequate sample of healthy and well-fed children of various ages, whose ages are known accurately. It is recommended that these be based on normal children, as defined above, of the same area. It would be ideal to have our own local standards, but, constructing tables of local standards is logistically time consuming requiring both human and capital resources. Therefore, what we use are the standards developed by a US agency-National Center for Health Statistics (NCHS). Surveys in different countries have revealed that heights and weights of well nourished young children from developing countries are very much comparable to those of American children as shown by data collected by the National Center for Health Statistics. In fact, during the preadolescence phase, environmental factors (including nutrition) play a dominant role in deciding the growth of children. Hence, the World Health Organization recommends the use of NCHS standards all over the world to assess the extent of undernutrition. These are also referred to as international standards, You should also be familiar with the concept of percentiles before you use the growth charts. Percentile is the numerical value of a child in a series of hundred children arranged in an ascending order. In other words, 50th percentile is the value of the fiftieth child in such a series and is also known as median. Equal number of children will be either above or below the percentile. Similarly 10th percentile means that 10 percent of children are below the value and 90% are above this value.

Table 7.2 gives the median values (or 50th percentile values) for height and weight as given by NCHS.

Age (Months)	Boys		Girls	
	Height (cms)	Weight (kg)	Height (cms)	Weight (kg)
0	50.5	3.3	49.9	3.2

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6	67.8	7.8	65.9	7.2
9	72.3	9.2	70.4	8.9
12	76.1	10.2	74.3	9.5
15	79.4	10.9	77.8	10.2
18	82.4	11.5	80.9	10.8
21	85.1	12.0	83.8	11.5
24	87.6	12.3	86.5	11.8
27	88.1	12.9	87.0	12.4
30	90.4	13.5	89.5	13.0
33	92.7	14.1	91.7	13.6
36	94.9	14.6	93.9	14.1
39	97.0	15.2	96.0	14.6
42	99.1	15.7	97.9	15.1
45	101.0	16.2	99.8	15.5
48	102.9	16.7	101.6	16.0
51	104.8	17.2	103.4	16.4
54	106.6	17.7	105.1	16.8
57	108.3	18.2	106.7	17.2
60	109.9	18.7	108.4	17.7

**Table 7.2: Weights and Weights of boys and girls (0-60 months) — NCHS
Median values**

Source: Measuring change in nutritional status. Guidelines for assessing the nutritional impact of supplementary feeding programmes for vulnerable groups. WHO, Geneva, 1983.

We can express the weight and height of children as % of NCHS values. For example, if we have a 18 month old girl weighing 8.5 kg, and if we want to express her weight as % of NCHS values. Then first we will find out the NCHS median weight for a 18 month old girl from the Table 7.2. The reference median weight as you can see in Table 7.2 for 18 months old girl is 10.8 kg. Thus, the weight of the girl as % expressed of NCHS median weight would be = = 78.7%.

We have learnt about two important component for growth assessment i.e. how to find out the correct age and how to select and use the growth standards. Also, earlier, we learnt about how to measure weight, height, MUAC and skinfold thickness, so now you are ready to learn how to determine the nutritional status of children based on these measurements. Let us first start with MUAC

7.8.1 Determination of Nutritional Status using MUAC

How do we determine nutritional status using MUAC as a body measurement? Let us find out. The arm circumference increases rapidly from birth to one year, from 11 cm to 16 cm. Between the first and fifth birthdays, it remains fairly constant at about 16 to 17 cm among well-nourished children. During this time, the fat of early infancy is replaced by muscle. A value of 16.5 cm is the reference cut-off point used as a standard. Table 7.3 gives classification for grades of malnutrition for MUAC

S.NO.	MUAC (cm)	Category
1	> 13.5	Normal
2	12.5 - 13.5	Possible mildly malnourished
3	<12.5	Severely malnourished requires

Table 7.3: Classification for grades of malnutrition for MUAC

immediate attention

If the MUAC measurement is about 13.5 cm or more, the child is classified as normal and if it is less than 13.5, the child is malnourished. Therefore, using the techniques explained in sub-section 7.6.2, we can measure the MUAC and compare the results with the reference given in Table 7.3.

Let us now go over to how we determine nutritional status using weight and height.

7.8.2 Determination of Nutritional Status using Weight and Weight

Relatively speaking, weight, height and MUAC have come to be considered the most sensitive parameters for assessing nutritional status of children under the age of six years. Several methods have been suggested for the classification of nutritional status based on these measurements. The heights and weights can be expressed in a number of ways in relation to reference data. These include: (a) by the use of mean and standard deviation values, and (b) by calculating percentages of the median value of reference population which is assigned as 100 percent. You might recall learning about different methods of classification of malnourished children in Unit 3. We will just recapitulate these here.

Various methods have been suggested to classify children into various nutritional grades using the body weights alone or in combination with standing height/recumbent length.

In addition, a method of classification to assess nutritional status of adults is also suggested. These methods are highlighted in Table 7.4.

S.NO.	Method of classification	
	Children	Adults
A	Gomez Classification	
B	Indian Academy of Pediatrics	Body mass index

	(IAP) Classification	
C	Standard Deviation Classification	

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Table 7.4: Methods of classification to assess nutritional status of adults and children

Let us start with methods of classification suggested for children. We will start with Gomez classification

A. Gomez Classification

Gomez classification is based body weights only. In this, the weights of children measured are expressed as percent of the NCNS median value of reference population, which is assigned as 100 percent. Table 7.5 gives Gomez classification for weight for age.

% Weight for age of NCHS	Type of undernutrition	Grade of undernutrition
90	Normal	Normal
75 - 89.9	Mild	I
60 - 74.9	Moderate	II
<60	Severe	III

Table 7.5: Gomez classification for weight for age

This classification is not frequently used in India. Therefore, let us understand the LAP classification, which is extensively used for growth monitoring of children in one of the largest nutrition intervention programmes i.e. ICDS in India.

B. Indian Academy of Paediatrics (IAP) Classification

The IAP classification is also based on weight only. Table 7.6 gives the IAP classification

Grade of undernutrition	% Weight for age of NCHS Standard
Normal	>80
I	70-79.9
II	60-69.9
III	50-59.9
IV	< 50

Table 7.6: IAP classification

This classification is currently used by the Integrated Child Development Scheme (ICDS) sponsored by the Government of India for selecting beneficiaries and growth

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monitoring. Figure 7.6 gives the growth chart used in the ICDS programme. It may be noted that the cut-off points used for grading children in this classification are arbitrary. That is, if a child's weight is 80% or more of standard, then he/she is classified as normal weight. If it is between 70-79.9%, then it is classified as grade 1 and so on, as indicated in Table 7.6. We can explain it with the help of the same example as used earlier under section 7.7. You may recall reading in Table 7.2 that median weight of the 18 month old child is 10.8 kg. Normal weight of this child according to IAP classification should be $\geq 80\%$ or 8.64 kg ($80/100 \times 10.8 = 8.64$ kg). But if an 18 month old child weighs only 8.5 kg, then she would be classified as Grade 1 (falling between 70-79.9% weight for age of NCHS value i.e. 7.56 - 8.63 kg). Like this the calculations can be done for other cases.

C. Standard Deviation Classification

The third classification i.e. the standard deviation classification is based on weight and height both,

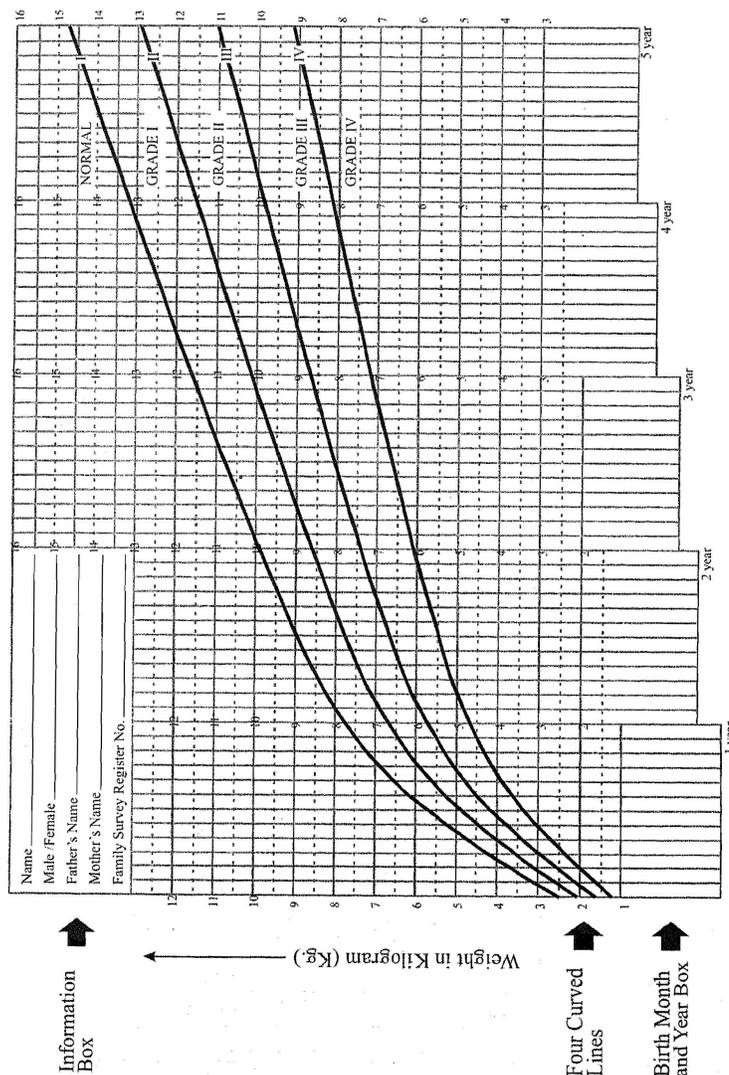


Figure 7.6: Growth chart used in ICDS programme

Normal growth is considered to encompass values within two standard deviations of the mean (2SD). Standard deviation is a measure of dispersion or variation in measurements. The World Health Organization recommends use of this classification to assess the extent of malnutrition in children

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The standard deviation classification comprises of

- Weight for age (underweight),
- Height for age (stunting), and
- Weight for height (wasting)

Let us understand these concepts in greater details.

Weight for age: Weight for age is an indicator of undernutrition. The classification is given in Table 7.7.

Grade of Undernutrition	SD of NCHS weight for age
Normal	>2 SD
Undernutrition	< 2 SD
Severe Severe	< 3 SD

Table 7.7: SD classification for weight for ag

One of the problems in measuring weight is that quite a large number of children with oedema (swelling of feet) may not be classified as acutely and severely malnourished. To overcome the problems of interpretation of the data on weight of children with oedema, the Welcome classification classifies the oedematous children who measure 60-80% of the reference median weight for age are classified as having kwashiorkor, while oedematous children below 60% are classified as having marasmic kwashiorkor. The term marasmus is applied to children whose weight less than 6000 Of the expected weight for age without oedema. Those children who are 60-80% of the reference standard but without oedema are classified simply as underweight children

- **Height for age (Stunting):** Height for age is a measure of stunting. It is well known that height for age is less only when children are exposed to malnutrition over a long period. The extent of height deficit in relation to age may be regarded as a measure of the duration of malnutrition. Therefore, stunting is considered as an index of long duration of malnutrition. Using height for age of NCHS standards children can be classified into different grades of stunting. The recommended classification is given in Table 7.8

Grade of Undernutrition	SD of NCHS weight for age
Normal	>2 SD
Undernutrition	< 2 SD
Severe Severe	< 3 SD

Table 7.8: SD Classification for height for age

Using this table, we can grade the children as normal or stunted.

It is not uncommon to find considerable percentage of rural children appearing as apparently normal. When their ages are assessed it would be apparent that these children are stunted. These children are actually nutritional dwarfs and require intervention.

Weight for Height (wasting) : A measure of weight against height is an indicator of wasting. It is also common to observe a large number of children who are wasted and emaciated. Wasting is considered as an index (of short duration undernutrition). In other words, even in middle and high-income group of children, an exposure to common childhood morbidities like diarrhoea, respiratory infections and measles can lead to weight loss and wasting. The commonly used weight- for-age classification does not take into account the changes in weight due to variations in height/length. Weight is related to height and it is therefore necessary to take into account the same particularly to assess wasting. Tables of weight for height (also believed to be age independent) are available based on the measurements of height and weight, of a large number of normal and healthy children. Weight for height less than 2SD of NCHS standards is considered to indicate wasting in preschool children. As in the case of height and weight, all the values less than 3 SD of NCHS standards' are considered to indicate severe wasting. Table 7.9 gives SD classification for weight for height

Grade of wasting height	SD of NCHS weight for height
Normal	>2 SD
Undernutrition	< 2 SD
Severe Severe	< 3 SD

Table 7.9: SD classification for weight for height

Weight for height is also a good prognostic indicator of severe malnutrition, and has often been considered as a good index of current nutritional status.

Thus, we saw that there are methods to classify grades of malnutrition in children. Can we use the above indicators to assess the nutritional status of adolescents? Yes, weight for age and height for age are commonly used for this purpose. Very often body mass index is also used as an indicator to assess the nutritional status of adolescents. What is body mass index? Read the next section and find out. You will realize that we can also assess the nutritional status of adults using the BMI.

D. Body Mass Index (BMI)

The ratio of weight (in kg) / Height (m) ² is referred to as Body Mass (BMI) After the cessation of linear growth around 21 years, weight for height indicates muscle fat mass in the adult body. It, therefore, provides a reasonable indication of the nutritional status of adults. The BMI has a good correlation with fatness (over weight or obesity). In the case of adults, the following classification suggested by James and coworkers as given in Table 7.10 is extensively used at present.

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BMI class	Presumptive diagnosis
<18.5	Chronic energy deficiency
18.5-20.0	Low Normal weight
20.0-25.0	Normal
25.0-30.0	Obese grade 1
>30.0	Obese grade 2

Table 7.10: BMI classification for adults

Table 7.10 shows BMI ranging from 20.0-25.0 is normal, BMI <18.5 indicates chronic undernutrition, while more than 25.0 is considered as an indicator of overweight/ obesity.

The discussion above focused on how to determine the nutritional status of individual children and adults. Now let us now learn how to determine nutritional status of community or community groups.

7.9 METHODS OF ASSESSMENT OF NUTRITIONAL STATUS OF COMMUNITY

We learnt about various methods to classify the grades of malnutrition for individual children. Now, how do we assess the grade of malnutrition for a community itself, where all these children reside? For this purpose, we use what is known as Distance charts/Percentile Charts.

At the community level, the means/medians (averages) of the weight and height measurements are compared with those values obtained on standards of corresponding ages. These can be plotted on growth chart plotted with the standards of reference. Such charts are known as distance charts, and indicate the growth pattern of the community in relation to normal children. It is common to use percentile charts for the purpose. Surveys carried out in different parts of the country indicate that, on the average, an average Indian child corresponds to the 5th percentile of NCHS standards.

In other words, an average Indian child has measurements of weight/ height corresponding to the lowest 5% of American children. Thus, distance charts are the simplest tools to assess the nutritional status using anthropometry.

So we learnt about nutritional anthropometry as one of the methods to directly assess nutritional status of individuals and community in this unit.

In the next unit, we will learn about other methods of direct assessment of nutritional status. Now, let us recapitulate what we have learnt so far.

7.10 LET US SUM UP

This unit focused on two methods of assessment of nutritional status. These are indirect assessment and direct assessment methods. Indirect assessment of nutritional status can be done by using mortality, morbidity data and ecological data. Some of the data used for this purpose are age specific mortality rate, cause specific mortality rate, cause specific nutrition - relevant morbidity rates and feeding practices in children.

Direct assessment method involves using certain indicators like weight, height etc. on representative sample of community to measure status. Methods used to directly assess nutritional status are: Nutritional anthropometry, Clinical assessment, Biochemical assessment and Dietary assessment. This unit focused in detail on Nutritional anthropometry.

Nutritional anthropometry is a measurement of human body at various ages and levels of nutritional status. The body measurement commonly used in nutritional anthropometry are weight, height, mid upper arm circumference and body fat.

These measurements are then compared with a frame of reference to classify individuals under different grades of malnutrition.

7.11 GLOSSARY

Anthropometry	: the field that deals with the physical dimensions, proportions, and composition of the human body, as well as the study of related variables that affect them.
Prospective survey	: a survey in which the disease or outcome has not occurred at the time the investigation begins.
Stunting	: shortness in length or height in the body.
Triceps	: a muscle found in upper arm region.
Wasting	: thinness or emaciation in the body.

7.12 CHECK YOUR PROGRESS

- 1).What are Methods of Nutritional Assessments ?
- 2). What is Cause Specific Mortality Rates ?
- 3). List three health statistics data used for indirect nutritional assessment ?
- 4). What is uses of Anthropometry?
- 5). What are the common measurements used in nutritional anthropometry?

8

ASSESSMENT OF NUTRITIONAL STATUS IN COMMUNITY SETTINGS -2

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STRUCTURE

- 8.1 Learning Objective
- 8.2 Introduction
- 8.3 Clinical Assessment
- 8.4 Biochemical Assessment
- 8.5 Dietary Assessment
- 8.6 Let Us Sum Up
- 8.7 Glossary
- 8.8 Check Your Progress

8.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- enumerate the methods of direct nutritional assessment namely, clinical assessment,
- biochemical tests and dietary assessment,
- describe the clinical signs of various nutritional disorders,
- discuss the advantages and limitations in biochemical tests in field surveys
- explain various methods of dietary assessment, and plan and implement dietary surveys.

8.2 INTRODUCTION

In the previous unit, we learnt about different methods of indirect and direct assessment of nutritional status of individuals and communities. We learnt that there are four methods to assess nutritional status under direct assessment. These are:

- 1) nutritional anthropometry
- 2) clinical assessment
- 3) biochemical tests, and
- 4) dietary assessment.

We now know that nutritional anthropometry is extensively used for individuals or in communities to assess the extent of malnutrition.

provides important information as to the dietary status of community. In this unit, we would continue our study of nutritional assessment methods by learning about clinical assessment, biochemical tests and dietary assessment as the other three methods of direct assessment of nutritional status.

8.3 CLINICAL ASSESSMENT

Clinical examination is one of the common tools used to assess the extent of clinical forms of undernutrition. In the following section, we will discuss about clinical examination and also know about the common clinical signs of various nutrition disorders utilized in nutrition surveys. Before we go into details about clinical signs, we should know that training of the staff assessing clinical signs is very important. Let us find out in detail about the training and standardization procedures.

8.3.1 Training and Standardization

Trained workers only should carry out clinical examination and it should be done in good light. All the investigators should undergo rigorous training so that there is complete agreement in the diagnosis of signs between individuals and between two examinations of a subject by the same investigator. We should record only the presence or absence of a particular sign. Any grading of any clinical sign (like + or ++ etc) should be scrupulously avoided. We should look for the presence of all the signs of commonly occurring nutritional deficiency so that nothing is missed. For the purpose, a schedule/ proforma should be prepared including all the clinical signs to ensure no deficiency sign is missed. You might recall that we studied about clinical signs of various nutritional disorders in Unit 3. Can you recall these signs and symptoms? List these signs/symptoms in the proforma given herewith including all the clinical signs you learnt in Unit 3.

Proforma for reporting nutritional deficiency disorders and signs and symptom

Nutritional deficiency disorders	Signs and symptoms

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Are you having trouble in recapitulating all the deficiency signs and symptoms? Well do not panic! Here, in the next section, you will once again find information on clinical signs and symptoms. So review the section below and get back to the proforma later.

8.3.2 Clinical Signs of Nutritional Disorders

What do we mean by clinical signs? Clinical signs are changes in the body which are indicative nutritional deficiency/excess. In this section, we are briefly going to recapitulate the clinical signs of the following nutritional disorders:

Protein energy malnutrition Vitamin C deficiency

Vitamin A deficiency Rickets

Anaemia Essential fatty acid deficiency

Goitre Vitamin B complex deficiency

Fluorosis

Let us begin with protein energy malnutrition.

A. Protein Energy Malnutrition

You are aware that the clinical forms of protein energy malnutrition (PEM) are kwashiorkor, marasmus and marasmic-kwashiorkor. We will now review the clinical signs of these three forms of PEM? You may find this information repetitive, but it is important we recapitulate these clinical signs here. Let us begin with kwashiorkor.

a. Kwashiorkor

It is more common among children of 1-3 years of age. The most important sign without which a diagnosis of kwashiorkor should not be made is presence of oedema (swelling of the body). The swelling is present mostly in the extremities particularly the lower extremities (legs and feet). The investigator can confirm the presence of oedema by applying pressure with the thumb over the skin just above the ankle or feet for a few seconds. It would leave a depression, when thumb is removed, the depression will disappear. In a normal child who does not have any oedema, no such depression would occur

Children with kwashiorkor are always apathetic and often irritable showing no interest in their surroundings. Their skin and hair (flag signs) may show changes. Kwashiorkor may be associated with other deficiencies and infections. Let us now discuss clinical signs of marasmus.

b. Marasmus

Marasmus is characterized by extreme wasting of muscle and subcutaneous fat. The child is very thin, with skin loosely hanging and appears to have nothing but skin and bones. The child has an old man's face and is extremely weak with little strength even to cry. The body weight could be as low as 50% of standard weight

for age. Hair will be thin and sparse. The child may be associated with diarrhoea and other infections.

Let us now discuss clinical signs of marasmic kwashiorkor

c. Marasmic kwashiorkor

Sometimes a child may suffer from clinical signs of both marasmus and kwashiorkor, this child may be having marasmic kwashiorkor. Marasmus with associated oedema is called as marasmic kwashiorkor. The child therefore would be emaciated and will also have oedema.

Let us go to clinical signs of vitamin A deficiency

B. Vitamin A deficiency

Deficiency of vitamin 'A' leads to changes in eyes (ocular signs), The ocular lesions - also known as xerophthalmia - can be of milder nature, such as night blindness, changes in the white of the eye like conjunctival xerosis or Bitot's spots. The severe lesions of eye affect the black of the eye (cornea). These are corneal xerosis, corneal ulcer or keratoconjunctivitis, which ultimately results in permanent loss of vision. Let us review these manifestations.

a. Night Blindness

Night blindness is the earliest symptom of vitamin 'A' deficiency in preschool children. The affected child cannot see properly at dusk. Often, an attentive mother can recognize the child's inability to see the plate of food or toys in ill-lit room.

b. Conjunctival Xerosis

Conjunctival Xerosis is recognized by dryness of the conjunctiva, which also becomes thick and wrinkled. It appears rough instead of being smooth and glistening. The dryness becomes more obvious when the conjunctiva is exposed to air for 10-15 seconds by keeping eyelids drawn back.

c. Bitot's spots

These are dirty white, foamy and raised spots on the surface of the conjunctiva, generally seen on the outer side of the cornea. Look up Figure 3.3(a) in Unit 3. Bitot spot may appear as a single spot or as several small spots, which may later unite to form a large triangular patch with base towards cornea. Bitot's spots will be stained black when the children use 'Kajal'. The Bitot's spots may appear in only one eye or both the eyes.

d. Corneal Xerosis

This is a manifestation of severe Vitamin 'A' deficiency, in which the cornea loses its normal smooth and glistening appearance and becomes dry and rough. Due to inability to see bright light, the child tends to keep the eyes closed and, hence, the condition may be missed during the clinical examination, if not observant.

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e. Corneal ulcer

Corneal xerosis, if not treated promptly, leads to ulceration of the cornea. Initially, the ulcer may be shallow, and if it becomes deep, it may lead to perforation resulting in prolapse of contents of the eyeball.

f. Keratomalacia

This is a condition of rapid necrosis and liquefaction of full thickness of cornea, leading to prolapse of iris, resulting in permanent blindness. Vitamin 'A' related corneal involvement (ulcer/keratomalacia) could be differentiated from other infective conditions of the eye, by the fact that it is painless and the conjunctiva will be muddy white. In infective conditions, the eye will be red and swollen.

g. Corneal Scar

The ulcer of the cornea, on healing, leaves a white scar, which may vary in size depending upon the size of the ulcer. When the scar is big or positioned centrally, normal vision is affected.

Let us now go over to clinical signs of anaemia.

C. Anaemia

Child with anaemia is less active than the normal child. The child may be pale and if the condition is severe, he/she will be breathless and will have swelling of face, body and limbs. The best way to detect anaemia is by examining the inner side of the eyelids, buccal mucosa (top of the roof of the mouth) and nail beds. They appear pale. Similar signs and symptoms also exist among adults, especially in pregnant and lactating women with anaemia. In severe condition, the nails of fingers and toes become papery thin and bend upwards to assume the shape of a spoon. This condition is known as "koilonychia". Haemoglobin estimation in blood is the best way for the diagnosis of anaemia.

Let us review clinical signs of goiter, which is the deficiency of iodine

D. Goitre

Goitre, deficiency of iodine, manifests as enlargement of thyroid gland situated in the front of the neck as you may recall seeing in Figure 3.4 earlier in Unit 3. In normal subjects, thyroid gland is neither visible nor palpable. In iodine deficiency, as you may recall seeing in Figure 3.4 earlier in Unit 3 it tends to enlarge in size. A thyroid gland when enlarged to a size of greater than the terminal phalanx of the thumb will be considered as goitrous. Other ill effects of iodine deficiency disorders include cretinism (physical and mental retardation), deaf mutism (deaf and dumb).

E. Vitamin B complex deficiency

Under this, we will review two most common types of vitamin B complex deficiencies - riboflavin and niacin deficiency. Let us review the riboflavin deficiency first.

Riboflavin deficiency

Angular stomatitis, cheilosis, red or magenta tongue, atrophic papillae, and dyssebacea are signs of riboflavin deficiency. A review of these clinical symptoms follows:

a. Angular Stomatitis

Ulcers at the angles of the mouth, with fissures, are characteristic of this vitamin deficiency. The fissures may be shallow or deep confined to the angles of the mouth. They may extend into the oral cavity and also on to the skin outside. Milder lesions are identified easily the mouth half-open

b. Glossitis

The tongue appears bright red or magenta in colour with or without fissures as you may have observed in Figure 4.1 (a) in Unit 4 earlier. The condition is often painful. The tongue may become completely bald in B complex deficiency

c. Cheilosis

The lips become red and may develop painful fissures and may sometimes get even ulcerated. Let us now look at the niacin deficiency

- Niacin deficiency (Pellagra)

Deficiency of niacin, leads to photo dermatitis (changes in the skin) on the parts of the skin exposed to sunlight, such as cheeks, neck, waist, hands and feet. In acute cases, the affected skin may appear red, slightly swollen and cracked, causing itching and burning sensation. In chronic cases, the skin becomes dry, rough and thick with brown pigmentation. Red and raw tongue with fissures and atrophic papillae are also seen in niacin deficiency

Let us now review the clinical signs of vitamin C.

F. Vitamin C deficiency

Spongy bleeding gums

Gums are swollen (spongy) and bleed with even slightest touch. There may be associated petechial haemorrhages, ecchymosis and painful epiphyseal enlargement of bones.

We will now review the clinical signs of deficiency of vitamin D

G. Active Rickets

It is due to vitamin D deficiency and is characterized by painless epiphyseal enlargement of growing ends of the long bones, beading of ribs, persistently open anterior fontanelle (after 18 months of age), craniotabes (parietal or occipital bones of skull become soft, and dent on pressure which spring back to normal

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shape when pressure is released (in children of <1 year), and muscular hypotonia. Healed rickets is characterized by the prominence of frontal and parietal bones of skull (referred to as frontal/parietal bossing), knock-knees (knees touching each other) [bow legs (legs becoming curved) due to inward or outward lateral bending of lower limbs, as a result of weight bearing. Look up Figure 4.4 in Unit 4 earlier for viewing their clinical manifestations.

Let us move on to essential fatty acid deficiency

H. Essential fatty acid deficiency

Phrynoderma: Phrynoderma is a hyperkeratotic lesion of the skin. Projections that resemble cones are formed surrounding the mouths of hair follicles. It is readily recognized by the spiky feeling it gives, when the palm is passed over the affected skin. It is generally seen on back of elbows, around knees and sides. They may sometimes be pigmented and the surrounding skin is dry.

Let us review the clinical signs of fluorosis - a condition caused by excess intake of fluorine

I. Fluorosis

Earlier stages of fluorosis are characterized by changes in teeth known as dental fluorosis. Normal teeth are ivory white in appearance. In fluorosis, the teeth are mottled (with yellowish streaks) and appear chalky white (opaque) with brownish patches as you may recall seeing in Figure 4.5 earlier in Unit 4. Sometimes, pitting or chipping of enamel is seen, especially in the upper incisors. In areas of severe endelnic fluorosis, many adolescents and young adults may also have skeletal deformities particularly in spine.

Nutritional deficiency disorders	Signs and symptoms
Kwashiorkor	<ul style="list-style-type: none"> ● Oedema ● Underweight (<80% of normal weight for age) ● Apathy and irritability ● Moon face ● Hair and skin changes
Marasmus	<ul style="list-style-type: none"> ● Extreme muscle wasting - "skin and bones" ● Loose and hanging skin folds ● Old man's or monkey race
Marasmic kwashiorkor	<p>Extreme muscle wasting - "skin and bones"</p> <ul style="list-style-type: none"> ● Loose and hanging skin folds ● Old man's or monkey facies ● Absolute weakness ● Oedema
Vitamin A deficiency	<p>Changes in the eye such as</p> <ul style="list-style-type: none"> ● Conjunctival xerosis:dryness of the transparent membrane that covers the cornea and lines inside of the eyelid

	<ul style="list-style-type: none"> ● Xerophthalmia (including Keratomalacia): cornea becomes soft and raw and easily infected ● Bitot's spot dry foamy, triangular spots appearing on the temporal side of the eye ● Night blindness: inability to see in dim light
Iron deficiency anaemia	<ul style="list-style-type: none"> ● Paleness of conjunctiva, ● Paleness of tongue ● Paleness of mucosa of soft palate ● Low haemoglobin ● Swelling of feet in severe anaemia ● Spoon shaped nails
Iodine deficiency disorder	<ul style="list-style-type: none"> ● Thyroid enlargement: gland visible and enlarged ● Abortions, Congenital abnormalities, ● Cretinism
Riboflavin deficiency	<ul style="list-style-type: none"> ● Angular stomatitis- lesions on both angles of the mouth ● Glossitis - Tongue bright red or magenta ● Cheilosis - Lips become red and develop cracks
Niacin deficiency	<ul style="list-style-type: none"> ● Dermatitis - Symmetrical skin lesions evident only on areas exposed to sunlight
Vitamin C deficiency	<ul style="list-style-type: none"> ● Spongy bleeding gums
Rickets	<ul style="list-style-type: none"> ● Changes in skeletal system- such as beading of ribs, pigeon chest: protruding breast bone, knock-knees or bow legs
Essential fatty acid deficiency	<ul style="list-style-type: none"> ● Lesions in the skin-generally seen on back of elbows, around knees and sides
Fluorosis	<ul style="list-style-type: none"> ● Mottled teeth with chalky white and brownish areas with or without erosion of enamel

Table 8.1: Nutritional deficiency disorders and signs and symptoms

We discussed above that we can assess various nutritional problems by looking at the clinical signs in the person. We will now discuss the next method of direct nutritional assessment which is the biochemical assessment.

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8.4 BIOCHEMICAL ASSESSMENT

Biochemical assessment deals with measuring the level of essential dietary constituents (nutrient concentration, metabolites) in the body fluids (normally blood and urine) which is helpful in evaluating the possibility of malnutrition. We have learnt in the previous unit that in the development of nutritional deficiency disease, certain biochemical changes occur before clinical changes take place. These are also considered to indicate sub clinical nutritional status with reference to various nutrients.

The range of biochemical tests that can be used is considerable. Before we go into details about various biochemical tests, we will give you an overview of biochemical tests. Let us begin with an overview of biochemical tests.

8.4.1 Biochemical Tests — An Overview

Before we conduct a biochemical test, there are some important points about which we should know. These are: what is an ideal biochemical test, what criteria do we use for selection of field test, what precautions do we use while performing a test, why do we need accuracy and what is the importance of standardization in these tests.

Let us find out the answers to these questions next.

What an ideal test?

An ideal biochemical test suitable for field survey should be sensitive (easily identify most positives), specific (easily identify normal subjects), easy to carry out, preferably non-invasive and inexpensive. It should reveal information on the extent of tissue unsaturation rather than the fluctuations that occur with variations in the diet. However, it is often difficult to have a biochemical test satisfying all these specified conditions.

The choice of the test depends on the actual aim i.e. make diagnosis of population surveys.

What the criterion for selection of field tests?

In the field conditions, the selection of the tests will be limited by the need for single- specimen tests rather than tests required more than once, age groups (collection of blood samples in young children being difficult), the site of collection of blood samples (finger-prick vs. veni-puncture samples), availability of laboratory facilities and skilled manpower. Thus, for field surveys, finger-prick blood samples and random samples of urine are more preferred.

In a large-scale field survey, it is often not possible to collect fasting samples of blood like for assessment of the extent of diabetes mellitus. The samples should be stable particularly during transport, not requiring refrigeration, as far as possible, and should not be affected by the recent meal or water consumption.

. In view of this, currently, tests involving dry blood spot methods are being developed. For example, such tests are already available for estimation of haemoglobin and serum vitamin A.

It is often suggested, considering the logistic difficulties and the cost of the tests, that biochemical assessment be carried out in a sub sample of the study population.

What precautions do we take while performing a biochemical test ?

Another important factor of consideration is use of disposable lancets for finger pricking and of disposable syringes for venipuncture specimens to avoid the danger of hepatitis and I-W infections. Even the investigators collecting the blood samples should wear disposable gloves as a precautionary measure against these.

The commonly included biochemical investigations in some routine field surveys are estimation of haemoglobin to assess the extent and distribution of anaemia and urinary iodine estimation to assess iodine status of the communities.

In specific surveys for the assessment of sub clinical deficiency of vitamin A deficiency, estimation of serum vitamin A is also being attempted.

Next, let us get to know why there is a need for accuracy and standardization of procedures in biochemical assessment.

Why there is a need for accuracy?

In the selection of methods for field surveys, accuracy and precision should not be sacrificed for the sake of convenience. For example, in large scale national surveys in India 'haemocue' was used as it was simple and required a drop of blood for estimation of haemoglobin.

Subsequent investigations have revealed that 'haemocue' gives higher values of haemoglobin in countries like India, where anaemia is widely prevalent leading to underestimation of the prevalence.

Thus, in the selection of methods and equipments, appropriate care should be taken.

Why standardizing the procedures?

As discussed earlier, it is very important to standardize the procedures and the investigators for accurate measurements. All the equipment should be tested for their accuracy and necessary care should be taken to carry voltage stabilizers in rural areas where electricity fluctuations are very common.

The training of the investigators should be such that the between observer and within observer variations should be within the allowable minimum ranges.

It should be recognized that errors could lead to inaccuracy, if the procedures of collection of samples are not proper. Cold storage of the biological specimens is most often required and adequate arrangements should be made for the purpose.

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If the samples are collected elsewhere and are transported to the laboratory, steps should be taken to provide for cold thermos flasks, which would keep cool for sufficient length of time.

Having learnt about the basic concepts of biochemical assessments, it is now the turn of biochemical tests i.e. let us review the different biochemical tests which can be used to assess nutritional status.

8.4.2 Biochemical Tests for Nutritional Deficiencies

We will now discuss the different biochemical tests used to assess nutritional status of community. It may be mentioned that the information on methodology for conducting the various tests is not provided in this section, since it is not within the purview of this unit. If you are interested to know about the methodology, we suggest you look up the publications on laboratory methods of biochemical tests in any library or perhaps find it on the internet. Here our focus will be to learn about the different tests that could be used to assess the sub clinical status of various nutritional deficiencies and about the interpretation of results. The nutritional deficiencies that we will discuss are:

- A. Protein energy malnutrition,
- B. Vitamin A deficiency
- C. Anaemia,
- D. Iodine deficiency
- E. Vitamin D deficiency, an
- F. Other nutrients like riboflavin, niacin, folic acid, vitamin B12 and zinc

Let us start with protein energy malnutrition.

A. Protein Energy Malnutrition

In most situations, dietary protein deficiency is secondary to calorie deficiency, dietary protein deficiency may be a specific problem only in some clinical conditions. The principle is that in protein deficiency, proteins and its derivatives are lowered. A number of tests like serum proteins, urea creatinine ratio and hydroxyproline index have, therefore, been suggested to assess protein nutritional status. However, these are not sensitive indicators of early protein malnutrition and do not provide any additional information over anthropometry. However, in clinical practice and nutrition surveys, serum albumin is the preferred method. Serum albumin reflects the long-term changes in protein nutritional status.

The guidelines for determining changes in protein nutritional status of children using serum albumin as an indicator are presented in Table 8.2.

S.No.	Protein nutritional status	Serum albumin levels (g/100ml)
1.	Deficient (high risk)	< 2.8
2.	Low (medium risk)	2.8 - 3.4
3.	Acceptable (low risk)	> 3.5

Table 8.2: Serum albumin levels as an indicator to assess protein nutritional status in children < 5 years of age malnourished children

Serum proteins, though are used in some cases, but can be raised during infections, which are very frequent in rural preschool children. Hence, we need ID consider this aspect while using this measure. You can note from Table 8.2 that different serum albumin cut-off values are used to indicate deficiency (high risk), low or medium risk and acceptable cases.

Let us go to the vitamin A deficiency assessment tests next

B. Vitamin A Deficiency

There are three methods to assess vitamin A deficiency. These include

- 1) Serum retinol method,
- 2) Relative dose response method, and
- 3) Filter paper method.

Let us get to know them.

1) Serum retinol method

Serum retinol or serum vitamin A is generally the simplest and feasible method of assessment of vitamin A status in communities. It may be noted that this indicator does not indicate the true tissue status of vitamin A. The guidelines for determining the vitamin A status based on serum retinol is given in the Table 8.3.

S.No.	Vitamin A status	Serum vitamin A levels	
		ug/dl	Umol/litre
1.	Deficient (high risk)	< 20	< 0.7
2.	Low (moderate risk)	20 - 30	0.7 - 1.05
3.	Acceptable	> 30	> 1.05

Table 8.3: Vitamin A status based on serum Vitamin A levels

Vitamin A is regarded as public health problem in a community if serum vitamin A levels are < 10 µg/dl or <0.37 gmol/litre in more than 5% of children under the age of six years. In other words, in such communities, there is a need for initiating nutrition intervention programmes like vitamin A supplementation.

Let us now learn about the second method which we can use to assess vitamin A status,

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2) Relative dose response method

A new method known as Relative dose response (RDR) is considered to be a better indicator of vitamin A stores in the body. Increase (%) in serum vitamin A levels is measured after a small oral dose of 450-1000 µg of vitamin A. The post dose is inversely related to the vitamin A status of the individual. An increase >20% is indicative of vitamin A deficiency in an individual. The limitation of the test is that it requires taking blood samples twice, which may not be feasible in young children particularly in community surveys. This limitation could be got over in Modified Relative Dose Response (MRDR) test where only one blood sample after administration of a prescribed dose (100 µg / kg body weight) of dehydroretinol (vitamin A₂) is taken. However, it is often difficult to procure vitamin A₂. A ratio > 0.06 of vitamin A₂/ vitamin A is suggestive of deficiency. The major limitation of serum retinol estimations is the requirement of sophisticated and expensive instruments like High Pressure Liquid Chromatography (HPLC). Finally let us learn about the filter paper method

3) Filter paper method

In the filter paper method, a blood spot is collected on a special filter paper and dried and carried to a laboratory for estimating serum retinol levels. This method though is simple, requires HPLC and the samples should be kept in cold storage. These facilities may not be available in many areas.

Next, let us learn about the biochemical assessment methods for the presence of anaemia in individuals.

C. Anaemia

Nutritional anaemia, as you may already know, is the most widespread of all the nutritional deficiencies. It is largely due to iron deficiency though folate deficiency is also observed in poor communities. There are two main methods used to assess iron deficiency. These are: 1) measurement of haemoglobin, and

Let us review these now,

1) Measurement of haemoglobin

Measurement of haemoglobin is the simplest method to assess nutritional anaemias in communities, In fact in view of the subjective bias in identifying clinical anaemia, haemoglobin estimation is adopted in large-scale surveys. It requires 20 µl of finger- prick blood sample, collected in a haemoglobin pipette and is estimated by cyanmethaemoglobin method by colorimetry. Inexpensive models of colorimeters are available in India now. Earlier in sub-section 8.3.1, we studied about the Haemocue method which is also used to assess haemoglobin levels. Because haemocue is easy to use in a field situation, it is recommended for use. However, it has few limitations specific to accuracy, which needs to be considered.

The criteria for diagnosing anaemia as recommended by the World Health Organization are given in Table 8.4.

Group	Cut-off for Haemoglobin (g/100 ml)
Children < 6 years	11
Children > 6 years Adolescents	12
Non-pregnant and non-lactating adult women	12
Pregnant women	11
Lactating women	12
Adult males	13

Table 8.4: WHO guidelines for diagnosing anaemia

Cases with values lower than the cut off suggested in Table 8.4 are considered anaemic.

Next let us learn about methods of estimating iron stores in the body.

2) Estimation of Iron Stores

Estimation of either bone-marrow iron or serum ferritin, both of which are lowered, indicates the earliest stage of iron deficiency. Other than serum ferritin, transferrin saturation, erythrocyte protoporphyrin and serum transferrin receptors are the other measures used to examine the prevalence of iron deficiency. Let us get to know about these measures.

Serum Ferritin (SF) test permits an evaluation of the storage iron level of a population. At all ages, serum ferritin levels <12 µg are strongly suggestive of iron deficiency. What we need to know here is that any inflammatory condition can also lead to increase in serum ferritin levels and, therefore, should be excluded. Serum iron is also estimated to assess iron deficiency. Serum iron levels < 40 µg/dl and transferrin saturation of < 15% are suggestive of iron deficiency. Transferrin saturation helps to determine whether the supply of iron is appropriate for the bone marrow, which is responsible for the production haemoglobin and red blood cells. This is a ratio (expressed as percentage) of serum iron and total iron binding capacity. The normal value is 33%. A low transferrin saturation and serum iron are characteristics of both iron deficiency, and recent or concurrent infection. Erythrocyte Protoporphyrin, like, transferrin saturation, helps to determine the supply of iron. Erythrocyte pmtoporphyrin is elevated in cases of iron deficiency (i.e. when there is insufficient supply of iron for heme synthesis). In children below the age of four, values > 80 µg/dl of red blood cells are indicative of iron deficiency. Serum transferrin receptors, is a new test for the evaluation of iron status. Measurement of circulating transferrin receptor, on cell surfaces and in plasma, provide a reliable index of iron deficiency anaemia. Transferrin receptors become

elevated whenever there is insufficient iron supply to cells or iron depletion
The criteria generally used to diagnose iron deficiency is listed in Table 8.5

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Indicator	Cut-off point
Serum Iron ($\mu\text{g/dl}$)	< 60
Total iron binding capacity ($\mu\text{g/dl}$)	> 300
Transferrin saturation (%)	< 15
Erythrocyte protoporphyrin ($\mu\text{g/dl}$)	> 100
Serum ferritin ($\mu\text{g/l}$)	< 12

Table 8.5: Diagnostic criteria for iron deficiency anaemia

In view of the need for laboratory facilities and skilled man power these tests are carried out only on a limited scale.

Next, let us go over to tests related to iodine deficiency

D. Iodine Deficiency

Urinary iodine levels reflect the iodine status in a community. On adequate dietary iodine intakes, the median urinary iodine is 100 $\mu\text{g/L}$ and is considered as normal. In other words, in areas with adequate iodine intakes, in half of the population urinary iodine level will be >100 $\mu\text{g/L}$. Similarly, if in > 20% of the subjects, urinary iodine levels are < 50 $\mu\text{g/L}$, the population is considered to be iodine deficient.

Iodine status	Median urinary iodine concentration ($\mu\text{g/dl}$)
Severe iodine deficiency	< 20
Moderate iodine deficiency	20 - 49
Mild iodine deficiency	50 - 99
Ideal iodine intake	100 - 200
More than adequate iodine intake (may increase the risk of iodine induced hyperthyroidism)	201 - 299
Excessive iodine intake	> 300

Table 8.6: Criteria for defining the iodine status of a population based on median urinary concentration

E. Vitamin D Deficiency

Clinical forms of vitamin D deficiency are rare in community surveys and cases of rickets are seen only in hospital practice. Serum levels of 25-hydroxy cholecalciferol or 25 HCC (which you may recall reading in the Nutritional Biochemistry Course, Unit 3, is a metabolite of vitamin D) are the accepted indicators of vitamin D deficiency. Levels $\mu\text{g/ml}$ (25 nmoles/l) are considered acceptable while 5-10 ng/ml as low and $< 5 \mu\text{g/ml}$ as high risk.

Let us go over to the biochemical tests for deficiency of other nutrients

F. Other Nutrients

Biochemical tests related to the deficiency of other nutrients i.e. riboflavin, niacin, folic acid, vitamin B₁₂ and zinc can also be considered, for assessing biochemical status of community. These are indicated in Table 8.7. These are carried out in specific surveys

Nutritional deficiency	Test	Deficiency Criterion
Riboflavin	1. Urinary Riboflavin 2. Erythrocyte Glutathione Reductase (EGR) test	$< 80 \mu\text{g/g}$ of Creatinine > 1.7 (high risk)
Niacin	Ratio of N ⁵ -methyl-2-pyridone-5-carboxamide and NI-methylnicotinamide	< 1
Folic acid	Serum Folate	$< 3 \text{ng/ml}$
	RBC Folate	140ng/ml
Vitamin B ₁₂	Serum B ₁₂	50pg/ml
Zinc	Plasma Zinc	$< 84 \mu\text{g/dl}$

Table 8.7: Biochemical tests and criteria for nutritional deficiencies

Interpretation of biochemical parameters is often complicated. It is not frequent to observe florid cases of clinical nutritional deficiencies with normal biochemical values at the community level. Other factors like dietary intakes and bioavailability of nutrients should be considered for proper interpretation of the biochemical values.

A common example is total goiter rate (TGR) and urinary iodine levels, despite the TGR being in the endemic range, the median urinary iodine values are normal. In such cases, the distribution of biochemical values would be better.

We hope having gone through the discussion above, you would now be in a good position to identify the biochemical tests which you would use while conducting nutritional assessment of population groups.

Check Your Progress Exercise 2

1. What do you understand by biochemical assessment? What are the characteristics of an ideal biochemical test?

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8.5 DIETARY ASSESSMENT

Dietary assessment is conducted with the help of diet surveys. When a systematic inquiry into the food supplies and food consumption of individuals and population groups is made, we call it a diet survey. Diet surveys, most often are a part and parcel of routine nutrition surveys. Accurate information on dietary patterns of communities would help in assessing the nutritional status of people but also for determining the relationship between nutrient intakes and deficiency diseases. These would help in understanding the dietary status of the community vis-a-vis other indicators of nutritional status like anthropometry, clinical signs of deficiency or biochemical parameters. Sometimes, dietary assessment of subjects in an institution like hostels or prisons also may be required to assess the adequacy of diet for any modifications. An appraisal of the dietary adequacy for populations would be required for planning programmes to overcome diet related disorders and to promote nutrition in general. Quantitative data on dietary intakes of populations are taken into consideration for fixing minimum wages and rations for households. In the recent past, assessment of the extent of poverty is based on dietary energy consumption pattern.

The dietary intakes can be assessed qualitatively either at the family or individual level. Sometimes institutional diet surveys are also important to find out the dietary intakes of individuals in large institutions. We would now study about common methods to assess dietary intakes at various levels.

The commonly used methods are:

Family/Household Diet Survey

- a. Weightment method
- b. Consumption Expenditure Survey

Assessment of dietary intakes of individuals

- a. Individual Oral Questionnaire (24 hour recall method),
- b. Food Record or Diary and

c. Diet History.

- Qualitative Survey
- Institutional Diet Survey
- Food Balance Sheets

8.5.1 Family Diet Surveys

Family diet surveys collect information on diet at the household level. The results are expressed as per capita or per consumption unit. In these surveys, it is not possible to find out the intakes of particular age groups or physiological groups. Since these are simpler than 24-hour recall individual diet surveys about which he will study later in this unit, routine nutrition surveys adopt these methods. These methods include: weighment method and consumption expenditure surveys.

Let us learn about these methods in details. Let us begin with weighment method first

A. Weighment Method

Weighment method of diet survey involves actual weighing of raw foods on a given day. The investigator visits the households before the food is cooked and weighs with the help of a grocer's balance or on a electronic balance all the foodstuffs (edible portions) that will be cooked for the day.

Earlier, weighment of foods was being carried out on seven consecutive days and the method was known as seven-day weighment method. Seven day surveys were logistically more difficult and time consuming. They also required complete cooperation of the households selected for the purpose. In the nineteen sixties, considering the monotony of the rural Indian diets with hardly any variation in the diet, after comparing the results of seven day and one day methods, it was decided to adopt one-day weighment diet surveys for assessing family dietary status in villages. Even now, in the urban areas, 3-day weighment is adopted, since there is more variation in these diets. Under weighment method, all the raw food items (edible) are weighed according to meal pattern(i.e. breakfast, lunch, evening tea and dinner) for the day of survey using grocer's balance and local measures. Information on all the family members who will be consuming the meal on that day is collected according to age and physiological status. In the case of young children, information on breast-feeding and complementary feeding practices is also collected. The respondent (house wife) is requested to bring all the raw foodstuffs she will be using for that day's menu. Each food item is weighed carefully and the weights are recorded in a proforma. The team is expected to visit the house as many times as the food is cooked and weigh all the foods that will go into the meal. However, in practical terms, often this may not be possible as the family may have foods just adequate for one meal and for the evening meal foods may be purchased only after the day's wages are collected. Therefore, information about what the quantities of foods would be, is collected from the respondent. It is also important to collect information about foods eaten outside home, supplementary food given to young children and food that is left over at the end of the day. In certain areas, even the cattle are fed either chapatis (roties) or rice. This information should be collected lest there will be overestimation of the intakes. As far as possible, the survey should not be carried out either on feasts or fasting days. Similarly, on occasions when special guests are present, the diet may not represent the actual intakes in the family. In the urban areas, the data is collected in the same way for three consecutive days.

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The dietary consumption is usually expressed per consumption unit (CU), which represents the intake of a sedentary adult male. These consumption units are calculated based on the calorie coefficients suggested based on the calorie requirements for different age, sex and physiological groups. The calorie requirements for one consumption unit are 2400 kcals. The Indian Council of Medical Research (ICMR) recommends the following calorie coefficients as given in Table 8.8, considering the value for a sedentary adult male as 1.

Age/ sex/physiological group	CU
Adult Male – sedentary	1
Adult Male – moderate activity	1.2
Adult Male – Heavy Activity	1.6
Adult Female – sedentary	0.8
Adult Female – moderate activity	0.9
Adult Female – Heavy Activity	1.2
Adolescents (12-21 years)	1.0
Children – 9-12 years	0.8
Children – 7-9 years	0.7
Children – 5-7 years	0.6
Children – 3-5 years	0.5
Children – 1-3 years	0.4

Table 8.8: Calorie coefficient expressed in relation to consumption units (CU) for age/sex/activity levels

The total number of consumption units in each family is first calculated based on the information on age, sex, activity, and physiological status of all the individuals in the family. The number of consumption units will be less than the total number of members in the family. We can calculate intake of each food per consumption as follows.

$$\text{Intake of each food/CU per day} = \frac{\text{Raw amounts of each food}}{\text{No. of consumption units}}$$

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We can explain this with the help of an example. Suppose we have a family of four consisting of two adults and two children in a household, we can calculate the total consumption units as shown in Table 8.9.

Characteristics	Adult male	Adult female	Child (3yrs)	Child (7 yrs)
Family composition	1	1	1	1
Type of activity	Moderate	Moderate		-
Physiological status	-	(Non pregnant, non lactating)	-	-
Equivalent consumption unit(C.U.)	1.2	0.9	0.4	0.6

Table 8.9: Calculation of total consumption units by a family of four people

We can note from the Table 8.9 that total CUs for this family are 3.1. We can now take the example of rice being consumed by the family and can calculate the intake of rice/CU per day as follows.

Suppose during the survey of this family, if the total intake of rice is found to be 400 g/day, then intake of rice/CU/day = Total intake of rice/total CU = $400/3.1 = 129$ g.

In this way, we can determine the intake of each food/ CU/day for each food consumed by the family.

The raw foods are converted into nutrients using the food composition tables (Nutritive Value of Indian Foods, National Institute of Nutrition, 2004), which provide nutrient content of commonly consumed Indian foods.

These are then compared with the recommended dietary intakes suggested by Indian Council of Medical Research(ICMR) for different nutrients for sedentary adult male to find out the adequacy or otherwise Of the diets in the family. The data obtained on all the families is then summed up to calculate the average intakes of the community surveyed.

The major limitation in the method is that consumption units are computed on the assumption that calorie coefficients hold good for all the nutrients.

Sometimes, the data are also expressed per caput (per head) by dividing the total consumption of foods by the total number of members (every member is treated as equal irrespective of age/sex/physiological status) who have partaken in the meal.

Having gone through the discussion above, you must have understood the

weighment method and per consumption unit concept. Next, we move on to the consumption expenditure survey.

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B. Consumption Expenditure Survey

In the consumption expenditure survey, the money spent on all the food and non-food items for a fixed period in the immediate past (usually one month) is found out by administering a specially designed proforma. This is considered to be comparable to the results of weighment diet survey. The National Sample Survey Organization collects such information every five years. In fact, the extent Of poverty in the country is calculated based on the results of food consumption surveys. The results provide information on foods bought by the family, which need not always mean actual consumption.

Having studied about the family diet surveys, next, we move on to the assessment of dietary intakes for individuals.

8.5.2 Assessment of Dietary Intakes of Individuals

Dietary status of individual "at risk" groups is often required to plan specific programmes for that group. For example, information of actual intakes of preschool children or pregnant women who are considered more vulnerable is essential to assess the actual deficit in the diets and to decide the quantities of supplements to be provided in the intervention programmes. We will discuss three types of methods used to collect information on dietary intakes of individuals. These are:

- a. Individual Oral Questionnaire (24-hour recall method),
- b. Food Record or Diary, and
- c. Diet History.

Out of these, the 24-hour recall method is probably the mostly widely used method of dietary assessment. We will now discuss these methods in details. Let us begin with the 24-hour recall method.

u. Individual Oral Questionnaire (24-hour Recall Diet Survey)

The 24 hour recall method is used in large nutritional surveys to collect dietary intake data of individuals. In this method, the individual is asked to recall in as much detail as possible the food intake for the past 24-hours by interview or by completing a questionnaire. The respondent recalls what was eaten, how much food was eaten, how was the food prepared, when was it eaten and other details related to food intake. However, while conducting the survey, both the respondent and the housewife (01' the person who cooks the food for the whole family) is contacted. The dietary intakes are assessed in terms of cooked food with the help of standardized cups measures appropriate for the local conditions, These cups are used to help the respondent to easily recall the quantities of food consumed each member.

These cups (generally about 12 with a teaspoon and a tablespoon) are first standardized in terms of volumes. These are so selected to represent the sizes of vessels used in the household. The respondent is questioned about the preparations made for each

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meal starting from the morning tea. For each preparation (say vegetable curry), all the ingredients (i.e. individual vegetables, oil, spices, salt etc) used are first listed. The housewife is then asked to give the actual weights of each of the food ingredient used in each preparation. This will give the quantities of total raw food used for the family. She is later asked to indicate in terms of the standardized cups the total volume of each preparation after cooking. This would give the total cooked quantities for each food item. For example, the volume of cooked rice may be 2-3 times of the raw amount depending on the age of the rice. Then the respondent is asked the amounts of cooked food consumed by each individual in the family who has partaken the meal. This would provide the individual intake of cooked food. This is repeated for each meal for each preparation. To check the accuracy of the assessment of the volumes by the housewife, it would be always better to take same volume of water to assess the total cooked quantity in the vessel used by her. This is then measured in terms of the standardized cups. Sometimes, previous day's remaining food may be consumed in the morning. Information about the total raw, cooked amounts may be assessed as described earlier and the individual consumption is assessed. The guidelines for conducting a diet survey using a 24-hour recall method are attached in Annexure IA. A schedule for 24-hour recall method is attached at Annexure 1B at the end of the course material. Well, there are certain points to remember while doing the 24-hour recall? What are they? Let us find out

We should remember that while doing a 24-hour recall, each and every ingredient used in the preparation of meals should be included. In the case of milk/curds/buttermilk, the extent to which these were diluted should be found out, as it is a common practice in rural families. In the case of bread, the number of slices per loaf should be assessed so as to approximately assess the weight of each slice. In the case of rotis or pancakes, the number should be recorded. A thorough knowledge of the local measures, the preparations, and the method of preparation is essential for obtaining valid results. Thus, for the purpose of calculation, the important step is to convert the individual cooked intakes into raw amounts of each food item as shown in the formula herewith.

$$\text{Individual Raw Intake} = \frac{\text{Total raw amount for each food item (g)} \times \text{Individual cooked intake (vol.)}}{\text{Total cooked amount of the preparation (vol.)}}$$

This calculation is repeated for each and every food item that was used in the meal and the total amounts consumed by each individual of each food item are computed. From the raw amounts, the nutritive value of each food item is calculated using the food tables as indicated earlier. It is often recommended that the information may be collected on all the members of the family even if the information is required for a particular group. The advantages are that this provides an opportunity to find out the intra-family distribution of diet and to assess whether a particular group is at a more disadvantage. Literature reveals that in India the dietary distribution is unfavourable to preschool children in the sense that even if other members in that family meet the requirement of nutrients like energy, a significant percentage of preschool children are given inadequate energy diets.

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The 24-hour recall has several strengths. It is inexpensive and quick to administer (20 minutes or less) and can provide detailed information on specific foods. It requires only short term memory. It is well accepted by respondents because they are not asked to keep a diet records and their expenditure of time and efforts is relatively low. The method also has several limitations. Individuals may withhold or alter information about what they ate due to poor memory or embarrassment or to please or impress the interviewer and researchers. Also data on a single day's diet, no matter how accurate, are a very poor descriptor of an individual's usual nutrient intake because of day-to-day or intra individual variability. However, a sufficiently large number of 24 hour recalls may provide a reasonable estimate of the mean nutrient intake of a group.

Let us now move on to the next method of assessing individual dietary intake i.e. Food Record or Diary.

b. Food Record or Diary

Food record or diary method provides food consumption data of individuals. Under this method, the subject records, at the time of consumption, the type and amounts of all foods and drinks consumed for a period of time usually ranging from 1 to 7 days. Portion sizes are estimated using food models and standard measuring instruments or food items are actually weighed. The strengths of the food record method are that it does not depend much on memory because the subject records food and drink consumption at the time of eating. In addition, it can provide detailed food intake data and important information about eating habits (for example, when, where, and with whom meals are eaten). However, the main limitation of this method is that recording food intake requires a literate and cooperative subject who is willing to spend the time and effort. Individuals having the time, interest and ability to complete several days of food records without assistance may not be representative of the general population.

Let us now move on to the third method of assessing dietary intake of individuals i.e. diet history.

c. Diet History

Diet history yields a retrospective estimate of food and nutrient intake of an individual over a period of time. The period covered may range from a month to one year at the most. Traditionally, the diet history approach has been associated with the method of assessing usual diet developed by a scientist, B.S. Burke. Burke's original method involves four steps; 1) collect general information about the subject's health habits 2) conduct 24-hour recall to get information on the subject's usual pattern of eating, 3) perform a cross check on the data given in step 2, and 4) have the subject complete a 3 day record.

Let us review these steps briefly

1) Collect general information about the subject's health habits: Information is collected from the individual about the number of meals eaten per day, appetite, food dislikes, the presence or absence of nausea and vomiting, use of nutritional

supplements, habits related to sleep, rest and work etc. This allows the interviewer to become acquainted with the subject in ways that may be helpful in obtaining further information.

Next, collect 24-hour recall to get information on the subjects usual pattern of eating. Let us see how.

2) Conduct 24-hour recall to get information on the subject's usual pattern of eating: A 24-hour recall is conducted with the subject using the technique as discussed earlier. The information is thus collected on subject's usual pattern of eating during and between the meals including types of food eaten, serving sizes, frequency and timings. Next perform a cross check on this data as explained next.

3) Perform a cross check on the data given in step 2 above: Once the information on 24 hour recall is collected, the data is then cross checked by asking specific questions about the subjects' dietary preferences and habits. For example, the subject may have said that he or she drinks 200 ml of milk every morning, The interviewer should then inquire about a subject's milk drinking habits to clarify and verify the information given about the subject's milk intake.

4) Have the subject complete a 3 day record: Finally the subject is asked to complete a 3-day record, which serves as an additional means of checking the usual intake.

As we said earlier, this is an approach suggested by B.S. Burke, but several investigators have modified it to suit their needs. The strengths of the diet history approach are that it assesses the subject's usual dietary intake, including the seasonal variations, and therefore, data on all nutrients can be obtained. The main limitation of this method is that it requires 1-2 hours to conduct the interview. Highly trained interviewers are needed and nutrient intakes tend to be overestimated.

Thus, the three methods discussed above provide information on nutrient intakes of individuals. We can choose any method depending upon the objectives of our study, time and resources at hand although the 24-hour recall method remains a method of choice for large scale nutritional surveys.

The methods discussed above provide quantitative information about the diet. Sometimes we may want to collect only qualitative information about the diet. Let us get to know about qualitative diet surveys.

8.5.3 Qualitative Diet Surveys

In certain instances, quantitative information on dietary intakes may not be required. Under such circumstances, qualitative data is compiled by carrying out surveys either at family or individual level. In such surveys, information is compiled on the kinds of foods eaten, the frequency of their consumption, perceptions of the community about foods, attitudes towards different types of foods and the special foods consumed during particular conditions like pregnancy or lactation. An attempt is also made to collect data on the foods avoided during health and disease and foods restricted during morbidities. This data is useful for planning

and evaluation of nutrition education programmes. Such data is collected through specially designed proforma.

We can study about one of such method in detail. This is known as food frequency method.

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Food Frequency Method: Food frequency method consists of asking individuals (by interview or checklist) how often (daily, monthly, weekly) specific foods are eaten. This is then used as an index of diet pattern of population groups. The underlying principle of food frequency method is that average long term diet, for example, intake over weeks, months or years, is the conceptually important exposure rather than intake on a few specific days. Therefore, it may be advantageous to sacrifice precise intake measurements obtainable on one or a few days in exchange for more crude information relating to an extended period of time. In fact, food frequency methods has become the primary method for measuring dietary intake in epidemiological studies as they are easy for subjects to complete, often as self-administered form. A food frequency questionnaire or checklist consists of two components: a food list and a frequency response section for subjects to report how often each food was eaten. Refer to Annexure 2 given at the end of this course. A food frequency questionnaire is given for you reference in this annexure. The questionnaire consist of a list of approximately 100 or fewer individual foods or food groups that are important contributors to the population's intake of energy and nutrients. Usually, the foods are grouped into categories (based on similarity of nutritive value, functions in the diet etc.). The strengths of food frequency questionnaire are that they are relatively inexpensive and quick to administer in large scale surveys. They are also considered one of the methods of choice for research on diet-disease relationships on both the macronutrient and micronutrient levels. The key limitation of food frequency questionnaire is that since the food list is limited to 100 or fewer foods and food groups, these must be representative of the most common foods consumed by individuals in a sample.

Sometimes we would like to know the dietary intake of large groups of people consuming food in an institution. For this, we use an institutional diet survey. Let us get to know about them.

8.5.4 Institutional Diet Survey

Institutional diet survey is used to find out the dietary pattern of people residing in hostels, orphanages, prisons, army barracks and homes for the aged, homogenous groups of people take their food from a common kitchen. The method of diet survey also is referred to as inventory method. The amounts of foods issued everyday as per the records are collected along with information on the number of individuals partaking in the meal. It is recommended that the inventory should be obtained for a period of at least one week. The average intake per person per day can be calculated as follows:

Average intake/person/day =

$$\frac{\text{Stocks at the beginning of the week} - \text{Stocks at the end of the week}}{\text{Total number of inmates} \times \text{Number of days of survey (7)}}$$

The major limitations of this method are that the validity of the data depends on the accuracy of the records and any lapses in recording the issues could vitiate the results. The selection of the reference period should be random so as to avoid any manipulation of the records by the wardens. On a regular basis, we require information on dietary consumption of people at a country/regional level. For this, we use food balance sheet. Let us review what it is, next.

8.5.5 Food Balance Sheets (FBS)

The food balance sheet is a method of indirectly estimating the amounts of food consumed by a country's population at a certain time. It provides data on food availability or disappearance rather than actual consumption. Food and Agriculture Organization (FAO) of the United Nations compiles food balance sheets for different countries. These are prepared based on the assessment of the quantities of total food produced in the region/country, imports (if any), foods allocated for seed and industrial purpose, animal foods and wastage of foods (if any). The amounts are divided by the mid year population of the region/country and 365 to derive average per capita consumption per day. Food balance sheets generally provide information as to the foods available at the country level. The strength of this method is that it can give a total view of the food supplies of a country and can be used in drawing conclusions about food habits and dietary trends within a country. Food Balance Sheets are valuable for planning international nutrition policy and formulating food programmes. They are also useful for the administrators to monitor food position in the country. Food balance sheets also have some limitations. The accuracy of data is dependent upon available statistics, the quality of which can vary greatly depending upon a country's level of development. The data only represents the total amount of food reportedly available for consumption, not what was actually consumed, nor does it show how food was distributed among individuals or groups. Hence, they are of little use at the community level.

Thus you saw that there are different methods of assessment of dietary intake at various levels. The selection of the method of diet surveys depends upon the purpose, the group to be studied and the resources available.

With this, we end our study on dietary assessment. In the next unit, we will study about nutrition monitoring and surveillance.

Check Your Progress Exercise 3

1. Enumerate the common methods used to assess dietary intakes.
2. Answer these briefly
 - a. Strengths and limitations of 24-hour recall.
 - b. Strengths and limitations of food frequency questionnaire.
3. Fill in the blanks:
 - a) The results of family diet survey are expressed as..... unit.
 - b) The National Sample Survey Organization collects information related to consumer..... on food every five years

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- c) The most common method to assess dietary intakes of individuals is.....
- d) diet survey is used to assess dietary pattern of group of people living in an institution.
- e) Food balance sheets are useful to.....the food position in the country.

8.6 LET US SUM UP

In this unit, we studied about the clinical assessment, biochemical assessment and dietary assessment, other than nutritional anthropometry, as the methods of direct nutritional assessment. We briefly reviewed the clinical signs of common nutrient deficiency disorders. For doing a biochemical test, we should have a knowledge of an ideal biochemical test, criteria to be used for selection of field test, precautions for doing the tests and importance of standardization of tests. We also learnt about the common methods used in dietary assessment. These are Family/Household survey which include Weighment diet survey and Consumption Expenditure survey; Individuals dietary assessment through 24 hour recall method, Diet record and Diet history; Qualitative survey; Institutional diet survey and Food Balance Sheets. We also learned that only trained people should carry out clinical, biochemical and dietary assessment.

8.7 GLOSSARY

- | | |
|------------------------------|---|
| Endemic | : a disease that is constantly present to a greater or lesser degree in people of a certain class or in people living in a particular location. |
| Fontanelle | : the soft spots on a baby's head where the bones of the skull have not fused together. |
| Hyperkeratotic lesion | : a lesion formed from excess production of keratin in the skin. |
| Lancet | : a surgical knife with a short, wide, pointed double-edged blade, used especially for making punctures and small Incisions. |
| Sensitivity of a test | : it is defined as the ability of a test to identify correctly all those who have the disease, that is "true positive". |

Specificity of a test : it is defined as the ability of a test to identify correctly all those who do not have the disease, that is "time negatives".

8.8 CHECK YOUR PROGRESS

- 1). What are Methods of Nutritional Assessments ?
- 2). What is Clinical examination ?
- 3). What are the characteristics of an ideal biochemical test ?
- 4). What is Clinical Signs of Nutritional Disorders?
- 5). What precautions do we take while performing a biochemical test ?

Assessment of
Nutritional Status
in Community
Setting - 2

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9

NUTRITION MONITORING AND NUTRITION SURVEILLANCE

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STRUCTURE

- 9.1 Learning Objective
- 9.2 Introduction
- 9.3 Nutrition Monitoring
- 9.4 Nutrition Surveillance System (NSS)
- 9.5 Let Us Sum Up
- 9.6 Glossary
- 9.7 Check Your Progress

9.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- describe the concept of nutrition monitoring and nutrition surveillance,
- enumerate the aim of nutrition monitoring and surveillance and the basic principles,
- explain the various programmes through which these activities are being carried out in India, and
- organize activities related to nutrition monitoring and surveillance at community level.

9.2 INTRODUCTION

In the previous Units 7 and 8, we learnt about different methods of assessment of nutritional status of communities. Now we would like to know whether the nutritional status of community is improving or not and, if not, then what actions could be taken to improve the nutritional status. For this purpose, we use the processes of nutrition monitoring and nutritional surveillance.

We have learnt in the previous units that, in direct assessment of nutritional status, nutrition surveys are used to collect information on population. Most often, the nutrition surveys are conducted not only at one point of time to understand the current status of a given community, but also are repeated periodically to find out the changes that may occur over time. The Union and State Governments

in India have been investing large sums of money on several direct and indirect interventions to improve the overall health and nutrition of vulnerable groups of population. We will learn about these interventions later in Unit 10. It is essential to know whether there has been any change in the nutritional status as a result of these interventions or not; if not, then appropriate corrective steps could be introduced, where necessary. Nutrition monitoring is one of the tools adopted for the purpose.

During our day-to-day life, we hear regularly about the disease surveillance (cholera, encephalitis etc.) by the health authorities. The health administration maintains a constant vigil on occurrence of certain notifiable diseases so that they can initiate prompt control measures to prevent the spread of these infectious diseases. This process is called disease surveillance. In the case of nutrition, early diagnosis of malnutrition in "at risk" population groups is crucial to institute immediate corrective action to prevent undernutrition. More importantly, this would also help in the promotion of optimal nutrition. Hence, effective nutrition surveillance system required to achieve this.

In this unit, you will now learn about nutrition monitoring and surveillance and the various mechanisms in place in the country. What is nutrition monitoring and surveillance? What is the aim of nutrition monitoring? How is nutrition monitoring and surveillance carried out at the community level? These are a few issues discussed in this unit. 185

9.3 NUTRITION MONITORING

The terms 'monitoring' and 'surveillance' are often used as synonyms in nutrition assessment. However, it is important to understand the difference between these two terms. Let us begin by understanding what we mean by monitoring. Monitoring literally means 'to supervise' or 'to keep an eye on' or 'to scrutinize'. 'Monitoring refers to the collection, analysis and feedback quantitatively precise from a relatively large representative sample of a population — at the National and State levels — essentially for the purposes of tracking time trends and understanding population sub-group differences in diet, nutritional status and nutrition-related health and disease risks.

You may be aware that the governments provide for built-in monitoring systems in most of the programmes that are implemented by them particularly with respect to the inputs either in terms of money or material. On the other hand, the aim of any monitoring should be to assess whether the goals (with respect to the outcomes), set at the beginning of launching such interventions have been met. Therefore, nutrition monitoring is a tool to keep a watch on the nutritional status of communities to assess the changes in nutritional status of communities over a period of time. WHO defines nutrition monitoring as the "measurement of changes over time in the nutritional status of a population or a specific group of individuals". Thus, nutrition monitoring involves repeated measurements on a representative population. You would also realize that quite often, the terms of monitoring and

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evaluation are used together. Evaluation is, in fact, a detailed appraisal of an intervention programme by examining the processes of implementation (pertaining to delivery inputs like outreach of the programme etc.) and the outcome variables (e.g. nutritional status) to determine as to how far the programme goals have been achieved and if not, then reasons for non achievement of goals.

Let us now learn about the objectives and components of nutrition monitoring,

9.3.1 Objectives and Components of Nutrition Monitoring

In the section above, we learnt that nutrition monitoring is a means to keep a watch on the nutritional status of communities. In fact, the objectives of nutrition monitoring are twofold. These are enumerated herewith:

Objectives of nutrition monitoring

The objectives include:

1) to assess the nutritional status of representative groups of communities on a continuous basis in order to study the changes in the nutritional status, if any, and
2) to evaluate the various nutrition intervention programmes in operation to determine the achievement or otherwise of the goals,

In fact, a well-planned and integrated national nutrition monitoring system should cover the following content areas:

- food and nutrient consumption at household and individual levels,
- nutritional status by anthropometry and clinical nutritional deficiency conditions,
- nutrition-related risks of selected chronic diseases,
- food security, particularly at the household level,
- the above information focused on selected high risk sub-population groups like Below Poverty Line (BPL) population, population in chronically drought prone area and tribal populations,
- identification of vulnerable sub-groups of the population at higher risk of nutrition- related health problems,
- food supply- agricultural and horticultural, .and
- food safety.

You should know that it requires at least a year to demonstrate changes in nutritional status at the community level, so the periodicity of nutrition monitoring is usually once a year. In India, five year monitoring is also suggested to coincide with the Five Year Plans.

The Objectives of nutrition monitoring, the target groups to be monitored and the availability of resources determine the components of nutrition monitoring. In countries like India, where clinical malnutrition is still widely prevalent, monitoring of both clinical (for example, assessment of clinical signs in case of kwashiorkor/marasmus, xerophthalmia and goitre etc.) and of sub-clinical nutritional status (anthropometric and biochemical indicators) would be required. However, with improvement in the nutritional status of communities,

the emphasis can be shifted to sub-clinical forms. The nutritional monitoring data could also be used in the revision of the Dietary Guidelines for Indians at regular intervals of about 10 years.

Next, what are the components of nutritional monitoring? Let's find out

Components of nutritional monitoring

Let us look at the two main components of nutrition monitoring. These are:

- 1) population groups, and
- 2) key indicators used in monitoring.

We shall start with the population groups.

1) Population for Monitoring

For nutrition monitoring, it is necessary to decide the groups of population, especially those, at risk of developing malnutrition. Considering the current status of nutrition of different groups, monitoring of nutritional status of mothers and children should receive utmost priority. Since the nutritional status of preschool children is accepted to reflect the nutrition of a community, under conditions of resource constraints, it may be adequate to collect data on this age group only. However, the aim should be to monitor the whole population.

Next, let us look at the second component i.e. key indicators.

2) Key Indicators

An effective nutrition monitoring system should be able to provide information on prevalence of nutrition disorders either by direct measurement and observation or by self-reported disease prevalence in different groups, personal attributes, nutrition behaviours and information on utilization of health and nutrition services. It is recommended that as far as possible, information which indicates various aspects of nutritional status e.g. underweight, wasting and stunting in addition to clinical assessment should be included. Since anaemia is a major problem among all the groups of population, particularly among pregnant women and young children, laboratory supported haemoglobin estimations at least once in five years may also be included. Dietary consumption by all the individuals would provide also information on the intra-family distribution of intakes within a family. In addition, data on various aspects of implementation of intervention programme participation of the beneficiaries would help in linking the nutritional status and the intervention programmes. Such data would help in assessing the current status of the programmes and in introducing appropriate changes required. The data so collected should be accurate and be representative of the communities. Having studied about the indicators of nutrition monitoring, it is also important for to know that only standard methods should be used to conduct nutrition monitoring. Emphasis should be placed on obtaining accurate data using sensitive indices by trained investigators. They should use standardized equipments to indicate the nutritional status of communities, with reasonable certainty.

Let us now learn about the current monitoring programmes in India.

9.3.2 Current Programmes of Nutrition Monitoring in India

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The assessment of nutritional status of different segments of the population, particularly in relation to dietary intakes, has been one of the important activities of nutrition research in India for more than six decades. These have been mostly isolated studies, either of specific groups or in specific regions of the country and they rarely assumed an all-India character. However, with an increasing emphasis on planned development through five-year plans, a number of organizations and departments have geared their activities to meet the stringent needs of the planning process at national and regional levels. These organizations provide a more systematic approach in collection and compilation of data.

S.No.	Agency	Type of information
1.	National Nutrition Monitoring Bureau (NNMB)	Diet and nutrition surveys Evaluation of ongoing nutrition programmes
2.	National Sample Survey Organization (NSSO)	Consumer expenditure surveys Socio-economic survey Employment position
3.	National Family Health Survey (NFHS)	Nutritional status, infant and child mortality and fertility
4.	District Level Household Survey (RCH-2)	Database on reproductive and child health at district level
5.	Food and Nutrition Board	Diet and nutrition surveys
6.	Registrar General of India	Census data Population statistics and trends
7.	DES	Food production, distribution, procurement and storage Consumer price index Food availability
8.	CBHT	Vital statistics Public health and medical statistics Community health surveys

Table 9.1: Major agencies and type of information collected

Thus, you can see in Table 9.1 that organizations like National Nutrition Monitoring Bureau conducts diet and nutrition survey and evaluation of nutrition programmes. Out of the organizations listed in Table 9.1, we would discuss the most notable four organizations. These are:

- 1) National Nutrition Monitoring Bureau
- 2) National Sample Survey Organization
- 3) National Family Health Survey
- 4) District Level household Survey (RCH-2)

Let us start with National Nutrition Monitoring Bureau

1) National Nutrition Monitoring Bureau

The National Nutrition Monitoring Bureau (NNMB) is the only organization involved in nutrition monitoring for the past 32 years. The Indian Council Medical Research (Medical Research Council under the Ministry of Health and Family Welfare, Government of India) established NNMB in 10 states, in 1972, to periodically collect information on the diet and nutritional status of communities and to evaluate various national nutrition intervention programmes in operation. NNMB is located at the National Institute of Nutrition, Hyderabad, India. Though it is in operation only in 10 states (Andhra Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal, Kerala, Gujarat, Maharashtra, Karnataka, Orissa) NNMB has been the only large-scale dynamic database on diet and nutrition in the country providing information on nutritional status of different age groups and dietary pattern at individual level. NNMB has two main objectives. These are given as follows:

Objectives of NNMB

The objectives of NNMB are:

- To collect, on a continual basis, on representative segments of population in each of the states, data on dietary pattern and nutritional status adopting standardized and uniform procedures and techniques, and

To periodically monitor and evaluate the ongoing national nutrition programmes, to identify their strengths and weakness and to recommend mid-course appropriate corrective measures to improve their effectiveness.

In pursuance of the first objective, the NNMB conducted surveys and has published 21 scientific reports between 1975 and 2003. From 1974 to 1981, in annual surveys on a probability sample, a total of about 500 households each year (rural and urban) were carried out in each State. In 1983, NNMB decided to link its sampling plan to that of the National Sample Survey Organization (NSSO) of the Government of India. The survey with the NSSO linked sampling plan was carried out in only four States due to resource limitations. Individual dietary intakes were assessed using a single 24-hour recall for estimating the intra-familial distribution of food. In the urban sample of 250 households, a three-day weighing method was adopted for assessing the dietary intake. Anthropometric data — height, weight, mid upper arm circumference and fat fold at triceps — and data on clinical signs of nutritional deficiencies were collected on all individuals in the selected households.

In 1985-87, a survey was conducted exclusively in the integrated Tribal Development Project (ITDP) areas in the States of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Orissa and West Bengal. This survey had the same objectives as all the previous surveys. This survey was repeated in 1998-99 among the tribal populations living in the same IT DP areas. Household dietary intake, anthropometry and clinical signs of nutritional deficiency signs were assessed from all the households in the sample. In 25 percent of the households,

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individual dietary intakes by a single 24-hour recall was done.

In 1988-90 and in 1996-97, two repeat surveys were carried out of the rural areas surveyed in 1975-79 to generate longitudinal data on dietary intake, anthropometry and clinical nutritional deficiency conditions in the rural population.

In 2000, using data from the surveys above, a separate report was produced on the diet and nutritional status of adolescents (10 to 17 years of age). In 2001, the NNMB took a decision to carry out diet and nutritional status surveys quinquennially (once every five years) instead of annually. Intervening years between the quinquennial surveys were to be utilized for carrying out surveys of special interest. Accordingly, in 2001-2003 a survey of the prevalence of micronutrient deficiencies - Bitot Spots in children 1-4 years, Iodine Deficiency Disorders in children 6- 11 years and haemoglobin level in pre-school children, adolescent girls and pregnant and lactating women- was carried out. Iodine content of salt samples from a sub-sample of households was studied.

Currently, the first quinquennial survey of diet, nutritional intake and anthropometry in the rural areas of the 10 States is being carried out. For the first time, this survey is also estimating the prevalence of obesity (using BMI, waist circumference and waist- hip ratio) and hypertension among adult men and women. Haemoglobin levels among adult males and non-pregnant, non-lactating women are also being estimated.

NNMB is not a routine data collecting organization. It has several unique features. These are given as follows:

Unique features of NNMB:

1. Organization of repeat surveys in 1988-90 and 1996-97, in the same villages in all the states that were surveyed during 1975-79, to assess time trends in diet and nutrition surveys.
2. Periodic generation of data on diet and nutritional status of socially vulnerable groups of population like the tribals living in integrated tribal development project areas, and the population physiologically at risk like elderly and adolescents.
3. Continuous collection of data on actual dietary intakes of families and individuals belonging to different physiological and age groups, in different states. NNMB is the only organization generating this type of data.
4. Assessment of intra-family distribution of foods and nutrients. Regular generation of data by NNMB on various aspects as discussed above has been very useful for the Planning Commission, Union and State governments and International organizations. The changes in the nutritional status over a period time could be ascertained with the help of NNMB surveys and the results so far indicate that over the last 25 years there has been gradual and significant reduction in the prevalence of both moderate and severe forms of undernutrition as measured by anthropometry and clinical assessment.

Let us discuss the second organization i.e. National Sample Survey Organization.

2) National Sample Survey Organization (NSSO)

NSSO, a permanent survey organization, was set up in the Department of Statistics of the Government of India in 1950 to assist in socioeconomic planning and policy making, by collecting data on various facets of the Indian economy through nationwide large-scale sample surveys. The NSSO has been carrying out Consumer Expenditure Surveys quinquennially since 1972-73. As a part of these quinquennial surveys data on dietary intake at National and State levels, and monthly per capita expenditure food are collected.

The data on food consumption per head is calculated from the data, which provide information on per capita energy consumption for different states. In fact, the calculation of the proportion of population below poverty line (indicator of poverty) is calculated based on this information. It should be recognized that these data do not provide individual diet my intakes of different age groups but indicate the availability at consumer level. These data have been used to monitor the consumption expenditure over years. This survey provides calorie, protein, and total fat intake per capita and per consumption unit, using the two reference periods of 7 and 30 day immediately preceding the day of the survey.

The NSSO data on nutritional intake gives data by rural and urban areas of States and India on:

- Average quantity of consumption of different cereals per 30 days,
- Average value of these in rupees,
- Food security at the household level,
- Per capita and per consumption unit intake of calories, protein and fat per day,
- Percentage of total intake of protein and calorie from different groups of food item,
- Distribution of households and individuals by calories intake level, and
- Cross-tabulations of the above by monthly consumption expenditure classes.

Let us next discuss the third organization i.e. National Family Health Survey.

3) National Family Health Surveys (NFHS)

The Ministry of Health and Family Welfare, Government of India, initiated the first National Family Health Surveys (NFHS-I) in 1991. A second National Family Health survey (NH-IS-II) was carried in 1998-99.

The main objective of the first survey was to provide State and National level estimates of fertility, infant and child mortality, contraception prevalence, maternal and child health care and the utilization of services provided by the government health system for mothers and children. As part of this survey, data on infant feeding, child nutrition were also collected. Anthropometric data were collected on children under 4 years of age. In addition to data on infant feeding and anthropometry and prevalence of anaemia in children below 4 years, in the NFHS-2, haemoglobin estimations in pregnant women, preschool children and non-pregnant and non-lactating women were also collected. The survey also collected data on food consumption.

Government and International agencies have extensively used these data to assess the changes in nutritional status.

From NFHS we move on to the fourth monitoring system i.e. district level household survey.

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4) District Level Household Survey (RCH-2)

The International Institute for Population Sciences, Mumbai, at the request of the Government of India, carried out a district level household survey (DLHS-RCH) covering 300 districts in 2002-2003. The main focus of the DLHS was to create a database on the reproductive and child health at the District level. In the subjects covered in this survey was a component on the nutritional status (weight/age) of children below 72 months. Haemoglobin levels were estimated in preschool children, adolescent girls (10-14 years) and pregnant women of 15 to 44 years of age.

Consumption of iodized salt (at concentration of 7 ppm and 15 ppm) at the household levels were also assessed.

From our discussion above it must be clear that we have few organizations in our country, which provide a more systematic approach in collection and compilation of health and nutrition data. Before we proceed to the next topic, let us check what we have learnt so far by answering the check your progress exercise given herewith.

Check Your Progress Exercise 1

1. What is nutrition monitoring?

.....
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2. List the main objectives of nutrition monitoring.

.....
.....

3. List the four notable organizations/systems involved with nutrition monitoring in our country.

.....
.....

4. List the objectives and unique features of National Nutrition Monitoring Bureau.

.....
.....

Now, we move on to the next topic i.e. nutrition surveillance system.

9.4 NUTRITION SURVEILLANCE SYSTEM (NSS)

Earlier in this unit we studied about nutrition monitoring. Nutrition monitoring you would realize is usually an integral part of nutrition surveillance. Quite

often, the terms "nutrition surveillance" and "nutrition monitoring" as mentioned earlier too are used synonymously. What then is nutrition surveillance? Nutrition surveillance means watching over nutrition in order to make decisions, which will lead to improvement of nutritional status population.

Nutrition surveillance is a continuous and systematic process of collection, analysis, interpretation of information to assess nutritional status and initiate appropriate early action to promote optimal nutrition.

Nutrition monitoring is usually an integral part of nutrition surveillance and you already know, it refers to "repeated measurements of the nutritional status, at regular intervals of population or a specific group of individuals over a period of time. 'Surveillance', on the contrary, is concerned with data on the current status/ activities at local levels for initiating action in response to events occurring during specific programme implementation in the population. Nutrition surveillance, therefore, encompasses analysis and action to promote better health and nutrition.

While studying about nutrition surveillance it is important for us to familiarize ourselves with a term "Triple A Cycle" What is Triple A? Let's find out. Triple A means Assessment, Analysis and Action. Nutrition Surveillance is carried out adapting triple A Cycle as indicated in Figure 9.1 herewith

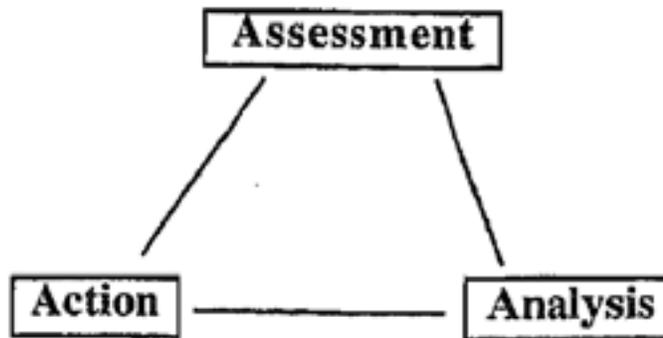


Figure 9.1: The Triple A cycle

The first step in the cycle is assessment of the nutritional status of an individual, which is followed by analysis of the causes for deterioration in nutritional status. For example, the reasons could be delayed complementary feeding, inadequate dietary intake, frequent attacks of morbidity and non-utilization of services provided by the government etc. The health and nutrition workers should carefully enquire the reasons at the household level and initiate suitable action, which is the next step in nutrition surveillance. The action may be education of the mother about initiation of complementary feeding by the age of 6 months or frequent feeding of energy rich foods or controlling morbidity. The triple A cycle is not one time activity but a continuous process.

Having understood the concept of nutrition surveillance, let us now look at the objectives and uses of nutrition surveillance. We will also discuss what infrastructure could be used to establish NSS in the country. At the end, we would discuss the key indicators and the importance of computerization in carrying out effective nutrition surveillance. Let us now begin with the objectives of nutrition

surveillance.

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9.4.1 Objectives of Nutrition Surveillance

The main aim of nutrition surveillance is early identification of at risk groups of population like children and mothers so as to institute appropriate interventions/ actions to prevent undernutrition. Thus, objectives of effective nutrition surveillance are:

1. It should identify the prevalent nutrition-related problems and the high-risk groups.
2. The information collected in 'NSS should prompt initiation of appropriate intervention programmes to prevent the occurrence of nutritional disorders. Surveillance should never exist in isolation from action.
3. It also should provide information on nutrition and health of communities to help in the preparation of action plans at different levels.
4. It should assist in the management and evaluation of health and nutrition related programmes.
5. The nutrition surveillance should also be able to provide timely warning about impending nutrition disasters.

Next, let us look at the uses of nutrition surveillance.

9.4.2 Uses of Nutrition Surveillance System

Nutrition surveillance system can have various uses. Some of the important uses include:

1. The most important contribution of NSS is to help in early diagnosis, initiating of prompt and immediate remedial measures to control undernutrition and thus promote the nutritional status.
2. The NSS provides information on the current nutritional status, the geographic distribution of nutrition problems (identification of geographic areas), causes and changes in the prevalence/incidence over time, the actions initiated and their effects.
3. The NSS can help to identify the seasons of nutritional stress.
4. The NSS can also be used for performance evaluation of the ongoing intervention programmes and assessment of contributory factors.
5. It can help the administration in prioritizing actions, so as to modify policies and programmes from time to time.

The NSS can provide information on nutritional trends over a period of time and help in establishing a database on nutrition and related indicators to enable assessment, constantly, of the extent of achievement of the national nutritional goals.

We learnt about the objectives and uses of nutrition surveillance system. Let us now study how we can institutionalize NSS i.e. what kind of infrastructure do we need for NSS.

9.4.3 Infrastructure for Nutrition Surveillance System

The important step in the establishment of national NSS is identification of suitable infrastructure. It would be preferred that we use an existing infrastructure rather than establishing a new set up. In India, Integrated Child Development Services (ICDS) is one of the largest nation-wide child development programmes. What is ICDS? You will learn about it in detail in Unit 10. We will discuss here how it could be used to develop NSS.

ICDS is best suited for developing NSS at the national level for the following reasons:

1. It is currently in operation in most of the community development blocks in the country and, as per the National Nutrition Policy (NNP) it will be expanded to the entire rural and 50% of the urban areas of the country.
2. It has the necessary infrastructure and trained manpower with a built-in management information system from the village level up to the national level.
3. Growth monitoring, an important requisite to find out the nutritional status of children is an integral part of ICDS. All the nutrition goals set by the NNP are covered by the ICDS activities.
4. More importantly, ICDS has a built in monthly progress reporting (MPR) system, which could be an important tool for NSS.

What is Monthly Progress Reporting (MPR) system? Let us find out more about it.

Monthly Progress Reporting (MPR) system

At present, Anganwadi Workers (AWW) at the anganwadi centre (village) level monitor the ICDS scheme through a system of monthly progress reports (MPR). The Supervisors and the Child Development Project Officers (CDPOs) consolidate these MPRs. These contain mostly quantitative information on the coverage under different components of ICDS (Process variables). For effective NSS, there should be a provision to identify, at different levels, "children at-risk" or "problem areas" so that corrective action could be immediately initiated. Information should be collected about the reasons for low coverage for various nutrition programmes like supplementary feeding programme, semi-annual distribution of massive dose of vitamin A, nutritional anaemia control programme, universal immunization programme etc. The information so collected should help the workers in taking immediate action. Critical review of the MPRs is essential at various levels i.e. village to the level of State, to improve the performance of the programmes.

In addition to ICDS, the Department of Health, which has extensive infrastructure in the rural areas, can also be considered as the delivery mechanism for nutrition surveillance. In fact, the nutrition surveillance should be a combined, approach both by the Health and ICDS departments.

Thus, we saw how we could use the existing infrastructure for establishing NSS. Now let us review the key indicators, which would be critical for a successful nutrition surveillance programme.

9.4.4 Key Indicators of Successful Nutrition Surveillance Programme

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ICDS and Health department do collect information on several health and nutrition indicators. However, we would mention here some key indicators which are critical for a successful nutrition surveillance programme. These are:

- Enrolment and attendance of different beneficiaries for supplementary nutrition and preschool education,
- Nutritional status of children and its trends,
- Growth faltering among children,
- Prevalence of nutritional deficiency signs like oedema (kwashiorkor), wasting
- (marasmus), Bitot spots, night blindness and visible goitre.

Coverage under national programmes namely:

- a. Immunization of children and expectant women,
 - b. Vitamin 'A' distribution to children,
 - c. Distribution of IFA tablets to children, pregnant woman and lactating women.
- Prevalence of low birth weight,
 - Vital rates in different age and physiological groups, and
 - Prevalence of common morbidity in children and causes for deaths.

Thus, the indicators given above could provide necessary information on nutritional status and coverage of target population in nutrition and health intervention programmes. You probably know that computerization, like in any other programme, could help in efficient delivery of NSS. Let us now study how could computerization help in efficient delivery of NSS

9.4.5 Computerization for Monitoring and Surveillance

The success of any surveillance programme depends on the regularity of submission of the reports, assessment of their completeness and correctness and reviewing the reports for further action. Manual compilation and consolidation of the data from different AWCs/Sectors/Projects on a continuous basis is often time consuming, and is liable to errors. Hence, a simple, user-friendly, computer software can be developed to enable the concerned personnel at each project level to enter the surveillance data on Personal Computers (PC) and obtain the necessary reports for assessing the actual status and initiating appropriate action at every level. If the existing NICNET services are utilized, the surveillance reports can be made available for decision making to all the developmental agencies and the office of the District Collector. The district authorities can also utilize the information for preparation of action plan for nutrition, and for targeting and reviewing the developmental programmes. The software programme will also help in the performance appraisal and remedial administrative measures. It also helps to present the data in a graphic form for easy comprehension. A feedback mechanism would motivate the ICDS functionaries at different levels and facilitate initiation

of appropriate action without any time delay, There is another important thing you have to remember is that the quality of the data collected by different workers should be ensured. Therefore, all the workers involved should be adequately trained in filling and interpretation of the MPRs and health- related information. While all the fresh recruitees could be trained at the induction level, those already in service should receive appropriate training. Training modules may be necessary to ensure uniformity.

You will be happy to note that the National Nutrition Policy of the Government of India and the National Plan of Action on Nutrition recommended establishment of National Nutrition Surveillance System. The Tenth Five Year Plan also recommended an integrated nutrition monitoring and surveillance programme through the existing resources and the agencies.

Thus, in this unit we learnt about various aspects of nutrition monitoring and nutrition surveillance. In the next unit, we will study about Nutrition Policy and Programmes implemented our government to eliminate malnutrition from the country.

Check Your Progress Exercise 2

1. What is Nutrition Surveillance?

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2. Name two main infrastructure/systems in India that could provide a useful delivery mechanism for NSS.

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3. Mention key indicators that could be critical for successful nutrition surveillance programme.

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9.5 LET US SUM UP

We learnt in this unit that Nutrition monitoring is a tool to keep a watch on the nutritional status of communities to assess the changes in nutritional status of communities over a period of time. There are several organizations/programmes which collect systematic information on nutrition, health and demography in our country. Most notable among these are National Nutrition Monitoring Bureau, National Sample Survey Organization and National Family Health Survey. This unit discusses in detail about these three organizations and their activities related to nutrition monitoring. Nutrition surveillance is a continuous and systematic

process of collection, analysis, interpretation of information to assess nutritional status and initiate appropriate early action to promote optimal nutrition. Nutrition monitoring is an integral part of nutrition surveillance.

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9.6 GLOSSARY

Encephalitis	: general term used to describe a diffuse inflammation of the brain and spinal cord, usually of viral origin, often transmitted by mosquitoes.
Process variable	: variables which measure certain activities or processes in a programme.
Supplementary feeding	: supplementary feeding means extra food which makes up for a deficiency in the normally consumed diets of individuals.

9.7 CHECK YOUR PROGRESS

- 1). What is Nutrition Monitoring ?
- 2). What are the Objectives of Nutrition Monitoring ?
- 3). What are the Components of Nutrition Monitoring?
- 4). What is Unique features of NNMB?
- 5). What are the uses of Nutrition Surveillance System?

10

NUTRITION POLICY AND PROGRAMMES

NOTES

STRUCTURE

- 10.1 Learning Objective
- 10.2 Introduction
- 10.3 National Nutrition Policy (NNP)
- 10.4 Nutrition Programmes
- 10.5 Integrated Child Development Services (ICDS) Programme
- 10.6 Nutrient Deficiency Control Programmes
- 10.7 Supplementary Feeding Programmes
- 10.8 Food Security Programmes
- 10.9 Self Employment and Wage Employment Schemes
- 10.10 Let Us Sum Up
- 10.11 Glossary
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10.1 LEARNING OBJECTIVE

After studying this unit you will be able to:

- describe the national nutrition policy,
- enlist the various nutrition intervention programmes launched by the Government, and
- discuss the major features of the nutrition intervention programmes.

10.2 INTRODUCTION

In Units 7 and 8, we learnt about the various methods of assessment of nutritional status. Unit 9 focused on the concept of monitoring and surveillance of nutritional status. In this unit, we are going to study about the intervention programmes and the policy of the Government of India (GOI), which is designed to ensure good nutritional status of the population.

Widespread poverty resulting in chronic and persistent hunger is the single biggest affliction of the developing world today. In India about 50 percent of the people live below the poverty line and even after spending 80 percent of their income on food,

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they cannot have a balanced diet. The physical expression of this continuously re-enacted tragedy is the condition of under nutrition. In the face of continuing poverty and malnutrition, a strategy of development, comprising a frontal attack on poverty, unemployment and malnutrition, became a national priority. Various intervention programmes have been launched by the government, to improve the provision of basic services to the poor and to devise a security system, through which the most vulnerable section, viz. women and children, could be protected. These programmes are discussed in this unit.

In 1993, the GOI adopted the National Nutrition Policy (NNP), in recognition of the magnitude of under nutrition in the country. The salient feature of the NNP is the other major focus in this unit.

10.3 NATIONAL NUTRITION POLICY (NNP)

The National Nutrition Policy, formulated by the Department of Women and Child Development, Government of India (GOI) was approved by the Cabinet in April 1993 and tabled in both houses of the parliament in August 1993. The policy advocates a "comprehensive, integrated and inter-sectoral strategy for alleviating the multifaceted problem of malnutrition and achieving the optimal state of nutrition for the people". The National Plan of Action on Nutrition (NPAN) was released in 1995 to implement the National Nutrition Policy, which included strategies specifically to address the prevention and control of micronutrient deficiencies

Let us now review the important aspects of the NNP. These include: a) Aims of NNP b) Nutrition Policy Instruments, and c) Policy implementation. We shall begin with the aims of NNP.

10.3.1 Aims of the National Nutrition Policy

The NNP is based on the conviction that reduction in malnutrition and improvement in nutritional status of the people will contribute significantly to development of human resources and the overall economic and social goals of the country. The main aims of the NNP are:

- to draw attention to the urgent need to reduce malnutrition in the country,
- to highlight the need for inter-sectoral coordination to achieve nutritional goals,
- to orient relevant sectors to perceive nutrition as an outcome of their sectoral activities, and
- to identify short term, intermediate and long-term strategies for achieving

nutritional goals either through direct policy changes or indirect institutional or structural changes. Next, let us get to know what nutrition policy instruments have been advocated for achieving these above listed aims.

10.3.2 Nutrition Policy Instruments

Realizing the fact that nutrition is a multi-sectoral issue and needs to be tackled at various levels, the nutrition policy instruments focused on tackling the problem of nutrition both through nutrition interventions, for especially vulnerable groups, as well as, through various development policy instruments that will create conditions for improved nutrition. A direct intervention (short term strategy) and an indirect policy instrument through long term institutional and structural changes were advocated.

Let us then look at the nutrition policy instruments highlighting short and long-term measures.

A. Direct Short Term Intervention

The short-term measures focus on the following strategies:

1. Nutrition intervention for specially vulnerable groups by a) expanding the nutrition intervention net through Integrated Child Development Services (ICDS) so as to cover all vulnerable children in the age group 0-6 years b) Improving growth monitoring between the age group 0-3 years in particular, with closer involvement of the mothers, in a key intervention c) Reaching the adolescent girls through the ICDS so that they are made ready for a safe motherhood, their nutritional status is improved and they are given some skill up-gradation training in home-based skills and covered by non-formal education, particularly nutrition and health education, and d) Ensuring better coverage of expectant mothers, such coverage to include supplementary nutrition starting from first trimester of pregnancy to the first year after pregnancy
2. Fortification of essential foods, for example, salt with iodine and/or iron
3. Production and popularization of low cost nutritious foods from indigenous and locally available raw material, by involving women in this activity,
4. Control of micronutrient deficiencies among vulnerable groups - deficiencies of vitamin A, iron, folic acid and iodine among children, pregnant women and nursing mothers.

Next, let us look at the indirect policy instruments.

B. Indirect Policy Instruments

The long term strategies for achieving the national goals through indirect institutional or structural changes includes:

- i) Ensuring food security, a per capita availability of 215kg/person/year of food grams.
- ii) Improvement in the dietary patterns by promoting the production and increasing the per capita availability of nutritionally rich foods.
- iii) Policies for effective income transfers so as to improve the entitlement package of the rural and urban poor by re-orienting and restructuring the poverty alleviation programmes (like Integrated Rural Development Programme) and

employment generation schemes (like Jawahar Rozgar Yogna etc) to make a forceful dent on the purchasing power of the lowest economic segments of the population and by ensuring an equitable food distribution, through the expansion of the public distribution system (PDS).

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- iv) Implementing land reforms.
- v) Health and Family Welfare.
- vi) Basic nutrition and health knowledge, with special focus on wholesome infant feeding practices.
- vii) Prevention of food adulteration, by strengthening/gearing up the enforcement machinery.
- viii) Nutrition surveillance.
- ix) Monitoring of nutrition programmes.
- x) Communication through established media for effective implementation of the nutrition policy.
- xi) Ensuring an effective, minimum wage administration.
- xii) Community participation, by involving the community through their panchayats / beneficiary committees or through actual participation, particularly of women, by promoting schemes relating to kitchen gardens, food preservation etc. and generation of effective demand at the level of the community for all services relating to nutrition.
- xiii) Education and literacy, and
- xiv) Improvement of the status of women.

The policy states that the measures enumerated above are to be administered through inter-sectoral coordination and activities. Next, we will look at how the National Nutrition Policy is being implemented.

10.3.3 National Policy Implementation

The nodal responsibility at the central level for policy implementation rests with the Ministry of Human Resource Development under the chairmanship of Secretary, Department of Women and Child Development. Sectoral Ministries/ Departments concerned like Agriculture, Food, Civil Supplies, Health and Family Welfare, Rural Development, Education and Environment, whose role is crucial for sustainable improvement in nutritional status of the population, are represented on the Inter- Ministerial Coordination Committee. A National Nutrition Council is constituted in the Planning Commission with the Prime Minister as its President and concerned Union Ministers, a few State Ministers by rotation, and experts, representatives of non- governmental organizations and grass root leaders (especially women) as its members. Further, the effective implementation of the NNP is dependent to a large extent on the State Governments/Union Territory Administrations and the constitution of State Nutrition Councils.

From the discussion above it must be evident that we have a very comprehensive national nutrition policy in place, which addresses malnutrition through multi-sectoral approach. In the next section, we will discuss the nutrition intervention

programmes designed and implemented by government of India. But first let us recapitulate what we have learnt so far.

Check Your Progress Exercise 1

1. List the main aims of National Nutrition Policy.

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2. List any two direct short-term interventions and two indirect policy instruments of National Nutrition Policy.

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.....

3. NNP is implemented through a multi-sectoral approach. Elaborate.

.....
.....

Now that we are aware about the Nutrition Policy, let us get to know about the nutrition programmes being run by the government to combat malnutrition.

10.4 NUTRITION PROGRAMMES

The National Nutrition Policy, about which we have studied above, was formulated only in 1993. However, prior to that, since the last four decades, Government has launched a variety of nutrition intervention programmes to combat malnutrition. One of the first nutrition programmes launched by the government was the Applied Nutrition Programme (ANP), way back in 1963. Thereafter, numerous programmes have been launched. Some of these programmes are in operation and some are not. Some new programmes focusing on ensuring food security for all and employment-based programmes have also been initiated by the government. We will now study about all these programmes. We will divide these programmes into the following sections. Integrated Child Development Services Programme (ICDS), which remains one of the world's most unique community based, outreach programme for early childhood care and development.

Nutrient Deficiency Control Programmes, namely National Prophylaxis Programme for Prevention of Blindness due to Vitamin A deficiency, National Anaemia Control Programme, National Iodine Deficiency Disorder (IDD) Control Programme. Food Supplementation Programmes, like the Special Nutrition Programme (SNP), Balwadi Feeding Programme, Composite Nutrition Programme and Applied Nutrition Programmes.

Food Security Programmes, namely Public Distribution System (PDS), Antodaya Anna Yojna, Annapurna Scheme, National Food for Work Programme, and Self Employment and Wage Employment Schemes, namely Sampoorna Gramin Rojgar Yojana, Swarna Jayanti Gram Swarozgar Yojana We shall begin our exhaustive study of these programmes with a discussion on the ICDS programme.

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10.5 INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) PROGRAMME

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The Integrated Child Development Services is the world's most unique welfare programme, which holistically addresses health, nutrition and development needs of young children, adolescent girls and pregnant/nursing mothers across the life cycle. Launched by the Government of India in 1975-76, in 33 blocks, today, it has expanded to 4348 community development blocks (to target 5652 blocks upon expansion), reaching out to 26.85 million young children, 5.07 lakh adolescent girls and 5.3 million pregnant/nursing mothers, through a network of over 5 lakh Anganwadi Centres and more than 1 lakh mahila mandals.

ICDS contributes not only to the achievement of women and child goals related to health, nutrition and early child development, but also to other primary health care goals and the goals of universal elementary education, as enunciated in the National Plan of Action for Children 1992. Integration of services and consideration of the mother and child as one 'biological unit' are the unique features of this programme. We will look at the 1) objectives, 2) target groups, 3) programme components and, 4) implementation of ICDS. Let us begin with the objectives.

1) Objectives of the ICDS

The ICDS scheme aims at the holistic development of children in the age group of 0-6 years, nursing and pregnant mothers belonging to the most deprived sections of the society. The specific objectives of the ICDS are to

- improve the nutritional and health status of children in the age group of 0-6 years and adolescents,
- lay the foundation for proper psychological, physical and social development of the child,
- reduce the incidence of mortality, morbidity, malnutrition and school drop-out,
- achieve effective coordination of policy and implementation amongst the various departments to promote child development, and
- enhance the capability of the mother to look after the health and nutritional needs of the child through proper nutrition and health education,

Let us look at type of population who receives the benefits of the programme. i.e. the target groups.

2) Target Groups

The main beneficiaries of the ICDS programme are

Infants

- Children 1-6 years of age
- Pregnant and Lactating women

- Adolescent Girls, and
- All women up to 45 years of age.

We will now review the services provided or the components of the ICDS.

3) Programme Components

ICDS programme is a package of several services. The services offered by the programme include:

- Supplementary nutrition
- Immunization
- Periodic health check-ups, treatment of minor ailments and referral services
- Growth monitoring
- Non-formal preschool education
- Health and nutrition education
- Adolescent girls scheme
- Safe drinking water

Let us look at each of these services in detail now. Figure 10.1 highlights the target group and programme component of ICDS.

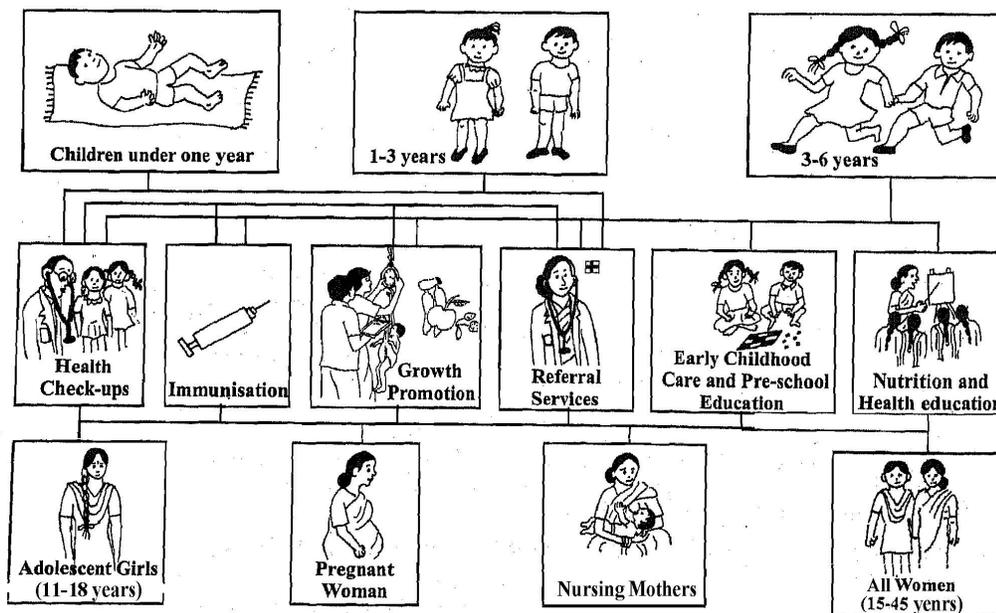


Figure 10.1 : ICDS : target groups and components

- **Supplementary Nutrition:** The ICDS Scheme has been recognized as the Nutrition Policy and strongest and most viable vehicle for improving nutritional status. In Unit 12, we Programmes will look at the supplementary feeding component of ICDS. We will briefly describe it here. As discussed earlier, the problem of under nutrition has been mainly addressed through the services like supplementary feeding within the ICDS. The beneficiaries for supplementary nutrition are children below 6 years, pregnant and lactating women. As per

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existing guideline, the feeding is supplemental to meet calorie protein gap of 300 Kcal, 8-10 g of proteins for Grade I and Grade II malnourished children and double the amount for Grade III and Grade IV children. In some ICDS projects 'take home ration strategy' (THRS) is already functioning. Food for 1-4 weeks is distributed at a time to mothers for feeding at home. As per existing norms, the cost involved in supplementary nutrition component of children is indicated at Rs. 1 per day per beneficiary

A new initiative in the form of Pradhan Mantri Gramodaya Yojana (PMGY) has been introduced during financial year 2000-2001. The PMGY envisages allocation for Additional Central Assistance to States/UTs for selected Basic Minimum Services including nutrition. The nutrition component of PMGY has been specifically outlined with the objective of eradicating malnutrition amongst under-three years children by increased nutritional coverage of supplementary feeding of these children through the ICDS scheme.

For pregnant and nursing mothers, the feeding is supplemental to meet calorie/protein gap of 500 Kcal, 20-25 g proteins. A meal similar to that received by pregnant and lactating mother is being provided to adolescent girls providing 500 Kcal and 20-25g proteins on all six working days of the week. A variety of foods are used in the feeding programmes. A few examples include; fruit bread/muruku/sev/biscuits etc.

- Immunization: Immunization plays a crucial role in preventing serious childhood diseases. All infants and children are covered by the ICDS and immunized against infectious diseases such as diphtheria, whooping cough, tetanus, poliomyelitis, tuberculosis etc. Measles vaccinations are also provided. All pregnant women are immunized against tetanus.
- Health check-up and referral services: As a vital input to provide the essential services of health check-up and referral services, each anganwadi center is provided every year with a medicine kit consisting of easy to use and dispensable medicines to remedy common ailments like cough and common cold, skin infections etc. If the ailment requires specialized treatment the case is referred to the nearest health system. Children, adolescent, nursing/pregnant women are examined and treated at regular intervals by the local health personnel, such as the Lady Health Visitor (LHV) and Auxiliary Nurse Midwife (ANM). They provide a link between the village and the Primary Health Centre and sub-centres.

Growth Monitoring: In the context of the ICDS, growth monitoring is a tool for preventing malnutrition and for early detection of growth faltering. Weight is easy to measure and interpret hence it is used in the Anganwadi+ a measure to watch the progress of the child's health/nutritional status. Proper record is maintained in the Anganwadi in the growth chart known as Weight-for-age charts. The chart consists of a card presenting in graphic form the weight-for-age curves drawn across. Each curve denotes a particular level of nutrition/growth status. A sample growth chart you may recall has already been appended in Unit 7 on page 153. The growth charts once plotted are useful to Anganwadi worker/mothers to quickly identify signs of malnutrition and take prompt action. Using the Chan, the mothers could

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be educated regarding: i) the child's weight, ii) dietary requirements, iii) right kind of food preparations demonstration of cooking and feeding to meet the special needs of the children, and iv) quantity and frequency of feeding.

A new initiative has been taken for growth monitoring of all children less than three years along with other children.

Early Childhood and Preschool Education: The preschool education component under the ICDS is a crucial component of the package of services envisaged under the scheme. It aims at psycho-social, cognitive, conative and affective development of child in a cogent and holistic manner. It also aims at school readiness and development of positive attitudes towards education. The preschool activities at the Anganwadi center, enables the elder siblings to attend school. The preschool education in Anganwadi center is provided through non-formal and play-way method.

Recognizing the two-fold significance of early childhood education, the Government has decided to improve the quality of preschool education in Anganwadi centers through a new initiative of regular provision of preschool kit in Anganwadi center. The items in the kit are multiple in terms of possible play activities and concepts, durable, safe for children (non-toxic and without sharp edges), manipulative, culturally and environmentally relevant, cost-effective, easy to maintain and store and conducive to creativity and problem-solving.

- **Adolescent Girls Scheme:** For the first time in India, a special intervention has been devised for adolescent girls using the ICDS infrastructure. The Adolescent Girls (AG) Scheme under ICDS primarily aims at breaking the inter-generational life cycle of nutritional and gender disadvantage and providing a supportive environment for self-development. The AG Scheme in its present form is being implemented through the Anganwadi Centers in both rural and urban settings in 507 ICDS blocks throughout the country.

Under the scheme, the adolescent girls who are unmarried and belong to families below the poverty line and school drop-outs are selected and attached to the local Anganwadi Center for six monthly stints of learning and training activities. The scheme includes two sub-schemes viz. Scheme - I - Girl to Girl Approach, designed for girls in the age group 11-15 years. Under the scheme supplementary nutrition is provided and in-service training on how to manage the Anganwadi center is imparted to the girls. The second scheme (Scheme-11) - Balika Mandal, intended to reach girls in the age group 15-18 years, aims at involving and motivating adolescent girls to participate in non-formal education, developing literacy skills and up-gradation of home-based skills in popular crafts of the area/region. Educational programme will stress personal hygiene, environmental sanitation, nutrition and child care.

The AG Scheme has been revised and renamed as Kishori Shakti Yojana (KSY) with a training component particularly on the vocational aspects aimed at empowerment and enhanced self-perception and convergence with other programmes of similar nature in the education, rural development, employment and health sectors. The objective of the Kishori Shakti Yojana are:

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- to improve the nutritional and health status of girls in the age group of 11 -18 years,
- to provide the required literacy and numeracy skills through the non-formal stream of education, to stimulate a desire for more social exposure and knowledge and to help them improve their decision making capabilities,
- to train and equip the adolescent girls to improve/upgrade home-based and vocational
- to promote awareness of health, hygiene, nutrition and family welfare, home management and child care,
- to gain a better understanding of their environment related social issues and impact on their lives, and
- to encourage adolescent girls to initiate various activities to be productive and useful members of the society.

To achieve the objectives of the KSY, a basket of programme options are made available. Under one option, a concerted effort is to be made to provide nutrition and health education including sanitation and personal hygiene aspects. IFA supplementation along with de-worming interventions may be provided. Another option is to emphasize m education with particular attention on school dropouts and functional literacy among illiterate adolescent girls. Alternatively, vocational training activities may be undertaken for adolescent girls for their economic empowerment.

We will next study how the ICDS is implemented at central, state and grassroots levels.

4) Programme implementation

The ICDS programme is implemented, at the central level, by the Department of Women and Child Development, Ministry of human Resource Development in coordination with the Ministry of Health. At the State level, implementation is the responsibility of either the Department of Social Welfare/Women and Child Development/ Health or a separate Directorate of ICDS.

The programme infrastructure along with the designation of the programme functionaries at the Block to Village/Community levels is presented in Figure 10.2. The Anganwadi center — a courtyard play center — is the symbol of Government systems and services, closest to disadvantaged communities, at village hamlet level. It is the focal point for converging various government programmes for young children, girls and women from disadvantaged communities.

The Anganwadi Worker assumes a pivotal role in the ICDS structure due to her close and continuous contact with the community. As the crucial link between the community and the government administration, she becomes a central figure in asserting and meeting the needs of the community she lives in.

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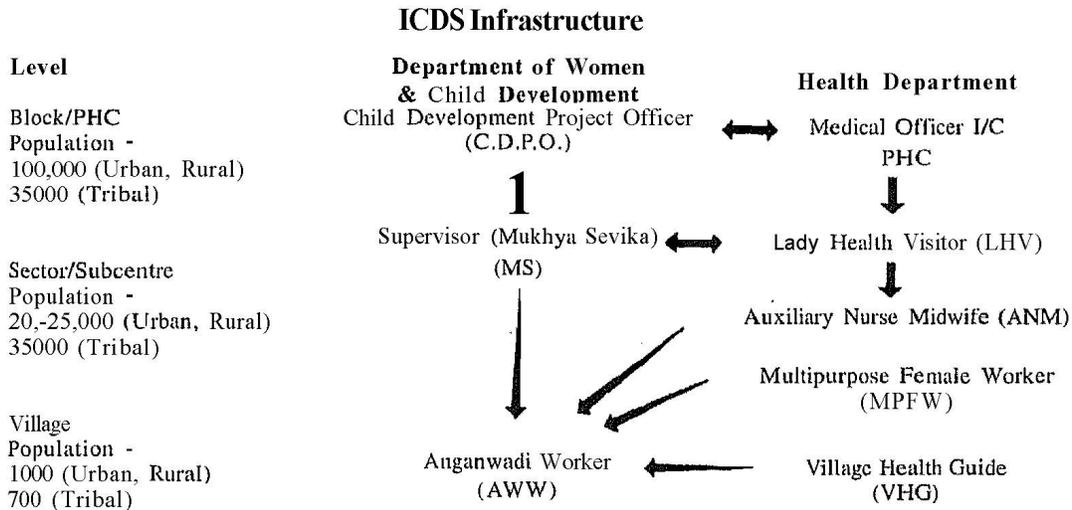


Figure 10.2: ICDS infrastructure

Thus, we saw that ICDS is a unique and largest programme in the world providing integrated services which holistically address the health, nutrition and development needs of young children, adolescent girls and pregnant/nursing mothers. In the next section, we would discuss the nutrient deficiency control programmes of the government of India. But first let us answer the questions given in check your progress exercise 2 to assess our learning of this section.

Check Your Progress Exercise 2

1. List the various nutrition programmes launched by our government to combat malnutrition.

2. Enumerate the goals/objectives of ICDS .

3. Write the programme components of the ICDS.

10.6 NUTRIENT DEFICIENCY CONTROL PROGRAMMES

The Government of India has implemented various prophylaxis (preventive) programmes to combat malnutrition, Under these schemes, commercially prepared vitamins and minerals are supplied to vulnerable sections of the population through organized programmes. These programmes are known as Nutrient Deficiency Control Programmes.

The three important ongoing nutrient deficiency control programmes are

- 1) National Prophylaxis Programme for Prevention of Blindness due to Vitamin A deficiency
- 2) National Anaemia Control Programme, and
- 3) National Iodine Deficiency Disorder Control Programme (NIDDCP)

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We will now discuss the important aspects of these programmes such as objectives, target group, programme strategy and implementation. Let us begin with the National Prophylaxis Programme for Prevention of Blindness due to Vitamin A deficiency

10.6.1 National Prophylaxis Programme for Prevention of Blindness due to Vitamin A Deficiency

We have read in Unit 3 that Vitamin A deficiency has been recognized to be a major controllable public health nutritional problem. In India, milder forms of vitamin A deficiency affecting conjunctiva, like bitot spots are observed in about 1-5% preschool children. According to WHO, prevalence of bitot spot in preschool children is indicative of public health significance. Longitudinal community studies reveal that in some parts of the country, the incidence of corneal xerophthalmia is about 0.5 to 1 per 1000 preschool children. It is estimated that about 30 - 40,000 children in the country are at risk of developing nutritional blindness every year. In recent years, however, there appears to be a significant change in the profile of vitamin A deficiency, The repeat survey of the National Nutrition Monitoring Bureau (NNMB) in 10 States in preschool children indicated a decline from about 2% in 1975-79 to about 0.7% in 1988-95. It is, however, important to understand that even mild vitamin A deficiency probably increases morbidity and mortality in children, emphasizing the public health importance of this disorder. Hence, the need for the National Prophylaxis Programme for the prevention of Nutritional Blindness due to vitamin A deficiency. Let us look at the objective of the programme.

Objective

The National Prophylaxis Programme for the Prevention of Nutritional Blindness due to vitamin A deficiency aims at protecting children 6 months to 5 years at risk from vitamin A deficiency. Let us look at the target group of the programme

Target Group

All children, of 6 months to 5 years, particularly those living in rural, tribal and urban slum areas, are beneficiaries of the programme. Next, let us review the programme strategy.

Programme Strategy

The programme focuses on two strategies a) prevention of Vitamin A deficiency, and

b) treatment of Vitamin A deficiency. Let us study each strategy in detail

a) Prevention of Vitamin A Deficiency

The prevention strategy within the programme comprises a long-term and a short-

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term intervention. While the short-term intervention focuses on administration of mega dose of vitamin A on periodic basis, dietary improvement is the long-term ultimate solution to the problem of vitamin A deficiency. We will study the long-term intervention first i.e. promotion of consumption of vitamin A rich foods

i) Long term intervention-Promoting consumption of vitamin A rich foods:

Action points under this intervention include that:

- Regular dietary intake of vitamin A rich foods by pregnant and lactating mothers and by children under 5 years of age must be promoted.
- The mothers attending antenatal clinics and immunization sessions, as well as, mothers and children enrolled in the ICDS Programme must be made aware of the importance of preventing vitamin A deficiency
- Breastfeeding including feeding of colostrums must be encouraged.
- Feeding of locally available β -carotene (precursor of vitamin A) rich food such as green leafy vegetables and yellow and orange vegetables and fruits like pumpkin, carrots, papaya, mango, oranges etc. along with cereals and pulses to a weaning child must be promoted widely. In addition, whenever, economically feasible, consumption of milk, cheese, paneer, yoghurt, ghee, eggs, liver etc. must be promoted.

For increasing availability of vitamin A rich food, growing of vitamin A rich foods in home gardens and consumption of these must be promoted.

We will now study the short term intervention i.e. administration of massive dose of vitamin A.

ii) Short term intervention-administering massive dose of vitamin A: Administration of massive dose of vitamin A to preschool children at periodic intervals is a simple, effective and most direct intervention strategy. This is a short-term strategy. Unlike most other micronutrients, vitamin A is stored in the body for prolonged periods and hence periodic administration of massive dose ensures adequate vitamin A nutrition

- Under the massive dose programme, every infant 6-11 months and children 1-5 years is to be administered vitamin A every 6 months. Priority is to be given for coverage of children 6 months to 3 years since the highest prevalence of clinical signs of vitamin A deficiency is reported in this age group. The recommended schedule is as follows:

6 — 11 months one dose of 100000 IU

1 — 5 years 200 000 IU/6months

A child must receive a total of 9 oral doses of vitamin A by the fifth birthday. The contact with an infant during administration of measles vaccine between the age of 9-12 months is considered a practical time for administering the vitamin A supplement.

A camp approach may be used for administering vitamin A to children 1-3 years and 3-5 years. However, the DPT/OPV booster in mid-second year to a child is a suitable time for the second dose of vitamin A (200000 TU) The 9th and 10th plan recommends the administration of vitamin A drops to children, 9 months-36

months of age, through RCH/ICDS system.

We will now study the second strategy i.e. treatment of vitamin A deficiency

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b) Treatment Vitamin A deficiency

All children with clinical signs of vitamin A deficiency must be treated as early as possible. Treatment schedule includes:

- Single oral dose of 200 000 IU of vitamin A immediately at diagnosis
- Follow up dose of 200000 IU 1-4 weeks later.

Infants and young children suffering from diarrhoea, measles or acute respiratory infections must be monitored closely and encouraged to consume vitamin A rich food. In case, early signs of vitamin A deficiency are observed, the above treatment schedule must be followed. We will now study the implementation strategy of the vitamin A programme.

Implementation Strategy

The national prophylaxis programme for the prevention of nutritional blindness due to vitamin A deficiency is implemented through the Primary Health Centers and its sub-centers. The multi-purpose worker (F) and other paramedicals working in the Primary Health Centers are responsible for administering vitamin A concentrates to children under 5 years and for imparting nutrition education. The services of ICDS, under the Department of Women and Child Development, Ministry of Welfare, is utilized for the distribution of vitamin A to children in the ICDS Blocks and for the education of mothers on prevention of vitamin A deficiency.

The Mother-Infant Immunization Card is used to record and monitor the administration of vitamin A dose to children under two years. The Growth Monitoring Card/Register used for monitoring the growth of children under the ICDS programme, is used for recording and monitoring administration of vitamin A solution till the age of five years. We will now study the second nutrient deficiency control programme. i.e. National Nutritional Anaemia Control Programme.

10.6.2 National Nutritional Anaemia Control Programme

We have read in Unit 3 in nutritional problems that nutritional anaemia is a serious public health problem. Although anaemia is widespread in the country, it especially affects women in the reproductive age group and young children. It is estimated that over 50 percent of pregnant women are anaemic. Nutritional anaemia, due to iron and folic acid deficiency, is directly or indirectly responsible for about 20 percent of maternal deaths. Recently the NFHS-2 (1998-99) data (NFHS 2000) reveal that 74% children, 6-35 months of age, are anaemic. Anaemia is a major contributor cause of high incidence of premature births, low birth weight and perinatal mortality. To reduce the prevalence of anaemia in pregnancy the national anaemia prophylaxis programme of iron and folic acid distribution to pregnant mothers was initiated by Government of India in 1972. Let us look at the

objectives of the programme.

Objectives

The National Nutritional Anaemia Control Programme aims at significantly decreasing the prevalence and incidence of anaemia in women in reproductive age group, especially pregnant and lactating women, and preschool children. Let us look at the target group of the programme.

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Target Group

The beneficiaries of the programme include

- Women in the reproductive age group, particularly pregnant and lactating mothers.
- Children 1-5 years of age.
- Family planning acceptors (women who accept family planning measures like intrauterine devices (IUD) and tubectomy).

We will now look at the programme strategies.

Programme Strategy

The programme focuses on primarily three strategies: a) Promotion of regular consumption of foods rich in iron b) Promotion of consumption of iron and folic acid supplements to the 'high risk' groups, and c) Identification and treatment of severely anaemic cases. We will study each strategy briefly now. Let us start with the first strategy i.e. promotion of regular consumption of foods rich in iron

a) Promotion of regular consumption of foods rich in iron

Various action points under this strategy include:

- Regular dietary intake of iron and folic acid rich foods by pregnant and lactating women, adolescent girls and children under 5 years of age must be promoted.

Regular consumption of iron rich foods such as green leafy vegetables (such as mustard leaves (sarso ka sag), amaranth (chaulai sag), colocasia (arbi) leaves, knoll khol greens (Ganth Gobi ka sag), bengal gram greens (Chana sag), turnip greens (shalgam ka sag), cereals (such as wheat, ragi, jowar, bajra), pulses, especially sprouted pulses and jaggery (gur) must be promoted widely. In addition, wherever culturally and economically feasible, consumption of animal foods such as meat, liver, poultry etc must be encouraged.

- Ensure incorporation of iron rich foods such as green leafy vegetables in the weaning foods of infants.
- Vitamin C (ascorbic acid) promotes absorption of iron. Regular consumption of vitamin C rich foods such as lemon, orange, guava, amla, green mango along with iron rich foods must be promoted.
- For increasing availability of iron rich foods, growing of iron rich foods in home gardens and consumption of these must be promoted.

- Tea inhibits absorption of iron. Advice a reduce consumption of tea, specially during pregnancy, for improving the absorption of iron and prevention of anaemia.

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Let us discuss the second strategy now.

b) Promoting consumption of iron and folic acid supplements to the 'high risk' groups As a priority, all pregnant women, irrespective of haemoglobin levels, must be provided with the recommended dose of iron and folic acid (folifer) supplements. Preschool children, especially those in tribal areas and ICDS blocks, should be given on priority the recommended dosage of iron and folic acid supplements. The recommended doses of folic acid and iron supplements are:

i) Pregnant women : One big (adult) tablet per day for 100 days (each tablet containing 60 mg/ 100 mg of elemental iron and 500 µg folic acid). These tablets provided to women after the first trimester of pregnancy

Preschool: Children (1-5 years): One paediatric (small) tablet containing 20 mg iron and 100 µg folic acid daily for 100 days every year.

iii) Lactating women and Intrauterine device (IUD) acceptors: One big (adult) tablet (containing 60 mg/ 100 mg of elemental iron and 500 µg folic acid) per day for 700 days.

Let us go over to the third strategy.

c) Identification and treatment of severely anaemic cases

Women with haemoglobin levels below 7 g/dl are considered to be severely anaemic. Testing of blood for haemoglobin concentration at field level is neither considered safe or practical. Therefore, as far as possible, severely anaemic cases should be identified on the basis of clinical signs. All health workers should be trained to identify such anaemic cases. Further, cases of severe anaemia should be refered to the PHC medical officer for diagnosis of the causative factors and treatment. Recommended therapeutic dose, for women in the reproductive age group is one big tablet of iron thrice daily for a minimum of 100 days. This will provide equivalent to 180 mg elemental iron and 1500 µg folic acid per day. In case of 100 mg elemental folifer tablet, recommended dose is two (big) tablet of iron daily for a minimum of 100 days. We will now study how the programme is implemented in the field

Programme Implementation

The programme is implemented through the Primary Health Centres and its sub- centres under the RCH programme. The Multipurpose Worker (F) and other paramedicals working in the Primary Health Centres are responsible for the distribution of iron tablets (adult and paediatric doses) to the beneficiaries. The functionaries of ICDS programme assist in the distribution of iron tablets to children and mothers in the ICDS Blocks and for imparting education to mothers on prevention of nutritional anaemia. Department of Food (Ministry of Food and Civil Supplies) is responsible for promoting consumption of iron rich

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foods. In addition, services of other community level workers and involvement of formal and non-formal education, media, horticulture departments and voluntary organizations is utilized for the effective implementation of the programme. In addition, records of under fives and antenatal care maintained under the MCH services and ICDS programme, is used for identifying beneficiaries, as well as, for recording and monitoring the distribution of iron and folic acid supplements. We will now study the third nutrient deficiency programme i.e. National Iodine Deficiency Disorders Control Programme (NIDDCP)

10.6.3 National Iodine Deficiency Disorders Control Programme (NIDDCP)

We have read in Unit 3 that Iodine Deficiency Disorders (IDD) form a spectrum of abnormalities which include goitre, mental retardation, deaf mutism, squint, difficulties in standing or walking normally and stunting of the limbs. Iodine deficient women frequently suffer abortions and still births. Their children may be born deformed, mentally deficient or even cretins. All these problems are caused by simple lack of iodine, and goitre is the least tragic of them. No State in India is free from IDD. In India, out of the 239 districts surveyed (in 29 states and union territories), 197 districts have goitre prevalence rates ranging from 10% to 65%. Women in child-bearing age and children under the age of 15 years are most susceptible to IDD. With every passing hour, 10 children are being born in India who will not attain their optimum physical and mental potential due to iodine deficiency. In 1962, the Government of India launched the National Goitre Control Programme (NGCP), which aimed at controlling goitre by supplying and ensuring consumption of iodized salt to the population living in the endemic region. The Government re-structured the NGCP in 1986, and aimed at achieving the goal for universal iodization of salt to control IDD in India by 1992. The National Goitre Control Programme, referred to as the National Iodine Deficiency Disorders Control Programme (NIDDCP) since April 1992, is being implemented by the Department of Health. The NIDDCP aims at universalizing iodization of all edible salt. Let us now look at the objectives of the NIDDCP.

Objectives

The objectives of the NIDDCP include:

- Supply of iodized salt in place of common salt to the entire country, The emphasis is on establishing iodized salt with active private sector participation.
- Re-survey to assess the impact of supply of iodized salt.

By September 1993, about 65 percent of the total population in the country had been covered in the Government of India's drive to universalize iodized salt. At the macro level, the salt producing areas of India are located in the States of Gujarat, Tamil Nadu, Rajasthan, Andhra Pradesh, Maharashtra, Orissa, Karnataka and West Bengal. Overall, the private sector handles 94% of salt iodization with the public sector handling a miniscule 6%. Under the Prevention of Food Adulteration Act (PFA Act), the level of iodization has been fixed at 30 ppm of iodine in salt at

the manufacturing level and 15 ppm at the household level. To ensure exclusive use of iodized salt in endemic areas, the sale of non iodized salt is being discouraged nationally. Let us look at the target population for NIDDCP.

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Target Group

Entire population, particularly women in child bearing age and young children.
NOW let us look at the implementation strategy.

Implementation strategy

The NIDDCP is executed by a multiplicity of agencies comprising the health, industry and railway ministries of the Central Government. The Ministry of Health and Family Welfare and Directorate General of Health Services (DGHS) is responsible for the national implementation of the programme. The Salt Department, under the Ministry of Industry, is the nodal agency for production, distribution, monitoring and quality control of iodized salt. The Salt Commissioner, in consultation with the Ministry of Railways, arranges for the movement of iodized salt from the production center to the States. The State Government is responsible for the distribution of the iodized salt within the state either through the Public Distribution System or through the open market. For effective implementation of the NIDDCP, a central IDD Cell is established at the DGHS level and is responsible for coordinating surveys, training, monitoring and management of the IDD programme. All the states/UTs have been advised to set up IDD Control Cell. Thus you saw that government has very well conceptualized and formulated programmes to combat micronutrient deficiency in our country. 'We will now study about the supplementary feeding programmes of the government. But first, let us check our learning by answering the questions included in the check your progress exercise 3 given next.

Check Your Progress Exercise 3

1. List the various nutrient deficiency control programmes? Enumerate the objectives of any one of the programmes.
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2. Explain the dietary actions you would take to promote foods rich in vitamin A.
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3. Mention the dosage of iron and folate for pregnant and preschool children and also the dose of vitamin A for infants and pre-schoolers.
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10.7 SUPPLEMENTARY FEEDING PROGRAMMES

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Food supplementation programmes have a very important role to play to combat malnutrition. The aim of these supplementary feeding programmes is to improve the nutritional status of vulnerable groups through distribution of food supplements. Different types of supplementary feeding programmes have evolved over the years as short-term measures to combat malnutrition. Some of these are ongoing and some are no longer in operation now. We will study about the following supplementary feeding programmes in this section:

1. National Programme of Nutritional Support to Primary Education (Mid Day Meal Programme)
2. Special Nutrition Programme
3. Pradhan Mantri's Gramodaya Yojana (PMGY)
4. Balwadi Feeding Programme
5. Coinposite Nutrition Programme, and
6. Applied nutrition programme

Let us get to know about these programmes then.

10.7.1 National Programme of Nutritional Support to Primary Education (Mid Day Meal Programme)

The National Programme of Nutritional Support to Primary Education commonly known as Mid Day Meals Scheme was launched in August, 1995 consequent to the favourable impact of the scheme on children in some States, as well as, the comfortable food stock position in the country, and to relate primary education with nutrition, health and ICDS.

The mid day meal programme is one of the most important ongoing feeding programmes organized by the Department of Education not only to improve nutritional status of school children but also to attract poor children to school. Further, school age children are in a phase of rapid growth and development. Their nutritional needs are considerable. However, children, particularly from poor families, do not get enough food to eat. Their home diets are often inadequate. Many, especially in rural areas, come to school partly hungry and some even on empty stomach, trekking long distances. Under such circumstances, they are unable to concentrate on the studies and benefit from the education. Hence, providing a supplement in school would complement the home diet and sustain the interest of children in learning so that dropout rates are lowered and school attendance improves. We would study about the objectives, target group, programme component and strategy of MDM programme. Let us look at the objectives first

Objectives

The programme is intended to give a boost to universalization of primary education by increasing enrolment, retention and attendance and simultaneously impacting upon nutritional status of students in primary classes.

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Target Group

All students of primary classes (I-V) in the Government, Local Body and Government aided schools in the country are covered in all States/UTs (except Lakshdweep).

From October 2002, the programme has been extended to children studying in Education Guarantee Scheme and Alternative and Innovative Education (EGS & AIE) Centres.

Private un-aided schools are not covered under the programme. The main beneficiaries of the programme are therefore school children between 6-11 years of age attending elementary/primary schools.

Let us now review the programme component and strategy.

Programme Component

The major component of the MDM programme is food supplementation. The central support consists of:

- 100 gram food-grains (wheat or rice) per child per school day where cooked meals are served; 3 kgs foodgrains per student per month where food grains are distributed.
- Transport subsidy up to a maximum Rs.50 per quintal for movement of food grains from the nearest FCI depot to schools.'
- Food-grain (wheat or rice) is supplied through Food Corporation of India the cost of which is reimbursed at below poverty line (BPL) rate.

As per provision mentioned in the programme, the meal is to be provided for 200 working days in a year and the rate of mid day meal is Rs. 2 per child per day.

The meal/food supplement distributed as part of the programme provides roughly 350- 450 Kcal and 20-30g protein per child per day, which is expected to meet one-third of the energy and half of the protein recommended dietary intakes of the children.

The food supplements provided through the programme vary from ready-to-eat food like fruit bread etc. to cooked food like 'upma' or 'khichri' or others, which are convenient to eat. In Tamil Nadu, traditional 'rice-sam.bar' preparation is used in the programme. In Rajasthan ghugri (porsidge) is being provided. Whereas, in the State of Delhi a six day cycle menu of cooked foods is being used for MDMP. The raw materials supplied by the international agencies include corn soya meal (CSM), wheat soya blend, soya fortified bulgar (SFB) and salad oil. The programme was conceived for inculcating the qualities of discipline, comradeship, good food and healthy habits and knowledge about nutrition through the provision of nutritious meal daily.

Programme Implementation

The programme is operated by the Department of Education. The programme is being implemented through Panchayats and Nagmpalikas. The feeding is usually

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carried out within the school premises. The school teacher is responsible for the preparation and distribution of food and maintenance of records such as food stock register, health cards and attendance register relevant to the programme. A helper is appointed to assist the teacher in organizing the feeding. Special budgetary provisions are made to meet the cost of fuel, condiments and other incidentals. Salaries of cooks, helpers, etc., as well as, expenditure on construction of kitchen sheds needed under the programme are eligible for coverage under the poverty alleviation schemes. Other costs of conversion of foodgrains into cooked meal/processed food are to be met by implementing agencies I states. There is a wide variation in the implementation of the programme from State to State.

We will now go over to the next supplementary feeding programme. i.e Special Nutrition Programme.

10.7.2 Special Nutrition Programme (SNP)

The Special Nutrition Programme was launched by the Central Social Welfare Board (CSWD) in 1970-71. The aim of the programme was to provide supplementary nutrition to children, pregnant women and nursing mothers belonging to the weaker sections of the society. In 1970-71, it was envisaged that nutritious food would be supplied to 6.8 lakh children in the age group 0-3 years. However, the benefits of the programme were extended to children in the age group 0-6 years, as well as, pregnant/nursing mothers during 1971-72. By 1986, the programme covered nearly 70 lakh beneficiaries in urban slums, tribal and backward rural area. In 1975 the ICDS programme was launched. As the area under ICDS increased, the coverage of the special nutrition programme decreased. It has now been converged with the ICDS wherever possible. The main component of the programme was food supplementation. The supplement consisted of 300 Kcal and 10 g protein for children and 500 Kcal and 25 g protein for pregnant/lactating women. Feeding (f the beneficiaries was undertaken for 300 days a year. The programme provided various food supplements according to the availability and convenience. In urban areas, usually bread, milk or other processed foods were given. In tribal areas, locally produced foods or food items donated by international organizations such as CARE, are being given.

In addition to supplementary feeding, the scheme also included periodic health check-ups for the beneficiaries. Efforts were made to conduct immunization, improving the appearance of children, haemoglobin estimation and weight measurement for beneficiaries from time to time. Let us now go over to the third supplementary feeding programme, i.e., PMGY.

10.7.3 Pradhan Mantri's Gramodaya Yojana (PMGY)

In order to achieve the objective of sustainable human development at the village level, a new initiative in the form of Pradhan Mantri's Gramodaya Yojana (PMGY) has been introduced in the Annual Plan 2000-01. This focuses on the creation of Social and economic infrastructure in five critical areas with the objective of improving the quality of life of our people specially in rural areas. Schemes related

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to health, nutrition, education, drinking water, housing and rural roads are undertaken within this programme. The PMGY has two components: Programmes for rural connectivity with 50 percent allocation, and other programmes of primary health, primary education, rural shelter, rural drinking water and nutrition with the remaining 50 percent allocation.

The PMGY envisages allocations for Additional Central Assistance (ACA) for selected basic minimum services in order to focus on certain priority areas including nutrition. The allocation under nutrition component of PMGY, which is essentially meant as an additionality for providing the complete nutritional requirements to all below poverty line (BPL) children in the age group of 6 months to 3 years only, is to be made under the Supplementary Nutrition Programme component of ICDS. You may recall studying about this earlier in Section 10.4 under the programme component of ICDS on page 205. Hence, we shall not duplicate the information here. The minimum allocation for nutrition component is 15% of the Additional Central Assistance for PMGY.

10.7.4 Balwadi Feeding Programme

Like the Special Nutrition Programme above, the Balwadi Feeding Programme was also launched in 1970-71. Although the Special Nutrition Programme is no longer in operation, the Balwadi Feeding Programme remains one of the ongoing programmes -implemented through the voluntary organizations. The Central Social Welfare Board and National level voluntary organizations such as Indian Council for Child Welfare, Bhartiya Adimjati Sevak Sangh and Harijan Seval Sangh are responsible for implementing the programme with grant-in-aid given by the Ministry of Social Welfare. At the field level, the programme is implemented through the Balsevika with the assistance of the helper.

The beneficiaries of the programme include preschool children attending the Balwadi. The services provided under the programme are supplementary feeding, regular health check-ups, immunization, habit formation and socialization through games and recreation. Supplementary food consisting of 300 Kcal and 10 g protein per day per child is provided for nearly 280 days in a year and contributes to at least one-third of the daily nutritional requirements of the child. The total cost per child per day of the food is expected to be around 25 paise. The nutrition programme also has an educative value as it brings together several children of the same age and is expected to inculcate good habits and help children develop taste for different types of foods. By 1986, about 2-3 lakh children in the age group of 3-5 years were covered under the programme. Let us move on to the next supplementary feeding programme i.e. Composite Nutrition Programme.

10.7.5 Composite Nutrition Programme

The Composite Nutrition Programme was a feeding programme launched by the Department of Community Development, with the main objective of providing nutrition education to the masses. The core of the programme was nutrition education and its particular application through demonstration feeding. The

programme had five components

- Nutrition education through mahila mandals
- Encouragement of economic activities of mahila mandals
- Strengthening 'the supervisory machinery for women's programme
- Training of associate women workers, and
- Demonstration feeding

In demonstration feeding, provision was made for feeding 80 beneficiaries (women and children in the age group 0-5 years) each day for 25 days a month. The State Government through official and non-government agencies implemented the programme. The existing institutions of mahila mandals and balwadis played a major role in implementing the programme at the field level. The programme is no longer in operation now. Let us now look at the last supplementary feeding programme i.e Applied Nutrition Programme covered in this section.

10.7.6 Applied Nutrition Programme

The Applied Nutrition Programme was one of the first national nutrition programmes launched in 1963 through the Community Development Department, aimed at improving the nutrition of lactating 1 pregnant women and children. The programme was developed 'to educate rural people about how they can increase and improve their food supply through their own efforts'. The main objectives of the programme were: To encourage production of body-building foods (such as eggs, fish, milk etc.) and protective foods (such as vegetables, fruits), and To provide nutrition education, so as to promote consumption of the body-building 1 protective foods by mothers and children.

The main components of the programme were nutrition education and demonstration feeding. Under the programme about 20-30 beneficiaries (children and pregnant \ lactating mothers) in each center, were provided nutritious items prepared with-body-building and protective foods and demonstration feedings held for 200 days in a year. The programme was an education effort and aimed at developing progressively a coordinated and comprehensive national programme of education and training in applied nutrition and related subjects. Efforts were made through the programme to improve local diets through the production, preservation and use of protective foods.

The programme was initially launched with the assistance of International Agencies such as United Nations Children Fund (UNICEF), Food and Agriculture Organization (FAO), and World Health Organization (WHO). At the central level, the programme involved the coordinated efforts of the Departments of Agriculture, Animal Husbandry, Health, Education and Social Welfare, By the end of the fifth five year; plan the programme covered roughly, '1880 community development blocks in the country.

However, with the introduction of other nutrition programmes in the country, the coverage of this programme was reduced' and it is no longer in operation.

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Thus, we studied about the major supplementary feeding programmes of the country. We also observed that with the launch of as big a programme as ICDS, some of the smaller programmes like Special Nutrition Programmes and Applied Nutrition Programme gradually ceased to be in operation. ICDS programme included all the services provided under these programmes. ICDS being a very ambitious programme, (its coverage still expanding) is formulated and implemented by the nodal agency —Department of Women and Child Development under Ministry of Human Resource Development and thus duplication of services by other government agencies is avoided. Let us now do an exercise to recapitulate our knowledge.

Check Your Progress Exercise 4

1. Read the following carefully and mention whether true or false and connect the false statement.

a) Mid day meal programme was launched not only to improve nutritional status of children but also to attract poor children to school.

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b) The department of women and child development operates the mid day meal programme.

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.....

c) Balwadi feeding programme of the government is implemented through voluntary organization.

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d) The nutrition component of PMGY is to be made under the supplementary nutrition programme component of the ICDS.

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2. Discuss briefly the special nutrition programme (SNP)

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3. Enumerate the programme component of MDM programme.

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10.8 FOOD SECURITY PROGRAMMES

Food security as you may recall studying in Unit 2 refers to access by all people at all times to enough food for an active, healthy life. It is now well recognized that the availability of food grains is not a sufficient condition to ensure food

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security to the poor. It is also necessary that the poor have sufficient means to purchase food. The capacity of the poor to purchase food can be ensured in two ways — by raising the incomes or supplying food grains at subsidized prices. While employment generation programmes attempt the first solution, the public distribution system (PDS) is the mechanism for the second option. Our government has made consistent efforts to improve availability of food for poor. Besides the PDS, other programmes such as, the Antodaya Anna Yojna (AAY), the Annapurna Scheme, National Food for Work Programme (NFFW) have also been launched. Let us learn about these programmes, here in this section. We shall begin with the PDS.

10.8.1 Public Distribution System (PDS) and the Targeted Public

Distribution System (TPDS)

A well targeted and properly functioning Public Distribution System (PDS) is an important constituent of the strategy for poverty alleviation. PDS continues to be a major instrument of Government's economic policy for ensuring food security to the poor. With a network of more than 4.62 lakh fair price shops (FPS) distributing commodities worth more than Rs 30,000 crore annually to about 160 million families, the PDS in India is perhaps the largest distribution network of its kind in the world. For effective functioning of PDS, the Central Government bears the responsibility for procurement and supply of food grains namely, wheat and rice, besides sugar, imported edible oils and kerosene to the State governments and the Union Territories for distribution. Some States [UTS distribute additional items of mass consumption also through the PDS outlets.

The PDS as it was being implemented earlier, had been widely criticized for its failure to serve the population Below the Poverty Line (BPL), its urban bias, limited coverage in the States with high concentration of the rural poor and lack of transparent and accountable arrangements for delivery. Therefore, in June 1997, the Government of India launched the Targeted Public Distribution System (TPDS) with focus on the poor.

Under the new system a tier subsidized pricing system has been introduced to benefit the poor. The essential features of TPDS are: Government of India is committed to making available food grains to the States to meet the requirement of food grains at the scale of 10 Kg per month per family at specially subsidized prices to population falling below the officially estimated poverty line (BPL families). The states would also receive the quantity needed for transitory allocation to Above Poverty Line (APL) population. The state governments were to streamline the PDS by issuing special cards to BPL families and selling essential articles under TPDS to them at specially subsidized prices, with better monitoring of the delivery system.

The BPL households were determined on the basis of population projections of the Registrar General of India for 1995 and the State wise poverty estimates

(1993-94) of the Planning Commission for 1993-94. The total number of BPL households so determined was 596.20 lakh. Thus the scheme, when introduced, was intended to benefit these poor families for whom a quantity of about 72 lakh tonnes of foodgrains was earmarked annually.

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Keeping in view the consensus on increasing the allocation of foodgrains to BPL families, and to better target the food subsidy, Government of India increased the allocation to BPL families from 10 Kg to 20 Kg of foodgrains per family per month at 50% of the economic cost and allocation to APL families at economic cost w.e.f. 1.4.2000. The allocation of APL families was retained at the same level as at the time of introduction of TPDS but the Central Issue Prices (CIP) for APL were fixed at 100% of economic cost from that date so that the entire consumer subsidy could be directed to the benefit of the BPL population

The end retail price is fixed by the States/UTs after taking into account margins for wholesalers/retailers, transportations charges, levies, local taxes etc. Under the TPDS the States are requested to issue food-grains at a difference of not more than 50 paise per Kg over and above the CIP for BPL families. Flexibility to States/UTs has been given in the matter of fixing the retail issue prices by removing the restriction of 50 paise per Kg over and above the CIP for distribution of foodgrains under TPDS except with respect to Antyodaya Anna Yojana (AAY) where the end retail price is to be retained at Rs. 2/- per Kg for wheat and Rs. 3/- per Kg for rice. We shall learn about the AAY scheme in a little while from now.

For identification of BPL families under TPDS, Gram Panchayats and Nagar Palikas are involved. While doing so the thrust is to include the really poor and vulnerable sections of the society such as landless agricultural labourers, marginal farmers, rural artisans/craftsmen such as potters, tapers, weavers, blacksmith, carpenters etc. in the rural areas and slum dwellers and persons earning their livelihood on daily basis in the informal sector like potters, lickshaw-pullers, cart-pullers, fruit and flower sellers on the pavement etc. in urban areas

Scale and Issue Price

Since 1997, the Scale of issue of the BPL families has been gradually increased from 10 Kg to 35 Kg per family-per ration month. The scale of issue was increased from 10 Kg to 20 Kg per family per family per month with effect from 1.4.2000. The allocation for APL families has been retained as the same level as at the time of introduction of TPDS (i.e 10 Kg per family per month). The allocation of foodgrains for the BPL families has been further increased from 20 Kg to 25 Kg per family per month with effect from July, 2001. Initially, the Antyodaya (AAY) families were provided 25 Kg of foodgrains per family per month at the time of launching of the scheme. The scale of issue under APL, BPL and AAY has been revised to 35 Kg per family per month with effect from 1.4.2002 with a view to enhancing the food security at the household level

10.8.2 Antyodaya Anna Yojana (AAY)

Antyodaya Anna yojana has been launched by the Hon'ble Prime Minister of

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India on the 25th December, 2000. This scheme reflects the commitment of the Government of India to ensure food security for all and create a hunger free India in the next five years and to reform and improve the Public Distribution System so as to serve the poorest of the poor in rural and urban areas. It is for the poorest of poor that the Antyodaya Anna Yojana has been conceived. It is estimated that 5% of population are unable to get two square meals a day on a sustained basis throughout the year. Their purchasing power is so low that they are not in a position to buy food grains round the year even at BPL rates. It is this 500 of our population (5 crores of people or 1 crore families) which constitutes the target group of Antyodaya Anna Yojana.

Scale and Issue Price

Antyodaya Anna Yojana contemplates identification of one crore families out of the BPL families who would be provided food grains at the rate of 35 Kg per family per month. The food grains will be issued by the Government of India @ Rs.2/- per Kg for wheat and Rs. 3/- per Kg for rice. The Government of India suggests that in view of abject poverty of this group of beneficiaries, the State Government may ensure that the end retail price is retained at Rs.2/-per Kg for wheat and Rs.3/-per Kg for rice.

Identification of Beneficiaries

The most crucial element for ensuring the success of Antyodaya Anna Yojana is the correct identification of Antyodaya families. It is estimated that there are 6.52 crore families below poverty line in the country as on 01-03-2006. These families are being provided food grains under the TPDS at highly subsidized rates. One crore Antyodaya families would constitute about 15.33% of the BPL families in the country. The identification of these families are carried out by the State Government / UT administrations, from amongst the number of BPL families within the state.

Issue of Ration Cards

After the identification of Antyodaya families, distinctive ration cards to be known as "Antyodaya Ration Card" are issued to the Antyodaya families by the designated authority. The ration card have the necessary details about the Antyodaya family, scale of ration etc.

Finally, let us get to know about the Annapurna Scheme.

10.8.3 Annapurna Scheme

The Annapurna scheme aims at providing food security to meet the requirement of those senior citizens who though eligible have remained uncovered under the National Old Age Pension Scheme (NOAPS). Under the Annapurna Scheme, 10 Kg of food grains per month are to be provided 'free cost' to the beneficiary. The number of persons to be benefited from the Scheme will, in the first instance, be 20% of the persons eligible to receive pension under NOAPS in States[Union

Territories. The National Old Age Pension Scheme (NOAPS), launched in 1995, seeks to provide pension @ Rs. 75 per month to 68.81 lakh destitutes, aged 65 years and above. Thus, 20% of 68.81 lakh would imply that 13.762 lakh beneficiaries would be eligible for coverage under the Annapurna Scheme.

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Who are eligible for this scheme and how are they identified? Let's find out next
Eligibility Criteria Central assistance under Annapurna Scheme is provided to the beneficiaries fulfilling the following criteria

- a) The age of the beneficiary (male or female) should be 65 years or above
- b) The beneficiary must be "destitute" in the sense of having little or no regular means of subsistence from his/her own source of income or through financial support from family members or other sources. In order to determine destitution, the criteria (if any) currently in force in the State/UTs could also be followed.
- c) The beneficiary should not be in receipt of pension under the NOAPS or State Pension Scheme.

identification of Beneficiaries

- a) The Gram Panchayat is required to identify, prepare and display list of persons eligible to receive benefits under the annapurna scheme, after giving wide publicity to the scheme. The panchayat is also responsible for the distribution of the Entitlement Card to beneficiaries, the dissemination of information about the scheme and the procedure for securing benefits under the same. The Municipality is responsible for the above activities in the implementation of the scheme in their respective areas. The State Government communicates the targets for "Annapurna" to the Panchayat and municipalities for identification of the beneficiaries

Next, who is responsible for implementation of this scheme? The following paragraph highlights this aspect.

Implementing Authorities

- a) The Department of Public Distribution, Union Ministry of Consumer Affairs and Public Distribution ensures the supply of required quantities of prescribed quality food grains from the godowns of the Food Corporation of India (FCI) to the agency designated by the State Government.
- b) At the State level, the State Department of Public Distribution (Departments of Food, Civil Supplies and Consumer Affairs) and at the District level, the Collector District Magistrate/Chief Executive Officer, Zila Panchayat is squarely responsible for the implementation of the scheme. The State Food, Civil Supplies and Consumer Affairs Department will purchase the food grains from the Food Corporation of India on payment of economic cost and will ensure that the FCI supplies the food grains to the district as per district-wise allocation decided by the state within the overall allocation of the State concerned. The Collector Public Nutrition CEO, through the District Officers of the State Food Civil Supplies and Consumer Affairs Department is responsible for ensuring

the availability of food grains at the District level and for distributing the same through the Network of Fair Price Shops under the Targeted Public Distribution System (TPDS).

The Collector/CEO makes arrangement for the distribution of food grains and issue the Entitlement Cards through the Panchayat/Municipalities and ensure that the beneficiaries covered under Annapurna are not receiving any old age pensions.

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10.8.4 National Food for Work Programme (NFFWB)

The National Food for Work Programme has been conceived with the objective to provide additional resources apart from the resources available under the Sampoorna Grameen Rozgar Yojana (SGRY) (about which we shall study in the next section) to 150 most backward districts of the country so that generation of supplementary wage employment and providing of food security through creation of need based economic, social and community assets in these districts is further intensified. The NFFWP is open to all rural poor who are in need of wage employment and desire to do manual and unskilled work. The programme is self-targeting in nature.

Distribution of foodgrains as part of wages under the NFFWP is the focus of the programme and based on the principle of protecting the real wages of the workers besides improving the nutritional standards of the families of the rural poor. Under the scheme, foodgrains are given part of wages to the rural poor at the rate of 5 Kg per manday. More than 5 Kg foodgrains can be given to the labourers under this programme in exceptional cases subject to a minimum of 25% of wages to be paid in cash. The State Governments will take into account the cost of foodgrains paid as part of wages, at a uniform BPL rate. The workers will be paid the balance of wages in cash, such that they are assured of the notified Minimum Wages.

The programme initially covers 150 most backward districts of the country and provide additional supplement my wage employment through creation of need-based economic, social and community assets. Works relating to water conservation, drought proofing and land improvement, flood control and rural connectivity of all-weather roads are taken up to create wage employment. The Centre provides food grains and cash component to the states to generate additional wage employment. Distribution of foodgrains to the workers under the programme is either through PDS or by the Village Panchayat or implementing agency or any other Agency appointed by the State Government. Distribution of foodgrains is made to the workers, most preferably, at the work site.

With this we end our study about the programmes being run by the government to ensure adequate availability of foodstuffs for the poor. In addition to the programmes discussed above there are a few employment schemes linked with food security. We will review a few of these next.

10.9 SELF EMPLOYMENT AND WAGE EMPLOYMENT SCHEMES

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Poverty alleviation and employment generation programmes have been in operation for several years. The specifically designed anti-poverty programmes for generation of self employment and wage employment in rural areas have been redesigned and restructured to improve their efficacy and impact on the poor and ensuring food security. Some of these programmes are discussed in this section.

10.9.1 Sampoorna Gramin Rojgar Yojana

The Government of India has indicated the Sampoorna Gramin Rojgar Yojana as an important scheme of poverty alleviation in the 10th Five Year Plan. The Honourable Prime Minister of India, on 15th August, 2001 has declared the new employment scheme linked with food security namely Sampoorna Gramin Rojgar Yojana. Accordingly, Government of India has merged the Employment Assurance Scheme and Jawahar Gram Samridhi Yojana into Sampoorna Gramin Rojgar Yojana and Sampoorna Gramin Rojgar Yojana has been started implementing in the country w.e.f. 25/9/2001.

The scheme is self targeting in nature. Under the scheme, the foodgrains are distributed to the labourers as a part of wages at the BPL rate. The main objective of the scheme is to give the security to the rural poor and create a water conservation watersheds, roads and small infrastructures by generating the employment for poverty alleviation through the employment and foodgrains. Generation of supplementary employment for the unemployment poor in the rural area is the focus of the scheme.

The SGRY is available for all the rural poor (BPL and APL), who are in need of wage employment and are willing to take up manual or unskilled works in or around his/her village and habitation. However, the preference will be given to the poorest among the poor, SC/ST and parents of child labourers withdrawn from hazardous occupation. The programme is implemented as a centrally sponsored scheme on cost sharing basis between the Central and State in the ratio of 75:25. Next, we move on to the Swarna Jayanti Gram Swarozgar Yojana.

10.9.2 Swarna Jayanti Gram Swarozgar Yojana (SGSY)

The Government of India by restructuring the self employment programmes has merged IRDP (Integrated Rural Development Programme), TRYSEM (Training of Rural Youth for Self Employment), DWCRA (Development of Women and Children in Rural Areas), Million Wells Scheme (MWS) into a new scheme namely "Swarajayanti Gram Swarozgar Yojana" which has been launched from April 1999. This yojana is a holistic package covering all aspects of self employment such as organization of poor into self help groups, training, credit, technology, infrastructure and marketing. The central and state governments are funding the yojana on 75:25 sharing basis.

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The scheme aimed at covering 30% of below poverty line (BPL) families in each block during the five years i.e., 1999-2000 to 2003-2004. The objective of SGSY is to bring the assisted poor families above the poverty line within 3 years, by providing them income generating assets through a mix of bank credit and government subsidy. The scheme envisages that the monthly income of an assisted family increases to at least Rs. 2000/- monthly. SGSY aims at establishing a large number of micro enterprises in the rural areas, organization of rural poor into self help groups and their capacity building, planning of activity clusters, infrastructure build up, technology, credit and marketing. The assisted families under this scheme will be individuals or groups (SHGs). SGSY particularly focuses on the vulnerable groups among the rural poor. Accordingly, the SC / ST account for the 50% of swarozgaris, women for 40% and the disabled for 3%. SGSY is implemented by the DRDAs (District Rural Development Agency) through the panchayat samitis.

SGSY integrates various agencies - District Rural Development Agencies, banks, line departments, Panchayati Raj Institutions, non-governmental organizations and other semi-government organizations.

With this we end our study of the food security and the wage employment schemes. Do answer the check your progress exercise given herewith. This will help you recapitulate what you have learnt so far.

Check Your Progress Exercise 5

Fill in the blanks:

- (a) is the main food subsidy programme implemented by the government to provide food security to poor people in India.
- (b)andare the local bodies involved in the identification of BPL families.
- (c) Yojana launched on 25th December, 2000 serves the poorest of the poor in rural and urban area.
- (d) Distribution of food grains is done as a part of wages under the programme
- (e) The implementing authority of annapurna scheme at the state level is department of public distribution.

2. Why were the food security programmes initiated. List the various food security programmes initiated in our country?

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3. Enumerate the working of the PDS. Also mention the highlights of TPDS.

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4. Who are the beneficiaries of Annapurna Scheme? Discuss the criteria for being eligible for this scheme.

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5. List the salient features of National Food for Work Programme.

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10.10 LET US SUM UP

In this unit we studied that the Government of India has undertaken several measures in alleviating the problems of malnutrition in the country. Some these include formulation and implementation of National Nutrition Policy and various nutrition intervention programmes like Integrated Child Development Services Scheme, nutrient deficiency control programmes and supplementary feeding programmes. The National Nutrition Policy advocates a "comprehensive, integrated and inter-sectoral strategy for alleviating the multifaceted problem of malnutrition and achieving the optimal state of nutrition for the people" The Integrated Child Development Services is the world's most unique welfare programme, which holistically addresses health, nutrition and development needs of young children, adolescent girls and pregnant/nursing mothers across the life cycle. The three important ongoing nutrient deficiency control programmes are: 1) National Prophylaxis Programme for Prevention of Blindness due to Vitamin A deficiency 2) National Anaemia Control Programme, and 3) National Iodine Deficiency Disorder (IDD) Control Programme.

These programmes aim towards reduction/elimination of vitamin A deficiency, iron deficiency anaemia and iodine deficiency disorders respectively. Mid Day Meal Programme is one of the most important ongoing supplementary feeding programmes organized by the Department of Education.

It is aimed at not only to improve the nutritional status of school children but also to attract poor children to school. In addition to these programmes the programmes linked to food security and wage employment such as PDS, food for work programme, SGRY and SGSY were also described.

10.11 GLOSSARY

Balwadi	: A play school for children 3-5 years of age
Intrauterine device	: A birth control device, such as a plastic or metallic loop, ring, or spiral, that is inserted into the uterus to prevent implantation.
Mahila mandal	: Women's group formed to carry out specific activities

10.12 CHECK YOUR PROGRESS

- 1). What is Aims of the National Nutrition Policy ?
- 2). What is Integrated Child Development Services programme ?
- 3). What are the programme components of the ICDS ?
- 4). What are the objectives of the NIDDCP?
- 5). Explain the dietary actions you would take to promote foods rich in vitamin A.

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REVIEW OF NATIONAL NUTRITION PROGRAMMES

STRUCTURE

- 11.1 Learning Objective
- 11.2 Introduction
- 11.3 Rationale for National Nutrition Programmes
- 11.4 Appraisal of National Nutrition Programmes
- 11.5 Limited Impact of National Nutrition Programmes in India
- 11.6 Costs of Improving Nutrition Situation in India
- 11.7 Let Us Sum Up
- 11.8 Glossary
- 11.9 Check Your Progress

11.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- highlight rationale behind the national nutrition programmes,
- explain major findings of the studies conducted to review nutrition intervention programmes,
- describe the actions to be taken to improve these programmes,
- elaborate on reasons for limited impact of nutrition programmes, and conclude the priority actions required to meet the national nutrition goals by 2010.

We will begin our study by reviewing the rationale behind the launch of national nutrition programmes.

11.2 INTRODUCTION

In Unit 10 we studied about various national nutrition programmes launched by Government of India to combat malnutrition and nutritional deficiency disorders. The programmes - their objectives, components, beneficiaries etc. were discussed in details. Having gone through the text, you may have wondered whether these programmes have made any impact in controlling the deficiency diseases or improving the nutritional status of the population or not? In this unit, we will critically analyze some of these programmes and get to know their successes and

failures. We will also learn analyze all these programmes when taken together have made limited impact in reducing malnutrition. We will conclude by studying the priory actions required to improve nutrition situation in India.

11.3 RATIONALE FOR NATIONAL NUTRITION PROGRAMMES

We have read in Units 3 and 4 that nutrition deficiency disorders due to reduced intake of iodine, iron, vitamin A and calories are significant public health problems in India, particularly among the underprivileged communities. These disorders have been described as a silent emergency. The adequacy of iron, iodine and vitamin A play an important role in growth and development of young children. Thus, the prevalence of nutritional deficiency disorders like Iodine Deficiency Disorders (IDD), Iron Deficiency Anaemia (IDA), Vitamin A Deficiency (VAD) and Protein Energy Malnutrition (PEM) remains high in all states and Union Territories of the country. We have also learnt that the primary cause of nutritional deficiency disorders is inadequate intake of food, both in terms of quantity and quality. This is further aggravated by impaired absorption of nutrients due to infections and infestations. Poverty is another contributing factor of the nutritional deficiency disorders. Poverty is often linked to inadequate food and nutrition security, poor sanitation, lack of safe water and inadequate knowledge about child feeding and rearing practices, which play a role in causation of malnutrition. In view of all these problems and issues, we learnt that the Government has initiated national nutrition programmes to improve nutrition situation in India. Nutrient deficiency programmes were initiated to reduce/eliminate deficiency disorders. Integrated Child Development Services was launched to achieve holistic development of child and reduce malnutrition. Programmes like Public Distribution Scheme and Targeted Public Distribution Scheme were initiated to improve the food and nutrition security of vulnerable population. The Mid Day meals programme was started to provide supplementary food to school children, as well as, to increase the enrolment and attendance in schools. The basic aim of all these national nutrition programmes such as ICDS, National Mid Day Meals programme etc. was to bridge the gap between daily routine intake of nutrients and their actual requirements amongst the beneficiaries. Having launched these programmes with specific objectives and rationale, let us now critically review these programmes and learn about their achievements and failures.

11.4 APPRAISAL OF NATIONAL NUTRITION PROGRAMMES

You might beware that the purpose of appraisal or evaluation is to assess the achievements of the programmes with reference to its stated objectives, activities and utilization of its services by the target population. Evaluation assures the impact of the programme. Evaluation studies on national programmes

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should ideally assess all the components of a national programme and its impact. However, except for ICDS, majority of research studies have evaluated one or two components of the nutrition programmes. For ICDS, several evaluations have been conducted in the past, which have looked at the entire programme in totality. Thus, in this unit, we will discuss the key findings of the research studies conducted to assess other partly or in totality the impact of these programmes. We will briefly recapitulate the objectives and various components of these programmes, discuss findings of research studies and describe various actions suggested to improve these programmes. As discussed earlier, we will review the following programmes:

- National Iodine Deficiency Disorders Control Programme (NIDDCP)
- National Anaemia Control Programme (NACP)
- National Programme for Prevention of Nutritional Blindness due to Vitamin A Deficiency
- Integrated Child Development Services Scheme (ICDS)
- National Mid Day Meals Programme
- Public Distribution System
- Targeted Public Distribution System, and
- Employment Generation Schemes

You already know that these programmes aim to reach significant segments of India's undernourished population. For example, poor households through PDS and employment generation schemes, vulnerable population like pregnant and lactating women and children 0-6 years of age through ICDS, and school children through NNMP. It is also important for us to know that in addition to the government programmes, there are few direct private sector efforts for nutritional improvement among the poor. Some NGOs concerned with health have focused on the treatment or prevention of malnutrition among women and young children. While some others, involved in a broad-based development efforts, have focused on community nutrition measures, such as grain banks or food distribution. In the aggregate, however, these efforts reach a minuscule proportion of the country's poor, and would need to be multiplied several hundred-fold to have a significant impact on India's malnutrition problem. In the short term, efforts would be useful to increase the attention of private medical practitioners to nutrition, of media to malnutrition and its effects, and to disseminate information about successful NGO programmes.

We will now critically analyze the function of national nutrition programmes as enumerated above and see what kind of impact they have made on the nutritional situation of vulnerable population. We will start with the National Iodine Deficiency Disorders Control Programme (NIDDCP).

11.4.1 National Iodine Deficiency Disorders Control Programme (NIDDCP)

We have studied about the National Iodine Deficiency Disorders Control

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Programme (NIDDCP).

We know that goitre is the most explicit clinical manifestation of endemic iodine deficiency. The problem of goitre is as old as human civilization with several descriptions found in ancient texts. The term "Iodine Deficiency Disorders (IDD)" was coined in the eighties following the realization that iodine deficiency is associated with several physical and neurological disorders which we have already studied earlier.

In the year 1962, the Government of India, encouraged by the results of iodized salt supplementation trial in Kangra Valley, Himachal Pradesh launched the National Goitre Control Programme (NGCP). However, due to several logistic problems like inadequate production, distribution, poor quality control, public apathy and lack of coordination, the programme could not make an impact. This programme was strengthened in 1984 after the Government of India adopted the policy of universal iodization of all edible salt. In the year 1992, the programme was renamed as National IDD Control Programme (NIDDCP).

Currently, the programme is successfully implemented in the country. At present 70 percent of population is consuming iodized salt. The states lagging behind are the salt producing states of Gujarat, Rajasthan and Tamil Nadu. The possible reason is that it is economical to transport salt by road network. The quality of salt moved by road is not subjected to monitoring by functionaries of salt department. However, salt transported by railways is monitored by salt department for its iodine content. Hence, the states receiving salt by railways receive salt with adequate quantity of iodine.

Significant achievements have been made under NIDDCP These include:

- (i) About 795 private manufactures have been given license to produce iodized salt.
- (ii) The manufacturers have an annual production capacity to produce 112 lakh tons of iodized salt against the total requirement of 50 lakh tons.
- (iii) Annual production of iodized salt has increased to 44 lakh tons in 2003 from 3 lakh tons in 1983.
- (iv) Enhanced inter sectoral coordination has been achieved.
- (v) IDD Control Cells have been established for effective implementation of NIDDCP in all states and UTS (except Chhattisgarh, Jharkhand, Lakshadweep and Pondicherry).
- (vi) National Reference Laboratory at National Institute of Communicable Diseases (NICD) and AIIMS, New Delhi has been established.
- (vii) Field-testing kits for monitoring of the iodine content of salt are being used by village level, health and ICDS functionaries.
- (viii) There has been ban on sale of non-iodized salt in all States/ UTS except Gujarat and Kerala.

There is no national level study to evaluate all the components of NIDDCP, however, several studies have been conducted in different parts of the country to look at various components of the programme. These studies have made an attempt to assess certain issues like 1) knowledge, attitude and practices (KAP)

about NIDDCP amongst the beneficiaries, 2) availability of iodized salt, 3) impact of iodine supplementation on reduction of goitre prevalence, and 4) adverse health consequences, if any, of iodine supplementation under NIDDCP. Major findings of these studies show that:

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- Awareness levels about the causes of IDD and their prevention and control is poor amongst the beneficiaries which has contributed to low demand and utilization of iodized salt.
- Families are consuming salt with iodine content of less than recommended levels of 15 ppm. Thus, although the salt is being iodized, either an inadequate quantity of iodine is added at the production level or there are losses of iodine at the different channels of distribution.
- There are beneficial effects of iodine supplementation through iodized salt in prevention of goitre and improvement in urinary iodine excretion levels indicating improved iodine nutrition.
- Prolonged consumption of iodized salt is not associated with ill effects due to extra iodine intake.

Thus having seen that awareness levels about the causes, prevention and control of IDD is low amongst households and families are consuming salt with less than recommended levels of 15 ppm., certain priority actions have been suggested to bring about improvement in aspects of programme implementation. These are as follows:

Actions for improvement

Information Education Communication (IEC) activities should be undertaken amongst the population regarding NIDDCP.

Regular monitoring of quality of salt at the manufacturer and consumption level should be done to ensure that the beneficiaries consume adequate quantity of iodine.

There should be continued and sustained supply of iodized salt in iodine deficient endemic areas.

Thus, we can conclude that although the programme has made significant achievements, we still have a long way to go for achieving complete coverage under the programme.

Let us now move on to the National Anaemia Control Programme (NACP).

11.4.2 National Anaemia Control Programme (NACP)

- We have read in Unit 3 that Iron Deficiency Anaemia (IDA) is the most common and the most neglected of nutritional deficiency disorders. In India, nearly 80 percent of the pregnant women, 50 percent non-pregnant non-lactating women, 30 percent men and more than 75 percent of adolescent and young children suffer from IDA. In under privileged communities, iron deficiency is the most common cause of anaemia and hence anaemia and IDA are used as synonyms in these communities.

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- The Government of India initiated National Anaemia Prophylaxis Programme (NAPP) in 1970, which was subsequently renamed in 1992 as the National Anaemia Control Programme (NACP). We have already studied about NACP in Unit 10. Except for one ICMR national study which has evaluated NACP in totality, other evaluations pertain to specific components of NACP like: 1) awareness amongst women and communities about the value of IFA tablets 2) awareness amongst health workers about NACP objectives 3) availability and distribution of IFA tablet, 4) consumption of IFA tablets 5) monitoring of NACP by health workers 6) impact of IFA supplementation on birth weight and incidence of low birth weight infants, and 7) chemical composition of IFA tablets. Major findings of these studies show that
- There is lack of awareness amongst women and communities about the consequences of anaemia and importance of taking IFA tablets. Many women who receive the tablets do not consume these.
- There is lack of awareness amongst health workers about NACP objectives and health consequences of iron deficiency anaemia. They lack awareness about IFA distribution, i.e. age group of beneficiaries, especially for small tablets, dosage, side effects and management of side effects.
- There are major shortages of IFA tablets across the country.
- There is inadequate consumption of IFA tablets by women and children due to a) poor supplies, b) lack of compliance, c) lack of worker motivation, d) lack of nutrition and health education by health workers, and e) lack of follow up by health workers.
- There is lack of monitoring by the medical officers in charge of primary health centers for implementation of the NACP. Iron supplementation as per programme guidelines shows beneficial effects in improving the birth weight and lowering the incidence of low birth weight infants.
- Chemical analysis of the IFA tablet shows less than recommended levels of iron and folic acid content of the tablet.

Based on these findings, it emerges that even today, there is poor coverage and high levels of anaemia persist in pregnant women and preschool children. The priority actions needed for improving the programme are stated as follows:

Actions for improvement

Information Education Communication (IEC) activities should be undertaken amongst the women and communities about causes, consequences of anaemia and importance of IFA and adequate diet in prevention and control of anaemia.

- Health functionaries should be adequately trained about the objectives and implementation of the NACP.
- Monitoring by health workers and the medical officers should be strengthened about the implementation of the NACP.
- Efforts should be made to improve the availability of IFA across the country.

We will now move on to the National Programme for Prevention of Nutritional

11.4.3 National Programme for Prevention of Nutritional Blindness due to Vitamin A Deficiency

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- We have studied about the National Programme for Prevention of Nutritional Blindness in Unit 10. In 1992-93, the programme was brought under the Child Survival and Safe Motherhood (CSSM) programme in which, universal coverage of children with vitamin A doses was targeted to 1-3 years of age. Also, an additional component of therapeutic administration of vitamin A was included in the programme. Accordingly, the therapeutic doses of vitamin A were to be given to children: suffering with eye signs of VAD, diarrhoea, measles and severe PEM with eye signs of VAD. The current beneficiaries include all children from 9 months to less than 3 years of age.
- Currently, the main focus of the programme is on synthetic vitamin A supplementation without consideration of prevalence of under five mortality and infant mortality rates, dietary intake of vitamin A and prevalence of ocular signs of VAD. For example, the state of Kerala has the same policy of vitamin A supplementation as in Uttar Pradesh. Sustainable strategies like promoting intake of vitamin A rich foods are given low priority.
- There are no studies which have evaluated all the components of Nutritional Programme for Prevention of Nutritional Blindness due to VAD hence, we would discuss major findings of studies conducted to assess the various components of the National Programme of Prevention and Control of Nutritional Blindness due to vitamin A. These studies have focused on 1) prevalence of VAD in the country 2) coverage of vitamin A supplementation in the country, and 3) impact of vitamin A supplementation on mortality and morbidity amongst children.

Major findings of the studies show that

- VAD is a public health problem in certain geographical pockets/districts of the country. Some of these districts are Gaya, Patna and Bikaner, located in socio- economically poor regions of the country.
- Coverage levels of vitamin A supplementation to the children are low due to various reasons like inadequate outreach, inadequate and irregular supplies, lack of orientation functionaries, lack of monitoring and supervision, vertical approach of the programme with total lack of community involvement and participation and complete absence of education and communication,
- Evaluation of the impact of vitamin A supplementation on mortality and morbidity shows no significant impact of vitamin A on mortality and respiratory tract infections among children.

Thus looking at the findings that VAD remains a public health problem in certain geographical pockets and coverage of vitamin A supplementation is low, certain priority actions for improving the vitamin A prophylaxis programme are suggested as follows:

Actions for improvement

Consumption of vitamin A rich foods should be especially promoted in areas found to be deficient in vitamin A

The programme should be strengthened through various measures like improvement of community outreach, adequate training of functionaries, provision of regular and adequate supplies of vitamin A supplements, community participation and nutrition education and communication.

Check Your Progress Exercise 1

1. Write some of the achievements made under NIDDCP

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2. Mention the priority actions required to improve the NIDDCP.

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3. Answer the following briefly

a) One major finding of studies conducted to evaluate NACP

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b) Priority actions required to improve the NACP.

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4. Answer the following briefly

a) Major findings of the studies conducted to evaluate vitamin A prophylaxis programme.

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b) Priority actions needed to improve the vitamin A prophylaxis programme.

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Let us now move on to Integrated Child Development Services Scheme.

11.4.4 Integrated Child Development Services (ICDS) Scheme

Integrated Child Development Services (ICDS) Scheme was launched on Oct.2, 1975 in pursuance of National Policy for children. We know that currently the scheme is the largest nutrition programme launched by Government of India for the holistic development of the child through interventions in nutrition, health and education. Although the 0-6 year old population of areas covered by ICDS is already 63 million, and the population of pregnant and lactating women is 13.6 million, only 30 million children and 5.2 million mothers are actually covered by supplementary feeding and 15 million, 3-6 year olds, by preschool education. Coverage figures are not available for the other services. ICDS also includes, in

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fewer than 10 percent of the 4200 programme blocks, schemes for adolescent girls, nutrition health awareness and skill development, and in some areas it has been linked with women's income-generating programmes. The impact of the programme is evident from the remarkable improvements made in child survival and development indicators as enumerated below :

- decrease in prevalence of malnutrition among preschool children
- improved immunisation coverage in ICDS areas
- decrease in IMR in ICDS areas
- improvement in school enrolment and reduction in school dropout rate in ICDS areas, 1992.

The most important impact of the scheme is clearly reflected in significant decline in the levels of severely malnourished and moderately malnourished children and Infant Mortality Rate in the country. The percentage of children suffering from severe malnutrition have significantly declined from 15.3% during 1.976-78 to 8.7% during 1988-90 (figures published by National Nutrition Monitoring Bureau). The Infant Mortality Rates have declined from 80 per 1000 live births in 1991 to 73 during 1994 (Sample Registration System).

The programme is targeted at poor areas, and increasingly at poor households. Programme guidelines call for the food supplements (which are limited to 40 percent of the expected beneficiary population of an anganwadi) to be given preferentially to children and pregnant women from households at high risk of malnutrition - those of landless labourers, marginal farmers, scheduled castes or tribes. The adolescent girls' and women's programmes are intended to improve health and nutrition over the longer term through improvements in women's skills and access to resources. However, evaluations of ICDS have found its impact on nutritional status to be limited. The reasons for this are:

inadequate coverage of children below 3 years of age, of those at greatest risk of malnutrition, and of women and children living in hamlets, irregular food supply, irregular feeding and inadequate rations, poor nutrition and health education of mothers (and none of families) to encourage improved feeding practices in the home and other relevant behavioural changes, inadequate training of workers, particularly in nutrition, growth monitoring, and communication, anganwadi worker's (AWW) overload, weak and unsupportive supervision of AWWs resulting in the neglect of crucial nutrition-related tasks, and poor linkages between ICDS and the health system.

In general, the quality of ICDS services needs great improvement. The programme's services are much in demand, but they are inadequately delivered and often uncoordinated. Worker training, in-service supervision and community involvement remain major gaps. Although there are exceptions, anganwadi facilities and environments need to be enhanced and the programme needs to inspire good health, hygiene and nutrition related behaviours that are essential to improving the nutrition and health status of children and women in poor households. To make a significant impact on nutrition and health, a great number of improvements are needed in ICDS. Thus, priority actions needed to improve the

programme are:

Actions for improvement

- improved targeting, especially to reach children under 2 years of age and pregnant women who are most at risk of developing malnutrition,
- greatly enhanced quality of services and impact through better training and supervision,
- establishing a reliable monitoring and evaluation system as soon as possible,
- community ownership and management of programme, and Programmes
- reducing AWW overload and improving coverage of hamlets by either hiring a second worker or separating the preschool education component from the rest of the programme.

ICDS during the Tenth Plan

Since its genesis, the ICDS has constantly gone through several stages of improvement in terms of enforced implementation and sustainability of its objectives. Thus in the current tenth five year plan (2002-2007) of the planning commission has focused on the following.

- Strengthening the nutrition and health education component for inter-familial distribution of food.
- Reach out programme for, 6-36 months age group children, pregnant and lactating women.
- Weighing of all vulnerable population, identification of CED group and provision of integrated health and nutritional support.
- Screening of children for growth faltering.
- Take-home supplementation to improve nutritional status of children in Grade III and IV under nutrition.
- Improved training of ICDS personnel for a more impactful effect of ICDS.
- Creating nutrition awareness through information, education and communication (IEC) at all levels.

Thus, we see that ICDS must greatly improve the quality of its services and their impact on the vulnerable groups. Both the quality of their services and impact must be regularly monitored and evaluated and improvements made continuously.

11.4.5 Pradhan Mantri Gramodaya Yojana: Setbacks and New Challenges

You may recall reading about the Pradhan Mantri Gramodaya Yojana (PMGY) earlier in Unit 10 which focuses on the creation of social and economic infrastructure in the area of health, nutrition, education, drinking water, housing and rural roads. Now we shall look at the new changes brought about in PMGY. This includes an

allocation of funds for nutrition component. This was done as poor and populous states with high undernutrition rates did not get sufficient funds.

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Some of the available data today indicates that the major setbacks of this yojana are:

- Difficulty in procuring locally available take-home food supplements
- Provision of relatively expensive ready to eat food was made, rather than the cereal-pulse-oilseed mixture.
- The funds provided under the nutrition component of PMGY were not treated as an additionality but were substituted for states own plan funds for nutrition.
- There has not been any substantial improvement in the enrolment of children.

The guidelines laid down for the nutrition component of PMGY emphasize that all infants and children should be weighed at least once in three months to detect those who are undernourished so that health and nutrition interventions could be undertaken. Under the Tenth Five Year Plan, the physical and financial evaluation and the impact of the programme on infant feeding practices or infant nutritional status will be taken up.

We will now move on to National Mid Day Meals Programme also known as National Programme of Nutritional Support to Primary Education.

11.4.6 National Programme of Nutritional Support to Primary Education

National Mid Day Meal Programme is the common name used for National Programme for Nutritional Support to Primary Education (NSPE). We studied about the coverage, salient features and implementation of the programme in Unit 10. We suggest you look up the sub-section 10.6. 1 in Unit 10. Here, our focus would be to critically review the programme.

NSPE is being implemented in all States/UTs except Jammu and Kashmir and Lakshadweep (the latter runs its own programme). It covers 107.5 million children as of 2003-04, but the actual number fed may be far lower than this. Fourteen States and 7 UTS provide cooked meals to all primary school children, while 9 states provide cooked meals in some areas only. Four states are distributing food grains under the programme. According to a Supreme Court ruling in 2002, all states should provide cooked meals under NSPE. However, in the interim, until the institutional arrangements are made, states continue to provide food grains. Let us review the evaluation of NSPE.

Evaluation NSPE

Although the NSPE has been in existence for 9 years (1995 to 2004), no all India level evaluation has been conducted so far for the programme. However, in 1999, an Operations Research Group, New Delhi, an independent agency, evaluated the programme in collaboration with UNICEF for ten states of which two states

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provide hot cooked meals. The findings state that while in Assam, AN, UP and West Bengal, there has been a boost to enrolment, in Gujarat, Haryana, Karnataka, Orissa and Rajasthan, the programme has made positive impact on attendance and retention particularly amongst girls. The Operations Research Group also made following recommendations:

- Since key objective of NSPE is to provide a boost to primary education, it is critical not only to strengthen the various programme components but also to design strategies to reach out of school population. This and other issues could be addressed by greater involvement of the community and panchayati raj institutions.
- There is a need to set up a separate cell for implementation of NSPE with full time staff. Presently, the Ministry of Human Resource Development is the national agency for the programme implementation, while at the state level, in all states except Rajasthan, Madhya Pradesh and Orissa, the implementing body is the Department of Education. There is little interaction between state agencies and the Food Corporation of India (FCI). Inter-linkages between the FCI and the implementing agency need to be improved for timely delivery of food grains. School records should be maintained on key indicators of the programme and data can be aggregated at various levels.
- There is need to improve the monitoring and supervision across states on various aspects of the programme such as: quantity and quality of food grains and cooked meals, timely delivery and frequency of distribution to eligible students.

As you may note that this review was conducted for ten states only. Therefore, it is widely suggested that a process and impact evaluation of NSPE be conducted on an all India basis. This process and impact evaluation should include the following:

- The reactions of the key participants at the grass root level, namely the schooler, the teacher and the local Ration Shop keeper about the programme.
- Linkages formed by the programme, if any, with the Primary Health Centre, the Village Panchayats, and the ICDS.
- The positive and negative aspects of the NSPE versus Hot Meal Variant.
- Impact on nutritional status and cognitive development among the children.

In other countries, school feeding has been found to increase learning achievement more when provided as a "breakfast" to hungry children than as a noon meal. The NSPE will have no impact whatsoever on the nutritional status of that child unless she/ he consumes adequate food. To enhance nutrition and health status, food intake would need to be assured and accompanied by deworming, vitamin A and iron supplementation and control of infections. These improvements in the NSPE would require state commitment to providing cooked meals at school, substantially increased management capacity, improvements in the school health programme, and a larger quantum of resources than is currently available from either GOI or the state governments. Thus, following strategies have been suggested to achieve

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the nutrition and health objective of the programme.

Strategies suggested to achieve the nutrition and health objective of NSPE:

- The NSPE must put the Nutrition and Health objectives ahead of the enrolment, retention and drop-out objectives.
- It must set a time-frame, say by 2007 AD, where every primary schooler and middle-schooler will receive a Hot Cooked Meal.
- The NSPE implementers must insist that a good brand of iodized salt be used in the Hot Cooked Meal Variant.
- Several studies have clearly shown that the school-age population is the most heavily infected with intestinal parasites. Hence, periodic deworming, is a must, for this group of population. Fortunately, India has the capability to produce the required quantities of anthelmintics, iron supplements and iodized salt. Dosing can and should be done by the teacher in the classroom.
- Similarly, weekly iron supplementation can and should be done by the teacher in the classroom.
- India is one of the most vitamin-A deficient countries in the world. Legislation can make it mandatory that red palm oil which is abundantly rich in vitamin-A, be used in the "Hot Cooked Meals". Also inclusion of other carotene rich sources in the MDM food supplement. International community could also come to our aid in facilitating this process. Six-monthly deworming could be done very easily in the classroom.

It is also important to understand that policy makers and the implementers of the NSPE must fully realize that if hard choices are to be made, it would benefit the schooler more to give him/her a health package of deworming, iron, vitamin A, and iodine, rather than just food grains. The cost of health package is estimated at Rs. 10/- child per year. Thus, for about 200 million primary school children in India, the total cost of the I-health Package in the Classroom, would come to Rs. 2000 million. (200 million primary school age children x Rs.10 per child = Rs.2000 million). Whereas, the yearly expenditure of food grains for this group comes to about Rs. 10,000 million. The best proposition would, of course, be to give the schooler both the Hot Meal plus the Health Package in the classroom.

Next, let us review the Public Distribution System.

11.4.7 Public Distribution System (PDS) and Targeted Public Distribution System (TPDS)

We studied about public distribution system in Unit 10. PDS is a food subsidy programme implemented by Government of India to provide food security to the poor people in India. PDS provides cereals and other essential items to cardholders at subsidized rates.

Various studies have been conducted to review PDS. While PDS has been an important buffer against local food shortages, it has fallen short in many respects as a measure to provide food security to the poor. Major findings of these research studies show that:

- PDS has been inadequately targeted, with a large number of beneficiaries actually coming from non-poor households.
- Many of the poorer states do not obtain the requisite quantities to cover their needy populations - they take less than their share of supplies from the PDS mainly because of weak administrative capacity and inability to move the food stocks.
- There are serious leakages in the programme, with supplies often finding their way to the open market.
- The PDS is a high-cost operation relative to the caloric support it provides, it costs about three times as much for the PDS to provide a given number of calories to a household, compared with ICDS.
- As late as 1997, access of the poor to the PDS was very limited, and particularly weak in the states with the highest incidence of poverty.

Thus, taking into consideration the various research findings about PDS, government introduced the Targeted Public Distribution System (TPDS) in early 1997. Let us now review the TPDS.

Targeted Public Distribution System (TPDS)

We know that the Central Government introduced the Targeted PDS (TPDS) aimed at better coverage of households below the poverty line. Under the TPDS, BPL households are given a special identity card to obtain up to 10 Kg of Rice or wheat per month at half the issue price.

No review has been conducted of TPDS so far. However, while the TPDS is designed to improve food supplies in the poorest households, it has not gone far enough in a number of ways. Some of the criticism which TPDS faces are:

Despite a very heavy subsidy burden, the TPDS has come in for severe criticism from various quarters including many State Governments. It has been argued that a scale of ration of 10 kilograms per month per BPL family is grossly inadequate since the average requirement of a family is about 30 kilograms per month. The quantity of subsidized grain provided amounts to a marginal supplement of 100 calories per person per day, far less than the estimated gap of poor people in rural areas. It has been suggested that the scale of ration to BPL families should be raised to 20 kilograms per month.

Secondly, the PDS in most states still provides large quantities of subsidized food to non-poor households, although this food could be targeted at needy children and mothers, for example, through ICDS.

It is unclear how the TPDS will plug leakages, particularly in the absence of a rigorous monitoring system.

We would like to bring this to your attention that people need not just food grains but also other food items such as pulses, milk, fruits and vegetables for improving their nutritional status. We also mentioned in Unit 2 that it is a challenge in front of us to provide these nutritious foods to people of India at affordable prices. We know that India's food grain production has continued to increase fairly

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steadily, though population growth has eroded these gains somewhat. The per capita availability of food-grains was 384 kilograms in 1960 and 464 kilograms in 1996. Unfortunately, however, the production of pulses, an important constituent of the vegetarian Indian diet, has fallen from 65.5 kilograms per capita to 34 kilograms in the same period, although availability has been boosted somewhat by imports. To ensure proper nutrition, adequate quantities of pulses or other protein-rich foods such as milk, eggs, or meat (which are also in short supply) must become more widely accessible, requiring increased production, improved distribution and consumption. Unless the prices of these commodities are reduced substantially- through vastly increased availability- they will remain out of reach of the poor.

Let us next review the Employment Generation Schemes.

11.4.8 Employment Generation Schemes

We studied about some of the employment generation schemes like Food For Work Programme, Sampoorna Gramin Yojana etc. earlier in Unit 10. However, there is little independent corroboration of the extent to which the employment programmes have supplemented the incomes and food available to the poor, though they are intended for this purpose. The programmes unfortunately suffer from managerial problems so that it cannot be assumed that the number of person, days of work they provide accrue fully to the poor. The efforts of the employment programmes to provide household food support by part payment in grain need to be strengthened, and the programmes have also to meet other nutritionally-relevant objectives, such as ensuring that 30 percent of beneficiaries are women, and raising participant families above the poverty line.

In this unit, so far, we have reviewed several nutrition programmes and pointed out the main deficiencies in each of the nutrition-related programmes. So now the question arises why all these programmes taken together have had a limited impact to combat malnutrition successfully. Let us now look at some of the reasons for this and what we can do to improve the situation. But first let us recapitulate what we have learnt so far.

Check Your Progress Exercise 2

1. List the reasons for limited impact of ICDS on nutritional status of vulnerable groups.
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2. List the priority actions suggested to improve the ICDS scheme.
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3. If an all India process and impact evaluation is planned for Nutritional Support to Primary Education Programme, what are the key components you would include in the evaluation?

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4. What criticism does TPDS faces from different states?
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.....

Next let us find out why the programmes discussed above have had a limited impact to combat malnutrition.

11.5 LIMITED IMPACT'OF NATIONAL NUTRITION PROGRAMMES IN INDIA

Having reviewed all these programmes, it becomes necessary to ask this question as to why all these nutrition programmes taken together have not been very effective to combat malnutrition successfully in India. You would have noticed by now that each programme appears well-conceived, but in most cases implementation has been weak - particularly with regard to ensuring the access of the poor. There are also virtually no synergies between the programmes. There is also a shortage of funds for expanding coverage and improving the quality of the programmes.

Thus, some of the reasons why nutrition programmes taken together have not been very effective to combat malnutrition successfully in India are poor implementation, inadequate coverage of BPL families and poor synergies between programmes. We will explain these in detail now. Let us start with poor implementation.

- **Poor implementation:** There are many issues, which need to be addressed for successful implementation of these programmes.. These issues relate to coverage, targeting, awareness building, training, supervision, monitoring, community participation and logistics including supply and distribution. Overall, the direct nutrition programmes are insufficient to the task, uncoordinated, lack regular monitoring and evaluation, and have limited impact. If the current programmes were properly targeted, rationalized and improved in quality, they could succeed in substantially reducing malnutrition within the next two decades, particularly in the context of India's projected economic growth over this period. Recent, developments in India, such as economic reforms, globalization processes, and the high skill-intensity of demand for labour, may increase the poor's vulnerability to shocks, and emphasize the need to strengthen programmes such as ICDS and TPDS.
- **Poor synergies between all the programmes:** Although the nutrition-specific actions are embedded in a broader policy framework that emphasizes employment- intensive economic growth, greater access to social services, and specific poverty alleviation measures, the potential synergies among these wider efforts and the direct nutrition programmes remain largely undeveloped. There is a great need to bring about coordination among the many institutions involved in the nutrition- related sectors. Key institutions such as the National Nutrition Council and the Department of Women and Child Development have important roles to play in advocating and implementing enhanced efforts for

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Inadequate coverage of BPL families by all the programmes: The grinding poverty of rural and urban slum dwellers in India suggests that BPL households need to be reached by all the programmes mentioned above, that is, the employment schemes and TPDS to ensure adequate income and food availability to poor households, ICDS to care for the nutrition and health care needs of vulnerable women and children, and the NMMP to provide school children with both the incentive and nutritional support to learn. However, the affordability of all these programmes is questionable and, therefore, in the context of inadequate resources, it is necessary to examine and weigh their relative costs and contribution to achieving nutritional objectives.

This brings us to the next issue, a most important issue, indeed, about having funds and resources for expanding coverage of the programmes. One would believe that we do need additional funds to expand coverage and improve the quality of the programmes. But we can also argue that some of the improvements in the programme could be done without increasing the cost of the programmes. Let us critically look at this aspect. The next section reviews the costs of improving nutrition in India.

11.6 COSTS OF IMPROVING NUTRITION SITUATION IN INDIA

You would note that many of the actions needed to improve the nutrition programmes involve relatively little additional cost. Assigning higher priority to nutrition training, devolving responsibility to the state, district and village level, and fostering greater health-nutrition collaboration do not increase the cost of the programmes. Having a second village-level worker for health or preschool education will involve additional cost, but not a very large one, especially in the context of overall spending on food and nutrition. On the other hand, expanding ICDS or National Mid Day Meal Programme to fully cover their target groups would require a large increase in funding. What we need most in improving the nutrition programmes are political will, community ownership, strengthening the work ethic, and supporting workers with the tools they need to do their jobs. The most important of all these is the adequate and sustained commitment at all levels, especially political levels.

Let us discuss in detail about political commitment.

- Political commitment: Malnutrition fails to receive the priority it deserves in India, as in many other countries, because it is largely invisible, and also because programme efforts must extend across many sectors and levels. The most important factor is that sustained political commitment is required for the long and difficult task of prevention of malnutrition. Due to inadequate political commitment, the programmes are therefore, not able to reach the poor, who are malnourished and therefore most in need of assistance. Sustained allocations and proper direction of the necessary financial and human resources would

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demonstrate political commitment in favour of improved nutrition.

- Under the National Nutrition Policy, we had set certain National Nutrition Goals to be accomplished by year 2000, which were not achieved. Even if we want to achieve these goals by 2010, it demands certain actions and demonstrated success in four areas.
- First, the country must put into place the leadership structure and administrative capacity to ensure commitment to and management of, the programmes required to deal with the massive challenge. This encompasses the policy, planning and implementation structure, and the institutional and individual capacities necessary to make it work effectively.

Second, the ICDS programme must greatly improve the quality of its services and their impact on vulnerable groups. Both the quality of services and their impact must be regularly monitored and evaluated and improvements made continuously. Third, the health sector must give higher priority to malnutrition and ensure that its actions have far greater impact on the problem than they do now.

And fourth, India must do better at providing food security to the poor at the community and household level. Sustained success in these four areas is essential if India is to deal effectively with the crisis of malnutrition.

Let us study each of these in detail now:

1) Rebuilding Institutional Capacity

- India must put into place the leadership structure and administrative capacity to ensure commitment to, and management of, the programmes required to deal with nutritional problems. Thus rebuilding India's capacity for nutrition action, training, research and advocacy will require:
 - high level policy, planning and implementation structure,
 - involving panchayati raj institutions in a major way,
 - setting clear quantitative goals and auditing them at least annually in a high profile national conference, and
 - making key institutions such as National Institute of Nutrition (NIN) and National Institute of Public Cooperation and Child Development (NIPCCD) autonomous.

Additional funds will be needed for 10-15 years, on a sustained basis, in order to assure a steady build up of capacity to undertake the tasks outlined above, and to provide the environment necessary to attract scientists and other professionals to careers in nutrition.

Since the achievement of nutritional goals is a responsibility shared amongst several departments, reallocation of resources across departments must be guided by their relative effectiveness in combating malnutrition. Approximately Rs. 25 crores per year will be needed for NIN and NIPCCD, plus about Rs. 100 crores per year for 20-25 colleges of home science, medicine or other nutrition-related institutions.

2) Enhancing the Quality and impact

We have discussed earlier that ICDS programme must greatly improve the quality of its services. The priority actions needed in ICDS are:

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- ensuring attention to 6-24 month-old children and pregnant women;
- enhancing quality and impact through better training, supervision, and community ownership;
- establishing a reliable monitoring and evaluation system as soon as possible; and
- reducing AWW overload and improving coverage of hamlets by either hiring a second worker or separating the preschool education component from the rest of the programme.

Measures to decentralize ICDS and place its management increasingly in the hands of panchayati raj institutions are likely to be budget neutral in the medium term, but extensive training will cost additional resources. Additional resources of about 150 crores would also be required for the second worker and the quality improvements that are necessary. Thus, if sincere efforts are made, then improving the quality and impact of the programme should be achievable within 3-5 years. Following this, reaching all those in need nationally, i.e. the one-third of families living in poverty, would cost on the order of an additional Rs. 1250 crores a year. In all ICDS will need an additional Rs. 1500 crores/year to have a substantial impact on malnutrition.

3) Strengthening the Contribution of Health Sector

The health sector must give high priority to malnutrition and ensure that its action have far greater impact on the problem than they do now. The priority actions needed to strengthen the contributions of the health sector are:

- training programmes to assure a quantum leap in the nutrition knowledge and capacity of all levels of health workers, and
- much greater synergy with nutrition programmes, especially ICDS, and especially by focusing ANM-AWW collaboration on 6-24 month olds and pregnant women.
- The cost for this would not exceed Rs. 25 crores annually.

4) Improving household Food security through TPDS and Mid Day Meal Programme

India must do better at providing food security to the poor at the community and household levels. You read about Targeted Public Distribution System (TPDS) and National Mid Day Meal Programme in Unit 2 and Unit 10. These programme provide food security to vulnerable population including school children. Certain actions could be taken for improving these programmes which could improve the food security of the vulnerable population.

Let us first consider TDPS. The urgent priorities for TDPS are

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- effective coverage of the poor, and shifting the food subsidy entirely to the population below the poverty line,
- careful monitoring to ensure benefits reach the poor, and
- ensuring that the vulnerable are reached quickly with needed supplies during droughts and other disasters.

Next, let us consider NMMP.

Increasing the impact of NMMP: Increasing the impact of NNMP could be achieved by these actions:

- targeting NMMP by area, using low educational attainment and poverty criteria, and
- targeting food on preschool, as well as, primary school children, in areas not covered by ICDS

These goals could be achieved without additional resources and would increase substantially the overall education and nutritional impact, and the cost-effectiveness of the programme.

Total Cost: If we calculate the total cost of improving nutrition programmes, then by one estimate, it would be Rs. 400 crores/year. While for a period of ten years, it would be a total investment of around Rs. 4000 crores, excluding the cost of expanding ICDS. Since the achievement of nutrition goals is a responsibility shared amongst several departments, reallocation of resources across departments must be guided by their relative effectiveness in combating malnutrition. When one considers that the cost of malnutrition in lost productivity, illness and death is at least Rs. 50,000 crores annually, the cost-benefit ratio of these investments is readily apparent.

Check Your Progress Exercise 3

1. List the three reasons why nutrition programmes when taken together are not able to reduce malnutrition in India?

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.....

2. What key actions are required if we want to achieve the National Nutrition Goals by 2010.

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.....

11.7 LET US SUM UP

The Government of India has launched many programmes to improve nutrition situation of India. Some of these programmes include nutrient deficiency programmes to combat micronutrient malnutrition, ICDS for holistic development of children through interventions in health, nutrition and education and for reduction of malnutrition; and PDS and TDPS for improving food and nutrition

security. However, when taken together, these programmes have not been very effective in reducing malnutrition. The main reasons identified relate to lack of political commitment, poor implementation, inadequate coverage of BPL families, poor synergies between programmes and lack of funds.

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Key actions are required in four different areas if we want to achieve the National nutrition goals by 2010. First, the country must put into place the leadership structure and administrative capacity to ensure commitment to, and management of, the programmes required to deal with the massive challenge. Second, the ICDS programme must greatly improve the quality of its services, and their impact on vulnerable groups.

Both the quality of services and their impact must be regularly monitored and evaluated and improvements made continuously. Third, the health sector must give higher priority to malnutrition and ensure that its actions have far greater impact on the problem than they do now. Lastly, India must do better at providing food security to the poor at the community and household level. All this would require a total investment of around Rs. 4000 crores over a period of ten years, excluding the cost of expanding ICDS.

When one considers that the cost of malnutrition in lost productivity, illness and death at the rate of least Rs. 50,000 crores annually, the cost-benefit ratio of these investments is readily apparent.

11.8 GLOSSARY

Beneficiaries	: persons who benefit
Cluster	: group sharing a similar characteristic
Corroboration	: confirmation, documentation
Diversification	: expanded range
Fortification	: strengthen
Genesis	: origin, or mode of formation
Intersectoral	: between more than one sector/department
Micronutrient	: nutrient required by body in small quantities
Strategy	: the art of planning for effective results

11.9 CHECK YOUR PROGRESS

- 1). What is Integrated Child Development Services (ICDS) Scheme ?
- 2). Mention the priority actions required to improve the NIDDCP.
- 3). Explain about the National Mid Day Meal Programme?
- 4). List the priority actions suggested to improve the ICDS scheme.

5. What criticism does TPDS faces from different states?

Review of
National Nutrition
Programmes

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12

STRATEGIES TO COMBAT PUBLIC NUTRITION PROBLEMS -1

STRUCTURE

- 12.1 Learning Objective
- 12.2 Introduction
- 12.3 Strategies to Combat Public Nutrition Problems
- 12.4 Diet or Food Based Strategies
- 12.5 Nutrient Based Approach : The Medicinal Approach to Combat Public Nutrition Problems
- 12.6 Selecting/implementing an Intervention, Strategy
- 12.7 Let Us Sum Up
- 12.8 Glossary
- 12.9 Check Your Progress

12.1 LEARNING OBJECTIVE

After going through this unit you will be able to:

- highlight the various strategies to prevent malnutrition,
- differentiate between food based and nutrient based strategies,
- describe the various food based strategies namely, diet diversification, food fortification, horticulture intervention, nutrition and health education, and
- discuss supplementation as a nutrient based strategy.

12.2 INTRODUCTION

In Units 3 and 4, we learnt about the various public nutrition problems, their causes and consequences. In Unit 10 we have discussed the ongoing nutrition programmes of the country. In this and in the next unit we will learn about various strategies to combat these public nutrition problems. We already know that there are multiple causes of public nutrition problems. Therefore, we require multiple strategies to combat these problems. In most instances, for maximal effectiveness, desirable control programmes will include a variety of intervention strategies/approaches operating concurrently and attacking various facets of the

causative factors at the same time so that the basic problems are being modified. What are these possible strategies? What is the basis of these strategies? These are a few aspects covered in Unit 12 and 13. Unit 12 will focus on the diet or the food based and nutrient based strategies. The relationship between immunization and malnutrition, genetics and biotechnology as one of the strategies to combat malnutrition, role of clean water and sanitation to combat malnutrition is the focus of Unit 13.

12.3 STRATEGIES TO COMBAT PUBLIC NUTRITION PROBLEMS

PEM and micronutrient malnutrition is a problem of global proportion. Micronutrient malnutrition, as we have already studied earlier in Unit 3, is a term commonly used to refer to vitamin and mineral nutritional deficiency diseases. Diets which lack adequate amounts of essential vitamins and minerals lead to such diseases. deficiency, iron deficiency anaemia and iodine deficiency disorders are among the most common forms of micronutrient malnutrition. Other micronutrients found in food, including vitamins such as thiamine, niacin, riboflavin, folate, vitamin C and D, and minerals such as calcium, selenium and zinc can also significantly affect health when dietary deficiencies exist. Micronutrient deficiency is "hidden hunger" in the sense that most people who suffer from these deficiencies are not aware that they are suffering from anything. It has not been until quite recently that the scientific and public health community has begun to understand the extent and impact of these public nutrition problems and develop programmes to combat them.

The primary causes of most micronutrient malnutrition are inadequate intakes of micronutrient-rich foods and impaired absorption or utilization of nutrients in these foods due partly to infection and parasitic infestation, which also increase metabolic needs for many micronutrients. Poverty is often at the root of malnutrition and is also linked to inadequate access to food, sanitation and safe water and to lack of knowledge about safe food handling and feeding practices.

Recognizing this aspect, the Government of India's Policy for control of public nutrition problems currently combines both short, as well as, long term measures and recommends a comprehensive strategy, addressing the following issues to achieve the goal of improving the nutritional status of the population:

- a) Diet/Food based strategies viz. dietary diversification/modification food fortification, horticulture intervention, nutrition/health education
- b) Nutrient based strategy i.e. distribution of vitamin and mineral supplements.
- c) Immunization programme in the context of public nutrition programmes.
- d) Supplementary feeding programmes.
- e) Improving the quality of food produced by genetic approaches.

- f) Clean water and sanitation as a strategy to combat public nutrition problems.
- g) Improving food and nutrition security.

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The strategies are not exclusive of the each other, rather they are complementary and may be of greater or lesser value according to present and changing circumstances. In fact, we need to understand that the public nutrition problems usually do not exist in isolation, thus, a strategy for a given problem, area or a specific population would likely incorporate many interventions supplementation, fortification, dietary diversification, as well as, public health measures.

The appropriate mix of interventions depends on the specific context. Remember, there is NO 'ONE-SIZE-FITS-ALL' STRATEGY.

A review of these strategies is presented in this and the following unit. Here, in this unit the focus is on the food based and nutrient based strategies. So let's get started.

12.4 DIET OR FOOD BASED STRATEGIES

Malnutrition, particularly micronutrient deficiency, usually occurs when diets lack variety. Since the problem is mainly of dietary origin, it would perhaps be logical to presume that policies/strategies need to be developed and implemented which ensure year round access and consumption of an adequate variety and quantity of good quality, safe food. Foods provide several essential micronutrients, simultaneously addressing a combination of deficiency problems. Furthermore, physiological interaction, between vitamin and minerals can enhance the body's ability to absorb essential micronutrients. It is in this context that diet or food-based approaches as preventive strategies to combat malnutrition are gaining momentum.

Food based strategies are defined as a preventive and comprehensive strategy' that use food (i.e. whole, refined form, processed, fortified or a combination) as a tool to overcome micronutrient deficiency.

Diet and food-based approaches play an essential role in preventing micronutrient malnutrition by increasing the availability and consumption of micronutrient-rich foods. In the long-term, such approaches are more likely to be sustainable. However, you would realize that the benefit of such approaches is not immediate. If overt micronutrient malnutrition (such as xerophthalmia, goitre or cretinism, or severe iron deficiency anaemia) is present, short-term supplementation programmes would need to be implemented in addition to starting food-based activities. We will look at the supplementation as a strategy to combat malnutrition later in this unit.

Now let us look at the benefits of food based strategies. The benefits of food-based strategies go beyond the prevention and control of micronutrient deficiencies. These are highlighted in Box 1.

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Box 1	Benefits of Food-Based Strategies
<p>The benefits of food based strategies include:</p> <ul style="list-style-type: none">● They are preventive, cost-effective and sustainable.● They can be adapted to different cultural and dietary traditions and locally feasible strategies.● Being broad-based (aiming to improve the overall quality of the diet of a population) they can address multiple nutrient deficiencies simultaneously.● Because the amounts of nutrients consumed are within normal physiological levels, the risk of toxicity gets minimized.● Food-based strategies support the crucial role of breastfeeding and the special diet and care needs of infants and young children.● Food-based approaches foster the development of sustainable, environmentally sound food production systems. Agricultural planners are alerted to the need to protect the micronutrient content of soils and crops.● Food-based strategies build partnerships among governments, consumer groups, the food industry and other organizations to achieve the shared goal of overcoming micronutrient malnutrition.	

Food based approaches, therefore, are preventive, cost-effective and sustainable long- term strategies to combat malnutrition, particularly the micronutrient deficiency. A comparison of the cost-effectiveness of food based programmes versus supplementation has demonstrated that food based approaches are preferable because they are generally less costly, more sustainable, better able to target vulnerable groups and have multiple nutritional benefits. Food based strategies also promote sustainable improvement by encouraging long-term behaviour changes. The modification of behaviour leading to better selection or preparation of food so as to enhance intake or bioavailability of nutrients is the primary goal of the approach. Few important food based approaches which can bring a qualitative improvement in the nutritional status include:

- Dietary diversification/modificatio to promote year round availability, access to and utilization of foods which promote the increased intake and absorption of nutrients.
- Horticulture intervention including home gardening addressing issues of food production, preservation, processing, marketing and preparation.
- Food fortification to improve dietary intake of nutrients and their bioavailability.
- Nutrition and Health Education to promote food based approaches.

You may recall studying briefly about these food based strategies earlier in Unit 3 under section 3.3 while studying about the nutritional deficiencies. A detailed discussion on these approaches is presented here in this unit.

12.4.1 Dietary Diversification/Modification

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Dietary change or modification, as a food based approach, to improve nutritional status is important. With respect to improving vitamin A status or iron status, evidence suggests that dietary modification is the most cost-effective measure. Let us see how?

Green leafy vegetables, we know, are the predominant sources of all, particularly for the poor people. In India, for example, the prevailing vitamin A malnutrition reflects the inadequate intake of these beta-carotene rich foods. Efforts in combating vitamin A deficiency must therefore, be logically directed towards augmenting the availability and intake of these relatively inexpensive foods. Abundant sources of vitamin A exist. However, the contribution of such plants to alleviate micronutrient deficiencies is greatly underappreciated. Among the wide range of green leafy vegetables, drumstick leaves (*Moringa oleifera*) in particular provide a very rich and inexpensive source of pre-formed vitamin A, in addition to other important micronutrients. Native to India, the tree grows abundantly in all tropical countries where vitamin A deficiency is a problem. A glassful of fresh drumstick leaves contains the daily requirement of vitamin A for up to ten people, or small amounts of less than 10 gm of fresh leaves can meet the day's requirement of vitamin A of preschool children. Hence, advocating and implementing such dietary modifications can go a long way in improving the vitamin A status of population groups. Similarly, examples of relatively small modifications/changes in behaviour/skills, related to food, which can have a significant impact on iron status are highlighted in Box 2

Box 2	Examples of Relatively Small Changes in Food Behaviour/ Skills which can have a Significant Impact on Iron Status
<p><i>CHILD FEEDING (New Behaviour)</i></p> <ul style="list-style-type: none"> ● Feeding colostrum instead of discarding it ● Breastfeeding as long as possible, but not beyond the 2nd year ● Introducing complementary foods rich in iron at about six months ● Providing small but frequent meals to the child ● Adopting a 5-6 meal pattern for infants/children ● Starting family food by one year of age ● Cooking food in iron utensils ● Introducing variety of foods in the diet of infants ● Feeding items which inhibit or compete with iron absorption in-between meals rather than with meals. Milk with high calcium content may be given in between meals or/and at bed time <p><i>GENERAL EATING HABITS</i></p> <ul style="list-style-type: none"> ● Consuming iron-rich food more frequently. In fact, including atleast one source/serving of iron-rich food in each meal, if possible. ● Eating new food combinations to enhance iron absorption. Including fruits (specially rich in vitamin C) with or directly after meals rather than only between meals. 	

- Consuming leaves or other part of the food that are not traditionally consumed
- Avoiding or reducing the consumption of tea and coffee with meals
- Adopting practices such as fermentation/germination, where not practised, to increase the bioavailability of foods.

NEW SKILLS'

- Preparation of recipes using higher proportion of iron-rich foods
- Appropriate household-level preservation methods for fruits, vegetables, fish and meat
- Food preparation methods that preserve micronutrients i.e. short cooking time, steaming, adding food to boiling water rather than cold water, adding just enough water to aid cooking rather than cooking in large amounts of water and draining excess water after cooking.
- Mashing and, if necessary, straining fruits and vegetables so they can be eaten by infants.

Source : Adapted from FAO/IISI 1997

The objective of dietary diversification is to ensure that individuals get essential nutrients in sufficient amounts through their daily diet. The modification of the behaviour leading to better selection or preparation of food so as to enhance intake or bioavailability of these nutrients is the primary goal of this approach.

Dietary diversification to include more micronutrient rich food is an ideal and sustainable long term solution. Improvements can be made, as you may have noticed in the examples above, through the introduction of new crops, better cooking or food preparations in the home, better storage or preservation methods, improving food safety or the promotion of more varied diets through nutrition education.

Box 3	Steps in Adopting Dietary Diversification/Modification as a Food Based Approach
	<p>The steps suggested in adopting diet diversification as a food based approach include:</p> <ul style="list-style-type: none"> ● <i>Assess what people are already eating</i>, describing the daily meal pattern - the foods/meals consumed and the items/dishes included therein - and describing how dietary patterns are changing. Remember, food preparation methods are culturally and economically determined and should be approached with care and respect. ● <i>Determine/analyse the bioavailability of the nutrient</i> say availability of iron, calcium etc. in the diet. ● <i>Assess what can be modified with respect to:</i> <ul style="list-style-type: none"> - composition of meals (given the local food availability, cost and cultural factors) - food preparation ● <i>Implement such modifications</i>. For example frying and fermentation decrease

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levels of beta-carotene in foods by about 25%, vitamin C is destroyed by cooking. Losses of both beta-carotene and ascorbic acid can be greatly reduced when vegetables are placed in boiling water and cooked for the minimum time necessary. Steaming in a covered pan preserves nutrients even more effectively.

- Assess the impact of approach i.e. in case of iron deficiency anaemia reassess Hb levels (i.e. before and after improved practices)

Source: Adapted from WHO (1994)

Geared with the knowledge about how to adopt dietary diversification as a food based strategy, we must further understand that dietary change programmes may be more sustainable at the family and community level when food sources are locally available and have the advantage of providing other nutrients and dietary factors to improve absorption and utilization of micronutrients. Dietary diversification, it must be noted, is cheaper than any form of supplementation or fortification. First and foremost, it requires a minimal amount of money, it promotes intakes of a whole range of micronutrients rather than singling out and tackling just one, it is sustainable, it fosters community and individual involvement, and can help stimulate local food economy. Furthermore, this approach does not "medicalise" food and nutrition, rather it enables individuals, families and communities to maintain their own health and nutrition. The key to this solution lies in bringing about a shift away from the growing of just staple crops, to a diversity of crops in the fields.

The "World Declaration and the Plan of Action on Nutrition", adopted by 159 countries at the International Conference on Nutrition jointly organized by FAO and WHO in 1992 states that strategies to combat micronutrient malnutrition should: "Ensure that sustainable food-based strategies are given first priority particularly for populations deficient in vitamin A and iron, favouring locally available foods and taking into account local food habits. "

Furthermore, it pleads forcefully in its Plan of Action for a policy of:

"...promoting the dissemination of nutrition information and giving priority to breast-feeding and other sustainable food-based approaches that encourage dietary diversification through the production and consumption of micronutrient-rich foods, including appropriate traditional foods. Processing and preservation techniques allowing the conservation of micronutrients should be promoted at the community and other levels, particularly when micronutrient-rich foods are available only on a seasonal basis."

These statements are a clear call for the action that is urgently needed to promote dietary diversification for the prevention and control of micronutrient deficiencies. With a clear idea about the role of dietary diversification in combating public nutrition problem, we move on to the next food based strategy i.e. horticulture interventions.

12.4.2 Horticulture Interventions

Let us begin our study on horticulture intervention as a strategy to combat malnutrition by considering the following case studies:

Case Study 1: Papaya saplings, drumstick trees and amaranth seeds were distributed to mothers of preschool children, up to 30% of whom were landless, living in South India. Local agricultural officers demonstrated how to plant and care for the trees and beds of amaranth. The gardening demonstration project raised the awareness of women pertaining to the significance of vitamin A-rich foods in their child's diets.

Case Study 2: Vegetable gardens (10 m plots) planted for a harvest sequence of spinach-fenugreek-safflower-dock-amaranth-dill-amaranth-spinach provided well over 100% of the recommended daily allowance for a family of five. Harvesting the leaves early in the day and eating the leaves within 3 hours after harvest provided the highest beta-carotene intake.

Having gone through these case studies, what do you conclude? Yes, any programme/ intervention that increases the production of micronutrient-rich foods is likely to have a beneficial effect on the awareness and the micronutrient status of a population.

Horticulture inputs including home gardening addressing issues of food production, preservation, processing, marketing and preparation are innovative measures targeted to meet the goal of reducing the incidence of malnutrition and deficiency disorders. Home gardening as a traditional family food production system is widely practised in many homes and societies. FAO states that "the home garden is an important land unit for households as it is often the center of family life; a well developed home garden is a complete farming system; the home garden is the most direct means of supplying families with most of the non-staple foods they need year-round. Hoogerbrugge and Fresco define the home garden as a small-scale, supplementary food production system by and for household members that mimics the natural, multi-layered ecosystem. Indigenous gardens have been a part of household production systems since the beginning of agriculture and remain important for food supply, nutrition and income in both industrialized and developing countries (Soleri et al).

Studies indicate that initiation of home gardens is possible and, if implemented effectively, could have a comprehensive impact on community development, health, nutrition and household food security in target populations. But, the use/effectiveness of home gardening as a strategy to combat micronutrient deficiency in India is limited to vitamin A deficiency control programmes. The Department(s) of Agriculture and Social Forestry are making efforts in this direction. The Indian Council of Agricultural Research (ICAR) has established so far 101 Krishi Vigyan Kendras or Science Centres in various parts of the country to impart training in agriculture technologies to farmers. In the past, the major thrust was on cereal and millet production. It is only in the recent years that horticulture production is receiving emphasis. Women Extension Workers are trained not only in agriculture technologies, but also in home gardening and preparation of recipes based on locally available nutritious foods.

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In our discussion above so far we have focussed on home gardens. Besides home gardening, community and family vegetable and fruit gardens play a significant role in increasing small-scale production of micronutrient-rich foods. School-based gardening programmes can be an excellent means of introducing new ideas about gardening and a useful channel for reaching others in the community, as children tend to be more open than adults to the adoption of new ideas. School-based programmes can reduce micronutrient malnutrition by:

- promoting consumption of fruits and green leafy vegetables,
- teaching students how to establish and maintain home gardens,
- introducing students to food preparation and storage techniques,
- providing nutrition information and encouraging adolescent girls to adopt more healthful dietary habits before their first pregnancy, and
- enhancing the status of and student's interest in agriculture and nutrition as future occupations.

A successful example of school gardening project is illustrated in Box 4.

Box 4	Successful Gardening Promoted Through Schools - the Asian Vegetable Research and Development Centre Case Study
A -model school garden project in Taiwan developed a 10 x 18 m school garden that provided half a cup of vegetables per day for each of 142 children throughout the school year, using indigenous plants. Each garden consisted of 12 raised beds that over the course of the year contained four or five vegetables. Garden produce provided an estimated 58% of the daily vitamin A requirement and 285% of the daily vitamin C requirement for a 10-year-old child.	

Having gone through the discussion above it must be evident that if planned and designed with a good understanding of local circumstances, gardening is an effective food-based approach to improving micronutrient status. A variety of micronutrient-rich crops can be grown by making use of available space, soil, water and microclimates. Gardening can be promoted at the household or community level or at schools. Programmes that promote small-scale production of micronutrient-rich foods can mobilize communities by appealing to community member's perceived needs (e.g., to increase food supply or generate income) in addition to offering to improve nutritional quality of the local food supply. Women are often more interested than men in working in such community projects, and their involvement can improve their income and social status. Even more important, children's nutrition benefits the most when women retain control of income generated by community projects.

This we end our study of horticulture intervention, and move to the next important food based strategy i.e. fortification. But first let us recall what we have learnt so far.

Check Your Progress Exercise 1

1. Enumerate the strategies, which can be adopted to achieve the goal of improving the nutritional status of the population.

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2. What are food-based strategies? What are their benefits.

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3. Discuss the role of dietary diversification in combating public nutrition problem.

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4. home gardening is an effective food-based approach for improving micronutrient status'. Comment on the statement giving appropriate examples.

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Continuing with our study on food-based approaches, we now move on to fortification as a strategy to combat malnutrition.

12.4.3 Food Fortification

The addition of nutrients to foods in order to maintain or improve the nutritional quality of individual foods or the total diet of a group, a Community or a population is referred to as food fortification. Fortification as defined by the Codex Alimentarius as "the addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the population or specific population groups "

While studying about fortification, you may also come across other terminology, which are used for the addition of nutrients to foods, namely restoration or enrichment or nutrification. What are these terms? Can we use them interchangeably with fortification? Let's find out

Fortification, we learnt above, is the addition of nutrients at levels higher than those found in the original or comparable food. Food technologists frequently refer to fortification as nutrification. The food that carries the nutrient is the vehicle; the nutrient added is the fortificant. Multiple fortification is the addition of more than one nutrient to a single food vehicle.

Restoration, on the other hand, means the addition to a food of essential nutrients which are lost during the course of Good Manufacturing Practices (GMP), or during normal storage and handling procedures, in amounts which will

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result in the presence in the food of the levels of the nutrients present in the edible portion of the food before processing, storage or handling. Enrichment, however, has been used interchangeably with fortification, but it has also been defined as the restoration of vitamins and minerals lost during processing.

Having looked at the definition of food fortification, can you now illustrate one example of food fortification in our country. Yes, the iodization of salt is a classical example of food fortification. Extensive tests, using iodine fortified salt in the community, have demonstrated the effectiveness of the fortified salt in improving the iodine status and reducing the prevalence of iodine deficiency disorders.

Fortification is an important food based strategy that may offer considerable nutritional benefits under certain circumstances. Advantages of food fortification relative to other modes of intervention have been widely noted and a result of these is that fortification programmes can be implemented and yield results within a short period. Food fortification as a strategy is likely to prove most beneficial when one or more nutrients are in short supply in the community, particularly in the wide segment of the population, but when the total amount of food available is not seriously inadequate. In simple terms, fortification improves the quality of the food without affecting the quantity. Specific benefits of food fortification include the following:

- It can provide wide population coverage. Combined nutrient fortification can address multiple deficiencies.
- It encourages industries to be socially concerned and to add nutritional value to their products. It provides opportunities for consumers to become involved in food quality issues and creates demand for safe, wholesome food.

In developing countries, fortification is increasingly recognized as an effective medium- and long-term approach to improving the micronutrient status of large populations. Fortification does not require changes in the dietary habits of the population, can often be implemented relatively quickly and can be sustainable over a long period of time. It is considered, by World Bank, as one of the most cost-effective means of overcoming micronutrient malnutrition.

So then what is the philosophy behind the addition of nutrients to food? Is it purely nutritional considerations or are other factors involved? Harris has described six distinct philosophies of food fortification which are reviewed herewith:

1. Fortification for restoration to normal level: We - have read above that nutrients can be removed or destroyed in food processing or storage. Under such circumstances, fortification may be undertaken for addition of nutrients to replace those removed or destroyed.
2. Fortification above normal level: Addition of nutrients to certain foods for special dietary uses is allowed. In special purpose foods i.e. foods for infants or geriatric food or foods for use in weight reducing diets, nutrients may be added in quantities well above the natural level with the intention of supplying the total nutrient requirements in the minimum amount of food consumed, perhaps in a normal daily portion of the particular food.

3. Enrichment with public health objective: Fortification of salt with iodine is in fact, a classical example of enrichment with public health objective. Food or series of foods as a vehicle is used for distributing nutrient supplement linked to a demonstrable need for these nutrients in the population or in a particular segment of the population.
4. Enrichment of 'substitute' foods to equivalent nutrient level: With advancements in food science and technology, new products are being developed as alternates to natural products. A need has risen to ensure that these foods supply equivalent amount of important nutrients. This is where fortification assumes importance. The fortification of margarine with vitamin A is an example of this kind of fortification
5. Fortification to make a food complete in itself? Under this philosophy, each food might contain adequate amount of the nutrient required for its metabolism. For example, suitable quantities of group B vitamins might be added to sugar or other heavily sweetened foods to provide for the demand of carbohydrate metabolism.
6. Addition of nutrients for non-nutritional purposes: You may recall studying about the use of carotene, riboflavin etc, as natural colouring matter in foods. Similarly, the addition of ascorbic acid, vitamin E etc. as antioxidants is prevalent. Addition of nutrients for technological reasons as mentioned above, is the philosophy here.

With these philosophies in mind we can now appreciate the importance and scope of food fortification. However, for maximum effectiveness of this strategy, certain basic criteria should be satisfied. These include:

- There should be a demonstrated need for a nutrient in one or more population groups
 - Food selected as a vehicle for the nutrient(s) must: reach the population at risk
 - The amount of nutrient added to food will supply adequate intake when the food is consumed in normal amounts by the population at risk
 - The amount of nutrient added will not be toxic or harmful to individuals with a high intake of the fortified food
 - The nutrient is biologically available in the form in which it is added and is stable in the food selected as a vehicle
 - The food selected does not seriously interfere with the utilization of the nutrient
- Addition of the nutrient has no detrimental effect on flavour, shelf-life, colour, texture or cooking properties of the food
- Fortification is technically feasible for the particular food
 - The cost of fortification does not result in a significant change in the cost of food
 - A method of controlling and/or enforcing the level of fortification is available

Selection of the carrier for fortification is a critical step and several required characteristics of the carrier have been noted. The identified vehicle must be consumed in roughly constant quantities throughout the year by majority of

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the population. The food must pass through a centralized point to facilitate a rigidly controlled fortification process. The addition of fortificants at the required levels must not affect the organoleptic qualities of the food. Thus, if a fortifiable food exists that is consumed by many people at risk of developing a deficiency/malnutrition, fortification is likely to be the most cost-effective component of any control programme.

Considering these aspects various carriers for fortification have been identified and adopted. One approach is to fortify a staple food that is consumed in significant quantities by most of the population. Fortification of wheat flour with iron has been successfully implemented in several countries in the Caribbean, South America, North America and Great Britain. The fortification of ready to eat breakfast cereals is another wide-spread practice.

Although staple foods are generally used as vehicles in food fortification programmes, at times when none can be identified which has all the required characteristics, it is necessary to find other options. One such option is to fortify a widely consumed condiment. Salt, sugar, curry powder, fish sauces have all been successfully fortified.

Salt has been favoured as a carrier for iodine due to its wide spread coverage, effectiveness, simple technology involved and low cost. Under the National Iodine Deficiency Disorder (IDD) Control programme, in India, we know, that the common salt is fortified with potassium iodate. The suggested minimum level of fortification of common salt with potassium iodate is 25 parts per million. This provides about 150 microgram of iodine in 10 g of iodized salt. Based on the suitability of salt as a widely used and low cost vehicle, fortification of salt with other nutrients has also been attempted. The National Institute of Nutrition (MN), Hyderabad has developed a technology for the fortification of common salt with iron. Extensive tests, using iron fortified salt in the community, have demonstrated the effectiveness of the fortified salt in improving iron status and reducing the prevalence of anaemia. But, this measure has not been introduced on a large scale. Recently, a new technology for the double fortification of salt with iron and iodine has been developed, which is currently being field tested. Besides salt, field studies on mono sodium glutamate (MSG) fortification with vitamin A have been conducted in the Philippines and Indonesia. Sugar, too, has been found to be a suitable vehicle for nutrients in fortification programmes in Latin America and the Caribbean.

Besides staple foods and condiments, fortification of oil, butter; margarine, dried and li.4id (with iron, vitamin A) is already being implemented in some countries. In India, it is mandatory for the hydrogenated cooking fat product called 'Vanaspati' to be fortified with vitamin A. Trials conducted in India and Pakistan established the technical feasibility of fortifying tea with vitamin A. Table 12.1 lists the foods that have been fortified with Vitamin A, iron and iodine in developing countries.

With respect to infants and young children, who are undoubtedly vulnerable, for a number of reasons, fortification of complementary foods is positively one important preventive strategy for iron deficiency. More recently,

multiple fortifications - fortifying wheat flour and other selected food items with nutrients like iron and B- Complex vitamins has also been suggested for our country. Fortification with two micronutrients (e.g. iron and vitamin A or iron and vitamin C) would enhance the effect of fortification on micronutrient status. This is particularly important with respect to infants/young children, in whom the prevalence of multiple nutrient deficiencies is high.

	Vitamin A	Iron	Iodine	Multi-mix
ONGOING	Sugar	Wheat flour	Salt	Tea
	Margarine	Infant formulae	Corn flour	
		Rice	Water	
		Biscuits	Bread	
			Milk	
			Salt	
EXPERIMENTAL	Whole wheat	Sugar	*Sugar	Wheat flour
	Rice	Salt		Corn meal
	Tea	Milk		Wheat flour noodles
	*Oil	Water		
	*Salt	Fish sauce		
		Curry powder		
		Maize meal		
		*Salt		

Table 12.1: Foods fortified in developing countries

Source: Adapted from Nestel (1993).

Evidence of fortification as a major approach to prevent micronutrient deficiency in the industrialized, as well as, less industrialized world exists. The role of food fortification in virtually eliminating micronutrient deficiencies in developed countries is widely acknowledged and recognized. WHO identifies fortification (micronutrient intervention) as among the most cost-effective of all health interventions. Although fortification may be effective without consumer education, it is generally considered wise to include a consumer education component, only to avoid incorrect information. Education may also be required when the fortified product requires different handling during household storage and when certain cooking or product use practices result in loss of the fortificant.

Thus, having gone through the discussion above; it must be evident that in spite of its good track record, fortification too has drawbacks. In most instances, food fortification is only feasible in countries that possess well-developed, efficiently monitored and properly regulated pharmaceutical and food processing sectors. Like supplementation, as you would learn later in this section, fortification too, does not lead to awareness building and changes in wider dietary habits and its impact is limited to those who can access these fortified products. Further, educational programmes may be required along with food fortification, as mentioned earlier, particularly if (i) the fortification causes any change in the

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flavour, appearance, cooking properties, or cost of the food, (ii) there is a danger that the home treatment of the food may remove or destroy the added nutrient. For example, some people may be accustomed to washing impure salt before using' it. If salt of this kind is iodized, consumers must be educated not to wash it because washing will remove all the iodine, or (iii) the programme depend on the addition of a locally centrally prepared premix. It is important to note that food fortification can never become a substitute for a planned nutrition programme designed to improve the food supply or food usage. It is only one part of the overall programme.

With this we end our study on fortification. You would realize that the success of food- based strategies lies in effective nutrition communication. How nutrition communication can promote food-based strategies, is the focus of the next section.

12.4.4 Nutrition and Health Education

In our discussion above we have highlighted that diet diversification, agricultural production of micronutrient-rich foods and production of micronutrient-fortified processed foods enhance micronutrient availability. However, achieving increased consumption of these foods may require a change in food habits. This is not easy. Such a change requires a vigorous and concerted effort through a variety of communication channels, e.g., radio/television, print media and interpersonal communications. Nutrition communication, can be a powerful force in helping individuals make sound decisions about what they purchase, grow and eat. There is conclusive evidence that nutrition communication can convey information, help people develop necessary skills and motivate people to make lifestyle changes. Evidence from India indicate that nutrition communication alone without any other input can be a promising approach for bringing about improvement in dietary behaviour. Nutrition education can convey information, persuade individuals to consume food rich in micronutrients, choose fortified Foods, and prepare food in new ways to protect their nutrient content and change patterns of feeding children.

So, what is nutrition communication or nutrition education'? Nutrition Education is that group of communication activities at achieving a involuntary change in nutrition-related behaviour to improve the nutritional status Of the population (FAO).

The Government of India's policy for control of nutritional anaemia, for example, includes Nutrition /Health Education as one of the major long-term measures to prevent iron deficiency. The National Consultation on Control of Nutritional Anaemia (GOI 1998) recommended that the existing Nutritional Anaemia Control Programme should be comprehensive and incorporate nutrition education through school health and ICDS infrastructure to promote:

- regular intake of iron/folic acid-rich foods by all age groups,
- consumption of foods that increase absorption of iron and vitamin C and avoid foods which inhibit iron absorption (tea/coffee), and

- adequate availability of iron-rich foods by:
- increasing their production through development of kitchen gardens in homes, schools and the villages
- development of iron fortified foods and promoting their consumption.

Based on these guidelines the key messages to promote good iron status among children through diet diversification/modification have been identified and highlighted in Box 5.

Box 5	Key Nutrition Messages to Improve Iron Status
	<ul style="list-style-type: none"> • Breast feed the child exclusively for 4-6 months a Introduce complementary food at 6 months of age a Ensure adequate inclusion of iron and vitamin A/C-rich food or foods fortified with iron in the household diet a Provide lots of green leafy vegetables such as mustard, fenugreek, bathua, spinach and corriander etc. • Avoid serving tea/coffee along with meals (atleast 2-3 hours before or after a meal)
	<ul style="list-style-type: none"> • Serve a glass of fresh lemon juice along with meals rather than tea/coffee • Add a few drops of lemon juice in dal/vegetable preparations • Cook food in iron pots/kadhai. This will provide the much needed iron to keep the body healthy • Include flesh foods (meat, poultry, liver, fish) in the diet, whenever possible • Use fermented and sprouted foods such as sprouted pulses • Wash raw foods thoroughly before eating or serving to children • Remove milk from the meal and serve it between meals or at bed time.

Source : Adapted from GOI (1996), WHO (1994)

Experiences have shown that the most successful behaviour-change nutrition education projects are based on systematic planning. A theoretical framework for planning nutrition education interventions has been proposed by Adrien and co-workers. The framework highlights four phases - conceptualization, formulation, implementation and evaluation - as its components which are described later in Unit 15 in this course booklet. Based on the framework, planning a nutrition education intervention to prevent micronutrient deficiency, would require consideration on the following issues:

- What are the factors contributing to the micronutrient deficiency?

- Which food or food-related behaviour to promote or change?
- Who does the message need to reach?
- How should the message be presented?
- What communication channels should be used for maximum impact?

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A detailed discussion on these aspects and other issues related to nutrition and health education is presented later in Units 15-18. Hence, we shall not go into the details here in this unit.

What we must emphasize here is that any nutrition communication programme should aim to reach the wider population. For example, a communication campaign that aims to improve micronutrient intake in young children must be directed at the care givers of the children. Besides the mothers, caretakers, or those who prepare food for the family and supervise the feeding of children, it is also important that those who make decisions and shape opinions about food consumption patterns in the household are included in the campaign. In any community religious, traditional and cultural leaders can influence shifts in food behaviour and sanction new customs. In certain regions, fathers do the shopping and control the money used to buy food. In many cultures, the father decides what food is served in the household and how it is apportioned. For these reasons, targeting messages only at mothers, caregivers may be ineffective. It is also important to provide nutrition education for school children, girls out of school and adolescents, as they are future parents and need to be aware of how to maintain or improve their dietary habits.

From our discussion above, you may now be able to appreciate the role of nutrition and health education in improving the nutritional status of community groups. But, it must be emphasized here that for any nutrition communication programme to be effective and to bring about a lasting change it must focus on exposing the target population to the messages and on the retention of the message on the part of the audience. A long term carefully sequenced communication effort is necessary to achieve permanent change in food behaviour. Repeated exposure to the message is extremely crucial for long lasting effects. Specialists in public health communication have noted the phenomenon of behaviour decay, or reversion to an original behaviour pattern in the absence of periodic reinforcing messages. Experiences from the Expanded Food and Nutrition Education Programme (EFNEP) in USA indicate that it may take years for the desired changes in behaviour to become sustained. Hence; nutrition and health education is a long term strategy, but can be an effective strategy to combat the public health problems.

Check Your Progress Exercise. 2

1. What is food fortification? Explain giving appropriate examples

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2. Enumerate the philosophy behind using fortification as a strategy to combat

public nutrition problems.

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3. List the basic points one should keep in mind for ensuring maximum effectiveness of fortification as a strategy to combat malnutrition

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4. 'Nutrition communication, can be a powerful force in helping individuals make sound decisions about what they purchase, grow and eat'. Justify the statement using appropriate examples.

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Having studied about the food based strategies, let us move on to the nutrient based strategy, i.e. supplementation as a strategy to prevent malnutrition.

12.5 NUTRIENT BASED APPROACH: THE MEDICINAL APPROACH TO COMBAT PUBLIC NUTRITION PROBLEMS

As compared to the food based approaches, the medicinal approach - is a drug-based approach - to combat public health problems. Nutrient supplements are effective. The medicinal approach, which is cheap in terms of cost of the pills, but expensive in terms of the support: devoted to repetitive use of scarce health-manpower, has been successful in reducing clinical deficiency signs. To illustrate, countries like Indonesia, as well as, Vietnam have declared themselves to be free of clinical vitamin A deficiency (Xerophthalmia) in part because of the successful broad coverage achieved through periodic delivery of high-dose vitamin A supplements. In unit 3 earlier, we have learnt about supplementation as a strategy to combat public nutrition problems. What is the strategy? What are its potentials and drawbacks? Under what circumstances, the strategy is likely to be beneficial? These are a few issues highlighted in the next section. So let's get started.

12.5.1 Supplementation —A Short Term Preventive Strategy

Supplementation, as a short term strategy, to prevent micronutrient deficiency particularly, iron and vitamin A deficiency, is most common in many countries. The oldest intervention route has been the provision of daily oral supplement. At the time of its introduction, supplementation was thought of as a short term emergency measure. But most of the current strategies worldwide still rely heavily health interventions - usually the administration, at periodic intervals, of oral dosages of synthetic vitamin/ mineral supplements to children under three years of age.

This was pioneered in India in the late 1960s. What was originally envisaged as a temporary and short-term measure, and an adjunct to dietary improvement of communities in India, became the default model for current programs to eliminate some of the common public health problems like VAD.

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Single-nutrient supplementation targeted at specific population groups has become an increasingly popular strategy to combat Micronutrient malnutrition. You may recall studying about supplementation as a strategy to combat iron deficiency anaemia, vitamin A deficiency etc. earlier in Units 3 and 10. The Government of India, you learnt, has launched the vitamin A supplementation programme on a National scale and the 'National Nutritional Anaemia Control Programme' to prevent and control nutritional anaemia. Under these programme, the schedule of supplementation recommended for preventive/therapeutic supplementation for population groups is highlighted in Table 12.2. This population-based approach is a pragmatic response to limited resources and assumes that, within a targeted group, the diagnosis of the nutrient deficiency is secure, its prevalence is clinically significant, and the benefits of supplementation outweigh the risks

Nutrient	Target group	Schedule of supplementation
Iron	Pregnant Women	100 mg of elemental iron and 0.5 mg (500 µg) of folic acid daily for 100 days
	Children	20 mg of elemental iron and 0.1 mg (100 µg) of folic acid daily for 100 days
Vitamin A	Infants 6-11 months of age Children between the age 1-5 years (currently only)	100,000 IU of vitamin A 200,000 IU of vitamin A given once every 6 months
Iodine	Women and children in hyper-endemic areas (Children between 1-3 yrs. old)	Iodized oil injection - Single dose of 1 ml

Table 12.2: Supplementary doses of nutrients recommended for preventive/therapeutic supplementation

The evidence is indisputable that supplements can substantially reduce the micronutrient deficiency. However, it is to be noted that supplementation, as a strategy, cannot correct a basic inadequacy in the quantity of food. The circumstances in which supplements may, therefore, be useful are limited and have been outlined herewith:

- **Supplementation as a therapy of specific deficiency and other diseases:**
As discussed above, supplementation may be needed to treat nutritional deficiency diseases prevalent in an area. For example providing folifer tablets to all pregnant women for prevention of anaemia. Further, diseases causing malabsorption or excessive loss of nutrients may lead to secondary malnutrition,

the classic example is the role of hookworm infections in causing iron deficiency anaemia. Under such circumstances, the administration of appropriate therapeutic levels of iron would be a necessary part of therapy.

- Part a broad preventive programme in the face of demonstrated need: If it is apparent that a particular deficiency disease is prevalent in a population, provision of suitable supplement is indicated as a measure to effectively promote rapid improvement. Under such circumstances waiting for a broader programme of nutrition/health education and food supply may not be very appropriate. However, it must be realized that supplementation should be used in conjunction with, but not as a replacement for, improvement in food selection.
- Complement to feeding programmes: Certain situations indicate a need for nutrient supplement. For example, you may recall studying that under many circumstances, the government resorts to provision of food supplements. However, in areas where it is apparent that a particular deficiency disease is prevalent, it may be strongly recommended that in such areas a food source may be fortified with the particular nutrient. However, if a suitable fortified source is not available, then it is clearly expedient to supply the nutrient supplement along with the food source. This is how supplementation complements the feeding programme.

Supplementation, as a short term strategy, therefore, can be effective. However, long experience with this intervention shows that it does not always work. The reasons identified, contributing to its ineffectiveness include: lack of compliance, economic constraints, poor efficiency of health services, dose-related undesirable gastrointestinal side effects, poor coverage, lack of awareness by local health workers, poor quality of supplement tablets etc. The 'drug-based approach' such as that of providing synthetic vitamin A has received wide criticism, even from the very individuals who have pioneered the work. Some of the limitations cited based on the 30-year experience of India are: ineffectiveness in correcting VAD (especially in populations where milder signs of deficiency are widespread), the limited shelf-life of vitamin A and logistical problems in ensuring supply.

Supplementation programmes are often expensive and unsystematic and coverage may be poor. Frequently, the key target groups are different for each micronutrient, and operational constraints are severe. Further, the ease of supplementation has meant neglect of research into and promotion of better use of inexpensive food sources and diet diversification as a lasting long term strategy to prevent public nutrition problems.

With our discussion above we end our study of different strategies. Next, we shall learn how to implement an intervention strategy,

12.6 SELECTING/IMPLEMENTING AN INTERVENTION STRATEGY

Having read about the different food and nutrient based strategies, the crucial

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question that needs to be addressed next is, which of these strategies, is the most appropriate. Well, this is a difficult question to answer. As mentioned earlier, there is really NO ONE-SIZE-FITS-ALL STRATEGY. Several approaches exist, as we now know, and are also highlighted in Table 12.3, to prevent and treat malnutrition, each with its own strengths and limitations (refer to Table 12.4), but which are highly effective if applied in complementary ways. The appropriate mix of interventions will depend on the specific context.

	Dietary diversification	Food fortification	Supplementation	Public health measures
Iodine deficiency disorders	Sea foods Reduce goitrogens	Salt Water Baby foods Condiments Flour Milk	Iodized oil Potassium iodide tablets	Legislation Enforcement Salt monitoring Primary health care
Vitamin A deficiency	Green leafy Vegetables Orange Fruits/vegetables Red palm oil Animal foods	Sugar Salt Milk powder Baby foods Condiments	Administration of massive or small doses	Prevention of infections: – immunization – antiparasitics – environmental health
Anaemia	Green leafy Vegetables Pulses Fruits/vegetables (vitamin C) liver, red meat Avoid tea/coffee with meats	Salt or Cereal Flour Condiments	Iron/folate tablets Parenteral iron	Prevention of infections – Immunization – Antiparasitics – Environmental health

Table 12.3: Approaches to prevent micronutrient deficiencies Strategies to Combating Public

There are several points which need to be considered in selecting/implementing an intervention strategy. These are illustrated next:

- Epidemiologic considerations:
 - prevalence of the specific micronutrient deficiency
 - severity of the specific micronutrient deficiency
 - geographic extent/clustering of the micronutrient deficiency
 - specific groups or subgroups affected
 - cause of the deficiency (single, multiple)

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- Level of country development: This aspect for example will influence the selection of strategies like food fortification which entails that food processing facilities, preferably centralized, must exist.
- Capacity country to implement and sustain the intervention
- Cultural considerations

typical diet

symbolic, ceremonial meaning of food/meals

Circumstances in which the various interventions may be appropriate in conjunction with advantages and disadvantages of the main interventions are presented in Table 12.4.

Intervention	Appropriate for:	Advantages	Disadvantages/ Challenges
Supplementation	Therapeutic treatment Prevention programmes (target groups)	Timely Sustainability	More costly than other measures Narrow scope of coverage
Fortification	Prevention (Universal)	Highly cost- effective Wide coverage Sustainable	Requires participation of food industry Does not lead to awareness building and changes in wider dietary habits
Dietary Diversification	Prevention (Universal)	Highly cost effective Wide Coverage Sustainable	Requires changes in eating behaviour Requires economic development to be feasible Require change in agricultural policies

Table 12.4: Interventions - appropriateness, advantages and disadvantages

An important advantage of food-based strategies is that foods provide many micronutrients simultaneously. Food-based approaches (i.e. fortification and dietary diversification) have the additional benefit of integrating micronutrient control programmes, and interactions are avoided between potentially concentrated- dose supplements. The long-term goal of intervention should be to shift away supplementation (which may be appropriate in the short-term for dealing severe deficiency) toward a combination of food fortification and dietary diversification. In other words, as the prevalence and level of severity for a given deficiency decreases, in a population the interventions should favour food-based approaches.

Having gone through the strengths and limitations, you would agree that an appropriate combination of interventions depending on the specific context should be considered. Although, the three major micronutrient deficiencies have

many different causes potential solutions, opportunities exist to coordinate micronutrient deficiency control programmes.

The advantages of programme coordination include:

- reductions in costly duplication,
- avoidance of unconstructive competition for funding (for example, joint grant applications may increase the likelihood of obtaining funding for all programmes),
- opportunity for combined information, education and communication efforts.
- opportunity for holding joint training sessions, and
- an increased likelihood of reaching policy makers with effective messages.

However, to be efficient and effective, strategies must incorporate a means of programme monitoring such that ongoing feedback occurs and programmes are improved in response to feedback.

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Check Your Progress Exercise 3

1. "Supplementation as a short term strategy is effective to combat malnutrition".
Comment on the statement giving appropriate justifications

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2. Enumerate the limitations of adopting supplementation as a strategy to combat malnutrition.

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3. What points would you consider in selecting/implementing an intervention strategy?

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12.7 LET US SUM UP

Various strategies can be adopted for the prevention of public nutrition problems prevalent in our country. In this unit we studied about the food-based and the nutrient based strategies to prevent malnutrition. Among the food based strategies, diet diversification, fortification, horticulture intervention, as well as, nutrition and health education were covered. We studied that these food based strategies are the most cost effective means to tackle the public health problems and are in fact the long term measures. As compared to the food based strategies, supplementation is the medicinal approach, to combat the public nutrition problems. Supplementation as a short term strategy to prevent micronutrient deficiency particularly, iron

and vitamin A deficiency, is most common in many countries. But, it has various limitations. Therefore when we talk about strategies, an appropriate combination of interventions, namely diet diversification, fortification, horticulture intervention, nutrition and health education, supplementation may be considered, depending on the specific context.

12.8 GLOSSARY

Intramuscular Injection : Injection of medicines into muscle for treatment of disease.

Malnutrition : Condition occurring due to deficiency or excessive intake of nutrients.

12.9 CHECK YOUR PROGRESS

- 1). What are food-based strategies? What are their benefits.
- 2). Discuss the role of dietary diversification in combating public nutrition problem.
- 3). What is food fortification?
- 4). Enumerate the limitations of adopting supplementation as a strategy to combat malnutrition.

13

STRATEGIES TO COMBAT PUBLIC NUTRITION PROBLEMS - 2

STRUCTURE

- 13.1 Learning Objective
- 13.2 Introduction
- 13.3 Immunization
- 13.4 Supplementary Feeding Programmes
- 13.5 Improving the Quality of Food Produced by Genetic Approaches
- 13.6 Clean Water, Sanitation and Street Foods and Strategies to Improve the Street Foods
- 13.7 Improving Food and Nutrition Security
- 13.8 Let Us Sum up
- 13.9 Glossary
- 13.10 Check your Progress

13.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- enumerate the immunization schedule available in on country to prevent the spread of major diseases,
- describe India's major supplementary feeding programmes and some of the successful programme strategies that have worked,
- explain the latest available facts regarding genetic foods and how to distinguish between benefits and non-benefits of genetic food
- describe the importance of clean water and improved sanitation as an important strategy to combat malnutrition, and
- elaborate on the efforts made by India to improve food production and the challenges that remain.

13.2 INTRODUCTION

In Unit 12, we studied about some of the strategies such as food based approaches (for example, dietary diversification, food fortification and horticultural interventions)

to combat malnutrition. We continue our study of strategies in this unit. The unit will focus on five other different strategies, namely, immunization, supplementary feeding, genetic/ food biotechnology, improving water and sanitation services and food and nutrition security to combat malnutrition. As you read through this unit, you will get the perspective that a single strategy may not be sufficient to alleviate large problem of malnutrition in our country. We may require more than one strategy, if we really want to make an impact in alleviating malnutrition.

13.3 IMMUNIZATION

Immunization, you might already know, is a process that increases an organism's reaction to antigen and therefore improves its ability to resist or overcome infection. Antigen can be any substance (as a toxin or enzyme) that stimulate the production of antibodies. In this section, we will focus on the different aspects specific to immunization i.e. what is the importance of immunization? What are the common vaccine preventable diseases? What is the national immunization schedule? Let us start our study of immunization by first understanding why immunization is important.

13.2.1 Importance of Immunization

You have learnt in Unit 3 that infection contributes to malnutrition in children by affecting growth. Therefore, it becomes very important to prevent infection in children so that they grow well. Immunization is one of the most cost-effective methods of preventing infections and a critical strategy to combat public nutrition problems. Immunization protects against several dangerous diseases by increasing body's ability to fight these diseases. Thus, immunization prevents

- lifelong physical and mental disabilities, and
- death from dreaded diseases

What are these dangerous diseases which can be prevented through immunization? Let's find out

13.3.2 Common Vaccine Preventable Diseases

The diseases which are prevented by immunization are known as Vaccine Preventable Diseases. Most common diseases which are prevented by immunization are: Tetanus, Poliomyelitis, Diphtheria, Pertussis, Measles and Child Tuberculosis. Let us learn about these diseases. We will start with Tetanus first

- Tetanus: Tetanus is caused by a toxin produced by the bacillus — *Clostridium tetani*. The organism is generally found in animal faeces. The disease is common in the age group of 5-40 years as this age group is predisposed to all kinds of injuries and the risk of acquiring tetanus is higher. In India and other tropical countries, tetanus of the new born infant is very common due to bad hygiene practices followed during delivery, particularly, for cutting the umbilical cord by the untrained traditional midwives (dais). Women, particularly those in the

reproductive age group of 15-45 years, are at a higher risk, especially after abortions and deliveries conducted under primitive conditions in the rural and tribal areas.

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Let us learn about poliomyelitis next.

- Poliomyelitis is an acute communicable disease caused by a virus. It is principally an infection of the alimentary tract but affects the central nervous system often leading to paralysis. It is essentially a disease of infancy and childhood. The most vulnerable age is between 6 months and 3 years.

Let us go over to diphtheria now.

- Diphtheria: Diphtheria is an infection of the throat, nose or larynx and is caused by the bacteria, *Corynebacterium Diphtheriae*. It is most common in infants and children but adults can also be infected with the disease. In the most common form of disease, a thin membrane is formed in the throat. The infection can cause complications in heart and nervous system. Let us now discuss pertussis.
- Pertussis: Pertussis or Whooping cough is caused by the microorganism *Bordetella pertussis* or the pertussis bacillus. Whooping cough is an acute highly communicable infection of the respiratory tract. It is primarily a disease of infants and children. The disease takes a serious form in malnourished children and may lead to death.

Let us move on to measles.

- Measles: Measles is an acute communicable viral disease, and is the most serious of the common childhood diseases. Usually it causes a rash, high fever, cough, runny nose and watery eyes lasting 1 to 2 weeks. It is responsible for many child deaths because of complications from pneumonia, diarrhoea and malnutrition.

Lastly let us get to know about tuberculosis.

- Tuberculosis: Tuberculosis is a chronic disease caused by *Mycobacterium tuberculosis*. It causes cough, fever and weight loss. It is transmitted by droplets from sputum of infected persons particularly during coughing. Although it can occur at any age, it is more prevalent among males over 45 years of age belonging to low income group. It is an important cause of disability and death in many parts of the world.

From the description about the common diseases you can see that these can be very fatal. Therefore, vaccines against these dreaded diseases are given to all the infants and children. Tetanus vaccine is given to pregnant women. Let us now get to know the immunization schedule as is being adopted in our country.

13.3.3 National Immunization Schedule

You must have heard about your friends and relatives taking their children to the doctors or health centers for immunization. There is a certain schedule of immunization which they have to follow. So what do we mean by an immunization schedule. The schedule that tells us when and how many doses of each vaccine

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should be given is called an immunization schedule. It is important for us to know that the vaccines must be given to individuals (infants, children and women) at the right age and the right dose. Full course must be completed to give the best possible protection to the beneficiaries

You would realize that each country follows its own immunization schedule depending upon the disease/disorders prevalent in that country. In India, we follow an Immunization schedule, as is given in Table 13.1, under which two doses of tetanus toxoid (TT) are given to pregnant women, three doses each of oral polio vaccine (OPV) a triple injection of diphtheria, pertussis and tetanus (DPT) and one dose each of BCG and measles are given to infants. Look up Table 13.1 carefully and check the age, vaccine and dose provided.

In Table 13.1, you would also notice few booster doses included at specific ages. What is a booster dose? A booster dose is an additional dose that makes sure that the first dose was effective. Booster doses of vaccines are given to children to ensure full protection. Booster doses of OPV and DPT is given around the age of 16-24 months and a booster dose of DT is given around 5-6 years of ages. In addition, two TT doses are given at the ages of 10 and 16 years.

Besides the vaccines for infectious diseases, oral prophylactic dose to prevent certain nutrient deficiency disorders is also given. For example, oral prophylactic dose of vitamin A is given at 9 months along with measles vaccine. Thereafter, 6 monthly dose of vitamin A is given to children till 3 years of age. You may recall reading about administration of Vitamin A doses under "National Prophylaxis Programme for Prevention of Blindness due to Vitamin A deficiency".

To Whom	When	Vaccine	Number of doses
Women	Pregnancy	TT	2 (one in early pregnancy and other one month later)
Infants	At birth	BCG	1
		OPV	"0" dose
	6 weeks	DPT	1
		OPV	1 st
		BCG (if not given at birth)	1
	10 weeks	DPT	2 nd
		OPV	2 nd
	14 weeks	DPT	3 rd
		OPV	3 rd
	9 months	Measles	1
		Vitamin A prophylaxis*	1**
	9-18 months	Measles, Mumps, Rubella (MMR)	1
16-24 months	DPT	booster	
	OPV	1 st booster	
Children	5-6 years	DT	2 nd booster
	10 years & 16 years	TT	2

Table 13.1: National immunization schedule

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* Given 6 monthly till 3 years of age (total 5 doses)

Another aspect, we need to highlight is that immunization is absolutely essential. Minor illnesses, including mild fever coughs and colds, as well as, malnutrition, are not a contraindication to immunization. Immunization should be postponed only if children are seriously ill or have high fever as any aggravation in the condition of the child may be attributed to immunization. The children should, however, be immunized as soon as they recover. The longer the immunization is delayed, remember the longer the child is exposed to the risk of infection.

In this section you learnt about, immunization as a strategy to combat malnutrition. If the children are protected from diseases by immunization, they would be healthier and less likely to become malnourished. In the next section, we would learn about the second strategy to combat malnutrition, that is, supplementary nutrition. how before we move on to this section let us recall what have learnt so far.

Check Your Progress Exercise 1

1. Explain the term "immunization" and its relevance as a strategy to combat malnutrition.

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2. Name the six common vaccine preventable diseases.

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3. Fill in the blanks:

a) Pregnant women receive two doses of toxoid.

b) BCG is given to infants at.....

c) Infants receive triple injection of along with oral dose at 1 ½ months, 2 ½ months and 3 ½ months, respectively.

d) Measles vaccine is given to infants at the age of months,

e) A booster dose of DPT and polio is given to children at months to give added protection from diseases.

Let us now move on to the next strategy i.e. supplementary feeding to combat public nutrition problems.

13.4 SUPPLEMENTARY FEEDING PROGRAMMES

Supplementary feeding in literary terms means extra food or the food which makes up for a deficiency in the normally consumed diets of individuals. In this section, we will learn about what supplementary feeding means as a strategy to combat malnutrition and why it is required? In Unit 10, we have already learnt about various nutrition intervention programmes where supplementa—yfeeding is an important component.

Here, we will briefly review the supplementary feeding component of these national programmes. Before we discuss this, let us first understand what is meant by supplementary feeding.

13.4.1 Supplementary Feeding

Supplementary feeding, is the food provided to pregnant, lactating women and children, adolescents to fill the gap between the average calorie intake and national recommended dietary allowances. It addresses the problem of food and nutrition security in the vulnerable population and provides extra calories and nutrients for growth and development at the critical stages of life cycle. You should remember that supplementary feeding aims only at supplementing and not substituting the family food. Let us look closely as to why, at all, we need to provide supplementary feeding to vulnerable population.

You have learnt in Unit 9 that National Nutrition Monitoring Bureau conducts dietary surveys in the country on a regular basis. Surveys from National Nutrition Monitoring Bureau show that about 30% of households in India consume less than 70% of energy requirements. Diets of children under the age of 5 years are far more inadequate than those of adults and are well below the recommended dietary allowances. Dietary surveys also show that diets lack in micronutrients such as iron and vitamin A. About 80% of the individuals consume diets which provide less than half of recommended allowances. Problems of inadequate dietary intake are more pronounced in the low income households.

So what are the outcomes of consuming a nutritionally poor diet and benefits of food supplementation, especially in vulnerable population, like pregnant women? Various research studies in developing countries have shown that in pregnant women, a reduction in dietary intake below the habitual levels and increased workload above the habitual levels are associated with deterioration in maternal nutritional status and reduction in birth weight of infants. Research has also shown that in such cases if the pregnant women are given adequate continuous food supplementation and antenatal care, there is substantial improvement in the outcome of pregnancy including birth weight and neonatal mortality. Similarly for children (1-6 year old), "catch up growth" is possible with food supplementation. The term "catch up growth", of course, means that the child catches up on the growth that could not be achieved earlier. If we provide the children (in the age group of 1-6 years) with right inputs, that is extra food, clean water and hygienic conditions, it is possible for these children to make up for the earlier deficits in growth and development.

It is for these reasons that government of India has included food supplementation as an integral component in some of its major programmes so that pregnant women, lactating women and young children can benefit from food supplementation. You have already learnt about these programmes in Unit 10. In this unit, we will consolidate our knowledge and recapitulate the supplementary feeding component of various intervention programmes.

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13.4.2 Intervention Programmes to Combat Undernutrition

We already know that there are many programmes in the country run by non government and government organizations which have supplementary nutrition as an integral part of their intervention activities to combat malnutrition. In this section, we would discuss seven such programmes. We would learn about three major government programmes and four large Research Action Programmes (RAPs). Research action programmes are those whose strategies have worked for the ICDS and have been integrated into state level or regional level ICDS programme. Of the three government programmes, two are implemented through anganwadi centers (a grassroot infrasuucture based in the community) and the other one is implemented in the schools. These are listed in the Table 13.2.

Implemented through anganwadi centers	Implemented through schools	Research action programmes
1) Integrated Child Development Services (ICDS) 2) Pradhan Mantri Gramodhya Yojana (PMGY)	National Mid Day Meals Programme	1) Project Poshak (1970-75) 2) The Integrated Nutrition And Health Project (INI-IP) in Eight States of India (1996-2006) 3) The Bal-Poshan Project, Rajasthan (1993-2003) 4) The Regular Incorporation of ARF in The Ready-To-Eat Complementary Food for the 'Under 3s' in the ICDS of Karnataka, Tamil Nadu, Andhra, Kerala, and the Union-Territory of Pondicherry (1992-Continuing)

Table 13.2: Supplementary food programmes

Let us study about the supplementary feeding components of each Of these programmes. Let us start with government programmes implemented through anganwadi centers. We will start with ICDS.

A. Programmes implemented through anganwadi centers

Integrated Child Development Services

We studied about the objectives, target group and services provided by Integrated Child Development Services (ICDS). In this section we will once again recapitulate the supplementary feeding component of ICDS.

The supplementary feeding component of the ICDS, we learnt, aims at providing food supplements to the vulnerable groups. The objective of providing supplementary food is to supplement the home diet i.e. add extra food to the home diet of the individuals so as to fill the gap in energy and protein intake and meet the RDI's for these individuals. The type of food supplements in the ICDS

programme varies from state to state, from ready-to-eat food to hot cooked meals at the anganwadi. The caloric and protein content of ICDS food supplements is given in the Table 13.3.

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S.No.	Recipients	Calories	Protein gm
1.	Children 6 months to 6 years	300	8-10
2.	Adolescents*	500	20-25
3.	Pregnant and lactating women	500	20-25
4.	Malnourished children (at or below grade 3 rd and 4 th)	Double the daily supplements provided to other children i.e. 600 and/or special nutrients on medical recommendation	16-20

Table 13.3: Calorie and protein content of food supplements provided at anganwadis

* Supplementary feeding provided to adolescents in some states only

In Table 13.3, you would note that adolescent girls are also included as beneficiaries for supplementary food but in practice supplementary food is provided to adolescents in some states only. This is not a routine practice. In the ICDS programme, the emphasis was initially on providing cooked food through on-the-spot feeding in the anganwadi because it was believed that:

- this would ensure that the targeted child would get food supplements, which would not be shared between other members of the family, and in
- the anganwadi centers would provide practical nutrition education to women on cooking and feeding young children.

However, on-the-spot cooked food feeding programme are found to have several disadvantages as well. These are:-

- children especially those in the age group of 6-36 months could not consume the entire amount of food provided because of a small stomach capacity,
- even if older children do eat the food provided in the anganwadis, this acts mainly as a substitute, and not an addition, to home food,
- the most needy segments viz., children in the critical 6-36 month age group and women, were not able to come to the anganwadis daily and receive the food.
- providing food supplements only to the children from Below the Poverty Line(BPL) families or those with undernutrition was not possible as it was difficult to feed one child and withhold food from another in the same anganwadi,
- cooking food, feeding the children and cleaning the vessels at the anganwadi took up most of the time of the anganwadi workers and helpers, leaving them little time for other important activities such as growth monitoring, nutrition

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education, or preschool education,

- in any mass cooking and feeding programme, the monotony of the food provided and relatively poor quality of the preparations was a problem,
- cooking in poor hygienic conditions and keeping left-over food resulted in bacterial contamination of food, and
- undernourished children, even those in the 3-6 year age group, if given double rations, did not consume all the food at one sitting in the anganwadi.

So as for today, the supplementary food in most cases is, ready to eat, which is distributed at the anganwadi centers.

Let us move on to the next programme i.e. Pradhan Mantri Gramodhaya Yojana.

● **Pradhan Mantri Gramodhaya Yojana**

Pradhan Mantri Gramodhaya Yojana (P M G Y), aims to achieve the sustainable human development at the village level. It provides for basic minimum services of rural roads, primary health, primary education, shelter and drinking water and nutrition in order to focus on these priority areas. The nutrition component of P M G Y specifically provides food supplementation to children 6 months - 3 years of age through take home ration as this age group is not able to attend anganwadi centers on a daily basis. The guidelines for provision of calorie and protein content of food supplement are same as those for ICDS, since it supplements the ICDS scheme. The nutrient contribution of the supplement is given in Table 13.3. There is a shift in focus from providing cooked food at anganwadis to take-home food supplementation under the PMGY. Undoubtedly, the take-home food supplements provided will be shared with the family, but that would add to household food security. When coupled with nutrition education, the undernourished persons may get their due share.

Let us now learn about the research action programmes whose strategies have worked for ICDS. These are the programmes which had been or are being implemented in the country. Let us get to know about these programmes now.

B. Research Action programmes

- **Project Poshak, Madhya Pradesh (1970-1975)**

Project Poshak was a macro integrated nutrition pilot study that was conducted in villages in 12 districts of Madhya Pradesh (MP) during 1971-1975. The project aimed to test the operational feasibility, cost effectiveness and nutritional impact of a "Take- Home" food supplement, health care services, and childcare education through 88 PHCs and 210 SHCs to tribal and rural children (6-36 months of age) and pregnant/ lactating women.

The major executing partners of the project were the Departments of Public Health and Family Planning (GOMP) and the Department of Tribal Welfare in MP (TWD), and CARE-Delhi and CARE-MP. The major funder was USAID, New Delhi. UNICEF, Delhi provided some financial support for the childcare education component. The Ministry of Social Welfare and the Planning Commission of Government of India evinced a keen interest in the progress and outcome of this

pilot study. What was the rationale behind starting the Project Poshak? Let's find out.

In 1969, the Secretary (GOMP) suggested to CARE-MP that it would be of great benefit to the tribal and rural mother and child (MCH) groups if a nutrition programme could be introduced through the PHCs and SHCs of the State's 17 tribal districts. Since the tribals in particular lived in far flung hamlets, it would not be possible to have a traditional "On-site" or "Spot Feeding" that was in vogue in the then ongoing national Special Nutrition Programme (SNP). The only alternative was to offer a "Take-Home" where the MCH group would have to come in only once a week or once a fortnight to collect the ration. By doing so they would be introduced to the various other PHC services including family planning. It would also be the most graphic and practical way of offering both the "providers" (PHC/SHC staff) and the "receivers" (recipient communities) Nutrition Health Education (NHE) on the need to feed sufficient quantities of food to the "below threes", pregnant and lactating women. Even at the planning stage cognizance was taken of the possibility of sharing of the "Take-Home Food". The "Take-Home-Food" ration component of the programme consisted of 200 g for the pregnant/lactating woman and 100 g for the child beneficiary of Instant Com Soya Mixture or ICSM (sweetened and containing a vitamin-mineral premix) per day for 14 days. The cost of delivering "Take-Home Food" and other Poshak Inputs/child/annum was about Rs.110 only for "Take-Home Food" under realistic programme conditions. It increased to about Rs.200 with supervision and the delivery of health care and educational inputs. However, the cost was about Rs.300 if the food collection was "On-Site" and not a "Take- Home".

Let now move on to another research action programme i.e. The Integrated Nutrition and Health Project

The Integrated Nutrition and Health Project (INHP) in Eight States of India (1996-2006)

The Integrated Nutrition and Health Project (INHP) is a ten-year project (1996-2006, with two phases of 5 year each) implemented by CARE with the goal of achieving "sustainable improvement in the nutrition and health status of women and children".

The project is implemented in partnership with the Women and Child Development and the Health and Family Welfare Departments of Government of India,

Governmental Organizations and Community Based Organizations with support of United States Agency for International Development (USAID). The INHP works with families having pregnant women, lactating women and children under 2 years of age (Under 2s) in eight Indian states reaching approximately 100,000 Anganwadi Centers (AWC). The programme is so designed as to strengthen and complement the ICDS programme.

The review of the first phase of the project highlighted two unique features of the INHP. These were take home rations and convergence of health and nutrition services at the anganwadi centres. Let us look at these in detail:

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"Take-Home-Rations" or THRs: The review highlighted that the THR strategy for children, the pregnant and lactating mothers had several advantages. It showed that THR strategy:

- had very high geographical reach,
- covered the majority of "under 2s",
- was convenient for the mothers ,
- was less expensive than 'fed-on-site',
- minimized cross Infections,
- treated undernutrition in its milieu,
- provided more emotional security to the child as child was fed in her/his home,
- was the most practical 'child-care-education' for the mother, and
- most importantly ensured weight gain inspite of 'sharing of the THR.

Let us look at the other feature.

Convergence of Health and Nutrition Services at the Anganwadi: It provided for convergence of health and nutrition services at the Anganwadi on a pre-specified date and time. The nutrition and health days were usually held twice a month or once a week. The supervisor, Anganwadi Worker (AWW), the helper, Auxiliary Nurse Midwife (ANM), the community change agent were present on nutrition and health clays. On these days, THR rations were distributed, the 'under 2s' are weighed, and nutrition and health education was given. The mothers willingly helped and participated. "The INHP version of the ICDS" has reached programme scale in 2003.

Let us now move on to the third research action programme.

• **The Bal-Poshan Project, Rajasthan (1993-2003)**

The Bal-Poshan Project was an improved ICDS model implemented in five districts of Rajasthan from 1993 to 2003. The project involved the participation of Self Help Groups (SHGs) who made the Amylase-Rich-Food (ARF) from wheat grains and sold it to ICDS who distributed the 'ARF-Packets' in their weekly THR. Now what is amylase rich food? Well, amylase rich food is germinated cereal flour which is rich in an enzyme " Amylase". ARF reduces the viscosity of cereal based gruel by breaking down the starches present in it. Thus, if added to a cereal based food for an infant, ARB will make the Food thinner so that the infant can consume it easily.

The unique features of Bal-Poshan project were:

- The responsibility for caring for the children under 3 years of age was transferred to the parents. In the weekly TI-IR, paediatric iron-folate-tablets, deworming tablets (if required), the weekly ration of staple grains and oil were also given.
- Simple information - education-communication was incorporated in the project regarding the use of the various components of the THR namely, ARF, iron folate tablets, grains/oil etc.

- The Anganwadi center was ensured to have adequate stocks of common medicines such as ORS, anti-malarials, and deworming tablets.

You can see for the first time how SHGs were involved in preparing nutritious supplement for under 3 children in the ICDS programme. So in the true sense, Bal-Poshan project contributed to providing supplemental food to ICDS.

Let us look at the fourth research action programme.

- The Regular Incorporation of ARF in The Ready-To-Gat Complementary Food for the 'Under 3s' in the ICDS of Karnataka, Tamil Nadu, Andhra, Kerala, and the Union-Territory of Pondicherry (1992-Continuing)

The regular incorporation of ARF in the Ready-To-Eat complementary food for children under 3 years of age (U3s) in the ICDS centres of Karnataka, Tamil Nadu, Andhra, Kerala, and the Union-Territory of Pondicherry began in 1992. This research action programme, as the name suggests, involves adding ARF to ready to eat complementary food for children under 3 years of age. The underlying principle of this programme is that 'U3s' need both their macro as well as their micronutrients day-in and day-out. An infant of one year of age requires half of what his father eats, or about 1,200 Kcal / day. He/she needs nutrient dense yet low bulk foods that will satisfy his macro hunger for calories and protein, and his micro-hunger for vitamins and minerals. Hence, a THR of grains will not do for this special category. She / he need a RTE-THR. This helpless and hapless child is in a chronic state of hunger. Further an infant born of an undernourished mother, suffers even more from iron, zinc, vitamin A, B-complex and vitamin C deficiencies. The miracle of ARF is that it literally 'liquefies' as an almost solid to semi-solid-gruel which the 'U3s' usually get.

The various factories making the RTE food for the 'U3s', routinely add 5 to 7% ragi malt to the RTE - processed and precooked complementary food-powder. Actually, barley malt is the most powerful ARF, where only 1 to 2% of the malt needs to be added to the RTE - complementary food. However, since the procedure for sprouting ragi is well-known in South India, the Karnataka Agro Corporation (Ltd.) (one of the companies making RTE) sub-contracts self help groups (SHGs) to sell them the ragi-ARF. However, it is important to know that while preparing RTE complementary food, the use of safe water is essential in the sprouting process. This has been one of the problems of SHGs, namely, lack of hygiene and lack of safe water. It is, therefore, essential that the entrepreneurs or SHGs set up safe and hygienic units and evaluate the same from time to time with Hazard Analysis Critical Control Point (HACCP).

There are some recommendations which flow from the experience of implementation of this programme. These are:

- Social production, social marketing and social advertising should be our war and slogan for promotion of complementary foods.
- The need of the hour is the manufacture of sachets (like a shampoo sachet) for say, Rs.2/sachet. This sachet or sprinkler (as it is called in the USA) would contain recommended daily requirements (RDA) of vitamins / minerals for the 'U3s' +just 2g of a hygienically produced barley malt. Such a sachet / sprinkler

(packed in aluminium laminate) has a shelf-life of upto 3 years.
Let us now review the national programme implemented in the school.

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C. National Programme Implemented in Schools

• National Meals Programme (NMDM)

We studied about National Mid Day Meals Programme . We will briefly review the supplementary feeding component of the programme now.

We learnt that the supplementary feeding component of the programme consists of:

- 100 gram food-grains (wheat or rice) per child per school day where cooked meals are served,
- 3 Kg food grains per student per month where food grains are distributed.

You are probably aware that as of yet, not all the states provide cooked meals under the programme, although they are in the process of doing so. As of now, only 14 states and 7 UTS provide cooked meals to all primary school children, while 9 states provide cooked meals in some areas only. Four states are distributing food grains under the programme. According to a Supreme Court ruling in 2002, all states should provide cooked meals under NN'IDM. However, in the interim, until the institutional arrangements are made for providing cooked meals, states are providing food grains.

Since it is such a big programme, it will be good to learn about the systems set up in the country to monitor the food component of the programme. GOI has developed a computerized Management Information System with the assistance of the National Information Centre, New Delhi. The system provides for recording data on enrolment, eligible beneficiaries for NN'IDM, quantity of food grains allocated, lifted and utilized in each block. However, no State or UT has been able to sufficiently master the computerized format as yet

Thus, we saw how different programmes in the country provide supplementary nutrition to children, pregnant and lactating women. Of course, there is a lot to learn from these and there is also a scope for improving these programmes.

Check Your Progress Exercise 2

1. Explain the term "Supplementary feeding" and its relevance as a strategy to combat malnutrition.

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2. Enumerate the target group, calories and protein provided by ICDS food supplement?

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3. What are the research action programmes whose strategies have worked for CDS?

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4. Read the following statements carefully. Indicate whether each is true or false. Correct the false statement.

- a) Bal Poshak project in Rajasthan was a unique project, in which self help groups were involved in preparation of food supplements for young children.
- b) One of the disadvantages of on the spot cooked food feeding programme in ICDS is the poor out reach of 6-36 months old children.
- c) NMDM has helped to boost enrolment in primary schools.
- d) PMGY specifically provides food supplementation to children 3-6 years of age.
- e) Project Poshak was pilot tested in Rajasthan.

In the above section, we learnt about supplementary feeding and how various supplementary feeding programmes form an important strategy to combat malnutrition. Let us now move on to the next strategy to combat public nutrition problems. This strategy focuses on how we can improve the quality of food or nutritional value through genetic or food biolechnology.

13.5 IMPROVING THE QUALITY OF FOOD PRODUCED BY GENETIC APPROACHES

Genetic or food biotechnology is a plant breeding science, It means the transfer or the implantation of a gene(s) that is abundant in another plant or living organism species to the one that is to be enriched. Genetic or food biotechnology can help us to improve the nutritional situation of people in two ways. First, this approach can help us to improve the nutritional quality of staple foods. Secondly, it can help us to produce crops which have greater resistance to external harmful agents (e.g. pests etc.).

Certain staple foods like wheat, rice and potato can be enriched with carotene, iron, zinc and the amino acid - lysine - using genetic/food biotechnology. Genetic approaches have been successful in producing β -carotene-rich wheat, β -carotene- rich maize, β -carotene-rich potato, 13-carotene-rich-sweet-potato, β -carotene-rich cassava. Action-research is required to assess producer (farmer), manufacturer, and consumer acceptance.

Food biotechnology can help in enriching the vitamin, mineral and amino acid content of-certain staple foods. Let us look at the second aspect of food biotechnology in improving nutritional situation, that is, how it can be used to show improved resistance to external harmful agents.

Genetically modified foods have been shown to exhibit improved resistance

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to several harmful agents such as virus, insects and herbicides. They have also shown improvement in the shelf-life. There are many advantages which have been demonstrated in genetically or biotechnologically modified crops. The Malaysian Agricultural Research and Development Institute, Malaysia has done excellent work with respect to rice, papaya and palm oil. Some of these advantages are:

- rice strains are more resistant to the tungro spherical form virus,
- rice strains are more resistant to the bacilli form virus,
- rice strains are more tolerant to herbicides,
- rice strains are more resistant to insects,
- papaya strains are more resistant to ring-spot virus,
- papaya strains have an improved shelf-life,
- oil palm strains have oil quality improvement,
- oil palm strains, have resistance to herbicides,
- oil palm strains have resistance to insects, and
- oil palm strains have resistance to fungus.

Thus, we studied that genetic modification of food can go a long way in combating the problem of malnutrition in India. However, policy makers, implementers, producers and consumers should be educated about the merits and demerits of genetically modified foods

In the above section, we learnt about how genetic/food biotechnological approaches can help to improve the quality of food and offer great opportunity to reduce malnutrition in India. In the next section, we will learn how improving water and sanitation is an important strategy to alleviate malnutrition. Let us move on to this strategy.

13.6 CLEANWATER, SANITATION, STREET FOODS AND STRATEGIES TO IMPROVE THE STREET FOODS

Access to clean water and sanitation is a very important strategy to combat malnutrition. If the clean water and proper sanitation are not available to families and communities, the individuals can suffer from water borne infections. Infections, as you know, cause malnutrition. You have already read about vicious cycle of malnutrition and infection in Unit 3 under causes of malnutrition. Thus it is important to provide clean water and proper sanitation to people, so that people are prevented from these infections and stay in good health.

This section is divided into three parts. In the first part, we will learn about the importance of clean water, how water gets contaminated and the harmful effects of contaminated water. We will also learn as to how we can improve the quantity and quality of water supply in our country.

In the second part, we will learn about sanitation and some strategies to

improve urban sanitation in India. We will also review some success stories, which have helped to improve sanitary services in India.

In the third part, we will learn about street foods and review two case studies, which demonstrate how street foods can be made more hygienic and safe.

Let us begin by understanding the importance of water, how the water gets contaminated and the harmful effects of contaminated water.

13.6.1 Importance of Clean Water, Reasons for Water Contamination and its Harmful Effects

Water is essential for life. In fact, one can survive without food for weeks but not without water. Water is a macronutrient made up of two elements, namely hydrogen and oxygen. Vegetables contain 70% to over 90% water, so do fruits. Even cereals contain over 10% water. If the food we eat is grown on contaminated soil (chemical effluents, or containing large amounts of human excreta), then, the roots of the food-plants or crops will suck up this contaminated water and in turn infest or infect the human beings who consume these plant foods. This is becoming a perennial problem in our 21st Century. As for the water we drink, the source of water in most urban areas is neither clean nor safe. Very often the mains (large tubes conveying water from the source) and tubes, are contaminated with sewerage mains. Water contaminated with faecal matter forms the single most important factor in the spread of gastro-intestinal diseases (diarrhoea, dysentery or even cholera). Tube-wells are a common sight these days. They also are the culprit for the spread of gastrointestinal disease. Here again sewerage can easily enter shallow tube wells.

Let us now move on to how we can improve the quantity and quality of water supply in our country.

Quantity of Water: It has been predicted that by mid-century (2050) water will become so scarce that wars will be waged for water. India is fortunate in that it has a perennial source of water from the Himalayas. We also have an extensive coast-line where future technology can also transform or convert sea water to drinking or potable water as in Israel. However, what is little realized is that the quantity required for drinking / cooking / washing purposes is just about 10 to 15% of the total quantity of available water. Most of the water is used in irrigation. Here again, genetic or biotechnology, can create seed strains that require much less water. Drip irrigation is another avenue to save water.

Quality of Water: India has constituted the Rajiv Gandhi Water Commission in 2000 to make improved quality of drinking water and sanitation services available to people. In the urban setting, the Water Boards (who oversee the distribution of water) could do the following:

- Replace all water and sewerage mains.
- Oversee and regulate the depth that tube-wells should be bored. They should be community, colonies and habitations-specific
- Set-up water purification plants at the source from where water will be drawn

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and distributed.

- Continuously test water, samples at source (rivers tanks) and at end delivery points, namely, public taps or tube-well taps. Take immediate and necessary action.
- Levy a small fee for water management to all i.e. slums, to the High Income Groups (HIGs).
- Control the huge inflow of rural population pouring into urban areas. Set-up 'migrant-shelters' on the fringe of urban settlements, Provide safe water (quantity and quality).
- Set-up washing areas in our 'mandi' markets and mandate that only clean and washed vegetables and fruits will be sold.
- Encourage rain-water harvesting wherever possible, starting with Public Institutions, e.g. Government Offices
- Provide micro-finance to the women in slums and Lower Middle Income (LIG) housing colonies to manage their own water requirements.
- Monitor the water and sanitation position during the rainy season.
- Make village Panchayats responsible for ensuring enough water (quantity and quality), the maintenance of taps and bore-wells and for rain-water harvesting.
- Encourage Food-for-Water-Management Schemes which can employ the youth of the village.
- Water and sanitation go hand-in-hand, especially in rural India where the concept of sanitation barely exists.
- Mandate that rural housing loans will incorporate the basics of water and sanitation.
- Since times immeinorial rural populations have been contaminating their water- sources. Hence, institute an appropriate Information-Education-Communication (IEC), starting with the Panchayat to the village school.
- Monitor water and sanitation position during the rainy season, monsoons.

You can thus see that Government of India is taking several measures to improve the quality and quantity of water supply.

Let us now learn about sanitation and some strategies to improve urban sanitation in India.

13.6.2 Urban and Rural Sanitation and Strategies to Improve

Sanitation

Sanitation has to be viewed as a package, namely, personal hygiene, family hygiene, community and environmental cleanliness. Sanitation is deplorable for the migrant population, the abjectly poor and the low income group (LIG) in India. Unless the communities who need it the most agitate for sanitary latrines and

maintain it, the situation cannot improve.

Let us review some strategies to improve urban sanitation:

- The slums should come forward and demand improved sanitation services.
- The Media should play an active role and influence the public and policy makers to provide for improved sanitation services.
- Women, especially those who stay at home, are the most affected and should be trained in the construction and maintenance of low cost latrines.
- As stated earlier, it is the migrant population who should be kept out of city limits, but provided with minimum levels of water and sanitation.
- Research development and technology is urgently needed for specific low cost latrines to suit different geo-hydrological conditions.

Now let us proceed to some success stories in India.

The Sulabh Sanitary Latrines are now a common features in all our big cities and towns. The concept of 'pay and use' has come to stay.

- SEWA in Ahmadabad, advances micro-credit to cvomen in the urban informal sector (Cart pullers, street-food vendors, construction workers) for housing which has to include a certain amount for water and sanitation.
- Ahmadabad Parivartan: Over 1000 slums (informal settlements) and nearly 1500 chawls (tenements), housing approximately 300,000 families had little or no access to basic urban services. In response to this growing problem, the Ahmedabad Municipal Corporation launched Parivarthan (meaning transformation) an ongoing programme which brings affordable and sustainable basic infrastructure services,

including water and sanitation, to these slums and chawls of Ahmedabad. The project brought together target communities, local NGOs, and the private sector in a meaningful partnership.

- SWAJAL - Uttar Pradesh: This World - assisted SWAJAL project has improved the rural water supply and sanitation services of over 10 lakhs people living in 1000 villages in the UP hills and Bundelkhand. The community willingly pays for operational and maintenance costs.
- The Rajiv Gandhi National Drinking Water Mission of the Government of India, has implemented national 58 district pilot project. This will help the rural poor in India to gain access to improved drinking water and sanitation services. Partnerships between NGOs, the Private Sector and the Water Mission have been formed in several districts.

Thus, we have several successful projects aimed at improving sanitation services in India. These need to be taken to scale before we could see significant improvement in sanitary conditions in India.

Let us learn now about street foods and review two case studies, one from Bangalore and the other from Kolkata, which demonstrate how street foods can be made more hygienic and safe.

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13.6.3 Street Foods and Strategies for Improvement

What are Street Foods? The term street foods describes a wide range of ready to eat foods and beverages sold and sometimes prepared in public places, notably streets. Street food vending is spreading rapidly all over the world. The popularity of street foods is due to several reasons viz. the modern life style compels both men and women to go to work giving less time to cook at home, easy accessibility of street food, the variety it offers, affordable costs etc. However, in several cases, street foods can become the cause of food borne disease due to unhygienic practices of the vendors and vending areas. Hence, all efforts have to be made to make street foods more hygienic and safe. The two recent case studies, one from Bangalore and the other from Calcutta, will demonstrate how this can be done.

Let us review the case studies now.

Case study from Bangalore

Improving the hygiene of street foods in Bangalore city — replicable strategy: The Foundation of Food Research and Enterprise for Safety and Hygiene (FRESH), Bangalore, an NGO established with the sole objective of creating food safety at all levels has initiated work related to food safety among street foods, canteens, hotels, restaurants and industries. FRESH has executed a project financed by WHO through the Ministry of Health, Government of India and has developed a successful Replicable Model to improve the hygiene of street foods.

Water used for drinking and washing was found to be contaminated in random samples with coliforms (faecal matter). Cut fruits had a high range of coliforms. Pathogens such Salmonella, Shigella and Vibrio were found to be present in both the samples of cut and fresh fruit. The presence of pathogens in mobile jamoon vendor was quite alarming indicating possible contamination from the vehicle used for carrying the sweetmeat and possibly improper washing of the container. Among snack items, the food analyzed were tomato rice, chitranna, dosa, onion chutney, bean sambar, Idli, and mobile dosa. All the samples were bought from the vendor as would be sold to the consumer, in order to get an indication of the microflora of all the hand contact surfaces, such as hands, plates, chutney etc. Chutney was a potential carrier of contaminants. Pathogens were found in almost all the samples of chutney analyzed. Pani puri and bhel puri form a very important group as the use of vendor's hands was rampant in this category. Chinese foods though generally heated to moderate temperatures were found to carry high counts of coliforms indicating insufficient heating and also mixing by hands could not be ruled out.

A consumer preference survey was also conducted to determine the consumer views/ thoughts/reactions on street foods and its vending process. The outcome of the Bangalore Study resulted in certain actions. The study was successful in: Convincing the City Municipality to set-up 'Food courts' with adequate water and sanitation facilities. In establishing that the food handlers, water and chutneys were the most contaminated. Strategizing "Hands on Training" as a positive tool towards improving the hygiene of street foods.

We will now look at another case study from Calcutta.

Case study from Kolkata

Street food: safety, risks und nutrition potentials:

In order to assess the quality of street foods and its management process, a study was conducted by the All India Institute of Hygiene and Public Health in collaboration with the Kolkata Municipal Corporation and the Kolkata Police supported by Food and Agriculture Organization of the United Nations. Based on the study an action plan was developed covering all sectors of street food vending viz., quality, management, environment, traffic control, pedestrian control, garbage disposal etc. for improvement of the quality of street foods in Kolkata. This eventually led to the Kolkata Model on Street Foods, which is being replicated in different cities of Asia and Africa.

The broad findings of the study were:

Clientele ranged from low income to middle to high income groups, Number of customers varied at different timings of the day, Each stall catered to approximately 65-70 customers a day, Fifty different varieties of foods and beverages were commonly sold at a cost ranging from 0.50 paise to Rs.8/- per serving, Customer preference was mainly for coffee, tea, bread, biscuits, cake, ghugni, chapatti / paratha with curly, futchka, churmur, idli, dosa, vada, samber, also highly preferred by customers, Nutritive value of street foods was satisfactory, Economically most viable viz. 1000cals were available for Rs.5/- or 200cals being derived from Re. 1/-,

Appearance, quality, smell and taste were satisfactory, Foods did not have any excessive amounts of fifth, dirt or dust, Chemical contamination was mainly through artificial food coloms, Microbiological quality of food and water sample was not satisfactory, which indicated the prevalence of coliform, E.CoLi, Salmonella, Shigella, Vibrio Cholerae, Klebsiella, Pneumonae, æcillus species in different foodstuffs.

Based on the above observations, a city plan of action was prepared with some important recommendations. These recommendations are - listing of vendors, identification of hawking areas, area-wise layout plan, proper coordination between Kolkata Municipal Corporation, Kolkata Police and Government of West Bengal, license to vendors, provision of potable water, garbage and waste water disposal facilities, awareness generation among regulatory bodies, vendors and consumers, regular analysis of food and water sample, traffic and pedestrian movement etc.

Thus, improving the hygiene of street foods, accessibility to clean water and sanitation services remain important strategy to combat malnutrition.

Check Your Progress Exercise 3

1. What is meant by genetic or food biotechnonology?

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2. Answer the following briefl
- a) Five different foods which have been successfully produced with enhanced content of carotene through genetic/food biotechnology.
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- b) Two important minerals that have been added to wheat and rice through geneticlfood biotechnology.
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3. What are the harmful effects of consuming contaminated water?
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4. Answer the following briefly
- a) Four main activities, which the water boards could take up to improve, water quality in the country.
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- b) Three important strategies to improve urban sanitation.
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5. Read the following statkments carefully. Indicate whether each is true or false. Correct the false statement.
- a) World bank assisted SWAJAL project has improved the rural water supply and sanitation services of over 10 lakhs people living in 1000 villages in th UP hills and Bundelkhand.
- b) Street foods can become the cause of food borne disease due to unhygienic practices Of the vendors and vending areas.
- c) In India, we have an excellent system to regulate the hygiene condition of the street foods.
- d) In the Bangalore study on Street foods, it was found that water and cut fruits were contaminated with coliforms.
- e) Based on the findings of Kolkata study on street foods, a city plan of action was prepared to improve upon hygiene situation of street foods.

In the above section, we learnt how improving drinking water and sanitation services is critical to combat malnutrition. Let us now review the last strategy, namely improving food and nutrition security to combat public nutrition problems.

13.7 IMPROVING FOOD AND NUTRITION SECURITY

We have studied in detail about food and nutrition security in Units 2, 5 and 10.

You have realized by now that improving food and nutrition security remains a very important strategy to combat malnutrition. People should have food accessibility and availability at all times, so that they have enough food in their homes to meet their energy requirements. In addition they should also consume foods of adequate nutritional quality. You also learnt in Unit 10 that for low income population, Public Distribution System (PDS) and Targeted Public Distribution System (TPDS) are important strategy to provide food at low prices. We also know that food and nutrition security is affected by regular food supply in India. Thus, we would learn how India has sustained its food production, but still, there are current problems, paradigm shift, and challenges that remain in this area. Although our government has made consistent efforts to improve availability of food for poor since the beginning of the first national plan, we would learn about specific efforts made by the government in the tenth national plan to ensure adequate availability of foodstuffs for the poor. You should remember that we should not always be dependent on the government to improve food and nutrition security. The community should also make efforts to improve the same. Thus, we will learn about innovative local efforts by the community and how these can contribute to achieving nutrition security for the poor population.

13.7.1 Sustainable Food Production to Meet Nutritional Needs

India has made great strides in improving food production in last 50 years and one of the major achievements in the last 50 years has been the green revolution and self-sufficiency in food production. Food grain production has increased four-fold, The Green Revolution ensured that the increase in food production stayed ahead of the increase in population. The country has moved from chronic shortages to an era of surplus and export in most food items. The country is self-sufficient in food grain production and currently there is a buffer stock of over 60 million tonnes. Along with the steps to achieve adequate production, initiatives were taken to reach foodstuffs of the right quality and quantity to the right places and persons at the right time and at an affordable cost. Over the years, there has been improvement in access to food through the PDS, the food for work programme has addressed the needs of the vulnerable out-of-work persons. The ICDS programme aimed at providing food supplementation for pre-school children, pregnant and lactating women, nearly covers all blocks in the country. The mid day meal programme aimed at improving diet my intake of primary school children and reduction in the school dropout rates has been operationalized.

However, now there is a paradigm shift from household food security and freedom from hunger to nutrition security. Although the food grain production has continued to increase steadily, there has been a decline in the production of pulses. Per capita consumption of fruits and vegetables also remains low. These items are also and available at affordable prices to poor. Poor people continue to have diets which are of low nutritional quality. Box I gives the progress achieved, current problems paradigm shift and challenges in the area of food production. Our challenge is, therefore, ensuring that adequate quantities of pulses or other protein rich foods such as milk, eggs, or meat, which are also in short supply, must

become more widely accessible, requiring increased production and improved distribution and consumption.

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Box 1	Progress Achieved, Current Problems Paradigm Shift and Challenges in the Area of Food Production.
FOOD PRODUCTION	
<i>Progress Achieved:</i>	
<ul style="list-style-type: none"> ● The country has achieved self-sufficiency in food grains to meet the needs of the growing population. ● There are ample food grain stocks. 	
<i>Current Problems:</i>	
<ul style="list-style-type: none"> ● 'Green Revolution Fatigue' in some areas. ● Productivity remains low. ● Improved food grain availability has not resulted in eradication of hunger or reduction in under-nutrition especially in vulnerable groups. ● Very little attention is being paid to achieve integrated farming systems that will ensure sustainable evergreen revolution essential for appropriate dietary diversification to achieve nutrition security. 	
<i>Paradigm shift needed:</i>	
<ul style="list-style-type: none"> ● From self-sufficient in food grains to meet energy needs to providing food items needed for meeting all the nutritional needs. ● From production alone to reduction in post harvest losses and value addition through appropriate processing. ● From food security at the state level to nutrition security at the individuals level. 	
<i>Challenges:</i>	
<ul style="list-style-type: none"> ● Continue to improve food grain production to meet the needs of the growing population. ● Increase production of pulses and make them affordable to increase consumption. ● Improve the availability of vegetables at an affordable cost throughout the year in urban and rural areas. 	
<i>Opportunities:</i>	
<ul style="list-style-type: none"> ● Achieve substantial improvement in nutrition security. ● Achieve decline in macro - and micronutrient under-nutrition. 	

So you learnt that although we have achieved good progress in achieving self sufficiency in food grains, we are still faced with many challenges and opportunities to improve food and nutrition security . So what does our government do to improve food and nutrition security Of the people. Our government has come up with certain measures to improve food security in the national tenth plan. Let us review these now.

13.7.2 Interventions Initiated during the National Tenth Plan to Improve Food and Nutrition Security

You probably know that our government has made consistent efforts to improve food production since the first national plan after independence. Let us specifically look at what the government plans to do in the tenth plan to ensure adequate availability of foodstuffs for the poor. These measures are listed below:

- Ensure production of cereals, pulses and vegetables to meet the nutritional

needs.

- Making them available at affordable cost throughout the year to urban and rural population through reduction in post harvest losses and appropriate processing.
- More cost effective and efficient targeting of the PDS to address macro – and micronutrient deficiencies (such as providing coarse grains, pulses and iodized/ double fortified salt to below poverty line (BPL) families through the targeted PDS (TPDS). Improving people's purchasing power through appropriate programme including food for work schemes.

Thus, these are some of the measures which government is taking to improve food security of Indian people. However, we should not always be dependent on the government to improve food and nutrition security situation, community should also make efforts to improve the same. Let us learn about some innovative local efforts by the community and how they have contributed to achieving nutrition security for the poor population. One of the examples of innovative efforts is community food banks. Let us learn about this next.

13.7.3 Community Food Banks

Innovative local efforts can go a long way in improving nutrition security especially for the poorer segments of the population living in vulnerable areas. Formation of local food grain banks under the supervision of the panchayati raj institution (PRIs) to help in achieving nutrition security for all and insulating the economically and socially deprived sections of the community from seasonal food insecurity has been suggested. M.S. Swaminathan Research Foundation, Chennai has proposed a Community Food Security System, and its diagrammatic representation is shown in the Box 2.

Box 2	Features of Community Food Bank
Community Food Bank	
Main features of the proposed food bank are:	
<ul style="list-style-type: none"> ● One bank for every village or cluster of villages with population ranging from 2000 to 5000. ○ Supervised by a society or council chosen by the gram sabha. ● Managed by a stakeholder council, with different operations assigned to different self-help groups. ● To be implemented with honesty, political neutrality, fairness, absence of discrimination based on religion, caste, class, gender and political belief. 	

Box 2 gives main features of a community food bank and shows how a community food bank is managed, supervised and implemented by community. Food bank thus becomes a source of food for government and other agencies with the distribution operations managed by the self help groups.

Thus, in this unit we learnt about various strategies to combat malnutrition and how they have been contributing to reduction of malnutrition in the country.

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Check Your Progress Exercise 4

1. What is meant by Public Distribution System (PDS) and Targeted Public Distribution System (TPDS).

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2. Read the following statements carefully. Indicate whether each is true or false. Correct the false statement.

- a) Our country is self sufficient in food grain production and currently there is a buffer stock of over 60 million tonnes.
- b) Improved food grain availability has not resulted in eradication of hunger or reduction in under nutrition especially in vulnerable groups.
- c) We need a paradigm shift to improve food security at the state level to nutrition security at the individual level.
- d) The production of pulses has been rising steadily in India.
- e) Community food banks are innovative local efforts which can improve nutrition security, especially for the poorer segments of the population living in vulnerable areas.

3. What are the progress achieved, current problems, and opportunities in food production?

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4. List the interventions initiated during the Tenth plan to improve food and nutrition security.

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13.8 LET US SUM UP

In this unit, we learnt about five different strategies to combat malnutrition. These strategies are immunization, supplementary feeding, genetic/food biotechnology, improving water and sanitation services and food and nutrition security. Immunization is a very important strategy to protect the children from diseases. All children should be immunized against the most common six vaccine preventable diseases. In our country, we have comprehensive national programmes which provide supplementary foods to children in addition to other services. We also have research action programmes which provide/have provided

supplementary foods to children. We need to learn from these research action programmes and integrate their best practices into national programmes in order to improve upon them. Genetically modified crops offer a great opportunity to reduce malnutrition in India. Nutritional quality of staple foods can be improved through genetic/food biotechnology.

Policy makers, implementers and consumers need to be made aware of the demerits and merits of genetically modified foods. Great efforts are required in India to improve the availability of drinking water and sanitation services especially in urban population. There are some successful projects that have demonstrated how these services can be improved. These projects need to be replicated and taken to scale to make an impact on overall situation in the country. Street food vending is spreading rapidly all over the world. These can become the cause of food borne disease due to unhygienic practices of the vendors and vending areas.

Research projects in the country suggest some recommendations which should be implemented in order to make the select foods hygienic and safe. The country has achieved self-sufficiency in food grains to meet the needs of the growing population and we have ample food grain stocks. But improved food grain availability has not resulted in eradication of hunger or reduction in under-nutrition especially in vulnerable groups.

In order to improve food accessibility to vulnerable population, subsidized food grains are provided to people below the poverty line under TDPS. There is also a paradigm shift now to move from food security to nutrition security.

13.9 GLOSSARY

Action research	: systematic enquiry designed to yield practical results capable of improving a specific aspect of practice and made public to enable scrutiny and testing.
Antigen	: a substance that can trigger an immune response, resulting in production of an antibody as part of the body's defense against infection.
Antibody	: proteins produced by immune system of human and higher animals in response to the presence of a specific antigen
Herbicide	: any chemical substance that is toxic to plants; usually used to kill specific unwanted plants, especially weeds.
Viscosity	: internal property of a fluid that offers resistance to flow

13.10 CHECK YOUR PROGRESS

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- 1). What are food-based strategies ? What are their benefits.
- 2). What is Pradhan Mantri Gramodaya Yojana.
- 3). What is Immunization?
- 4). What is Supplementary feeding.
- 5). Explain the National Immunization Schedule.
- 6). What are important strategies to improve urban sanitation.

14**PROGRAMME MANAGEMENT AND
ADMINISTRATION****STRUCTURE**

- 14.1 Learning Objective
- 14.2 Introduction
- 14.3 Concept of Programme Management and Administration
- 14.4 Personnel Management
- 14.5 Planning, Implementing and Evaluating Public Nutrition Programmes
- 14.6 Techniques for Conducting Situational Analysis/Needs Assessment
- 14.7 Principles of Good Governance and Management
- 14.8 Let Us Sum Up
- 14.9 Glossary
- 14.10 Check Your Progress

14.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- discuss the concept of programme management and administration,
- explain the importance, advantages and skills required of personnel management by those working in government, non-government and international agencies,
- elaborate the techniques of conducting situational analysis/need assessment,
- describe the various steps required to plan, implement and evaluate a public nutrition programme, and
- discuss the importance of good management and governance to achieve the goals of the public nutrition programmes.

We will begin our study by explaining the concept of programme management and administration.

14.2 INTRODUCTION

In the earlier units we have studied about nutritional problems and various

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strategies to combat nutritional problems. We have also studied about various nutrition policies and programmes designed to combat nutritional problems. Now, we need competent and skilled staff who can design and manage these programmes in the field. However, recruiting and training of these staff is a big task and a very complex one too. We need people who recruit and train these specially skilled staff. This is where the role of personnel management comes in. In this unit, we will study about the role and functions of personnel managers, who will recruit and train the staff required to manage the programmes designed not only by government but also NGOs and international and bilateral agencies. We will also learn about needs assessment of the communities since needs assessment is the first step to design a programme. We will also take you through the steps of planning, implementing, and evaluating a public nutrition programme. Finally, we will end the unit by discussing the importance of good management and governance to achieve the desired results in the communities.

14.3 CONCEPT OF PROGRAMME MANAGEMENT AND ADMINISTRATION

You must be wondering what do we mean by programme management and administration? In Unit 10, we learnt about nutrition policy, various nutrition programmes and their implementation. These programmes have to be managed by government or non-government organizations, and more so, they have to be managed systematically and efficiently, if we really want to see an improvement in nutritional status of people. For managing these programmes systematically, we need to follow principles of good management. Before we do that, we need to understand what management is. So, we will briefly review what management is. We will then review the principles and functions of management. We will also review what we mean by administration as it applies to public nutrition programmes. Let us try to understand what we mean by management.

Management has been applied since the beginning of civilization, whenever people have worked together in groups, whether it is to grow crops, to buy and sell or to arrange for an event etc., there has been management. What does management mean? It simply means getting things done. It means committing to purposeful action or achievement and not just action for its own sake. Thus when applied to programming, it means we decide what we want to achieve (i.e. objectives are specified and achieved). A public nutrition programme requires many resources in terms of human, materials and equipment etc. Thus, programme management, in this context, can be defined as getting people to work harmoniously together to make efficient use of resources to achieve the objectives

Management consists of many functions which are derived from six principles of management. These are:

- 1) Management by objectives
- 2) Learning by experience (feedback)
- 3) Division of labour

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- 4) Delegation
- 5) Substitution of resources, and
- 6) Shortest decision path

A public nutrition team has three main functions of management. These are planning, implementation and evaluation of public nutrition programme.

Let us see how we can derive these three management functions from the principles of management as discussed above.

Planning function: Planning function of management is derived from the first principle i.e. principle of management by objectives. This principle requires the specifications of what and how much is to be done, and where and when it is to be done. Each of these questions needs one or more planning decisions. Thus the sum of these planning decisions constitutes the planning functions of management of public nutrition team.

Implementation function: The implementation function is derived from the principle of delegation. This principle is concerned with authority and responsibility i.e. functional relations between people working together to achieve some purpose. types of decision involved are concerned with organization of working relations so as to ensure effective and efficient work i.e. implementation

Evaluation function: The evaluation function is derived from the principle of learning from experience. Applying this principle to programme management requires tie analysis of gaps between desired results and actual results, or achievement, the use in decision-making of the information obtained from the analysis. This is, in other words, a measurement and a judgment of performance, or the evaluation function of management, that contributes greatly to the success of a public health and nutrition team. In this unit, we will study in detail about' these management functions.

Let us now learn about administration. The term administration refers to the direction and management of affairs, and to the activities (f groups cooperating to accomplish common goals. Administration, therefore, is a wider term and encoinpasses such activities as spelling out policies and objectives, establishing suitable organization structures and providing necessary resources for realization of objectives. Thus, administration determines the organization and management uses it. Administration defines the goals and management strives to attain it. Management is an executive function that is primarily concerned with carrying out the broad policies laid down by administration. Figure 14.1 depicts the difference between administration and management clearly which shows that administration is a determination function carried out by top people in the hierarchy of the system, while management executes as is decided by administration.

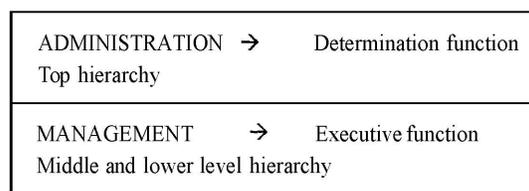


Figure 14.1: Difference between administration and management

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Thus, in public nutrition programme, we have policy makers at higher levels in Ministries and the Specialized Departments under' the Ministries who are involved in making decisions about nutrition policy and programmes, their organization and sources and amount of funding. Management of these programmes is then handed over to various functionaries at the center, state, district, block and village/ panchayat level for planning, implementing and evaluation.

You know by now that the management functions as discussed earlier i.e., planning, implementing and evaluating a public nutrition programme essentially involve working and dealing with people. Getting the work done through people means that people must work, perform certain activities and tasks to reach certain ends and objectives. This also means that people who do these tasks possess certain technical skills and competencies so that they are able to accomplish these activities and tasks successfully. Developing an organization structure for a public nutrition programme then becomes a carefully thought out and planned process and again requires the skills and competencies of certain specialized people. This is where the role of personnel management comes in. Let us now discuss in detail what is personnel management and what are the role, skills and functions of a personnel manager.

14.4 PERSONNEL MANAGEMENT

Personnel management in a public nutrition programme has a special role to identify, recruit, train and maintain the staff responsible for nutrition programmes. We discussed above that we need specially qualified and skilled staff to manage the nutrition programmes. So the people who will recruit, train, and maintain these staff in an organization need to possess certain skills and perform certain roles in achieving this task. This is where the role of a personnel manager comes in. Earlier " liking people" appeared to be a sufficient qualification to become a personnel manager. Presently, however, preference to work with people rather than objects is still important but personnel management has become one of the most complex and challenging fields. It requires the skills to meet the demands of an employer, as well as, the employee and society in general. Society at large requires its human resources to have vital needs that move beyond a 'work force status'. The employer must realize that an employee of an organization is not only an employee but also a human being and a citizen of the society/country in which he/she works. Thus, the personnel manager has to perform certain roles and functions which will help them to recruit, train, and maintain staff required to manage programmes. Let us now study about the roles, skills and functions of a personnel manager. Let us start with the role first

14.4.1 Role of a Personnel Manager

The manager has to satisfy the top management in procuring and maintaining a work force which will be instrumental in enhancing the productivity of the organization. He she also has to understand the necessity of ascertaining and

accommodating to the needs of the human beings that constitute such work force. Therefore, the job of a personnel manager has become more challenging in recent times. It is due to the rise of the modern labour unions, increased educational levels of the members of the society, the increasing size and complexity of the organizations and its technology and the demands (reasonable/unreasonable) of the less privileged segments of our communities.

Let us now look at the skill of a personnel manager.

14.4.2 Skills Required by a Personnel Manager

The modern personnel manager requires the following skills:

1. a broad background in the fields of psychology, sociology, philosophy, economics and management,
2. he or she must deal with situations, which often do not have right answers for all,
3. an ability to understand not so logical demands (f the employer or employees,
4. a capacity to programme one self into others position without losing perspective, and
5. skills in predicting human and organizational behaviour,

Having learnt about the skills required by the personnel manager, let us now look at the functions which the personnel manager is expected to perform.

14.4.3 Functions of a Personnel Manager

If we refer to the principles of management as discussed in section 14.2 above, you would note that the principles of division of labour and delegation apply to management functions that deal with personal relations. These functions relate to a personnel manager as the one who exercises authority and provides leadership over other personnel. In addition, a personnel manager has to perform certain functions where he/she has no authority but has been given certain specific responsibilities to perform the basic function, these are termed as operative functions. Thus the personnel manager has to perform both the management and operative functions. Management and operative functions include certain components. These are illustrated in Figure 14.2.

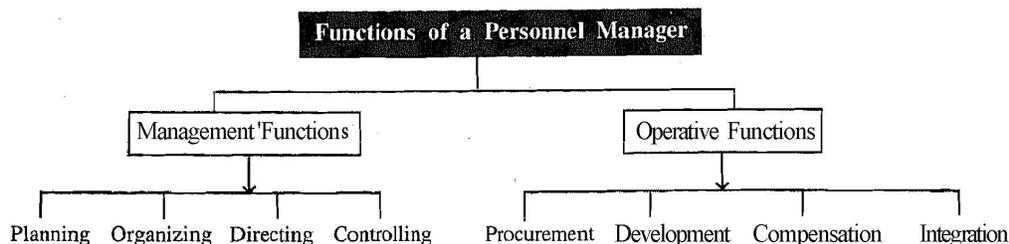


Figure 14.2: Functions of a personnel manager

Let us study the components of management and operative functions in detail. We will start with the management functions first

1) Management functions

Within the management functions, planning, organizing, directing and controlling are the main components. Let us look at each of these component functions, which a personnel manager is expected to perform.

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a) **Planning:** Planning here refers to clearly spelling out the activities and tasks to be performed and assigning the personnel to perform them. Under the planning function, the personnel manager has to identify a personnel programme in advance that will contribute to the goals established for the organization. For doing this, he needs to actively participate in the process of goal establishment and contribute his/her expertise in the area of human resources to this process. The planning function also includes personnel manager to demonstrate varying set of skills and expertise while hiring staff for government or non-government organization. For example, while planning or hiring staff for the government, the personnel manager may require special skills to judge attitude, commitment, efficiency, as most often in government organization, an employee once recruited will be required to perform functions for long periods of time with virtually no option for the change. Similarly, in non-government and international agencies, specific core qualifications and skills of employees may be required for doing a specified job for a specified period of time. For this, the personnel manager may require expertise testing the person's knowledge and skills for specific jobs to be done.

Next, let us look at the second component of management functions i.e. organizing

b) **Organizing:** After planning for a personnel programme and establishing the type of personnel required for recruitment, the next important function of the personnel manager is to organize his/her work. Organizing here means that the personnel manager should arrange the work in such a way that the hired staff use their individual skills and talents effectively and work is distributed evenly among them. For carrying out this function, the personnel manager has to form an organization by designing the structure of relationships among jobs, personnel and physical factors, This organization is nothing but a means or a process to reach the goals set earlier during the planning process.. The manager must be aware of the complex relationship that exists between the specialized unit and rest of the organization. Let us look at the third component i.e. directing.

c) **Directing:** Once the plan and organization to execute the plan has been established, the next important function of the personnel manager is to give directions to staff for working in an organization. Under this function, the personnel manager is expected to guide the people to work in an efficient and healthy environment. In some organizations, the personnel manager is expected to develop a policy and procedure manual which provide guidelines for employees. The personnel manager is also expected to keep the employees motivated to work willingly and effectively.

Let us now look at the fourth and the last component of management functions of

a personnel. i.e. controlling

a) Controlling: The management duty of the personnel manager is to observe or control the actions of the employees. Under this function, the personnel manager has to assure certain minimum standards by staff in an organization. He/she has also to ensure that employees continue to work according to the plans of the organization. Good control by the personnel manager should be timely, simple, minimal and flexible

With controlling component, we come to an end of our study of the management functions of a personnel manager. We studied above that along with management functions, certain operative functions are also basic to the job of a personnel manager.

Let us now look at the various components of the operative functions.

Operative functions:

The operative functions of a personnel manager include procurement/recruitment, development, compensation and integration. Let us get to know more about these functions.

a) Procurement: The first operative function of the personnel manager is to procure or recruit the kind and number of personnel necessary to accomplish the goals of the organization. He/she is expected to determine human resource requirements and their recruitment, selection and placement.

b) Development: After recruitment, the personnel manager is expected to develop or train the employees to increase their skills for their professional development, which may be necessary for proper job performance.

c) Compensation: Under this function, the personnel manager is expected to provide adequate and equitable remuneration to personnel for their contributions to the organization. This requires that he/she possess special skills for job evaluation, wage policies and wage system etc.

d) Integration: The personnel manager should be able to reconcile effectively the individual, societal and organizational interests for pursuing the goals of the organization.

If both management and operative functions of the personnel manager are well executed, the other important functions of the personnel manager are maintenance of the work force. This requires constant communication with the employees and cares to look after the physical conditions of the employee, such as maintenance of health and safety of the employees.

Lastly, the personnel manager has to make plans of separation of the employees from the organization. This includes functions such as retirement benefits, if any, lay off, out placement, and discharge

Thus, to sum up, personnel management is the planning, organizing, directing, maintenance and separation of human resources to the end that individual, societal and organizational objectives are met.

In this section, we learnt about the importance of personnel management in

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public nutrition programmes. They can provide tremendous support in recruiting, training and retaining staff responsible to manage public nutrition programmes in government or non-government agencies. Once we have hired the right staff with specific skills and competencies and established an organization, the next step is to manage the public nutrition programme. In the next section, we will study about the key management functions i.e. planning, implementing and evaluating a public nutrition programme. Before we move on this section, let us recapitulate what we have learnt so far.

Check Your Progress Exercise 1

1. What do you understand by programme management and administration?
.....
.....
2. What are the management and operative functions of a personnel manager?
.....
.....
3. Mention the type of knowledge and skills required for being a good personnel manager.
.....
.....

14.5 PLANNING, IMPLEMENTING AND EVALUATING PUBLIC NUTRITION PROGRAMMES

In this section, we will study about how to design/plan, implement and evaluate a public nutrition programme. A programme manager in a public health team is responsible for improving public nutrition in his/her area. The area may be as large as a village or as big as a district. We studied about three management functions i.e. planning, implementing and evaluating in section 14.2 above. These concepts of management functions are applied to public nutrition programme also. The planning function of management in a public nutrition team deals mainly with decisions about objectives, activities, and resources, by systematically considering what, which, where, when, and how much and how the team would perform. The implementing function deals with achieving and performing activities planned during the planning process. Evaluation function is concerned with effectiveness or achievement of results and efficiency or economic use of resources

Thus, keeping these functions in view, major steps in planning, implementing, and evaluating a public nutrition programme are listed as:

1. Identify the issues or health problems in the community.
2. Prioritize the issues or nutrition health problems, to identify those that the programme will address.
3. Identify risk and contributing factors and set the goals and objectives for the programme

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4. Determine strategies for the programme.
5. Develop the action plan and implement it.
6. Sustain the entire programme or its components.
7. Evaluate the programme.
8. Incorporate sustainability issue and the evaluation plan at the time of planning the programme.

We will review these steps in detail now: Let us begin with the first step

Step 1: Identify the Issues or Nutrition Health Problems in the Community
Identifying the issues or nutrition health problems in the community is the first step of planning a public nutrition programme. Problem identification and its analysis is required for developing goals and objectives for the programme that are realistic and achievable. Once the goals and objectives are set, strategies for achieving them can be determined. Resources needed for the programme and the sources to obtain these resources, are then identified

The nutrition and health problems in a community are identified through the process of needs assessment or situational analysis. You must be wondering what needs assessment is. Needs assessment describes a process by which the assessment of the current situation in the community is undertaken, value-based judgements regarding the preferred or desired situation are reached, and some determination the priority status of local needs is made. We will read in detail about it in the next section 14.5. Needs assessment helps the community to reflect upon their problems and bring forth issues which need to be addressed. In fact, needs assessment is the first step in designing a public nutrition programme and gives a good indication of the priority needs of a community. It is important to remember that needs are always thought of differently by different people, For example, if you see a mother with a sick child, you may think that her need is to take the child to the doctor. However, she may feel the same need as yours. Her need may be to go to work and earn some money. Thus, while undertaking a need assessment, it is important to consider that needs will be thought of differently by different people. For this reason, needs are sometimes classified as

1. Normative Needs
2. Felt Needs
3. Expressed Needs
4. Comparative Needs

We should understand the different types of needs so that we can identify the issues appropriately for programme design. Let us study about each type of need in detail.

1. Normative Needs

Normative needs are based on the opinion and experience of 'experts' according to current research and findings. For example, nutrition and health experts consider that even mild to moderate malnutrition is detrimental for health. Therefore, a primary health care provider may strongly devise strategies for its prevention and

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control, Similarly, the Health Ministry recommends that all children be vaccinated against specific diseases. Also, assuming that during needs assessment, we identify that many children in a particular population of children were not immunized against these diseases. This situation would indicate a need for an immunization programme.

2. Felt Needs

Felt needs are those needs that groups or individuals say they want, or the problems that they think need addressing. For example:

- Many women from a community feel that there is lack of safe drinking water or irrigation facilities for their lands. The community only decide to address this issue by informing their elected local leaders to solve their problem.
- The community demands more variety in ration available at the ration shop. The government may decide to look for reliable and cheaper sources of different varieties of ration to satisfy the demand.

3. Expressed Needs

The number of people using community facilities and services shows expressed needs. For example:

- Long queues at the community taps or pumps may express a need for more community taps.
- Very few people using the community health facilities may express a need for alternative activities.

4. Comparative Needs

Comparing what is available to one group of people with what is available another group shows comparative needs. For example:

- During droughts and natural calamities all groups of people may want equal access to the government services as compared to normal times only marginalized population or most vulnerable population may be utilizing government services.

When determining the needs of a community or a group, we should focus on a range of needs and use variety of tools to determine each type of need, The tools which can be used for needs assessment have been discussed in the next section. Thus, understanding about different types of needs while doing needs assessment, can help us to channelize our resources more effectively and efficiently in programme design and implementation.

Once we conduct needs assessment, we should always share the results with the community. This sharing process is a key part of the planning process. This process will:

- raise community awareness about the issues and possible underlying causes,
- stimulate discussion about ways to address the issues, and

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- get the community more involved in planning and decision-making about the programme.

Now that we have identified the needs and decided on what issues/problems exist in the community with their participation, we may get a long list of issues/problems to be addressed. But it is not feasible to resolve all their problems, so we want to 100k at just few important issues. Thus the next step becomes to prioritize issues from the assessed needs/problems.

Step 2: Prioritize Issues or Nutrition Health Problems

At the end of Step 1, the programme team would have identified a list of major issues and potential target groups for the programme. There are always competing needs or issues in any community. Limitations such as time and resources mean that not everything can get addressed. Issues would need to be prioritized. Needs and priorities you have learnt in step 1 can vary from individual to individual, family to family, group to group. It is important to work out criteria to sort out which issue the programme will address. For doing this, we may ask some questions to ourselves and key stake holders, which may help to expand group thinking and discussion on prioritizing needs. We have divided these questions into five broad categories

- a) How many people in the community are concerned about the issue?
- b) How serious is the issue or problem?
- c) How easy is it to change. ?
- d) What kind of resources will it need?

You would realize that within each of these questions, there may be more issues which would require thinking. Let us review the list of issues under each category. We begin with first question

a) How many people in the community are concerned about the problem?

To be able to find out the answers to this question, very often the programme team may need to find out the following

- What is the felt need of the people and how has this been demonstrated?
- What kind of community support is necessary for a programme to succeed'?
- Who needs to be involved? Are the 'right' people concerned and involved?
- How much support does the programme or activity really have?

Once the team has determined the answers to these smaller issues, it can get the answer of how many people are concerned about the problem.

Let us now look at the second question.

b) How serious is the issue or problem?

This question can be divided into smaller set of questions whose answers we have to determine from the people.

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Is the problem affecting a lot of people?

What proportion of the population does it affect?

- What sort of damage is it doing to people of different socioeconomic/ethnic class
- on physical health, mental health and other aspects of life?
- What will happen if nothing is done about the situation?
- Having determined how many people in the community are concerned about the problem and how serious is the problem, the next thing is to find out how easy it is to change.

c) How easy it is to change?

We will be required to answer some smaller questions in order to answer this question.

- What has already been tried or done which may affect a new approach to the issue or problem? Bad past experiences can and do affect community motivation to get involved.
- How much assistance will people need to change the situation?
- How likely are they to have success? What are the barriers and what are the helping factors (enablers)?
- How many other things need to change before this particular problem changes?

Thus after determining, how easy or difficult it is to change the situation, it will help us identify the type and amount Of resources. so we come to the next question.

d) What kind of resources will it need?

We will have many questions related to the type and amount of resources. answers to these questions will help us decide a very important component of the programme. i.e. resource allocation, without which we really cannot achieve our goals.

• **Human Resources**

What kinds of human resources will it need initially and in the long term?

What human resources are available within the community?

How much training and external support will be required?

Will there be a need to involve people outside the community?

How easy will it be to get outside help if needed?

• **Funding**

How much will different options cost?

Where will the money come from? How long will it take to receive it?

• **Materials and equipment**

What kind of materials will be required? What materials are available locally that

could be used?

Is any equipment needed? Are any buildings required?

Thus, having identified the problems, seriousness of the problem and the resources, we still need to answer some more questions related to implementation. These are listed as follows.

e) Some questions to answer before implementation

- Did a number of community members participate in identifying the problem?
- Have a wide range of people and organizations been consulted?
- Has all the relevant information been reviewed (literature, community profile)
- Did people have accurate information about the problem, causes and possible solutions'?
- Was this information used in the discussions and consultations?
- Has the information been fed back to the wider community?
- Has the programme team got the information that it will use as baseline data?

Thus we can find out the answers of these questions from the community and government and non-government members who have an interest in solving the problems of the community. We can then prioritize the issues/problems to be addressed during programme implementation.

- We mentioned "funding" above for identifying the kind of resources. Funds or munity resources are very important criteria for prioritizing the problems identified during needs assessment. This determines to a large extent what issues we can address and what we can't. You should know, how we can obtain resources for our programme. Generally, there are two ways to fund the programme: We can: use resources available locally, and
- seek funding from government, non-government organizations, bilateral agencies etc. These funds will probably be tied to priorities based on 'normative needs', However, a programme funded according to these needs can include Other community identified priorities

Thus we saw how we can prioritize the issues/problems of the community. Community action can be mobilized through confidence gained by participating in successful, well- planned programmes. There are numerous examples of situations where community members have taken on an idea from outside the community and become more fully involved in controlling and participating in activities. Third step is how to identify risk and contributing factors and set the goals and objectives.

Step 3: Identify Risk and Contributing Factors and Set the Goals and Objectives for the Programme

After we prioritize the problems, we need to analyze the problem to identify the risk and contributing factors and set the goals and objectives for the programme.

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Let us first understand what we mean by risk factors and contributing factors. 'Risk factors' are any aspect of behaviour, society or the environment that are directly linked to the health problem. Risk factors lead to or directly cause the problem. Note that some risk factors can be modified, while others are not modifiable. For example, smaller landholdings of a farmer may be a risk factor for poverty and are not modifiable under the issues addressed by public nutrition programmes, while direct exposure to bacteria and germs (environmental) may be a risk factor for diarrhoea which can be changed.

'Contributing factors', on the other hand, are any aspect of behaviour, society or the environment that leads to the development of risk factors. Contributing factors enable or reinforce the risk factors. They can relate to individual, financial, political, educational, environmental, or other issues.

Some examples of contributing factors are:

- lack of knowledge about balanced diets (educational) and wrong beliefs and habits are both contributing factors to the risk of malnutrition in children, and poor housing conditions (environmental) and lack of home hygiene (behavioural) are both contributing factors to the risk factor 'exposure to bacteria and germs'.

We need to analyze the problems to determine the risk factors and contributing factors.

Let us see how problem analysis is done.

Problem analysis

Addressing a problem successfully will require the programme to focus on the underlying causes or issues that led to the problem in the first place. In other words, the goal and objectives of a programme need to relate to the underlying causes or issues. Developing a clear and organized goal and objectives that relate to each other requires some critical analysis of the problem. The way to analyze the problem is to first state what it is and then ask questions like 'why' and 'how' to identify the causes of the problem. At this point, you may need to search through research reports, articles and books to see what others have discovered about the problem.

The issues or problems targeted by the nutrition health programme will probably have more than one risk factor. The programme will aim to make a change in one of these risk factors as stated in the programme goal. Analysis of the nutrition health problems helps the programme team to identify what complementary programmes are needed (either planned by the team or others) to change the other risk factors. Based on the problem analysis, the team should develop the goals and objectives for the programme which is discussed next.

Developing the programme goal and objectives The goal is about making changes to the risk factor addressed by the programme. The goal indicates what the planned, long-term outcome of the programme is. It is also intended to inspire, motivate and focus people and encourage team cooperation. For example, we can have the goal "Reduce prevalence of diarrhoea in preschool children".

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Objectives state what changes the programme will make to the contributing factors. The objectives indicate what the impact will be on the contributing factors during the time frame of the programme and finally the objectives should indicate the desired changes in the programme. An example of objective would be: X% of families are educated about improving home hygiene in 2 years. Well written 'goals and objectives' would state who will achieve how much of what and by when. Developing a clear, achievable goal and objectives would also require good baseline data, which can be available either through primary data collection or secondary sources.

While there may be many contributing factors, it is advisable to focus on three or four factors only, in order to keep the programme manageable and achievable. Perhaps there are other people in the community willing to tackle the other contributing factors, Thus before we proceed further, we need to ensure the following points:

- Are the risk factors directly linked to the priority nutrition health issue/ problem?
- Does the goal address one of the risk factors?
- Do the contributing factors relate to the risk factors chosen?
- Do the objectives address the contributing factors?
- Do the risk factors and contributing factors relate to the situation of the target group?
- Are the goal and objectives specific and measurable (who will achieve how much of what and by when)?
- A worksheet that can be used. for problem analysis can be prepared. It is part of the documentation of a full programme plan.

After we have identified goals and objectives, we need to determine the strategies to realize these goals and objectives. This brings us to the next step i.e. determine strategies.

Step 4: Determine Strategies

After the goals and objectives are identified, then the strategies are determined. Strategies describe what the programme team will do, to try and make the changes required to achieve the objectives.

Box 1	Examples of Strategies	
– Conducting nutrition health sessions about causes and consequences of malnutrition	– Meeting with parents, other family supporters, grass root level nutrition health workers	
– Making behaviour change communication (BCC) materials	– Pasting educational materials at important community points	
– Organizing programmes to promote the consumption of variety of foods	– Training in how to budget	
– Supporting a nutrition health grass root team	– Making policies for joint collaborations to reach common goals	
– Developing a nutrition policy for malnutrition control	– Organizing an advocacy programme for policy makers	

Again, we can ask the key stakeholders and ourselves certain questions. Finding answers to these questions would help us to determine strategies. These questions are:

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- How will we achieve our objectives?
- What are the most useful and appropriate strategies for the target group?
- Will interested community members be involved in carrying out the strategies?
- Who else might, have ideas that could help us?
- Is there anything else that we need to find out first?
- What strategies have been used in the past to address this issue?
- How well did the past strategies work? Were there any problems? What can we learn from them?
- In general, what resources are needed for each strategy? Do we have them or can we get them?
- Were interested Community members/target group members involved in deciding on the strategies?
- Will the strategies be appropriate for the target group?
- Do the strategies reflect the essence of the government policies
- Do the strategies promote and respect cultural practices?

Therefore, we have seen that the process for planning a programme begins with the big picture of an issue or a problem. It is an analysis of the big issue/problem that gives the framework for developing the plan - from the long term goal, to more specific objectives, then to the actual strategies, and finally the detail of individual actions. So now the next step is develop an action plan and implement the programme. Let us learn how.

Step 5: Develop an Action Plan and Implement it

Once the strategies of the programme are determined, the programme team can write the action plan. The action plan includes all the specific activities, large and small, that will need to be done to implement each of the strategies. It should also specify who will carry out these activities, when they will be completed and how they will be evaluated.

The more detailed the strategies, the easier it will be to accurately identify all the activities to be done. If the programme is large, with many stages, it may not be possible to detail all the specific activities at the beginning of the programme. If the programme objectives must occur in a special time sequence, wait for some early work in the programme to be completed before working out the detail of the later phases.

Detailed documentation of the activities, responsibilities and time frames will assist each team member to plan his or her part of the programme. Detailed documentation is also important for maintaining accountability within the team and between the team and the community or funding agency.

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The action plan will also list the resources required to do the programme successfully. Resources will be required throughout the whole programme, from need assessment through putting strategies into action to final report writing. Resources can include human resources, financial resources, materials, equipment and venues. The best resources for a community nutrition health programme are those that come from the community or are developed by interested community members. Programmes carried out using a community development approach build on existing skills and support people to develop further skills.

If programmes use human resources from outside the community all the time, community members may begin to feel that they have no resources of their own. Such an approach could make the community dependent on outside sources to solve their problems, hence will not be sustainable. We should use the resources of the community, whenever possible. It will build community confidence, self-reliance and enthusiasm and empower them to solve their own problems. Answering the following questions can help identify resources:

- Who can assist in putting the strategies into action?
- What skills are there in the community which can be drawn on and built upon?
- What venues or places need to be organized? Are they appropriate for activities? Will people feel comfortable there?
- What equipment is needed? Is it in the community? Will the programme team need to borrow or buy equipment?
- Do we need any money for the programme? Can the local self government, community groups/ members budget or fund it?
- Where will we get the educational resources?
- What resources have worked well in the past with the target group?

Before proceeding to implement the programme, we can try to get the answers for the following questions:

- Have all members of the programme team been involved in developing action plan?
- Are the activities achievable with the current resources (time, money, personnel, equipment, and so on)?
- Does the programme use community member's skills, knowledge and resources?
- Do people know what their responsibilities are?
- Are they confident, willing and able to carry them out

Once we have answered the above questions, we can go ahead and implement the programme with the help of government, non-government and other partners as stated in the action plan.

Once the programme has been implemented, it is very important to ensure that the programme continues as long as it is planned for and even thereafter. Sustaining the programme is an important aspect. Let see what strategies can be adopted to

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sustain the programme.

Step 6: Sustain the Programme

Planning for sustainability means thinking of ways to keep the programme (or important parts of it) going after its official end. It then becomes an ongoing part of community activity. Factors can threaten the sustainability of the programme. Programme teams need to be on the lookout for these factors and have a plan for dealing with them. Sustainability needs to be considered from the initial planning stages of a programme. Again we need to answer certain questions in collaboration with key stakeholders to address the issues sustainability. These questions are:

- How will the programme team assess the ongoing need for the programme?
- Are community members involved in the management of the programme?
- What skills and facilities are required by the community to manage and maintain the programme?
- Is training needed? Is it available? How will the community access it?
- Who can continue the work?
- How will the community secure ongoing access to financial and other resources to do the programme?
- How will interest, commitment and ownership be maintained?
- How will the direction and focus of the programme be maintained?
- Is there further support required from outside the community?
- If yes, how will the community secure this outside support?
- Is there enough flexibility in the programme to respond to changing circumstances?

We should know that people will be more likely to keep the programme going if they:

- feel that the programme is theirs and that they have control over it, are working together well, can see positive changes happening because of the programme, are learning new skills and their confidence is increasing, get recognition for their work, understand that all elements of the programme are suitable and relevant to them language, style, pace of work, strategies, evaluation methods, resources, believe that the people from outside the community, who are working on the programme, are credible to the community, and
- know that accountability to the community has been built into the programme.

Thus we see that for sustainability of the programme, we need to plan for all the above factors from the very beginning of the programme, otherwise we will not be able to sustain the programme. Once the programme is being implemented, we would always want to know how it is going. For this we conduct an evaluation of the programme.

We will discuss it in detail in the next step.

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Step 7: Evaluate the Programme

To evaluate is simply defined as to judge the (f something. Evaluation is a type of research that is required to be planned right from the beginning of the programme. It is important to incorporate evaluation into the planning process so that the information required for the evaluation can be obtained during the programme. If evaluation is not planned until the end of the programme, valuable information may have been lost. Before planning the evaluation, the programme team needs to consider some basic questions:

- Who are we evaluating for?
- What do they want to know?
- What do we want to know?
- How are we going to find out
- What does the information mean?

When the programme takes a community development approach, then community partnership in evaluation means that people take a significant role in deciding when, how and what to evaluate. Community members need to be involved in selecting the methods to be used in collecting and analyzing data, in preparing reports, and in .,deciding how to use the results and put their recommendations into practice. It is useful to prepare a written plan for the evaluation in the same way as it is prepared for the programme (e.g. goals, objectives, strategies, activities, resources and timeframes), The Eight Stage Model of Evaluation is one way to plan the evaluation.

It offers specific questions to focus the planning of the evaluation into manageable stages.

Box 2 depicts the eight stage model of evaluation, with different stages of planning an evaluation, right from what to evaluate to designing strategy for evaluation and reassessment for improving the programme.

Box 2	Eights Stage Model of Evaluation Plan
<p>The eight stage model of evaluation plan include:</p> <p>1) Focus of evaluation:</p> <ul style="list-style-type: none"> ● What is being evaluated and why? ● Who needs to know? <p>2) Formulation of questions for evaluation:</p> <ul style="list-style-type: none"> ● What are the key issues that need to be evaluated? ● What will be the lessons learned from evaluation? <p>3) Designing strategy for evaluation:</p> <ul style="list-style-type: none"> ● Information to be collected from where, when and how. <p>4) Coordinate plan for evaluation:</p> <ul style="list-style-type: none"> ● Who will implement the plan of evaluation? ● How evaluation should be done? <p>5) Collection of data:</p> <ul style="list-style-type: none"> ● Evidence of the impact of the programme. ● Evidence of best practices/failures of the programme. <p>6) Analyze data:</p> <ul style="list-style-type: none"> ● Major findings ● Reasons for success/ failures ● Lessons learnt <p>7) Reporting:</p> <p>8) Reassessment:</p> <ul style="list-style-type: none"> ● How to improve the programme for better impact 	

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Evaluation is done mainly for the following reasons 1) To determine if the programme objectives have been met 2) To assess how the strategies are working and make modifications if required 3) To provide feedback to key stakeholders, and 4) To assess best practices and failures. Thus evaluation is a carefully thought out planned process, It needs to be incorporated into the programme from the very beginning.

We discussed about how to plan, implement and evaluate public nutrition programme. You may recall that in the beginning of this section, we stated that needs assessment is the first step of designing a programme, It helps the community to reflect upon their problems and bring forth issues that need to be addressed. We also stated that when determining the needs of a community or a group, we should focus on a range of needs and use variety of tools to determine each type of need. In the next section, we are going to discuss the kind of tools or techniques we use in assessing the needs of the community. But, first we shall review what we have learnt so far.

Check Your Progress Exercise 2

1. What are the steps for designing a nutrition health programme?
.....
.....
2. What do you understand by the term sustainability and list points that have to be kept in mind while designing sustainable programmes?
.....
.....
3. What are the steps involved in the process of evaluation?
.....
.....

14.6 TECHNIQUES FOR CONDUCTING SITUATIONAL ANALYSIS/NEEDS ASSESSMENT

In this section, we would learn about various tools or techniques for conducting needs assessment. But you must be wondering what are community needs? What is needs assessment? Why do we do it? So before we learn about techniques to conduct needs assessment, let us answer some of these questions first

What are community needs?

Community needs can be many, but here, we will limit ourselves to nutrition and health related needs. Thus, nutrition health needs are understood as being those states, conditions or factors in the community that, if absent, will prevent people from achieving complete physical, mental and social health. This would include such things as minimum provision of basic health services and information, a safe physical environment, good food and housing, productive work and activity, and a

network of emotionally supportive and stimulating relationships,

What is needs assessment?

The concept of community needs assessment/situational analysis describes a process by which the assessment of the current situation in the community is undertaken, value-based judgements regarding the preferred or desired situation are reached and some determination of the priority status of local needs made.

The accurate appraisal of the current situation is an important element in this process. In most instances, this requires the collection of first-hand information from relevant audiences.

Why do we conduct needs assessment?

Needs assessment helps the community to reflect upon their problems and bring forth issues which need to be addressed. It is the first step in designing a public nutrition programme. Needs assessment provides an opportunity for the community to become involved in the planning from the beginning. It helps with allocating resources and making decisions about where to start with health promotion work. Some of the information gathered during the need assessment may be used to collect baseline data to decide on the important indicators, which will help to evaluate the impact of the intervention programme.

Let us now study different techniques for conducting needs assessment or situational analysis.

Techniques for conducting needs assessment or situational analysis

There are different techniques/approaches for conducting needs assessment. We will discuss the commonly utilized approaches for gathering new information on the needs of community members. These are:

- Key informant approach
- Public forum approach
- Nominal group process
- Delphi technique, and
- Survey approach.

Each of these techniques/approaches represents a unique method for gathering information on the concerns of community. Which technique should you use in your need assessment activities? We can decide that once we review these techniques. The quality of information about a community is only as good as the technique or combination of techniques used. A single technique may be too narrow in the information it provides and using too many methods may be costly in terms of time and money. Different techniques are appropriate for different needs. We should analyze the situation and most significant questions being asked and then weigh the advantages and disadvantages of several techniques. Sometimes a combination of several techniques will provide a reasonable picture. Re-examination of the "needs assessment process" may be done. This can be done by a logically arranged, step-by-step procedure for conducting a needs assessment. For example, the "need

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assessment process" includes careful attention to the purpose of the study, as well as, determination of whose needs are to be assessed. These two steps by themselves can help guide you in the selection of a primary data collection technique(s). The financial, human, and other anticipated resource requirements associated with the technique should be taken into consideration as well. We will now discuss each approach in detail. We will study about the purpose, type of people from whom the information is collected, implementation, advantages and disadvantages of each approach. Let us begin with the key informant approach.

14.6.1 Key Informant Approach

The purpose of this approach is to collect information from those community members who, because of their professional training and/or affiliation with particular organizations, agencies, or associations, are in a prime position to obtain a more comprehensive viewpoint of what the needs facing the community are. After the data from the questionnaires or interviews are collected and organized, the sponsoring group may want to give "feedback" about the findings of the survey to the key informants, participated. In this way, the sponsoring group may help stimulate additional insights into public needs.

Who are the types of key informants?

The types of key informants are: Elected officials (e.g. mayors, commissioners, panchayat raj leaders, etc.), key persons in institutional areas of the community (e.g. religious leaders, health/ nutrition sector officials, administrators, etc.). agency administrators (e.g. social sector departments), leaders of public service organizations and professionals in specific service areas (e.g. physicians, public health specialists, nutrition specialists and faculty, etc.).

How to implement the key informant approach?

We implement it through the following steps:

- Compile a list of "key informants" by name.
- Decide how you want to collect information from these key informants via questionnaires, interviews, meetings or (perhaps all of them).
- Construct a brief questionnaire and/or interview form which can be used to obtain the information you need.
- Gather data.
- Organize data.
- Interpret data.
- Schedule a meeting with key informants.

Share the findings of your study with key informants. Discuss your interpretations and their interpretations of the data. The instrument administered to key informants should contain questions that will successfully elicit the type of information needed to identify community needs. For nutrition programmes this might include the following types of questions: (I) the key informant's perceptions

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or attitudes of general community needs, or needs that might exist within specific areas of the community (e.g. the local economy, literacy levels, gender equity, nutrition or health services) (2) key informants perceptions (or attitudes) concerning what is currently being done about meeting those needs, and (3) his/her ideas as to what should be done about resolving needs that remain unmet. As a means of ensuring that a good cross-section of key informants comprises your study, it might be useful to also include questions concerning the background characteristics of key informants (e.g. age sex, race, and of residence).

What are the advantages of key informant approach?

The advantages are:

- It is one of the easiest and least expensive ways to systematically assess needs.
- It gives opportunity to establish rapport and trust and thus obtain the insiders' view.
- It provides depth of information concerning causes or reasons.
- It permits continual clarification of ideas and information
- It can be combined effectively with other techniques.
- It permits input from many individuals with different perspectives on the needs of the community.
- It can be implemented by community volunteers, thereby building community involvement and awareness.
- It does not involve the high cost of printing and data analysis.
- It may help initiate (or strengthen) the lines of communication among service organizations, agencies, and associations.
- Discussion of the findings with the key informants promotes insights for all concerned.
- The data collection instruments are usually easier to construct than those associated with the Survey Approach. Let us also look at the disadvantages.

What are the disadvantages of the approach?

The disadvantages are that:

- The information derived from this technique may represent a "biased perspective", since the information is typically elicited from "providers of services" (as opposed to the "consumers" of services).
- The information derived from key informants often represents the perspectives (and biases) of the organization, agencies, and associations with which these informants are associated.
- A group meeting held to "feed back" the findings of the study to the key informants may only work to rigidify a "provider ' bias in terms of clarifying what the real needs are.
- Personal relationships between researchers and informants may influence type

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of data obtained.

- Jealousy and resentment amongst other community members whose opinions are not solicited may develop.
- Should be combined with other methods, because representation of total community is difficult to achieve
- Few people can sense all the needs and concerns of all people in a community, the perspectives of those who are less visible may be over looked.

Sometimes to overcome some of the disadvantages mentioned above, an expanded key informant approach is also used. Thus, one of the weaknesses associated with the traditional key informant approach is the persons identified as "key" may not always hold formal positions in the community, nor wield a substantial amount of power and influence. The "expanded key informant approach" is designed to capture some of those individuals who may be omitted using the traditional approach but who occupy positions of leadership in the community. One method that can be used to identify these people is to select five individuals who hold official positions in the community (e.g., sarpanch of the village, grassroot level programme functionaries and school teachers etc.) and ask each of these persons the following concerns/ issue(s) which is (are) being considered. These are:

- Name five to ten individuals who you feel are knowledgeable about this (these) issue(s) in a particular community.
- Compile the list of persons mentioned.

Take the most frequently mentioned persons on the list and ask them to complete the same questionnaire or interview that the key informants (who hold formal positions of authority) have been asked to complete. In some cases, key informants holding formal positions will also appear on this latter list. If time and resources permit, ask these persons to identify the five to ten people who they believe are most knowledgeable about the issue or issues in question. You will notice that at some point along the line, an increasing number of repeat selections will appear on your list. You can stop the process at this point and ask the most frequently mentioned persons to respond to the key informant questionnaire or interview.

We will now discuss the second approach. i.e Public Forum Approach,

14.6.2 The Public Forum Approach/ Focus Group Discussions

The purpose of this approach is to elicit information from a wide range of community members concerning issues and community needs via group discussion taking place at a series of public meetings in the community. Under this approach, one or more organizations, agencies, or associations sponsor a series of public meetings (forums) where the participants discuss some of the needs facing the community, the priority needs are, and what can be done to meet these priority needs.

Who should Attend these Forums?

Generally open invitation is given to encourage all members of the community

to attend. Special invitation is given to "key informants," such as those types previously considered under the Key Informant Approach.

How do we implement the Public Forum Approach?

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The steps for implementation are:

- Develop a list of discussion questions/checklist that will serve as the basis for group discussion. Such questions as: What are the most important needs facing our community? Why are these needs important? What have we done to help meet these needs in the past? Where have we failed in the past in our attempt to meet these needs? Are the needs broad enough, yet important, so that most community members (and those participating at the forums) should feel free to address the issues without too much difficulty. However, public forums are probably most useful where specific issues and needs are being addressed.

Select a strategically located place for the initial meeting. Try to select a meeting place that you feel will be conducive to the open interchange of ideas. Large assembly halls, for example, are not usually the most appropriate settings for open discussion. Also, select a Kite that is geographically and socially acceptable to all segments of the population.

- Publicize the purpose, date, and place at which the forum will be held. Use media as much as possible.
- The group sponsoring the initial forum should take the initiative in conducting the first meeting. A person representing the group should be responsible for communicating the purpose of the forum to those present and what the meeting hopes to accomplish. Another person representing the sponsoring group should be responsible for recording ideas and suggestions presented at the meeting.
- After stating the purpose, objective, and "groundrules" for the initial forum, the discussion leader should pose the questions prepared in advance to the audience.

Encourage the open discussion and interchange of ideas.

- If the participants are on the right track, you'll find the recommendations for topics to consider and/or directions to consider for possible next meetings will "come from the floor". If this occurs, the convener should make sure an "ad hoc" committee of participants is organized to plan for the next meeting.
- Make sure the recorder gets the names of all the participants so that they may be personally contacted prior to the next forum.

Recognize that unlike the other needs-assessment approaches discussed thus far, you'll probably need to "play it by ear" more with the Public Forum Approach. Be well prepared for the initial meeting. Then let the participants join with you in planning for future meetings. Your goal is to learn from them by permitting them to get involved in the needs assessment process.

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What are the advantages of this approach?

The advantages of this approach are:

- The approach offers a good way to elicit opinions from a wide range of the community members.

It provides an opportunity for citizens to actively participate in the needs assessment process.

- Participants in the forms may offer able assistance to decision makers after the need assessment process is completed.
- It often contributes to enhancing the lines of communication between the "providers" and "consumers" of services and programmes.
- This approach is perhaps the least expensive of all the systematic needs assessment approaches.
- It is also one of the easiest to implement.
- It can provide a quick, intensive picture of community concerns.
- The approach gives community issues broad visibility.
- It is useful to identify problems, assess needs, or to suggest questions requiring further study.
- The design of the approach is flexible and a variety of techniques can be incorporated into it.

What are the disadvantages of this approach?

The disadvantages are:

- The burden is mainly on the sponsoring organizations, agencies, or associations to encourage participation.
- It requires good leadership and advance organization.
- The opinions obtained are limited to those who attend - all viewpoints may not be heard.
- The participants in the forums may actually represent a variety of "vested interest" groups.
- Poor advance planning and advertising may result in limited participation.
- Participants in forums may use the sessions as a vehicle to publicize their grievances ("gripes") about local organizations or agencies.
- If not well facilitated, only the vocal minorities will be heard.
- A large turnout may prevent everyone from speaking and may limit time allowed for each speaker.
- The approach may generate more questions than answers.
- The forums may bring about unrealistic expectations in the minds of the participants in terms of what "providers" can do to help meet needs.

We will now discuss the third approach/technique i.e. Nominal Group Process.

14.6.3 The Nominal Group Process Technique

The Nominal group process is an idea generating strategy to gather individual's ideas in face-to-face non-threatening situations. It is intended to maximize creative participation of group members where input from all participants is sought. The process takes advantage of each person's knowledge and experience. This approach is useful in generating and clarifying ideas, reaching consensus, prioritizing and making decisions on alternative actions.

How do we implement the Nominal Group Process approach?

There are many variations in using the nominal group's process. The following steps outline one general approach to using the process:

- If a large number of participants are involved, divide participants into small groups of 6 to 20 persons.
- Members of the group write their individual's ideas on paper,
- Each person discusses his/her ideas and all concerns are listed on a chart or board.
- Each idea is discussed, clarified, and evaluated by the group
- Each person assigns priorities silent ballot.
- Group priorities are tallied.
- There is discussion on final group priorities

What are the advantages of this technique?

The advantages are:

- If well organized in advance, a heterogeneous group can move toward definite conclusions.
- The technique can be used to expand the data obtained from surveys/existing documents, or generate a more specific survey
- It motivates all participants to get involved because they sense they are personally affected.
- It generates many ideas in a short period of time, allows for a full range of individuals' thoughts and concerns.

A good way to obtain input from people of different backgrounds and experiences.

- It gives all participants an equal opportunity to express opinions and ideas in a non-threatening setting.
- It stimulates creative thinking and effective dialogue.
- It allows for clarification of ideas

What are the disadvantages of this technique?

The disadvantages of this technique are:

- It may be extremely difficult to implement with large audiences unless advance

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preparation has taken place to train group facilitators and divide participants into groups of 6 to 10 members.

- The process may appear rigid if group leader does not show flexibility, encourage agenda building, and show respect for all ideas and concerns.
- There may be some overlap of ideas due to unclear wording or inadequate group discussion.
- The knowledgeable individuals selected to participate may not represent all community sub groups.
- Assertive personalities may dominate unless leadership skills are exercised.
- The technique may not be a sufficient source of data in itself and may require follow-up survey, observations or documentary analysis.

Let us now look at the fourth technique, the delphi technique.

14.6.4 The Delphi Technique

The Delphi technique is an idea-generating strategy that does not require face-to-face interaction, although it also can be used in small groups or workshop settings. It is more structured than the nominal group process and uses a series of questionnaires and summarized feedback reports from preceding responses. This approach is similar to the nominal group process i.e. in generating and clarifying ideas, reaching consensus, prioritizing, and making decisions on alternative actions. Since face-to-face interaction is not a requirement, the delphi technique could be used with groups that would not ordinarily meet together. Let us look at the implementation of the technique.

How do we implement the Delphi Technique?

Many variations of the delphi technique can be designed. The following steps outline a general approach for using the delphi technique:

- Develop a questionnaire focusing on identified issues, problems, causes, solutions, and actions. The intent is for each respondent to list ideas regarding the specified Issue
- Distribute the questionnaire to an appropriate group of respondents. Each respondent independently generates ideas in answering the questions and returns the questionnaires.
- Summarize the questionnaires into a feedback report and develop a second questionnaire for the same respondent group. The second questionnaire should ask respondents to prioritize or rank input from the first round
- Distribute feedback, summary and second questionnaire.
- Respondents review feedback, report independently, rate priority ideas in second questionnaire, and return response.
- This process is repeated until general agreement is reached on problems, causes, solutions, and actions.
- A final summary and feedback report is prepared and distributed to respondents.

- The feedback reports throughout this process allow for the exchange of opinions and priorities, and often result in individual changes in opinions and priorities after respondents evaluate the general groups perspectives.

Let us study the advantages of the technique.

What are the advantages Delphi technique?

The advantages are:

- The technique allows participants to remain anonymous.
- It is inexpensive.
- It is free of social pressure, personality influence, and individual dominance.
- It allows sharing of information and reasoning among participants.
- It is conducive to independent thinking and gradual formulation.
- A well-selected respondent panel, a mix of local officials, knowledgeable individuals, community members, regional officials, academic, social scientists, etc. can provide a broad analytical perspective on local problems and concerns.
- It can be used to reach consensus among groups, hostile to each other.

Let us look at the disadvantages of this technique.

What are the disadvantages of this technique?

The disadvantages are:

- The judgments expressed in the responses are those of a selected group of people and may not be representative.
- The technique offers tendency to eliminate extreme positions and forces a middle- of-the-road consensus.
- It is more time-consuming than the nominal group process.
- It should not be viewed as a total solution.
- It requires skills in written communication.
- It requires adequate time and participant commitment (about 30 to 45 days to complete the entire process).

Let us study the fifth or the last approach of the section i.e. survey approach

14.6.5 The Survey Approach

The purpose of the survey approach is to collect information from a wide range of community members concerning issues and community needs via their responses to specific questions. The information (data) is gathered through a carefully developed instrument administered to individuals identified via a sampling procedure. It is recommended that the individuals who collect this information should have at least some training or experience in the construction of survey instruments (e.g., writing clear and precise questions) and sampling technique

(e.g. selecting the most appropriate sampling design given the nature of the study). There are various methods of conducting surveys. Let us look at these.

Methods of conducting surveys

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Some of the methods of conducting Surveys are: 1) Personal (face-to-face) interviews, 2) Self-administered questionnaires completed by respondent's in-groups, 3) Telephone interviews, and 4) Mailed questionnaires. The types of surveys can often be compared in terms of: (i) cost of implementation, (ii) time needed for completion (iii) rate of refusal, and (iv) the extent and type of training needed by supporting staff and decide according to our requirements. Let us look at some of the advantages of survey approach.

What are the advantages of this approach?

The advantages are:

- Survey approach is perhaps the best approach for eliciting the attitudes of a broad range of individuals.
- The data obtained are usually valid and reliable.
- The various methods discussed above may be selected in relation to desired cost or response rate.
- It can be used to survey an entire population and provide an opportunity for many persons to feel involved in the decision-making process.
- It secures information from individuals who may be the recipients of services initiated as a result of the findings, thereby eliciting data from individuals who are usually in a good position to critique the present services.
- It can be used to record behaviours, as well as, opinions, attitudes, knowledge, and beliefs.
- It is an excellent technique to use in conjunction with other systematic needs assessment techniques.

What are the disadvantages of survey approach?

The disadvantages are:

- This approach is often the most costly.

To ensure statistical meaning, samples must be carefully selected.

- The results may not be valid if survey is not designed correctly.
- It may require time and expertise to develop the survey, train interviewers, conduct interviews, and analyze results.
- It is subject to misinterpretation depending on how the questions and response categories are designed.
- The tendency for scope of data may be limited as there may be omission of underlying reasons, and actual behavioural patterns.
- Respondents may, at times, be hesitant to answer certain questions and may answer what they think the authors want to hear and not necessarily how they feel. This is a problem particularly with interviews.
- Surveys are often "one shot" affairs. For example, persons responding to a

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needs

- survey may not be resurveyed again in the future.
- Individual's attitudes can change rapidly due to a variety of "intervening factors" ,

Thus, in this section, we learnt about various techniques/approaches used to conduct needs assessment/situational analysis. Thus you would note that for planning our programme, the first thing we would have to do is to go into the community and identify needs through the use of one or more of these methods. We can then identify the problems in the community and plan further steps in our programme.

In the last two sections, we have discussed how to plan, implement, sustain and evaluate a public nutrition programme. We also discussed that the programmes or certain components of the programmes should be sustainable if we want to see the continuous improvements in the health and nutritional status of the communities. For successful implementation of programmes and sustainability, it is critical that these programmes be administered properly. In other words, we need to have a good system and mechanism in place which will provide support in programme implementation. We also want to follow good management principles i.e. an integrated approach, so that the programme is effective and efficient in meeting its goals and objectives. In the next section, we will study about good governance and good management principles in detail. Now we shall take a break and answer the questions given in check your progress exercise 3.

Check Your Progress Exercise 3

1. Describe the term situational analysis/needs assessment.
2. Enumerate the techniques commonly used to conduct situational analysis.
3. Answer these briefly
 - a) Five advantages of conducting nominal group exercises
 - b) Five disadvantages of conducting a survey in a community

Now let us learn about good governance and good management principles.

14.7 PRINCIPLES OF GOOD GOVERNANCE AND MANAGEMENT

As discussed above, we will study about what do we mean by good governance, why it is essential to have good domestic governance, the importance of partnership for good governance and good management principles.

Let us begin with what is governance? The act or process of exercising authority or power over political units is known as governance. We should not merely have governance, we need to have good governance. Why is it so? This is because good governance in partnerships with developing country governments, non-governmental organizations and labour unions is essential for sustainable

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improvements in the nutrition and health programmes. Good governance is the foundation of sustainable development. This requires developing transparent democratic institutions, independent and fair judiciaries, and strengthened law enforcement that can combat corruption. When development programmes are infused with democratic principles and approaches, a cycle of benefits accrues. The programmes not only achieve better results but also can change the way communities go about solving problems. In addition, we also need good domestic governance. Good domestic governance is essential because almost every aspect of sustainable development is affected by the quality of civil society, political participation, decision making, and responsible and reliable governance.

Since good governance is the fundamental requirement for progress and sustainability, furthering it is the strategy to foster sustainable development. There are certain goals that support good governance. These are:

- democratic institutions that are effective, accountable, and transparent,
- an independent and fair judiciary,
- law enforcement that - with integrity - protects the people while strengthening their capacity to combat corruption,
- sound monetary; fiscal, and trade policies that promote economic growth, social
- development, and environmental protection, and
- participation by all members of civil society in decisions that affect them.

Democratic governance supports sustainable development by making institutions and policy making more accountable, transparent, and responsive. Free and fair elections allow people to select and change their leaders and to express their preferences for political parties and popular movements. Increasing political participation allows citizens to influence the allocation of health services, food, clean water and sanitation. A vibrant and politically active civil society, with a free press and the right to free association, will hold institutions accountable, more so when policy making is transparent and responsive to the concerns of citizens.

An independent and fair judiciary is also crucial for good governance. Solid judiciaries support laws that protect people, commerce, and the environment, and they enable enforceable contracts - a cornerstone of a functioning economy. Good governance also facilitates economic growth and equity. Both are shackled by corruption, a worldwide problem that distorts investment decisions, leads to misallocation of resources, and has a disproportionate impact on the poor.

Governance issues are critical at local levels, where participatory problem solving permits effective resource allocations. For example, a population and child nutrition programme in Morocco promotes localized management of public health services in order to reduce bureaucracy and permit more direct assistance. This assistance will be more efficiently targeted through collaboration between public health officials, non- governmental organizations, community associations, and the private sector. Similarly, in India local self government like panchayat raj institutions plays a significant role in sustainable improvements in nutrition and

health status of the communities. This takes us to the importance of partnership for promotion of good domestic governance. Let us review this in detail.

Importance of partnerships for good domestic governance

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Good domestic governance can be promoted through a wide range of partnerships. Significant partnerships of government programmes with local NGOs, community based organizations, civil society and democratic processes. Similarly, addressing employment and labour issues is essential to poverty alleviation and sustainable development, and that labour unions often play key roles in promoting civil society, fostering political participation, and demanding accountability from elected leaders. The abilities of developing countries to design and institutionalize the social safety net policies and programme needed to foster economic growth and workers protection. We know that public nutrition requires multisectoral approach to solve nutrition problems so it becomes essential that public nutrition programmes are managed by multidisciplinary terms. Let us see the principles we need to follow for managing successful nutrition programmes.

Good Management Principles : The Value of an Integrated Approach An integrated, cross-sectoral approach is required for addressing governance and sustainable development in public nutrition programmes. Good management involves multisectoral teams from various sectors to manage the programmes, For example, sustainable improvements in nutritional status in communities are possible only when agriculture and nutrition sectors work together. This could be further enhanced by the participation of irrigation departments and community members and organizing training small community groups etc.

A good and effective programme management requires a good nutrition/ health programme team along with a good leader to guide.

Thus for a good programme management, a multi-disciplinary team is required, who is able to:

- understand the people (realizing their problems, communication with the people),
- elicit community participation,
- work efficiently with maximum use of available resources, and
- institutionalize overall efficient administration, no waste of resources, proper co-ordination among the team.

Thus we saw that good governance and good management are required for successful public nutrition programmes. Good governance is required for sustainable improvements in nutrition and health status of people.

Check Your Progress Exercise 4

1. What is the importance of good governance and what are the goals that support good governance?

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.....

2. Describe briefly the principles of good programme management

.....
.....

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14.8 LET US SUM UP

In this unit, we began our study by understanding the concept of programme management and administration. Programme management is defined as getting people to work harmoniously together to make efficient use of resources to achieve the objectives. Since programme management involves working with people, especially skilled and competent people, we discussed in detail about personnel management which has a special role to identify, recruit, train and maintain the staff responsible for nutrition programmes. We discussed the roles, skills of a personnel manager and the core functions he/she is expected to perform in an organization. We studied about various steps involved in process of planning, implementing and evaluating a public nutrition programme. While doing so, we reviewed various questions that need to be answered while designing a programme. We also described in detail the process of needs assessment/situational analysis since this is the first step to design a programme. We learnt about the most commonly employed methods/techniques for conducting needs assessment. We discussed each method's purpose, procedures, advantages and disadvantages, which will serve as a guide in the selection of an appropriate technique for the collection of first-hand information on local needs for the community. We concluded that for a programme to sustain it is important to have good governance and good management principles. Thus we ended our discussion by learning about the issues of governance and principles of good management principles.

14.9 GLOSSARY

Civil society	: includes voluntary and non-profit organizations of many different kinds, philanthropic institutions, social and political movements, other forms of social participation engagement and the values and cultural patterns associated with them.
Key stake	: holders people who have an interest or are affected by a activity.
Normative	: relating to, or prescribing a norm or standard.
Political unit	: a unit with political responsibilities.
Remuneration	: wages or salaries including retroactive wages or salaries Bonuses including stock bonus plans; Extra pay for overtime work pay for holidays, vacations or periods of sickness.

14.10 HECK YOUR PROGRESS

Programme
management and
Administration

- 1). What are Skills Required by a Personnel Manager ?
- 2). What is role of a Personnel Manager.
- 3). What are Functions of a Personnel Manager ?
- 4). What is Supplementary feeding.
- 5). What are the steps involved in the process of evaluation?

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CONCEPTUALIZATION AND THE PROCESS OF NUTRITION EDUCATION

STRUCTURE

- 15.1 Learning Objective
- 15.2 Introduction
- 15.3 Understanding the Need and Scope of Nutrition Education
- 15.4 Importance of Nutrition Education
- 15.5 Potential Challenges and the Constraints of Nutrition Education
- 15.6 Theories of Nutrition Education
- 15.7 Process of Nutrition Education Communication
- 15.8 The Conceptual Phase
- 15.9 Let Us Sum Up
- 15.10 Glossary
- 15.11 Check Your Progress

15.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- describe the need and scope of nutrition education,
- discuss the importance of nutrition education,
- enumerate the challenges and the constraints of nutrition education,
- describe the various theories of nutrition education, and
- explain the overall process of nutrition education.

15.2 INTRODUCTION

In this unit and the next three Units 16, 17 and 18, we will study about the concept, scope, need importance and process of nutrition education. You might be having various questions related to nutrition education in your mind, like what is nutrition education? How well or poorly does nutrition education work? Does it deal better with some nutritional problems compared to others? You can probably get the answers to some of these questions as you read through these units.

In this unit, we will learn about the basic concepts related to nutrition education.

We will learn about the potential challenges and constraints of nutrition education and various theories of nutrition education. The process of nutrition education consists of four phases. These are: conceptualization, formulation, implementation and evaluation. In this unit, we will study in detail about conceptualization and briefly introduce you to the other three phases

Conceptualization
and the process
of Nutrition
Education

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15.3 UNDERSTANDING THE NEED AND SCOPE OF NUTRITION EDUCATION

We will start this section by learning about the history of nutrition education and by exploring how the need for nutrition education evolved over time. We will then discuss some definitions of nutrition education and explain the scope. So let us begin our study on the topic by looking at the history of nutrition education.

The beginning of modern nutrition education may be traced to the early attempts to prevent protein energy malnutrition (PEM) in infants and children, primarily due to faulty weaning. The need for nutrition education evolved about half a century ago, when in 1950, the first report of the Joint Food and Agriculture Organization/ World Health Organization (FAO/MFHO Expert Committee on Nutrition), recognized the need for nutrition education in developing countries. This report brought this need to international attention and emphasized the importance of nutrition education in the health sector. By 1958, the same committee reported, "Education in nutrition is a necessary part of practical programmes to improve human nutrition.. and recommended the channels for nutrition education such as schools, maternal child health (MCH) centers, community development and related programmes. We can thus see that, nutrition education, as an intervention, came into prominence with the realization that malnutrition to a large extent is not only due to inadequate food availability but also due to faulty food habits, some of them based on food prejudices, superstitions or taboos, and importantly, lack of awareness of the right food choices. Therefore, nutrition education was accepted as an important measure for the promotion of nutrition and well being, and was placed at a level of priority equal to that of other interventions.

So then what is nutrition education? Nutrition education has been viewed as the process of persuading people to act in their own best interest for attaining nutritional well being. It has long been established in an informal unstructured way.

often being embedded in traditional folklore.

Let us get to know more about this process by looking at some important definitions of nutrition education, as proposed by some experts.

"According to WHO, the focus of health and nutrition education is on people and action. In general, its aims are to persuade people to adopt and sustain improved/ desirable nutrition and health practices and to take their own decisions, both individually and collectively to improve their nutritional and health status, and environment." "Nutrition education is also described as the process by which

beliefs, attitudes, environmental influences, and understandings about food lead to practices that are scientifically sound, practical, and consistent with individual needs and available food sources."

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"Nutrition education is the process of applying a knowledge of nutrition related scientific information and social and behavioural sciences in ways designed to influence individuals and groups to eat the kinds and amounts of foods that will make a maximum contribution to health and social satisfaction."

"Nutrition education may be defined as a group of communication activities aimed to bring about a voluntary change in practices, which have an effect on nutritional status of a population. The ultimate goal of nutrition education is to improve nutritional status. "

"The term "nutrition education" applies to any communication system that teaches people to make better use of available food resources with the ultimate goal of improving nutritional status. "

So you can note that there are many definitions of nutrition education. Having gone through these definitions, in your opinion, what is the basic concept highlighted in these definitions. Yes, the concept highlighted is that nutrition education essentially involves communication for behaviour change. As a worker in public nutrition, you will come across terms like Communication for Behaviour Change (CBC) and Information, Education, Communication (IEC) or Nutrition Education (NE). What are these terms? Are these interchangeable? Let us see first how they are defined. "Communication for Behaviour Change (CBC) is a multi-level tool for promoting and sustaining risk-reducing behaviour change in individuals and communities distributing tailored health messages in a variety of communication channels".

"Information, Education, Communication (IEC) combines strategies, approaches and methods that enable individuals, families, groups, organizations and communities to play active roles in achieving, protecting and sustaining their own health. Objectives of IEC are to identify and promote desirable behaviours".

We can note that CBC, IEC and nutrition education are, in fact, interchangeable, since they all aim at creating awareness, motivating people to change behaviours and result in necessary action.

Sometimes it is customary to use the term Nutrition Education Communication (NEC) in place of nutrition education. You have read in the Unit 1, section 1.5 that nutrition is a determinant of health status, therefore, nutrition education communication falls under the broad area of health communication. Let us then try to understand what is health communication. "Health communication can be broadly defined as the systematic attempt to influence positively health practices, using principles, instructional design, social marketing, behaviour analysis, and medical anthropology. " The primary goal of health communication is to facilitate change in health-related practices and, in turn, health status.

You should know here that nutrition education communication (NEC) strategy is within the reach of most programmes. It can teach people beneficial

facts about nutrition and food, can help them develop necessary skills, and can communicate in a manner that motivates them to make life style changes on a sustained basis. So we can conclude here that nutrition education involves a set of communication activities and falls under the umbrella of health communication. Let us study about the role and importance of nutrition education in some more detail in the next section.

15.4 IMPORTANCE OF NUTRITION EDUCATION

Now that we know what nutrition education is, can you visualize the importance of this important activity. Yes, nutrition education can play a vital role in improving nutritional status of all the individuals within a family or community if they adopt positive nutrition behaviours. Nutrition education also has a vital role to play for policy makers as it helps mainstreaming nutrition into various projects and programmes. The following points tell us why nutrition education is important and essential:

- 1) Nutrition education reinforces knowledge and connects faulty concepts about nutrition.
- 2) It allows the individual to evaluate the nutrition information he or she receives.
- 3) It promotes the best use of an individual's limited economic resources.
- 4) It promotes the concept of 'health' as a valued community asset.
- 5) Nutrition education equips the individuals with the ability to make judicious food choices for health and well being. Nutritionally aware parents can pass on appropriate eating habits to their children. If importance of good nutrition is ignored, undesirable eating patterns may develop from early childhood causing eating problems leading to malnutrition (both under nutrition and overweight / obesity). Thus members with different physiological needs in a family can benefit from nutrition education as follows:
 - If families learn the importance of child nutrition, they can promote optimal development of their children. Mental development is almost complete by the second year of life and nutrition is crucial for brain development.
 - School children and adolescents, who are nutritionally aware of healthy foods, can adopt practices, which will help them in normal growth and development and will enable them to avail of maximum benefits from education
 - Adolescent girls by understanding the importance of nutrition and healthy food choices facilitate their own optimal growth during adolescence and ensure safe motherhood in future.
 - Pregnant women, by making the right food choices, increase their chances of a healthy pregnancy and a normal birth weight newborn.

The following points summarize why nutrition education is important for policy makers and programme planners.

- 1) Nutrition education is vital for policy makers and programme planners, simply,

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because they should be educated about extent, magnitude and distribution of various nutritional problems in the country. They should also be educated about causes and consequences of these problems. Nutritionists have the essential role of advocating and impressing on the government officials about the need for a good food and nutrition policy to be included in the economic planning.

2) Nutrition education helps policy makers and programme planners in formulating policies for other sectors like agriculture, rural development and education etc. Since causes of malnutrition are at multi-sectoral level, contribution of other sectors to improved nutrition can very well be recognized if the policy makers themselves are educated about nutrition.

3) Commonly nutrition education acts as a conserving force maintaining the validity of the culture and as an innovative force facilitating adjustment to contemporary problems and conditions. In general public, there is a tremendous gap between current nutrition knowledge and the dissemination and application of such knowledge: People do not instinctively choose what is best for them and so nutrition education becomes an essential activity. Initially the community may resist attempts at change and it would be useful to pay attention to what they see as their priority areas.

Thus it must be clear that nutrition education to population groups and policy makers has a potential to improved nutritional status. Now the next question, which comes to our mind is, whether nutrition education can really contribute to, improved nutritional status or not? Nutrition education has been a part of various programmes for many years. If this is so, then we would have seen remarkable changes in the nutrition situation of the people. However, this issue is not as simple as it sounds. Let us find out more about this complex issue in the coming section.

15.5 POTENTIAL CHALLENGES AND THE CONSTRAINTS OF NUTRITION EDUCATION

We face a big challenge when we plan to change behaviours of people through nutrition education. Also "how much of an improvement in nutritional status can be expected to be achieved through nutrition education?" is a frequently asked question. Nutrition education is considered unique and at the same time difficult because improved nutrition requires sustained and repeated individual behaviour. There are other reasons why nutrition education is challenging. The reason why people eat what they eat is complex and it involves both cultural and psychological aspects. Changes in food consumption patterns require shifts in deeply ingrained food habits established since childhood.

Further, in very poor communities nutrition education cannot be effective without simultaneous increase in real income. Nutrition education teaches better use of resources, which are already available to the family. When these resources fall below a certain level, redistributing them does not help, as this would not meet the actual requirements. Therefore, it is not surprising that nutrition education

for nutritional status improvement in food insecure communities is often viewed with skepticism because malnutrition is largely believed to be a reflection of poverty. However; there is also a view that, NEC does have the potential to make a difference even in communities having poor resources. Thus at a given level of income, NEC can:

- favourably influence practices like food purchase, preparation and storage and a more equitable intra-household food distribution, which meets the need of both male and female members,
- inform families on how to add important nutrients like micronutrient and rich foods through dietary diversification, particularly for vulnerable groups like infants,
- counter harmful traditional beliefs and practices related to dietary intake of women and infants.

You will learn more about nutrition education communication in later sections. Here we would like to emphasize that NEC, if designed, implemented and evaluated properly by committed personnel, there indeed are positive and significant impacts seen on nutrition behaviour and nutritional status of vulnerable groups, even in resource deprived communities.

The documented literature indicates that NEC does lead to behaviour change. One area where success in behaviour change has been achieved is in the projects on "Breast feeding and complementary feeding practices". This is mainly because behaviours related to breast feeding and complementary feeding are influenced more by cultural beliefs and traditions than resources

In fact nutrition educators have come up with various theories to understand how and why people change their behaviour. This brings us to the next section, i.e. theories in nutrition education. We will now look at some theories of nutrition education.

15.6. THEORIES OF NUTRITION EDUCATION

Nutrition educators have become increasingly aware of the importance of understanding the audience they want to influence. The field of communication offers nutrition educators practical theories for understanding people, their knowledge, attitudes and behaviour regarding nutrition. We will discuss here five main theories of NEC. These theories are: cognitive — gestaltist theory, behaviourist theory, the communication approach theory, diffusion and the social marketing approach theory. We will discuss each of these theories in detail. Let us start with cognitive - gestaltist theory.

15.6.1 Cognitive — Gestaltist Theory

According to the cognitive-gestaltist theory, education is seen as a process of self-development, whereby, the individual takes control of his/her environment. When this theory is used as a basis for nutrition education, it assumes that individuals

are basically rational, they are able to make free choices and when provided with relevant information, they will adopt behaviours that are healthy and self-actualizing. Therefore, the goal is to disseminate relevant information.

Let us go over to the next theory i.e. behaviourist theory

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15.6.2 Behaviourist Theory

Behaviourist theory is based on the premise that the inner cognitive experience is not the only determinant of behaviour. Behaviour is considered determined by the environment, which may consist of competing forces to provoke and reinforce unhealthy behaviours. It is argued that people are not free to make decisions as long as these environmental stimuli continue to be there. It is assumed that sufficiently strong stimuli and reinforcement will have to be set up for the learners. In all practical interventions, elements from both theories are used.

Let next go to the communication approach theory.

15.6.3 The Communication Approach Theory

The communication approach theory states that the receiver is selective in his response to the communication, the factors responsible for this selectivity being the individual's psychological orientation. This is known as the "communication effects" perspective. According to this theory, different people react differently to the same message. In addition, each individual also has a stored experience of beliefs and values. These beliefs and values influence the receiver interprets the message. This 'individual differences' perspective postulates that people with similar beliefs and values will respond similarly to a given message and in a predictable manner. Further it is also seen that people of the same age and sex and who have same level of education and wealth tend to select communication content of a similar nature and respond to it in a similar fashion. This is called the 'social categories' perspective. Both the individual differences perspective and the social categories perspective are considered important in their ability to predict response of the audience to communication. These theoretical perspectives have led to some conclusions:

- Communication through the interpersonal channel is considered more influential than mass media in effecting behaviour change

Individual factors such as educational level and social categories influence responses.

- If change occurs, it is likely to be in small increments and in the direction of previous inclinations.
- Changes occur only after a lot of effort.

It is very important that while formulating communication material and in interpreting the response to communication, both individual differences and social factors are considered.

Let us learn about diffusion theory next.

15.6.4 Diffusion — The Special Type of Communication

Diffusion is described as a special type of communication, whereby, innovations spread to the members of a social system. While the term communication encompasses all messages, the term diffusion is concerned with messages that are new to the audience that receives it. In a free choice situation, diffusion of innovations occurs more effectively when the sender and the receiver are alike in personal and social characteristics.

The key elements of diffusion process are:

full diffusion of most major innovations requires considerable time. innovations are more rapidly accepted if they offer advantage over existing practices, are compatible with other current practices, are easy to understand and use, and if their benefits are quickly and clearly demonstrable

You would have experienced that it is not easy to accept new ideas. It is true with most individuals. How do people go through a series of steps in accepting a new idea? What are these steps? Let us review them one by one.

- **Awareness** — this is the first stage in the adoption process, when people will know about an idea or product and become aware or conscious of it. Interest once they know, it may arouse their interest or curiosity: what is it? How does it work? How could it work for me?
- **Evaluation** — with more information about the idea, the person compares the idea with the existing one and might ask: how can I use it? Is it more effective than what I am doing now?
- **Trial** — people by nature are active and want to get involved and try something new. Hence they try the new concept.
- **Adoption** — the final stage is complete acceptance and use of the idea or product.
- **Adoption** - diffusion research shows that although individuals may be persuaded to change, they are usually resistant to change and change occurs only slowly.

Lastly, let us learn about social marketing approach theory.

15.6.5 The Social Marketing Approach Theory

Social marketing of nutrition health concepts and practices has developed over the past few decades. It is defined as a process or strategy to make people aware of the goods and services available to them and how to make use of these. It is believed that social marketing, like consumer marketing, should be responsive to consumer needs, preferences and priorities. The similarities between social marketing and consumer marketing should not however distract us from some of the important Dissimilarities between the two. Thus dissimilarities between consumer marketing and social marketing are:

Consumer marketing (CM) promotes the sale of goods or services for a profit while social marketing (SM) has the objective to promote welfare of the people.

CM tries to sell brands or products while SM tries to sell concepts and practices.

- The major concern of SM is with the poorer segments of the population, although this might not always be so.
- While CM is concerned mostly about user, SM has to worry about the influences of providers as well.

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contribution of the SM perspective appears to be the development of the The major resolution model for designing the message. This model postulates that a Resistance message is divided into a number of elements. The audience receives successive elements and reacts to them. If each element of the message is understood and accepted by the audience, then each successive element reinforces the foregoing element so that at the end of the message, the audience is persuaded to accept the message and practice it. Frequency of exposure is an important factor and it is admitted that several exposures are needed before the message leads to the adoption of the desired behaviour.

You should, however, remember that, if any of the elements in a message is not understood or accepted due to reasons of traditional beliefs or customs, it triggers off conflict and distracts the audience. Such a distraction is referred to as internal dialogue/dissonance. Successive elements may p10duce more internal dialogue until eventually the audience may cease to listen at all and reject the whole idea. The message design strategy of SM attempts to eliminate the internal dialogue by uncovering resistance points and designing strategies to overcome them.

It is important to note that the process of interaction between the communicator and the receiver (audience) can deal with dissonance in the course of intetperpersonal communication. However, in the case of mass media, this is not possible and therefore message design to overcome resistance is a very important consideration while using the mass media.

We studied about various theories of nutrition education. Before we move on to the next section, let us recapitulate. what we have learnt so far, by answering the questions given in check your progress exercise I

Check Your Progress Exercise 1

1. "Nutrition education aims to change behaviour". Justify the statement giving appropriate examples.

.....

2. What are the potential challenges and constraints of nutrition education?

.....

3. Enumerate various theories of nutrition education.

.....

4 Read the following statements carefully and indicate if true or false. Correct the false statement.

- a) Social categories perspective states that similar people react differently to the same message.
- b) Diffusion is described as an act of transmitting new ideas or innovations.
- c) Social marketing is same as consumer marketing.
- d) Communication through the interpersonal channel is considered more influential than mass media in affecting behaviour change.
- e) Nutrition education if designed, implemented and evaluated properly by committed personnel can have positive effects on the behaviour of people.

We have studied so far what nutrition education is all about. We also learnt about the scope and importance of nutrition education. We will now study about how we plan and conduct a nutrition education programme. i.e. the process of nutrition education programme.

15.7 PROCESS OF NUTRITION EDUCATION COMMUNICATION

You must be curious to know as to how do we go about actually conducting a nutrition education programme? Well, there are many steps involved in the process of conducting a nutrition education programme. During this process, we have to identify the problem and analyze the causes of the problem. We should also know what message to give and methodology to use to communicate to the people so that they are able to improve their nutrition and health behaviours. We will now introduce you to the process of nutrition education. You may recall that in the beginning of this unit we learnt that nutrition education involves many communication activities. So, before we discuss the process of nutrition education communication, let us first understand what we mean by communication. Communication simply defined, is the act of transmitting information, ideas and attitudes from one person to another such that intended goals are met. There are four basic components of the communication process. These are sender or communicator, message, receiver and the feedback. Figure 15.1 illustrates the communication process.

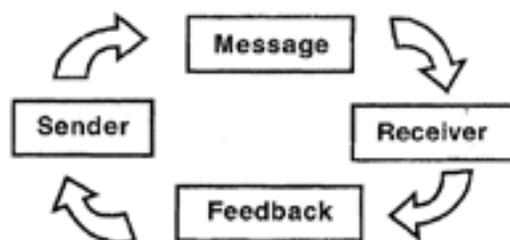


Figure 15.1: Components of communication process

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You can note from Figure 15.1 that the communication process is simple. The sender or the communicator wants to communicate something and decides to speak, write, send non-verbal or visual signals known as message. The receiver wants to understand the sender's meaning and therefore listens, reads or observes non-verbal information or visual information and sends verbal or non-verbal feedback to the sender.

Let us learn about each of these components in detail.

- **The sender or communicator (source):** People are exposed to communications from many different sources and more likely to believe a communication from a source they trust, that is, has high credibility. The reason why the same individual responds differently to different communications also resides in sender- controlled characteristics of communication i.e. the communicator's attributes.
- **The message:** The message consists of what is actually communicated including the appeals, words, pictures and sounds that we use to get our ideas across. for motivation or practice change. A well designed message addresses itself clearly to the problem to be dealt with. It recommends a solution or action after taking into account the resistance points to the desired action and has a motivational element.

The presence of a channel is very important for delivery of message. This is also sometimes referred to as the communication method. It is same as the medium, which is the delivery system or channel of communication for a message. This medium can be a person and/or an audio visual aid like radio or a television.

- **The receiver (audience):** The first step in planning any communication is to consider the intended audience. A method that will be effective with one audience may not succeed with another. Different individuals respond differently to the same message, with the significant causes being present in attributes of the receivers themselves.
- **The feedback:** Feedback is defined as the response or information provided as a result (If an event, the event in this case being the transmission of information. Feedback occurs when the receiver receives the message from a source through a medium/channel. The receiver listens, reads, or observes non-verbal signals or visual information and sends verbal or non-verbal feedback to the communicator/source who can modify the messages to make it more persuasive to the receiver.

Thus, communication is effective if all these elements are present. We can now look at the process of nutrition education communication. Nutrition education communication involves a carefully planned and thought out process to achieve the objectives of improved health and nutritional behaviours in the vulnerable population. The scheme for planning a nutrition education is based on a theoretical framework and consists of four phases namely: Conceptualization, Formulation, Implementation and Evaluation as illustrated in Figure 15.2.

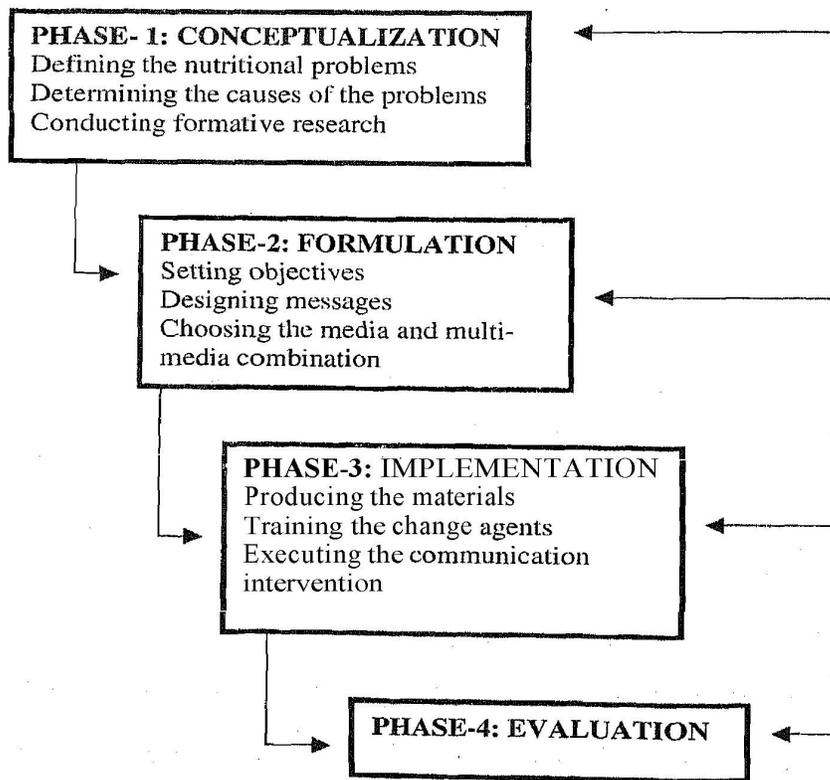


Figure 15.2: Process of nutrition education phases

You can see in Figure 15.2 that each of these phases has different elements, for example, conceptualization phase consists of identifying nutrition problems, analyzing the causes of the problems and conducting formative research. All the elements in each of the 4 phases contribute in a specific manner to the final outcome of the educational intervention. We will briefly review these phases here and then enumerate key elements involved in the intervention design for behaviour change. Let us begin with conceptualization phase:

A. Conceptualization. phase

The first phase in designing/planning a nutrition education programme is conceptualization. In the conceptualization phase, we determine the type and extent of nutritional problems, identify the population groups at risk and analyze the causes of nutritional problems. It is very important to analyze the causes of the problems as it helps to identify the factors which influence these problems. Therefore, problem analysis is the first step in conceptualization. Problem analysis is conducted by a method called causal analysis. This method has proven very useful in nutritional diagnosis. It involves drawing up a network of factors known or presumed to affect nutritional status in a given context. Since there can be several factors which can contribute to nutritional problems, we would like to understand the factors specific to the community for which interventions are designed. We will learn in greater details about causal analysis later in sub-section 15.7.2. For conducting causal analysis specific to a community, we conduct formative

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research. Formative research is, in fact a term which describes investigations conducted for programme design and planning. Formative research helps us to understand the context, need and characteristics of a community before we plan a nutrition education communication programme. It helps to understand specific human actions and behaviours and the cultural, social, economic, environmental and political factors that influence these human actions and food behaviours as highlighted in Figure 15.3.

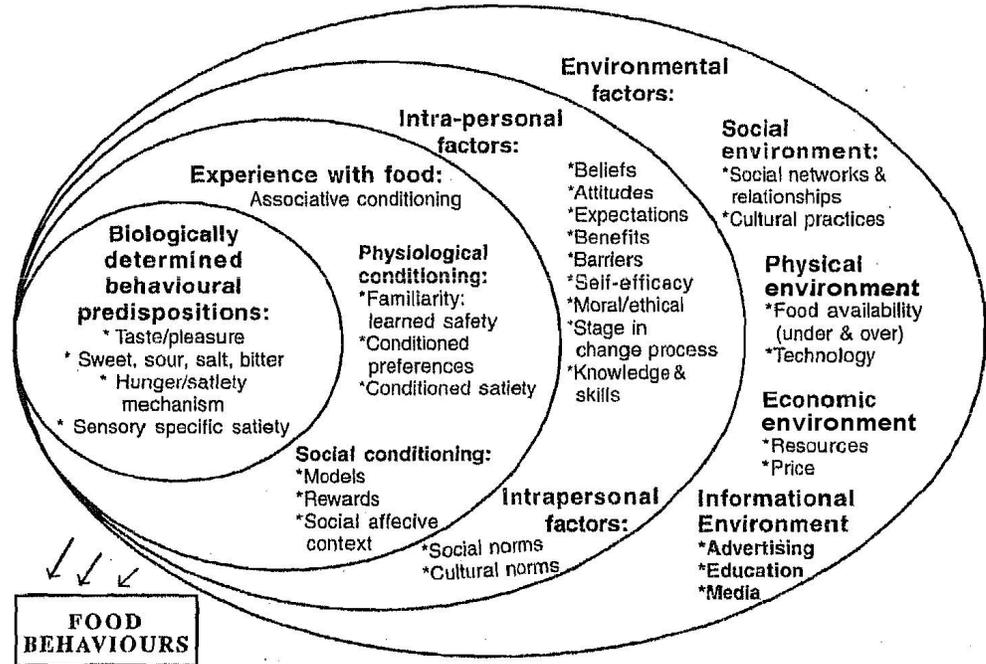


Figure 15.3: Factors influencing food behaviours

You can note from Figure 15.3 that food behaviours are affected by environmental factors such as social, physical, economic and informational environment and interpersonal factors. They are also influenced by experiences which an individual might have had with the food and some biological factors. The findings of formative research show the undesirable behaviours and factors affecting these behaviours.

We can thus identify behaviours which should be adopted by the target group and the actions which must be taken in order to modify the behaviours in question.

Once the programme has been conceptualized, we move on to the formulation phase.

B. Formulation phase

In the formulation phase, we give shape and structure to the elements we conceptualized in the conceptualization phase. The first step in formulation phase is to define the clear objectives for the NEC programme. These objectives should be specific, measurable and time bound. We also identify the audience who will be targeted for behaviour change. For example, we may identify the mothers of

children below the age of 6 years, especially children below 2 years and pregnant and lactating mothers for nutrition education.

We discussed above that from findings of the formative research, we determine the current behaviours and the factors affecting these behaviours. This process facilitates the development of messages. So we develop messages during formulation phase. Again the findings of the formative research can identify the popular channels of communication or media in the community. We develop a choice of media mix in order to develop optimum synergy between the channels. After we identify the media mix, we can decide on the support materials to be developed for the programme. Support materials are those on which messages are transmitted for example, posters, radio programme. The next step in the formulation phase is to formulate a communication strategy in which all the communication activities as discussed in the previous are integrated with each other. We will discuss the formulation phase in detail in Unit 16,

We will now briefly discuss the implementation phase

C. Implementation phase

Implementation means carrying out the activities in the field. You are familiar with the term "implementation" as you read about implementation of public nutrition programme in Unit 13. Implementation of NEC programme basically includes being ready with the software (the people or the nutrition educators) and the hardware (the messages, material and communication strategies). Implementation phase has three aspects: production of support materials, training and executing the communication intervention. In the formulation phase we identified messages and media mix and decided on the support materials. Thus during the implementation phase we produce the support materials. You should realize that support materials should always be used, whatever the scope of the project, as they serve to reinforce person-to-person communication. You should also know that prior to implementation, the nutrition educators should be trained appropriately in all aspects of NEC, particularly counseling and communication methods, monitoring and evaluation of the programme and learning from the experiences. We need to ensure that all persons involved in various communication activities carry out adequately their roles in their respective sectors. We involve a multidisciplinary team in training for the NEC programme.

They should very well understand and know the messages content, as well as, the technique to effectively communicate these messages. There are different methods of communication which can be used to disseminate messages to the community. It is also important during implementation that the health system and health nutrition services are geared to meet the increased expectations and demands for quality services from audiences who have been exposed to NEC. We will cover implementation of NEC in detail in Unit 18 later in this course.

After we have implemented activities in the field, we would like to assess how we are doing. For this we conduct evaluation. Let us study this last phase briefly

D. Evaluation phase

Evaluation is the measurement and assessment of the success of a communication programme in reaching its goals. Evaluation must be considered as a necessary support activity, an instrument for refining or restructuring communication activities. We should try to make evaluation a participatory process, which will involve the educators, service providers, planners and the community. The evaluation must respond to two fundamental questions.. These are: 1) Have the objectives been met? 2) Has the implementation process satisfied the various persons involved in the intervention and above all the population concerned. You are already familiar with the evaluation process as you read about the evaluation of public nutrition programme in Unit 14 earlier. An evaluation plan would guide us about what, how, where and when will evaluate the nutrition education programme. While nutrition education activity is common, the assessment of nutrition education, especially the whole process is not. The great majority of nutrition education programmes are not evaluated and apparently assumed to be ineffective. Therefore it is very important to evaluate any nutrition education programme.

Having gone through the discussion above, it must be clear that the process of nutrition education includes conceptualization, formulation, implementation and evaluation. Figure 15.4 summarizes the key elements discussed in the intervention design for behaviour change.

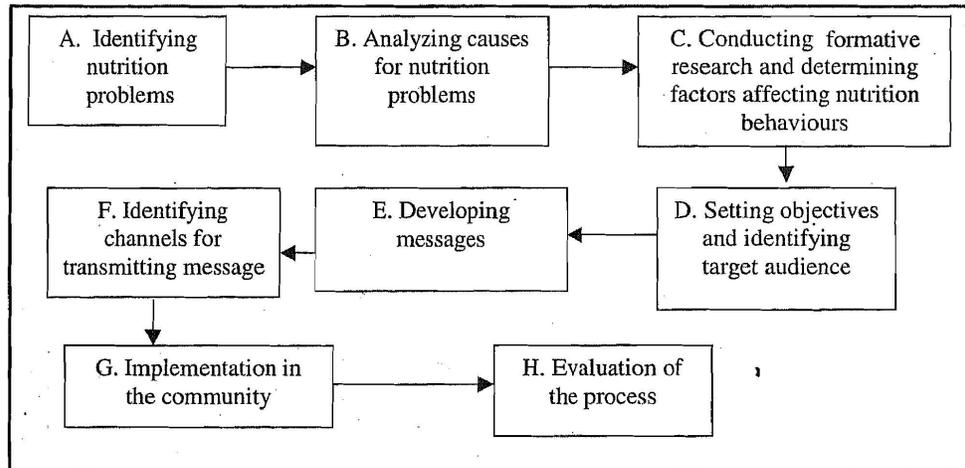


Figure 15.4: Key elements in the intervention design for behavior change

Identifying the nutrition problems, analyzing causes of the problems, conducting formative research to identify factors affecting the behaviours are all part of the conceptualization phase. Setting objectives, message design and identifying channels for transmitting messages fall under the formulation phase. The implementation stage includes development and production of support materials, pretesting these materials, training of educators and disseminating messages to the community through various communication methods. In the evaluation phase, we develop an evaluation plan which will guide us to assess if the objectives been

met and if the implementation process satisfied the various persons involved in the intervention and above all the population concerned, As discussed earlier, we will study about conceptual phase in detail now. The subsequent Units 16, 17 and 18 will have detailed discussions on formulation, implementation and evaluation phases. But you move on to the next section do answer the questions given in check your progress exercise 2.

Check Your Progress Exercise 2

1. Enutnerate the components of communication process.

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2. What are the four phases of the process of nutrition education? .

.....
.....

Now, let us study about the conceptual phase in greater details.

15.8 THE CONCEPTUAL PHASE

In this section, we will study about various elements involved in the conceptual phase. The conceptualization phase, as highlighted in Figure 15.2, Focuses on identifying the type and extent of nutritional problems, identifying the population groups at risk and analyzing the causes of nutritional problems. Let us study each of these elements in greater details:

15.8.1 Identify the Nutrition Problems and the Population at Risk

The first step in conceptualization of NEC programme is to identify the type and extent of nutrition problems and the population at risk. Nutrition educators generally have to address the nutritional problems of two types of population — the undernourished who are susceptible to infections and, the well nourished who are susceptible to degenerative diseases. The general consensus appears to be to tackle problems for which affordable solutions exist and defer the others.

For identifying the nutritional problems, we can ask certain questions to ourselves, for example:

What is this problem? How is it manifested?

What population is affected?

What is its impact on the social, economic and cultural life of the population concerned?

Is it a priority public health problem?

Finding answers to these questions would help us to conceptualize the issues related to the problems prevalent in the community. We can identify the nature, extent and the magnitude of the problem, groups affected, its socioeconomic importance

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and prioritization by conducting nutritional assessment of the community. You might recall that we learnt about assessment of nutritional status in earlier Unit 7 and 8. We also learnt about different nutritional problems prevalent in our country. To recall, the principal nutritional problems in our country, are protein energy malnutrition (PEM), vitamin A deficiency disorders, anaemia and iodine deficiency disorders. Suppose we conduct assessment of nutritional status in a community and we may come up with many nutritional problems. For example, about 50% children 0-3 years of age in that community are low weight for age, only 20% children exclusively breast fed for first six months of life, only 25% of 6-9 months old children, have been introduced to complementary foods in addition to breast milk. And so on. So we can see that the nutritional problems can be many in a given situation. So what do we do? We would be required to prioritize the problems to be addressed in consultation with the community. The next step after we prioritize the problems is analyzing the cause of each and every prioritized problem. Let us review this next.

15.8.2 Analyzing the Causes of the Problems

After we identify the problems and prioritize them, the next step is to analyze the causes of the nutritional problems. We identify list of factors known or presumed to contribute to the nutritional problems. This is known as causal analysis. It is known that casual analysis is absolutely necessary for the successful design and implementation of nutrition education programme. Why is it so? This is because nutritional problems are the results of an interaction between complex and multiple socioeconomic, biological and environmental factors. We can take one of the problems identified earlier-and conduct casual analysis. For example, 50% children 0-3 years of age in that community are malnourished or low weight for age. What are the problems contributing to this condition? We have already discussed about causes of malnutrition in Unit 2 and Unit 3 earlier. Some of these are, as you know, poor infant and child feeding practices, lack of awareness, low socioeconomic status, poor household food security, low accessibility to health services and poor environmental conditions. You may recall reading in Unit 2, Figure 2.1 about the conceptual framework portraying the causal factors and their interaction, leading to malnutrition. These were at three levels - immediate causes, underlying causes and basic causes. Further, according to this framework, the immediate causes of poor nutritional status/malnutrition are poor dietary intake and disease. You can note in Figure 15.5 that for casual analysis, we have further analyzed the factors which contribute to poor food intake. Let us take the cause - poor food intake and study the various factors contributing to inadequate food intake. These are, for example poor child feeding practices, inadequate household food consumption, intra household distribution etc. We can take one of the factors such as inadequate household food consumption and further identify its cause such as family food habits, taboos etc. Thus, we identify factors contributing to each cause at successive levels. Like this we can construct a chain of causality with linkages formed progressively and organized into a hierarchy. With the result we get a network of factors affecting nutritional status. We then identify the factors which are linked to human behaviours.

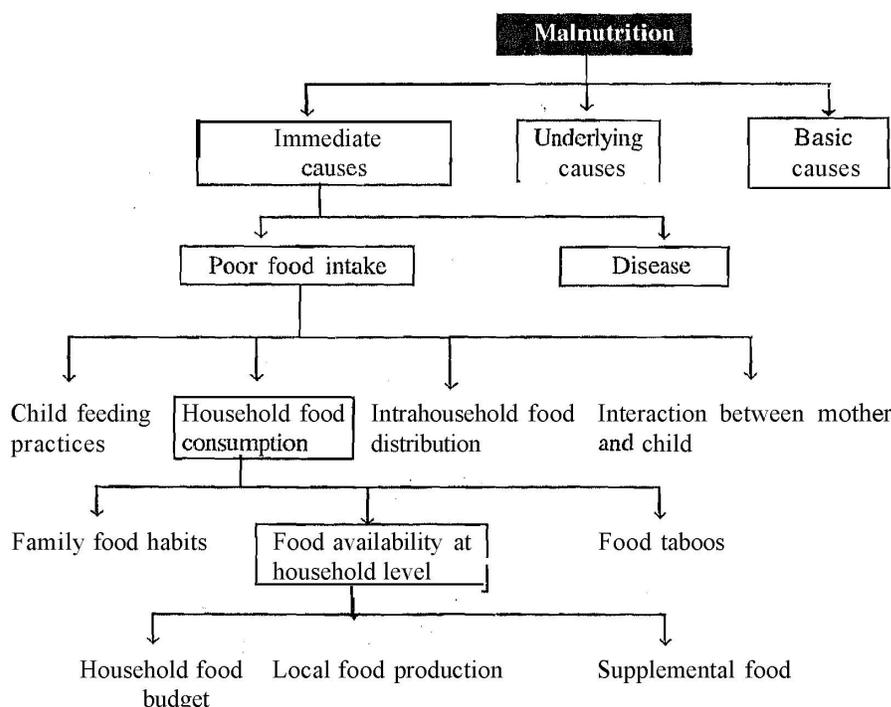


Figure 15.5: Casual analysis for malnutrition

Only these factors are most likely to be amenable to nutrition education. For example, you may note from Figure 15.5 that the child may not be consuming enough food because the mother has poor awareness about what all food to give to the child. Mother may also have certain misconceptions about what to feed the infant. These are the factors which are amenable to nutrition education communication because mothers can gain knowledge about what to feed the baby and remove the misconceptions about feeding through education. Like this we need to take each and every problem identified during assessment of nutritional status, conduct casual analysis and identify factors most likely to be changed through educational approach. Eventually, we will get a list of behaviours linked to these factors which can be addressed during the education programme.

In our discussion so far we have discussed about causal analysis and the different factors known or presumed to be contributing to malnutrition. However, when we actually plan to conduct a nutrition education communication programme, we need to learn from the community about various factors which affect the nutrition and health behaviours of the population. Once we understand the context of the community, we can plan a programme which will meet the specific needs of the community. For this we conduct a type of research known as formative research. Let us study about formative research in detail, next:

15.8.3 Formative Research

As discussed earlier, formative research describes investigations conducted for programme design and planning. It helps to understand the context, need and characteristics of a community. Formative research is done on a representative

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sample of a target audience to understand the cultural, social, economic and political factors as highlighted in Figure 15.3, that influence human actions and behaviours. Thus formative research helps to:

- understand motivators and barriers to optimal practices,
- create messages and materials specific to the needs of the community, and ensure messages and programmes are appropriate, acceptable and feasible to beneficiaries

The results of formative research aid the programme planners in establishing measurable objectives and realistic strategies for the programme. Before conducting formative research, you would realize that it will be useful to develop certain research questions. These are as follows:

- What are the behaviours and how can we describe them?
- What influences human behaviour
- What is the role of culture, social change and economic factors in determining behaviours?
- How do we use an understanding of behaviour, and plan nutrition-health education and nutrition-health promotion programmes?

Finding answers to these questions can help us to identify current behaviours (which may or may not be optimum), factors affecting these behaviours and the barriers which prevent adoption of optimum behaviours,

We can use certain methods in formative research to answer some of the questions mentioned above. Let us now learn about these methods.

Method used in formative research

Formative research methods help us understand the cultural, social, economic and political factors that influence human actions and behaviours. We can use either a single method or a combination of methods. Some of the commonly used methods used in formative research are: focus group discussions, individual in-depth interviews, participant observations, direct observation, informal conversations and ethnographic studies. We will briefly review each of these methods now

Focus group interviews: The focus group interview method brings together eight to ten respondents typical of the intended target audience. A trained interviewer uses a prepared list of probing questions to collect information on vocabulary, attitudes and concepts related to the selected nutrition problem. Here, the group atmosphere may stimulate more in-depth discussion than individual interviews do. The insights into the commonly held beliefs can also be obtained relatively quickly.

- **Individual in-depth interviews:** The individual in-depth interviews build on information gathered during other research efforts, to probe deeper into individual attitudes and concerns. They are useful when sensitive topics are addressed, when issues must be probed deeply, when individual rather than group responses are needed, or when it will prove difficult to gather respondents for a group meeting.

- **observation:** In the participant observation method, the educatory programme implementer participates in the daily life of the community she or he is studying - observing what is happening, listening to what people talk about, asking questions in various ways over a period of time.
- **Direct observation:** Unlike the participant observation method, in direct observation method, the educator/programme implementer observes, but does not participate in an event. She usually has a checklist of behaviours to be observed and a recording format for the observations which may be unstructured or structured.

Informal conversations: In the informal conversation method, the educator 1 programme implementer takes advantage of any opportunity to converse informally either individually or in small groups with the members of the community being studied.

- **Ethnographic studies:** They combine anthropological techniques to analyze how specific nutrition practices relate to the larger cultural context. An ethnographic study may employ several qualitative methods in a complementary manner to get a holistic picture of the nutritional problem. Besides the methods enumerated above, one other important method used in formative research is trials for improved practices. What is this method? Let's find out

Trials for improved practices: Trials for improved practices is an important method used in formative research. We use this method after we have analyzed and consolidated findings from rest of the other methods and made recommendations regarding desirable behaviours. Sometimes we would like to test the recommended behaviours in people's homes to see whether the suggested behaviours are feasible and acceptable by the families or not. This is known as Trials for Improved Practices (TIPS) and it is a core method of formative research.

In TIPS mothers primary caregivers are given a choice of recommendations for Vaction, questioned about their reasons for that choice and then followed up to see what actually happened after a trial period. In this way the proposed recommendations are tested in a real environment and information is gathered on their acceptability. This information helps programme planners to set priorities among the many seemingly important nutrition practices and messages. TIPS is conducted before the suggested practices are finalized and recommended as a part of the nutrition education communication strategy. TIPS thus follows formative research in which the behaviours to be targeted for change have been decided and counseling is done for each type of behaviour.

There are some basic steps involved in carrying out TIPS. These are:

- training field personnel in the methodology of TIPS
- recruiting participants from the community for TIPS,
- an initial visit to gather information, conduct dietary or other assessment as needed,
- feed back and discussion with teams to analyze dietary information, prepare

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for counseling, counseling visit to present options for various behaviours, get reactions, negotiate

- trial practices, note the practices the family has agreed to try out, debriefing to discuss reactions to recommendations and options selected,
- follow-up visits to learn about the reactions to the new practices after a trial period of two to three weeks. Note the practices which were followed and those not followed, during the trial period from among those selected by the respondent, and why, and
- analysis, summary and application of results - designing more effective materials and strategies based on TIPS findings

Thus, TIPS helps us to fine tune our recommendations, test their feasibility and acceptability and help develop appropriate messages and materials.

From our discussions above, it is clear that there are a variety of formative research methods. Interestingly you would realize that, we can use any or combination of methods to answer the research questions highlighted above. The findings from these methods are analyzed and consolidated to understand various factors affecting the behaviour and design materials and strategies. Thus we can determine the current behaviours (which may or may not be desirable behaviours) and reasons for those behaviours by target audience. We also make recommendations regarding what the desirable behaviour should be. For example, during formative research, we may find that "Mothers feed their 6-9month old children, only a small piece of chappati once a day".

Based on this observation, we may make two recommendations for optimum behaviours as: "Feed the child h katori of mashed up family foods (cereals/dals/vegetables) 3-4 times a day".

Feed $\frac{1}{2}$ katori mashed green leafy vegetables or yellow fruits/vegetables once a day"

Now we would like to test whether the recommended behaviours are acceptable and feasible for people to follow in their own environment. For this TIPS will be conducted. To continue with the same example as above, we may ask mothers to try these behaviours as follows:

"Feed the child $\frac{1}{2}$ katori of mashed up family foods (cereals/dals/ vegetables) 3-4 times a day".

Feed h katori mashed green leafy vegetables or yellow fruits/vegetables once a day."

After trying these behaviours in their homes, the mothers might come up and say that only the first behaviour is acceptable and feasible for them but the second one is not. So you will have to consider only the first behaviour as part of your communication strategy.

We may identify certain factors or barriers which prevent adoption of desirable behaviours. These factors can be lack of awareness about what, when and how much to feed the baby and food taboos. Our communication strategy while developing messages, choice of media and materials would have to take

into account all these factors in order to bring about a lasting change in current behaviours. would like to explain that it is very important to list the expected behaviours in detail. This goal has to be clearly defined, practical and feasible to achieve. we need to ask ourselves certain questions before we define the expected behavior. Let us elaborate on some of these questions now for defining an expected behaviour

15.8.4 Defining the Behaviour

We should define the expected behaviour in as much detail as possible. This involves specifying not only what the behaviour should be, but who is to carry it out and when. We can begin to make judgments about the feasibility of changing a behaviour once we have considered the following questions:

- **Frequency of behaviour:** How often should it be performed - daily, every few days, occasionally, only once? For example, hygiene behaviours such as cleaning children and washing hands have to be done every day. They will be more difficult to promote than a behaviour such as giving mega vitamin A doses that have to be given only twice in a year.
- **Easy difficult :** How complicated is it to carry out - is it very simple or does it require learning new skills? For example, breastfeeding is simpler than complementary feeding.
- **Similarity with existing practices:** How similar or compatible it is to existing practices - is it completely new, or does it show some similarities? For example, making a rice gruel may be more compatible with existing practices than making oral rehydration syrup (ORS). Also, not giving water to an infant before 6 months of age may be incompatible with existing practices.
- **Resources available:** How much does it cost, in time, money or resources to carry out the behaviour? Complementary feeding involves time and resources, which are not easily available.
- **Felt need of the community :** Does the behaviour fit in with a felt need of the community? For example, taking iron folic acid tablets (IFA) in pregnancy may not be the felt need of the community.
- **Impact on nutritional status:** How much impact will the behaviour have on nutritional status - a great deal or very little? For example, deworming may show visible impact while change in dietary behaviours may show impact over time.
- **Long or short term outcomes:** Will beneficial effects be observed in the short or long term - within a few weeks, months or years? For example, weekly IFA supplementation to anaemic adolescent girls may show improvement in haemoglobin levels within a few months. While impact of NEC to mothers towards improved complementary feeding behaviours in terms of improved nutritional status of infants, may take longer duration.

Remember, we need to pay attention to these minute details of a behaviour otherwise it will be difficult to set clear goals for expected behaviours and bring

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about a change in the behaviours.

So we studied how formative research would help us understand various factors influencing behaviour. It would also help to create appropriate messages and materials for the nutrition education programme. Results of TIPS would help us to know whether the suggested behaviours are feasible and acceptable to the community or no. This takes us to the next step of formulation of the nutrition education programme i.e. developing objectives and messages and identifying channels of communication for the targeted audience. We will read about these in the next unit.

Check Your Progress Exercise 3

1. What is the importance of formative research?

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2. List all the methods you would use in formative research.

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3. What kind of questions will you keep in mind while deciding on the expected behaviour for the families?

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15.9 LET US SUM UP

We learnt in this unit that nutrition education, as an intervention, came into prominence with the realization that malnutrition to a large extent is not only due to inadequate food availability but also due to faulty food habits, some of them based on food prejudices, superstitions or taboos, and importantly, lack of awareness of the right food choices. Thus, nutrition education can make a difference in people's life by helping them to make right behaviour changes for healthy living. We also learnt that nutrition education is vital for policy makers and programme planners. They should be educated about extent, magnitude and distribution of various nutritional problems in their community and causes and consequences of these problems. This helps them to make decisions on programme priorities and allocation of funds. Nutrition education is unique and at the same time difficult because improved nutrition requires sustained and repeated individual behaviour. Nutrition educators have come up with various theories which help in understanding people, their knowledge, attitudes and behaviours regarding nutrition. The process of nutrition education communication programme consists of four phases - these are: conceptualization, formulation, implementation and evaluation. Each of these phases have key elements which are critical in designing nutrition interventions. We discussed the conceptualization phase in detail which consists of identifying nutritional problems, analyzing causes and

conducting formative research to understand the context and characteristics of the community.

Conceptualization
and the process
of Nutrition
Education

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15.10 GLOSSARY

Education	: implementation of appropriate methods for ensuring the training and development of an individual.
Medical anthropology	: branch of anthropological research studying the factors that cause, maintain or contribute to disease or illness, and the strategies and practices that different human communities have developed in order to respond to disease and illness.
Qualitative methods	: research methods based on anthropological, psychological, and market research techniques, that use open ended and unstructured question guides to probe rationale behind current norms and practices.
Quantitative methods	: research methods such as surveys that use structured questionnaires or measurements to quantify conditions and estimate prevalences.

15.11 CHECK YOUR PROGRESS

- 1). What are the potential challenges and constraints of nutrition education ?
- 2). What is Nutrition education ?
- 3). What are the importance of Nutrition education ?
- 4). What are the theories of Nutrition education ?
- 5). What are the Components of communication process?

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NUTRITION EDUCATION COMMUNICATION PROGRAMME: FORMULATION

STRUCTURE

- | |
|---|
| 16.1 Learning Objective
16.2 Introduction
16.3 Setting Objectives of a Nutrition Education Communication Programme
16.4 Identifying a Target Audience
16.5 Designing Messages
16.6 Choosing the Media and Multi-Media Combinations
16.7 Development of a Communication Strategy
16.8 Let Us Sum Up
16.9 Glossary
16.10 Check Your Progress |
|---|

16.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- explain the importance of setting objectives for nutrition education communication (NEC) programme,
- identify the target audience for NEC, based on specific criteria
- enumerate the criteria for designing effective communication messages and selecting appropriate channels, and
- develop skills to develop a communication strategy.

16.2 INTRODUCTION

In the previous unit, we briefly discussed about the process of Nutrition Education Communication (NEC). These processes are conceptualization, formulation, implementation and evaluation. We discussed in detail about the conceptualization and enumerated different elements of nutrition education communication. In this unit, we will study in detail about formulation of nutrition education programme. Formulation here means to give shape and structure to the different elements conceptualized during the process of nutrition education. Thus we would learn

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how we design a nutrition education programme. We will begin by learning how specific objectives of a nutrition education programme should be set. How to identify the target audience for nutrition education? How to design messages and choose media for delivery of messages? These are the other aspects covered in this unit. We will conclude this unit by discussing how we can develop a strategy to communicate our messages to the target audience.

16.3 SETTING OBJECTIVES OF A NUTRITION EDUCATION COMMUNICATION PROGRAMME

We have read in the previous unit and also earlier in Unit 7 that for identifying an existing problem, we conduct a nutritional assessment. Nutritional assessment of the community can give us information on the existing nutrition and health problems in terms of quantitative data. For example, if through the nutritional assessment we determine that only "3% of infants 6-9 months of age are initiated into complementary foods in a particular community", then we may like to see an improvement in this practice in a given period of time as a result of our nutrition education programmes. So we may set up an objective saying that at the end of two years 35% of infants 6-9 months of age would initiate complementary foods. However, you would realize that, objectives of the NEC programme can be set at different levels like nutritional, educational and communication. These objectives must be quantifiable and consistent over the life of the programme. Let us study in detail about the different levels of these objectives. We shall begin with nutritional objectives.

A. Nutritional objectives

The primary objective of a nutrition intervention programme is the nutritional improvement of the target group as measured by the indicator's of nutritional status. Nutritional status is a complex phenomenon which is influenced by many factors external to an educational intervention. The timeframe within which different indicator safe affected by interventions differ. The nutritional objectives would therefore be defined with short term and long tem objectives. If we design an educational programme aimed to change behaviour in the short term (for example, improving complementary feeding practices of 6-9 months old infants) within the long term objective of improving nutritional status (for example improving weight for age), then we will have to see that the external factors which affect the nutritional status are favourable. These external factors, for example , are, improved food production, availability of food and improved health facilities. You know that all these are conditions which axe outside the control of communication intervention. Thus, short term objectives can be achieved based on the interventions which are independent of external factors. For example, improving awareness in mothers in nutrition. You may realize that it is important to set nutritional objectives in measurable terms but understand that the long term objectives will be achieved only when factors external to communication

intervention sare conducive to their achievement.

Let us look at the educational objectives, now:

B. Educational objectives

These objectives are concerned with changes in behaviours of the target population. The specific objective of a NEC programme is to bring about lasting changes in the behaviour affecting nutritional status. Adoption of new behavior depends upon many factors external to communicationprogramme.

Educational objectives should be operationalized as far as possible. These provide the basis for preparation of an objective evaluation of the intervention. To be operational, an educational objective should state clearly the following points:

- what observable behaviours will indicate that the objective has been achieved'?
- who will show the various behaviours?
- what will be the results of the new behaviour?
- under what conditions will the behaviour be shown? , and
- what criteria determine that the desired result has been achieved?

Programmes: Formulation

We can also have intermediate obiectives, which are concerned with changes in motivation, knowledge, self efficacy and the skills required. These objectives can be achieved independent of the external factors.

Let us next look at the communication objectives.

C. Communication objectives

The communication objectives relate to exposure of the target population to the message and its retention through various channels of communication. The goal of any communication programme, you would agree, should be to bring about a lasting change in the behaviour of the population. You should remember that in the field of communication, the methods are as important as the results. For example, we can have two communication programmes which achieve the same objectives of message retention. The first programme may do so due to authoritarian approach which results in a relationship of dependence on the media while the second programme may be participatory and encourages the population itself to make informed decisions to solve their problems.

We would prefer the second communication programme. Having learnt about different kinds of objectives, we can develop a hierarchy of objectives as shown in Table 16.1.

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Types of objectives	Examples
<i>General objectives</i> (long term, nutritional)	<ul style="list-style-type: none"> ● x% of target audience would have improved nutritional status by the end of five years.
<i>Specific educational objectives</i> (change in behaviour, short term nutritional)	<ul style="list-style-type: none"> ● x% more of the target audience compared to baseline will report introducing their children to complementary foods at 6 months.
<i>Intermediate objectives</i> (changes in knowledge, motivation etc.)	<ul style="list-style-type: none"> ● x% more of the target audience compared to baseline will state that children need to start on top foods (complementary foods) at 6 months or will state where to obtain ORS packets or will demonstrate knowledge of the growth monitoring chart and state that when the curve begins to descend and the child needs special help in feeding.
<i>Communication objectives</i> (exposure and retention of messages)	<ul style="list-style-type: none"> ● Compared to baseline, x% more in the target audience would have heard a radio programme, or possess a growth chart, or have attended anganwadi sessions within x months of communication activities start-up.

Table 16.1: Hierarchy of objectives in a nutrition education

Thus, you learnt that we can set nutritional, educative and communicative objectives depending upon the problems identified in the nutritional assessment. These objectives could relate to exposure to media, knowledge, behaviour and outcomes of nutritional situation. Every NEC programme should specify quantifiable objectives in the beginning of the programme

You can see in the cited example above, that we are using the term target audience in our objectives. You learnt that we generally name vulnerable groups for nutrition education as target audience. There may be other groups also in the community who may be considered as target audience.

16.4 IDENTIFYING A TARGET AUDIENCE

The formulation phase, we learnt earlier, also deals with identification of target audience, What do we mean by target audience? Target audience is the population with whom we communicate for change in behaviours. You know that an individual's behaviour is extremely important for his or her health. However, it is not always the individual who makes the decisions. We often find that other persons in the family and community influence a person's behaviour. For example, mother or mother-in-law will influence what food should or should not be given to an infant. Communications should thus be also directed at the persons who make the key decisions in the family and community i.e. the 'gate keepers'. The target population of a NEC programme is, therefore, made up of different groups. These can be vulnerable groups and target groups. The vulnerable group in fact

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may be the target group but now always it is so. For example, pregnant women in a NEC programme are the vulnerable population, as well as, the target audience for education. But this is not the case for vulnerable population of 0-5 year old children. The target audience for this group is their mothers or grandmothers. The target audience can be further divided into three segments. These are primary, secondary and tertiary audiences. Let us review these in a little detail.

1) The primary target audience: These are the individuals who would actually change their nutrition health practices. For example, mothers of young children who would modify their behaviour to feed their children.

2) The secondary audience: These are the people who can be motivated to teach, support, and reinforce the practices and beliefs of the primary audiences. Examples of secondary audience are health care providers, family and friends, and popular public figures. Few communication programmes are successful if they ignore the potential of these groups.

3) The tertiary audience: These are the decision-makers, financial supporters, and other influential people in the community such as pradhan or school teachers. They can facilitate the communication process and behaviour change and make the programme a success.

Thus target audience consists of primary, secondary and tertiary audience. Nutrition education communication planners must use the results of demographic, socio-economic, and epidemiological research to determine different types of audiences. We need to clearly spell out the specific audience we need to target during the NEC programme.

In child survival and nutrition programmes, the primary audience generally consists of caretakers (mothers), grandmothers, and sometime - older siblings. However, in an area where service providers have limited knowledge and acceptance of these skills related to the new practices, planners may also want to consider health workers, supervisors, or other opinion leaders as the primary audience for the first stage of the programme. Since there is a large category of people involved with programme implementation, planners usually segment these audiences. For example, urban mothers may need a different communication strategy and different educational materials than rural mothers. Given limited time and resources, planners must designate the audience segment most critical to programme success. This may be a geographic or socio-economic group considered at highest risk, one with low access to nutrition care services, one which can be most effectively reached with limited resources or an existing outreach system, or the segment which is most inclined towards initial adoption of new behaviours.

In our discussion so far, we have studied about how to set objectives and identify target audience. The next step in formulation is how to design messages. We will study this in the next section. But first let us recapitulate what we have learnt so far in the check your progress exercise 1.

Check Your Progress Exercise 1

1. What is the formulation phase of nutrition education communication process?

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2. Enumerate the different types of objectives one need to set for a NEC programme.

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3. Mention the different types of audience who can be targeted for nutrition education

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16.5 DESIGN MESSAGES

We studied earlier that formative research is crucial and it helps to determine the current behaviours of the target audience and the factors affecting these behaviours. As a result, we identify the gaps and give recommendations for desirable behaviours. Now comes the challenging task as to how do we put these recommendations across to the people. We want the target audience to improve upon the current behaviours so that it leads to improved nutritional and health status. You may recall studying earlier that results of formative research also help us to identify different channels of communication for the target audience. We are now ready to develop appropriate messages and support materials for the nutrition education programme.

Before we go any further, we need to first understand, what we mean by messages, media and support materials. Let us find out

- Message is the formulation of an idea or concept to be transmitted to a specific population (for example, breast milk is the best food for infants)
- Media is the channel of communication through which the message is transmitted (for example, counseling, group discussion etc.), and
- Supports are the materials on which the message is transmitted (for example, flip charts, radio programme etc.

Having distinguished between message, media and support materials, let us now review the process of developing these elements. In developing messages, channels of communication and support materials we need to ask certain preliminary questions to ourselves, for example, for developing:

messages, the first question we could ask is what words should be used and in what order?

media, we could ask, what type of media? What is the optimal media mix for a particular situation?

support materials- Which materials to use, what colours and what pictures/images?

You would realize that all these questions are interrelated. The contents of the message influence die choice of media and support materials. These, in turn influen e how the message is formulated. Selection of support materials

is dependent on choice of media. For example, if we want to counsel the rural illiterate women, then we may develop poster, flip charts etc. If we want to use mass media such as radio, we may develop script for a radio programme. We will learn about effectiveness of various media to different target groups later in this unit. However, whatever be the message, it is important that the message be persuasive and coherent.

So then how do we design messages. Let us first discuss the essential elements of a message design and how we design persuasive and coherent messages conveying the specific recommendations to the target audience

16.5.1 Essential Elements of a Message Design

For a message to be coherent, persuasive and effective, the essential elements include:

- **Content**— this includes the problem identification, target audience, resistance points, solutions and required action.
- **Design** — the design factors such as use of single ideas, using language that is relevant, portrayal of characters with which the target audience can identify or relate themselves.
- **Persuasion**— that is dispelling doubts and reducing the chances of the doubts acting as a barrier to action.
- **Memorability** — that is, idea reinforcement, minimizing distraction and using repetition as a strategy.

Thus, messages designed should consist of what is actually communicated, including the appeals, words, pictures and sounds that we would use to get the ideas across to the target audience. We would like our messages to be persuasive and coherent so that they are effective in changing attitudes and behaviours of the target population. But then how do we design persuasive and coherent messages? The next section focuses on this aspect.

16.5.2 How we Design Persuasive and Coherent Messages?

We learnt earlier that a well designed message should reach the target audience. Although there is no one formula for effective message design, there are several useful guidelines. These are enumerated here for your consideration:

- **Nature of the advice given:** A message will only be effective if the advice presented is relevant, appropriate, and acceptable and put across in an understandable way. The type of appeal: The appeal is the way we organize the content of the message to persuade or convince people. Let us see the different types of appeals:
- **Fear:** A message may try to frighten people into action by emphasizing the serious outcome from not taking action. Symbols such as dying persons, dead child or mother, and skulls may be used.
- **Humor:** The message is conveyed in a funny way such as a cartoon or an animation.

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- **Logical/factual appeal:** The emphasis in the message is on conveying the need for action by giving facts, figures and information. For example giving facts/figures on the causes of anaemia or malnutrition
- **Emotional appeal:** Attempts to convince people by arousing emotions, images and feelings rather than giving facts and figures, e.g. showing smiling babies.
- **One-sided message:** Only presents the advantages of taking action and does not mention any possible disadvantages/limitations that may exist.
- **Two-sided message:** Presents both the benefits and disadvantages ('pros and cons') of taking action.
- **Positive appeals:** Communications that ask people to do something e.g. breastfeed your child as long as possible, give ORS to children suffering from diarrhoea.
- **Negative appeals:** Communications that ask people NOT to do something i.e. do not bottle-feed your child.
- **Actual content of message:** This includes the actual words, pictures, sounds that make up the communication and convey the appeals. In a radio programme the content would be a mix of the advice given, wording, tone of voices and music. A poster would contain the basic appeal, pictures, words, photographs, symbols and colours.

Thus if we follow these guidelines, we will be able to make our messages persuasive and coherent for target population.

Another important point which you need to remember is that we cannot overwhelm the target audience with too many messages, therefore, we need to prioritize the recommendations and limit them to 2 or 3 messages.

Having designed our messages, next we need to decide on the choice of media and then develop support materials. You may recall that design of support materials depends upon the choice of media. Let us now learn about choice of media.

16.5 CHOOSING THE MEDIA AND MULTI-MEDIA COMBINATIONS

You know that the media are the channels of communication through which messages are transmitted. We discussed earlier that information about different communication channels can be obtained during formative research in a community. Thus, while conducting nutrition education programme, we can make use of these channels in a most effective way to transmit the messages. What are the different channels of communication one can use in nutrition education communication? Let find out

Nutrition/health information can be communicated through many channels to increase awareness and assess the knowledge of different population about various issues, products and behaviours. Channels might include:

- **Interpersonal** — face-to-face or interpersonal methods include all those

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forms of communication involving direct interaction between the source and the receiver. For example, individual discussions, counseling sessions or group discussion, community meetings and events.

- Mass Media communication such as newspapers, magazines, booklets, leaflets exhibitions with charts, models, posters, radio, television and audio visual aids like films and documentaries
- Traditional channels/folk media such as story, telling, play acting, song with a message, hand puppets or string puppets and others.

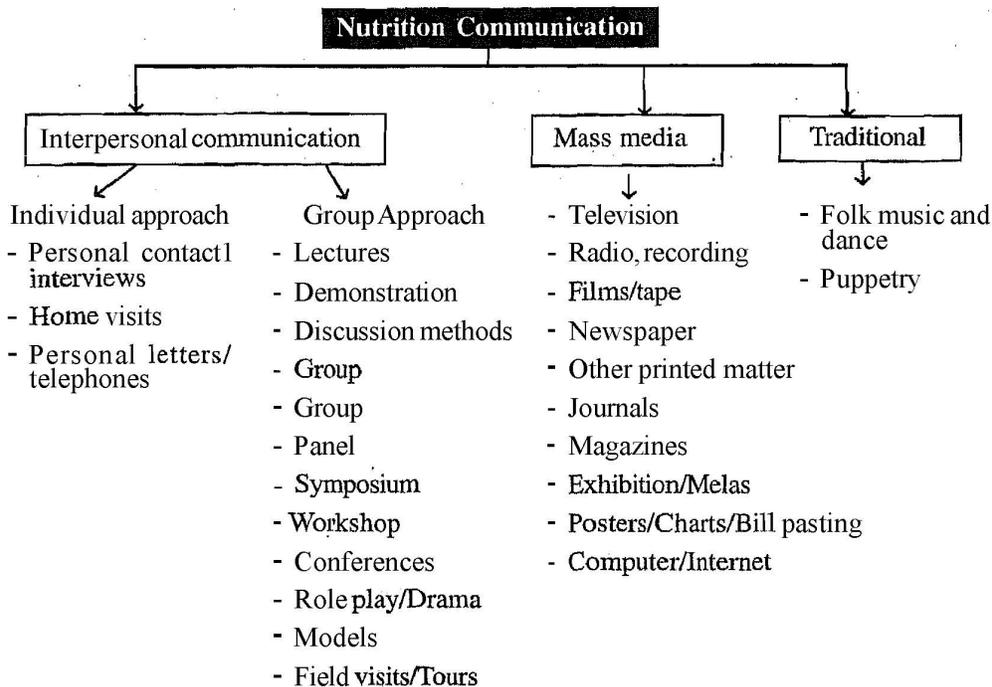


Figure 16.1: Channels of Communication

Let us look at these channels now in detail with their advantages and limitations.

16.6.1 Face-to-Face or Interpersonal Methods

As stated above, face-to-face or interpersonal method include all those forms of communication involving direct interaction between the source and receiver. In this method, voice is the main organ of communication, but the use of other support materials is highly recommended. These support materials can be printed, visual, and audiovisuals. They reinforce the oral communication between the educator and the target audience. Interpersonal communication is a very effective way of studying the nutrition problem and for adapting the necessary messages. It is important for you to know that interpersonal communication is of considerable importance in any strategy for public education. In fact, the most successful attempts to change nutritional habits have been based mainly on interpersonal communication usually used in conjunction with other methods. Thus, interventions in nutrition education must encourage interpersonal communication. You would realize that most people working in development programmes are involved in

interpersonal communication. Interpersonal communication may take place in two kinds of circumstances. These are: One-to-one counseling and group situation. Let us understand these in detail. We will look at one-to-one counseling first

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a) One-to-one counseling

One-to-one counselling can take place when the caregiver or mother visits the doctor, health worker or anganwadi worker. These functionaries can listen to the mother 1 caregiver's problems and help her find solution to her/his problems. The messages given by them should complement those transmitted via other channels of communication. They can reinforce the messages relevant to the public.

b) Group discussions

Group discussion involves face-to-face interaction with a group of people. Sometimes it is desirable to work with groups of people not only to save time and money but also to benefit from group dynamics. Examples of face-to-face group discussions are:

lecture, demonstration, meetings, community events, role play etc. Face-to-face group discussion can be a small group (less than 12 persons) counseling, intermediate group/lecture (between 12 and 30) and large group lecture1 public meeting (more than 30).

We have looked at the different forms of interpersonal methods of communication. Now let us get to know the advantages and limitations of face-to-face method of communication, We shall look at the advantages first

Advantages of face-to face methods

The main advantage of face-to-face methods is that it is possible to contact specific groups, make the advice relevant to their social needs and develop problem-solving skills and community participation. It is also possible to check that you have been understood and give further explanations.

The advantage of face-to-face communication over mass media is that it creates opportunities for questions, discussion, participation and feedback. Let us look at the limitations, next.

Limitations of face-to-face methods

Face-to-face methods are slower for spreading information in a population because of the need to mobilize field workers and travel to different communities to hold meetings. There are not enough educators for the intensive personal contact needed on a mass scale. Also the communicator may be ineffective if he/she is "ill-informed, uses an unsuitable approach, or holds a status in the community felt to be inconsistent with his/her role". Further, as the size of the group increases, it is more difficult to have feedback and discussion. In large groups and public meetings usually only a small number take part and many persons feel shy speaking out. Finally, person-to-person education carried out by paid workers is difficult to

justify in terms of cost-effectiveness.

Having looked at the interpersonal methods of communication, let us next, study about mass media.

16.6.2 Mass Media Methods

What do we mean by mass media? The term "mass" in mass media means that we can reach large number of people at a time through the means of communication employed through this approach. Mass media methods comprise the institutions and techniques by which specialized groups employ technological devices (press, radio, films, television etc.) to disseminate symbolic content to large heterogeneous and widely dispersed audiences. Thus in mass media methods, the interaction between source and the receiver is mediated through the visual image, print, verbally or by a combination of these elements. The source and receiver are never in direct contact in mass media methods. Mass media include broadcast media such as T. V, radio etc. and print media such as newspapers, magazines etc. Mass media plays a very important role in creating awareness and interest in new ideas among general population groups.

You may also be aware about the technological innovations taking place in the world today and we should not forget the presence of computer in our daily life. In fact, computers in nutrition communication are becoming very important means to disseminate information across the globe. The information can be disseminated through internet, electronic mail (email), chat rooms and multimedia. On internet, we have data base of various topics in nutrition, research, and reports of programmes and projects conducted in any part of the world. All these can be downloaded easily on the internet. Nutritional professionals all over the world are using email to exchange ideas, documents and data. Email is a very fast, easy and inexpensive means of communication. You might have used chat rooms to converse with your friends or relatives electronically. Chat rooms are also a type of electronic communication where several people sitting miles apart from each other can engage in a face-to-face conversation through the computers. Chat rooms can be used to discuss nutritional issues and exchange ideas. You must have heard of multimedia programming used in computers. Multimedia is a computer controlled combination of text, graphics, sound, photographs, motion pictures and other types of media. There are many types of multimedia programmes available which can be used in nutrition communication and nutrition training. The programmes can be used by both professionals and consumers. Some of these programmes include food service and recipe management, dietary data collection and nutrient analysis. You might have seen colourful brochures on the internet promoting a product or services. These are prepared using multimedia programming. Similarly, nutritional brochures can also be designed using multimedia and distributed to large groups of people accessing the internet. Satellite based interactive teleconferencing can also be arranged to discuss nutrition issues and for teaching students sitting at far off places as is being practiced by IGNOU.

Let us then review the advantages and limitations of mass media. We begin with the advantages first

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Advantages of mass media

The advantages of mass media include:

- It provides a rapid way to reach a very large (even non-literate) audience.
- It makes good use of scarce manpower.
- Mass media are not only appropriate to inform and to create or reinforce change, but may also help to motivate and teach.
- It can be inexpensive, at least in terms of cost per person reached.

Next, let us look at the various limitations

Limitation of mass media

Mass media though effective, have certain limitations as well. These are:

- As mass media are broadcast to the whole population, they are not a good method for selectively reaching specific groups, e.g. grandmothers or teenagers. It is difficult to make the message appropriate to the special situation of local communities, whose problems and needs may be different from the rest of the region. Even if a person hears something on the radio and wishes to change, those around them may pressurize him or her against change.
- Particularly for large and diverse audiences, mass media alone cannot persuade people to change deep-rooted attitudes or learn complex skills, since mass communication cannot possibly have the required cultural, linguistic, and social sensitivity nor receive individual feedback that will help assure that messages are relevant, appropriate, and understood by the audience. A well-planned programme involves a carefully chosen mix of both face-to-face and mass media methods, which exploits their different advantages. For example, we can counsel the rural women on child nutrition. We can also present the information on child nutrition through a radio programme so that the messages, which she receives through counseling, get reinforced.

Let us review traditional media now.

16.6.3 Traditional Media Methods

The traditional or folk media are the traditional methods of communication prevalent in a community. In contrast to the modern mass media, the traditional media are personal, familiar and more credible forms with which the majority of literate and illiterate individuals identify easily. There can be three different types of traditional or folk media. These are folk music, ballad forms of folk and puppetry. In the folk music, there are 300 folk musical styles in India. These folk musical styles are used in all languages and states in India. These are entertaining and invite audience participation. Ballad forms of folk approach involve folk singing. The range of folklore presented through these ballad styles is extensive and full of variety. Some common forms of ballad style include Burrakatha (Andhra Pradesh), Villupattu (Tamil Nadu), Alha (Uttar Pradesh), Jugani and Vaar (Punjab), Powada (Maharashtra) and many others. Puppetry has fascinated

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people of all ages but children, in particular, for centuries. Puppet shows are an effective communication folk approach practiced in many cultures. Puppets come in many forms, these are string puppets, rod puppets, shadow puppets and hand puppets, Community gatherings, religious meetings and ceremonies can also provide opportunities for nutrition-health education. Let us look at some of the advantages of folk or traditional media. These include:

- traditional media is cultural specific and community can easily identify the context and understand the messages,
- it appeals at a personal and intimate level,
- it is available to all at a very low cost,
- it is flexible in adopting new themes, and
- it preserves and disseminates the tradition and culture of our ancestors in a lively manner.

You must be wondering as to how do we choose the right channel of media i.e. face-to-face, mass media or traditional approach for nutrition education programmes.

16.6.4 Criteria for Selecting Methods

We have studied about the different channels of communication in the previous subsection. Now the question arises, which method we should select to communicate our messages? Obviously, that would depend upon the various parameters such as what are the objectives? Who is the audience? What is the budgetary allocation? Let us look at these parameters and see how they influence the choice of method

- **The learning objective:** Our 'learning' objectives would determine if we need to convey simple facts, complex information, problem-solving skills, practical manual e.g psycho-motor skills, or simply target for an attitudinal change? For example, if we want to teach mothers to recognize what a malnourished child looks like, we would perhaps use media that include visuals such as posters and chart etc.
- **Characteristics of the audience:** We will have to know what are the characteristics of the audience that will affect choice of channel? e.g. age, experience in life, education level, previous exposure to media, ownership of radio/TV, listening, watching and reading habits, familiarity with different media, traditional communication methods already in use in community.
- **Characteristics of different methods:** We will have to know how much will the different methods cost, including initial costs and operating maintenance? How many staff members and what levels of skill are involved in using the method? What factors will affect the use of the equipment, e.g. need for electricity, storage and transport needs.
- **Costs:** We have to ensure availability of funds for initial purchase, spare parts and maintenance, charges for electricity, paying for trained staff for media production, maintenance and implementation.

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Other programme considerations: There will be other programme considerations for which you will have to answer many questions like- if you need a visual dimension, e.g. a picture, to explain your point? Is sound necessary? How agreeable is the community of new ideas? Will they be resistant to your advice? How urgent is your time scale? Is it a short or long-term priority? Do you want to develop community participation?

So we have looked at criteria , which when considered, would help decide what communication channel we can choose to communicate our messages. You would realize that it is always better to use several channels to transmit the same message than a single channel. Why? Using several channels will reinforce the message delivery and is more likely to be effective for behaviour change. So how do we do that. There are two aspects which we can look at to consider which media is best suited to bring about a change in behaviour. First is its relative strength and weakness in relation to improving the various parameters of nutrition education and the other is how effective it is with different types of audience.

A. Strengths and weakness of various media

It is important for you to understand that each channel has a specific impact on us. For example, using a specific channel of communication, we may gain in knowledge, we may change attitudes and/or we may retain a mental image of what we see or develop verbal or demonstration skills. These are the factors or parameters which will contribute to change in behaviour. We may acquire various parameters in varying degrees depending upon the type of media used in the nutrition education programme. This translates into its strengths and weaknesses.

Channels of communications	Acquisition of parameters						
	Knowledge	Mental image	Concepts and Principles	Methods	Verbal skills	Psycho-motive skills ^A	Attitudes
Only verbal communications	++	+	++	++	++	++	++
Verbal communication+ fixed image	+++	++	+	++	+	+	++
Verbal communication+ moving image	+++	+++	+++	+++	++	++	+++
Verbal communication+ 3 dimension object	++	+++	+	++	+	+	++
Verbal communication+ printed material	+++	+	++	++	+	+	++
Verbal communication+ demonstration	++	++	++	+++	++	++	++
Radio (non interactive)	++	+	+	++	++	+	++
Television	+++	++	+++	++	+++	++	+++
Written press	++	+	++	++	+	+	++
Poster	++	++	+	++	+	+	++

Table 16.2: Relative strengths of the media in changing various parameters of nutrition education

Apsychemotive skills include how a particular message influences our mind

Key: Good effect + + + Little effect +

Moderate effect + +

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Having gone through Table 16.2, it is clear that different channels of communication adhere to different parameters. If the channel of communication is only verbal communication like lecture or discussion, then there is moderate effect on acquiring knowledge and verbal skills to the target audience but little effect on mental image. Mental image, as you know, has a big impact in retaining the messages. But if we use verbal communication with a moving image like lecture with a film, then acquisition of knowledge, mental image, procedures, and attitudes is greatly enhanced. Thus each channel has relative strengths and weaknesses in relation to improving specific parameters of nutrition education.

Based on these characteristics of each media we can develop a plan for multimedia combination for dissemination of messages.

We will now look at the second aspect in choosing media, that is the effectiveness of each media in reaching a specific target group

B. Effectiveness of each media reaching a specific target group

It is important for us to know that different channels of communication are effective in reaching different target groups. Table 16.3 highlights the effectiveness of different means of communication in reaching various target groups like rural women, urban population, village leaders, field workers etc

Communication Methods	Rural women	Rural men	Urban population	Field workers	Village leaders	School children	General public
Group Communication							
Television			+++				+
Radio	+	+++	+++	+++	+++	+	+++
Written Press			+	+		+	+++
Posters	+	+	+	+++	+	+	+++
Popular theatre	+++	+++	+	+++	+	+++	+
Video			+	+	+		+

Table 16.3: Methods of communication for different target groups

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Practical demonstration	+++	+	+	+		+++	
Fix film	+++	+++	+++	+++	+++	+++	
Audio cassette	+++	+++	+++	+++	+++		
Personal contact	+++	+++	+++	+++	+	+++	
Flanellographie	+++	+	+++	+++	+	+++	
Flip chart	+++	+	+++	+++		+++	
Brochures		+	+	+++	+	+++	t

Key : Less effective +

Very effective +++

We can note from Table 16.3 that while using mass media, television as a means to reach urban population is very effective. Similarly, while using interpersonal communication with rural women, demonstration and use of flip charts may be very effective.

Thus we may want to use a specific channel of communication for a given target group in order to make the communication effective.

C. How to determine the best multimedia combination

First what do we mean by a multimedia combination? A multimedia combination involves a systematic and organized use of several channels of communication. If we use several channels of communication in such a way that each one of them reinforces the other, so that their collective impact is greater than the sum of their influence taken separately, their overall impact on the education intervention is increased. This principle is also known as synergy. It is well known that interpersonal communication is the best way of communicating with the target audience. The basis of a media mix is the interaction of interpersonal communication with mass media communication. An essential element of many successful nutrition education programmes has been to use a multimedia combination. We know that each channel of combination is specific in its own way.

The challenge is to find the best combination which can result in the realization of objectives. We want to reach a group of rural illiterate women, we can use popular theater or traditional/folk music to communicate specific message. We can also communicate the same message through counseling and practical demonstration. This will have a synergic effect and lead to reinforcement of messages.

It can, therefore, be seen that the ideal approach is to select not one, but several complementary media to maximize the potential for a successful intervention.

Having looked at the various channels to deliver the messages, we can now look at how we communicate our messages to the target audience in a systematic way. This brings us to a very important step of designing the nutrition education programme, that is, development of a communication strategy for behaviour change. Let us look at this now.

16.7 DEVELOPMENT OF A COMMUNICATION STRATEGY

A communication strategy is a planned and systematic way of communicating messages to the target audiences. We can have a clear and well defined strategy to communicate our messages, based on the key elements discussed above. A communication strategy can guide us about behaviours to be changed in the target audience, and messages and materials to use through various media. There are nine components, which form part of a communication strategy for behaviour change. These components are derived from our discussions above. These also serve as a basis for the detailed implementation plan.

These components are:

1. Ideal behaviours
2. Current behaviours
3. Feasible behaviours
4. Barriers to behaviour change
5. Audience
6. Messages
7. Media and materials
8. Activities (e.g. Training, community mobilization, advocacy, counseling, negotiation during group meetings and household visits)
9. Monitoring and evaluation

Let us briefly review these components one by one

Ideal behaviours: Ideal behaviours are the recommended behaviours which the target population should follow to achieve optimum health and nutritional status. These recommendations are those which are suggested by the experts in the area of nutrition and health. For example, a major recommendation for infants 6-9 month old is that "in addition to breast milk, the child should receive complementary foods at least 3-4 times a day". Ideally, we would like all mothers to follow this recommendation so that the infants are healthy.

Current behaviours : Current behaviours are the behaviours currently followed by the target population. It may or may not be ideal. For example, current behaviour of a six month old child may be that he/she has not started any

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complementary foods yet. He/she is on mother's milk only.

Feasible behaviours: Feasible behaviours are the behaviours which have been tried by the target population during trials of improved practices (TIPS) as discussed in the earlier Unit 15 and found acceptable. The feasible behaviours guide us to develop our messages. **Barriers:** These are the resistance points which need to be overcome while delivering messages during various channels of media. For example the barriers in infant feeding may be lack of awareness and traditional beliefs.

Audience: The target audience for communicating messages, as you may recall studying earlier, can be primary, secondary and tertiary. Continuing with the same example of feeding complementary foods to children 6-9 months old, it would be mothers of infants 12 months of age, anganwadi workers, mother's groups and families, who would form the target audience.

Messages: We can develop our message accordingly. Using the same example as above, our message can be " Start feeding I -2 tablespoons of soft mashed cereals and vegetables once a day". " Mother's milk alone is not sufficient to meet the growing needs of infants after 6 months - the infants need complementary foods".

Media and Materials: From the findings of the formative research, we learnt about the channels of communication most popular in our community. For example, we may determine that the most popular channels of communication are face-to-face or interpersonal methods. Then we use counseling and group meeting as methods to communicate our messages. We can use the materials such as flip charts, flash cards and posters

Activities: When we implement the nutrition education programme in the community, then we will be conducting certain activities such as training, community mobilization, counseling etc. We will discuss some of these activities in detail in the next Unit 17 on implementation of nutrition education programmes. These form a very important part of our communication strategy.

Monitoring and evaluation: Finally, we develop a monitoring and evaluation plan and include in the communication strategy. For example, we might organize review meetings with the staff implementing the programme on a regular basis to monitor the programme. For evaluation we might plan an evaluation at the end of the programme to assess if we have achieved the objectives or not. We will discuss this in detail in Unit 17 and 18. Thus we learnt about how various steps would eventually lead to formation of a communication strategy. We are now ready to implement the nutrition education programme in the field. We will study this in the next Unit 17.

Check Your Progress Exercise 2

1. What are points to be considered for development of effective messages?

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2. Fill in the blanks

- a) The different communication channels are and media.
- b) The main advantage of face-to-face communication over mass media is that it creates opportunities for and
- c) The advantages of mass media is that it makes good use of scarce

3. List any three criteria, you would adopt for selection of communication channels?

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4. What do you understand by the concept of multimedia mix?

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5. What are the different components of a communication strategy

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16.8 LET US SUM UP

We learnt in this unit that after the conceptualization of a nutrition education programme, next step is to formulate the programme. Formulation gives shape and structure to different elements of a nutrition education programme. There are many steps involved in formulating a nutrition education programme. These steps are: setting measurable and well defined objectives in a nutrition education programme, identification of target audience, designing messages and materials and choosing media and media mix. We studied about how to design persuasive and coherent messages. We learnt that it is always better to use a combination of media mix rather than single media. A combination of media mix helps to increase the impact of nutrition intervention. We concluded the unit by elaborating upon various steps of a communication strategy and we are ready to carry out the programme in the field

16.9 GLOSSARY

Attitudes : affective, motivational, perceptive and cognitive lasting set of beliefs related to a reference group which predisposes an individual to react positively or negatively to these references.

Behaviour : overt action of an individual.
Culture : a set of rules or standards shared by members of a society which when acted upon by the members produce behavior that falls within a range of variation the members consider proper and acceptable.

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Print media: a medium that disseminates printed matter.

16.10 CHECK YOUR PROGRESS

- 1). What is the formulation phase of nutrition education communication process?
- 2). Enumerate the different types of objectives one need to set for a NEC programme.
- 3). How we Design Persuasive and Coherent Messages?
- 4). What are the Channels of Communication ?
- 5). What are the Components of communication process?
- 6). What is Advantages and Limitation of mass media.

NUTRITION EDUCATION COMMUNICATION PROGRAMME : IMPLEMENTATION

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STRUCTURE

- 17.1 Learning Objective
- 17.2 Introduction
- 17.3 Implementation Process — An Overview
- 17.4 Production of Communication Support Materials
- 17.5 Designing an Effective Training Programme
- 17.6 Executing the communication Interventions
- 17.7 Social Marketing : A Key to Successful Public Health Programmes
- 17.8 Community Participation
- 17.9 Let Us Sum Up
- 17.10 Glossary
- 17.11 Check Your Progress

17.1 LEARNING OBJECTIVE

After studying this unit, you will be able to:

- describe the method of production of support materials,
- elaborate on the purpose of a training strategy,
- explain the plan for a training programme,
- develop skills to conduct communication interventions,
- discuss social marketing, and
- describe community participation.

17.2 INTRODUCTION

In the previous unit, we studied about formulation of nutrition education programme. We studied about how to set objectives for the nutrition education programme and identify target audience. Further, this unit focused on how to design messages, how to choose media of communication and finally how to develop communication strategies. Now in this unit, we will discuss the implementation of NEC programme.

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We will begin our study with an overview of implementation process. Here we will highlight three main aspects of implementation process. These are production/duplication of communication materials, training and executing a communication intervention. Thus we will get to know how to produce the communication materials, what is pretest and why it is important in production of communication materials and how to produce materials on a large scale. Training of nutrition educators which includes assessment of training needs and development of training plan is the. Other aspect discussed in this unit.

17.3 IMPLEMENTATIONPROCESS –AN OVERVIEW

Implementation, as you may already know by now, means carrying out activities in the field. We saw in the previous unit the process of planning a nutrition education communication programme. The car is all assembled and ready to go. Let us now start the engine and move ahead on the road to implementation and see what is required for a smooth journey towards our intended destination, or goal.

There are three main aspects of implementation process. These include:

- production of communication materials,
- training, designing and conducting a training programme, and
- executing the communication intervention.

Let us briefly review these aspects. We shall begin with production of communication materials.

17.4 PRODUCTION OF COMMUNICATION SUPPORT MATERIALS

We learnt in the previous unit that based on the findings of formative research and trials of improved practices (TIPS),we design our messages and choose our multimedia mix. The next step now is to design and develop the communication support materials. Support materials, as you may recall reading earlier, refers to materials on which the message is transmitted (for example, flip charts, posters etc.). In the implementation phase, we determine various aspects related to the production, distribution and use of communication materials such as how much material we produce, who produces these, who uses them, how they are distributed, methodology of their use and the total costs involved in all these activities. Therefore, there are three aspects involved in production of support materials. These are: need of a multidisciplinary team to develop materials, pretesting the materials and large scale production of materials. We will study each of these in detail in the following sections. Let us start with need or a multidisciplinary team.

17.4.1 Need of a Multidisciplinary Team in Production of Support Materials

The development of materials for communication calls for members of a

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multidisciplinary team to work in close collaboration with each other. This is because it is very rare to see any one professional having the knowledge and the skills to develop communication materials. There are very few nutritionists who are also the graphic artists. We need a team consisting of the nutritionist, creative or graphic artist, technicians and the overall coordinator. The team members should know and accept the notion of a team effort where each person's contribution is subject to constructive criticism for the overall good and success of the materials. The role of each team member should be clarified as follows

- The nutritionist is responsible for the message content.
- The creative or graphic artists are concerned with design, formulation of the messages and their translation into appropriate materials. They are responsible for the appeal, tone and format of the message.
- Technicians are responsible for creativity, particularly when it involves an audio-visual material. The producer works with a team of technicians concerned with sound, editing etc.
- An overall coordinator coordinates the work of artists and technicians.

Thus we can place our messages in appropriate support materials with the help of a multidisciplinary team. You can see that no single member of the team above has the required skills or knowledge to develop support materials, that is why we need a multidisciplinary approach.

Once we develop our draft support materials we are ready to pretest it in the community before we produce it on a large scale production. Let us now discuss pretesting the materials.

17.4.2 Pretesting Communication Materials

We start by answering the question. What do we mean by pretesting? Pretesting is defined as an activity conducted to predict the impact of a communication material/message prior to its implementation. Once messages are drafted and a series of communication materials are prepared, pretesting is done with representatives of the intended audience in order to test the message and visuals. Next, why do we need to pretest the materials? Pretesting is crucial because audiences, especially those, who have had little exposure to printed materials can easily misinterpret illustrations and the text. Hence, it provides an opportunity to test the effectiveness of the materials. Pretesting also helps in training the project staff. The setting in which the pretesting is conducted is important. The greater the similarity between the setting in which the pretest is conducted and the setting for implementation, more are the chances of the pretest predicting the correct responses from the audience.

How do we conduct pretesting?

During pretesting, an interviewer shows the materials to the members of the target audience and asks open-ended questions to learn if the message is well understood and acceptable. We can conduct individual pretesting or group pretesting. Let us see how.

Individual pretests and group pretests

Pretesting can be done with both individuals and groups. Whenever possible, pretests of materials for groups with low literacy skills should be conducted with only one member of the target audience at a time to ensure that respondent answers are not influenced by other people. Pretest respondents must be representative of the target audience. We should ask questions that are "open-ended" rather than "close-ended" and those that are "probing" rather than "leading".

Group pretests are sometimes used as an alternative to individual interviews. Group pretesting can provide invaluable information when testing materials intended for literate audiences. Group pretesting is also particularly effective for pretesting materials containing primarily textual messages or other materials such as film scripts, audiocassettes, videos, rehearsals, or live performances.

Pretesting should be done before the materials are finalized so that they can be revised based on the audience's reactions and suggestions. Most materials must be pretested and revised several times. Each new or revised version is tested again until the material is well understood and acceptable to the target audience. Pretest sites must be similar to those of intended audience for communication so that there are greater chances of the pretest predicting the responses of the audience. Implementation During pretesting we need to ask certain questions to help guide us how well we communicate with our audience. Let us find out what these questions are. These are:

- Do they like the materials?
- Do they understand the symbols and pictures correctly?
- Do they get the message right away, or are they confused by the way things are portrayed, or by unnecessary details?
- Do they see the relevance of the picture or situation portrayed, to their own lives and their own needs?
- Does any part of the picture embarrass people?
- What significance is attached to the different colours

Seeking answer to these questions will help us decide on key issues to be kept in mind while conducting pretesting.

Now that we have pretested and finalized the development of messages and materials, it is time to produce these on a commercial scale. Let us find out how to do that next.

17.4.3 Large Scale Production of Support Materials

Once the draft model of the support materials has been finalized, we are ready to produce these on a large scale. We have to decide where and how these would be produced. The selection of a production unit will depend upon the availability of resources in the country, district or village. A private company may be selected or in other cases a production unit of a government institution may take up the work of production. Cost is a very big factor which has to be considered while producing

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materials on a large scale. We should remember that we need to obtain the optimum balance between quality and price while producing large quantities of communication materials so that we have the best quality materials at reasonable prices. There are many type of costs involved. We will give you some guidelines on the various costs. These are listed as follows:

- Development related costs: Development related costs include fees for the graphic artist for a graphic production or fees for the producer in an audiovisual production.
- Cast of materials: Costs of materials include the materials bought or rented for developing support materials. For example, paints, charts, audio, video equipment etc.
- Pretesting costs: Pretesting cost depend upon the method of pretesting done. These include traveling expenses, investigator's fees, compensation for persons interviewed, processing of data and writing up reports.
- Cost of revising the materials: These include costs for technicians, artists and the materials bought and rented.
- Cost of producing: This cost involves producing the materials on a large scale. Many a times there is an economy of scale for producing large amount of graphic or print materials. Market should be scanned to identify best offer for the unit price.
- Dissemination costs: These costs are determined when the audio visual aids like T.V. and radio are used for disseminating the messages.

Other than these, there are certain administration costs involved in executing all these

Thus we have to take into account these costs while producing the support materials in draft form and on the commercial scale.

Now that we have the communication materials ready, people are ready to use them in the field. But the crucial question here is, are the people trained to take LIP this task? Let us now look at the training and how we design an effective training programme, next.

17.5 DESIGNING AN EFFECTIVE TRAINING PROGRAMME

A major aspect of implementation is training the change agents for the purpose of educating and communicating for behaviour change among the target audience. Behaviour analysis supplies principles for effective learning strategies in programmes such as nutrition communication where not only knowledge, but practice is criterion of success. For designing and conducting an effective training programme need to train the educators or change agents, establish a training strategy, develop training guidelines and formulate a training plan. We will study each of these aspects in detail now. Let us start with training the change agents.

17.5.1 Training the Change Agents

The major step in implementation is the training of the educators who are actually going to conduct the nutrition education programme? You should know that it is the various members of the government, non government organization and community who are actually going to conduct the nutrition education programme. It is necessary that implementation of a nutrition education programme be carried out by a multidisciplinary team. Why? We discussed earlier in Unit 2 that there are multiple causes of malnutrition, accordingly. we need representatives/ members from different departments/sectors, for example, agriculture, water and sanitation etc. who will be involved in implementation process. We could also have teams involved at various levels e.g. national, regional and local levels. At the national level, we can have a team composed of a representative from Planning Commission members froth other Ministries already active in nutrition education e.g. agriculture, food processing, health and family welfare, forest, education, rural development and NGOs working in the country, certain private companies (e.g. the companies concerned with production and/or the marketing of food stuffs) the sponsors, as well as, recognized representatives of the population. At the district/regional level, we could have members the local governments and their counterparts represented at the national level. At local level, intersectoral and interdisciplinary representation will be assured by the presence of local panchayats, school teacher, the health officer, the anganwadi worker or the supervisor, representatives from local womens' groups and NGOs. The presence of recognized representatives from the population will guarantee a mechanism for participation and in the decision making process. However, some of these people need to be oriented and trained in different steps of nutrition education programme. These people are known as "change agents". They are the agents of change because they Till carry out communication activities in their respective sectors and also train other members of community. These agents, whether they are anganwadi worker, health workers, teachers, agriculture promoters or other persons from a diversity of sectors, must be very familiar with the message content, as well as, the techniques to effectively communicate these messages. They must also be well informed of their individual roles in the entire strategy. Therefore, training the "change agents" is another vital stage during the implementation of nutrition education programme. Since we want change agents to be effective educators, we should impart them a training of good quality. We will now move on to the next aspect of training. that is, training strategy.

17.5.2 Training Strategy

The purpose of the training strategy is to define the overall context for training, including who should be trained, what they should be trained in, when the training Implementation should take place, etc. In many respects, this is the most important part of the training process, since all future training decisions will be made within the overall context of the strategy.

The training strategy should establish who will be trained such as

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programme implementers (functionaries and supervisors), other influential people (physicians, pharmacists, NGO personnel, traditional healers, small store owners, or local volunteers). It should establish details about numbers to be trained, schedules and materials, and training of trainers i.e. training other groups.

The trainer must specify and define the learning objectives clearly. The role of the trainer is to help the trainees to learn that:

- they are learning something and are convinced that is useful; they practice what they are learning to do - more the practice the better it is,
- they receive feedback on their efforts and are rewarded when they do well, and
- rewards are from several sources and are as immediate as possible.

The training strategy should establish linkages between those who design messages, products and communication materials, those who design and conduct training, and those who implement the NEC, to make sure all groups promote the same messages. Therefore, there should be some guidelines which need to be developed before the training. Let us now move on to the training guidelines.

17.5.3 Training Guidelines

The training guidelines presented here are designed to train a community worker to improve nutrition in her area by learning in a practical way, the most important things she needs to know and do. These are as follows:

- 1 The training should be directed to the performance of specific tasks – activities needed to deal with the nutritional problems in her area.
2. To be fully effective, training requires maximum participation by the trainees themselves.
3. As far as possible, the training should be given near the community in which a trainee will be working later.
4. Training is not necessarily completed in a set period of time or at the end of formal training course. Refresher training at regular intervals will increase the effectiveness of community workers and supervisors.

After explaining training strategy and guidelines, we can now move on to formulating a training plan. Let us learn how do we develop a training plan.

17.5.4 Plan for Training Programme

Although trainers may have the necessary knowledge about nutrition, they often do not have enough knowledge about basic principles of training that can facilitate learning. Therefore, it is recommended that, all trainers first should learn the basic principles of training i.e how to conduct needs assessment, formulate a curriculum, select the appropriate teaching method and plan a lesson. That is, they need to develop a plan for training. There are different steps involved in formulating a training plan. These steps are:

1. Assessing learning needs,

2. Defining learning objectives for the programme
3. Deciding on content area,
4. Arranging contents,
5. Selecting appropriate training methods,
6. Selecting appropriate learning aid, and
7. Putting the entire schedule in a time frame.

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Let us review each of these steps very briefly

1) Assessing learning needs

First step in planning a training programme is the assessment Of learning needs of the learner. We need to know what the target audience needs to know in order to perform their role better and meet some specific requirements of the work they are involved in. Thus, needs assessment helps us to know:

- what is required of the role of the learner in the community,
- what are the existing competencies, skills, knowledge already available with the learner, and
- what is expected of the learner by herself/himself, the community and organization.

Learning needs can be assessed by different methods such as: individual and group meetings, interview, questionnaires, field observations in learner's context of work and studying various documents like annual reports relating to the trainee's work/organization.

2) Defining learning objectives

After we have completed the needs assessment, we are ready to identify the objectives for learning. These objectives will direct the entire plan for training programme and affect the selection of content areas and teaching methods.

3) Deciding on content area

Content areas are derived from learning objectives. The content areas will include actual topics and subject matter. They also include specific areas where we want learners to gain knowledge, awareness and skills.

4) Arranging contents

After deciding on the content areas, we need to make a lesson plan. In the lesson plan, the content areas should be arranged in such a way that there is a logical flow from one content to another. This kind of arrangement helps to form linkages and ensures faster learning without disrupting the chain of thought in the learners.

5) Selecting appropriate teaching method

We need to select an appropriate method for training the learners. The learning process can be made easier with the help of different teaching methods and aids.

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Selection of an appropriate method will depend upon the content areas whether we want to give just the knowledge or impart skills. There are several methods of training such as lecturing, assigning a task and imparting skills through practice. Let us review these very briefly

Lecturing is just one way of helping the trainees to learn. Lecture should build on what the trainees already know, it should be made interesting by asking questions and posing problems and asking trainees to suggest ways of solving them. Use visual aids whenever possible.

Another way is by assigning a task that requires the students to do something or to observe a real life situation. The following Chinese proverb may be useful to remember in this context:

Hear and you forget
See and you remember
Do and you understand

Learners should also develop certain skills in a training programme. What are they? Let us find out

Teaching skills to the learners- In nutritional care, community health workers have to perform tasks such as weighing children to monitor their growth, identifying children who are at risk of becoming malnourished, and advising mothers on how to feed young children, identifying anaemic women or children and so on. Community health workers need to learn three types of skill to do their job well. First, they must have manual skills. For example, using their hands skillfully in weighing children. Second they would need thinking skills, for such tasks as identifying children at risk of becoming malnourished. Finally, they would need communication skills: the ability to convince mothers and other people to change their practices. Community health workers will need a lot of practice in doing tasks before they develop the necessary confidence to do those tasks independently. Communication involves a combination of decision-making skills and reaching out to the group, that includes :

- choosing objectives,
- deciding actual content of advice, i.e. what to say,
- deciding which learning aids to use,
- ability to speak clearly and sufficiently loud to be heard
- ability to listen, ask questions, promote discussion, and
- use of non-verbal communication including gestures, eye contact, tone of voice and posture to establish rapport, show concern and respect and encourage responses.

The best way of training personnel in communication skills is: first, to demonstrate good communication to the learners, and then let everyone in the training group

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practice the skills with each other in role plays and discuss experiences. You can give the trainees a checklist to judge how well the communication was carried out. After everyone has had a chance to practice the communication skills, you can have a general discussion to bring out the main points. You should encourage a friendly atmosphere of helpful criticism and explain that we can only learn by making mistakes. Communication can be made more effective through the use of appropriate learning aids. Let us see how.

6) Selection of a appropriate learning aids

Learning aids can greatly improve our teaching, but only if they are well chosen and properly used. A learning aid is only an aid to learning. Just showing a film, picture or slide by itself will only have a limited effect. Rather than using them just for formal one-way teaching, they should be used to stimulate understanding, discussion and participatory learning.

Learning aids can:

- keep the group's interest, arouse curiosity and hold attention,
- emphasize key points-when key headings are written out,
- allow step-by-step explanation and sequencing of information,
- show something rather than just telling people- e.g. drawing of a life-cycle of a disease, and
- provide a shared experience for discussion and questions.

An appropriate learning aid is:

- relevant to the learning objectives,
- affordable,
- easy to make and use,
- well understood by the audience,
- interesting and entertaining, and
- it also encourages participation and discussion.

Some factors to be considered in choosing the aids for a particular session are:

- **Situation** - To whom will the presentation be made: an individual or a group?

Where will the presentation take place - clinic, classroom or field

- **Subject matter and desired effect** - What emotion is the communicator trying to arouse - fear, surprise, shock? Does the information require gradual building- up and linking with other information?
- **Cost** - Teaching aids cost money, and some are very expensive. Films, slide projectors and overhead projectors are quite expensive. We should weigh costs against benefits

After we have developed a lesson plan and selected an appropriate training method and learning aid, it is time to put the entire training plan into a time frame. Let us see how we do that.

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7) Putting the entire schedule into a time frame

We need to decide the time allocated to each content area and then determine total time required to complete the entire training. Time also has to be allocated for short and long breaks and for relaxation such as games etc. In case a field visit is planned, time for traveling to and fro from the training venue should be planned accordingly. So now our training plan is ready and we are ready to conduct the training for the designated audience. After the training has been completed successfully, we would like to know how much the trainees have gained in acquiring knowledge and skills. For this, we conduct an assessment of training. Let us see how we conduct an assessment.

17.5.5 Assessment of Training

Assessment enables trainers to know how much the trainees have learnt. It also enables the trainers to know how they have performed as teachers. Most common assessments usually have three components - theoretical, practical, and oral. Assessment is usually done through an informal or formal testing. Let us study these briefly

- a) Informal testing can be done inside the class or outside where the trainer can check his/her own performance, and what trainees have learnt. A checklist for such assessments helpful, which covers objectives achieved, content and teaching aids in training, participation by trainees and other aspects.
- b) Formal testing or examination may be done in various ways:
 - Practical tests - as an example of a practical test, trainees may be asked to demonstrate how to weigh a child accurately and how to record the result on a growth chart.

Oral tests - the trainee's Knowledge of a subject is probed deeply by verbal questions and answers.

Written tests - the trainee's Knowledge is tested by writing answers to questions. we have now accomplished an important aspect i.e. training for implementation of nutrition education programme. After the training is completed, the educators need to communicate the messages to the target population. Let us now learn how to execute the message or the communication intervention.

17.6 EXECUTING THE COMMUNICATION INTERVENTIONS

Having trained the educators of the multidisciplinary team, we are now ready to execute the communication activities with the target audience. We would review who the target audience are and how do we reach them with our messages and materials. Let us review the target audience first. We learnt in the earlier Unit 16, section 16.3 that target audience consists of three different types of groups. Just to recapitulate, these groups are primary target, secondary target and tertiary target audience:

- the primary target audience consists of those whom the programme hopes will actually perform the new nutrition and health practices,
- the secondary audience for the programme are those who influence the primary audiences (for example, health care providers, family and friends and popular public figures), and
- the tertiary audience constitutes decision-makers, financial supporters, and other influential people who can make the programme a success

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Thus, primary target audience will actually act and perform the new nutrition and health behaviors. However, you would realize that all the members of a target audience do not react in the same way after understanding the nutrition and health messages. So once the message has actually spread or diffused through a community, we need to carefully analyze the answers to questions such as the following:

- Which individuals are most likely to initiate action of behaviour change (innovators)?
- What motivates them?
- Who would be most likely to follow the innovators first? Why
- Who is likely to resist my kind of change? What is preventing these individuals

from adopting a particular practice or course of action?

These questions bring out some important aspects we need to consider in adopting a practice, the following situations may arise:

- i) A few members of primary target audience begin a new practice as promoted by nutrition education communication programme. Such people are called innovators.
- ii) Some other member follow in the footsteps of the innovators and adopt practice as well. These are called early adopters.
- iii) People who are hesitating in adopting the practice but have a favourable attitude.

They exercise caution and prefer to "Wait and Watch". These are slow adopters.

- iv) Then there are those people who resist change. They may be indifferent. On the other hand, they may even be hostile. These are the people we would have to tackle with tact and persuasion. The innovators and early adopters can help.

Thus during implementation of the programme, we would have to identify these groups of people in our target audience and make special efforts to convince the slow adopters and also try to break down the barriers which exist in the case of those who reject a message.

Having reviewed the target audience, let us review how do we communicate with them through our messages and materials. Effective communication probably is the basis of any NEC programme and effective communication depends to a

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great extent on the choice and combination of media. You may recall studying in Unit 16, that no one media can influence the change in behaviour of the people. We should always make use of different media which will reinforce each other. It is important for us to know that the programmes that have been successful in bringing about behaviour change in nutrition, have demonstrated a need to complement the interpersonal channel with other media. There are several communication methods that can be used in a NEC programme. These have been categorized under three approaches namely individual, group and approaches about which we have already discussed in Unit 16, section 16.5. They complement the types of media we studied in Unit 16. Let us study about each one of these in detail.

There are several methods under the individual approach, A personal contact involves face-to-face interview or counseling. This type of interpersonal communication is a very efficient way of studying the nutritional problems and adapting the necessary messages. Here the counselor/educator helps the target audience to find solution to their problems themselves. When the time is limited and distances are long, then letter or internet/telephone are effective methods. Individual approach provides first hand information about nutrition related behaviours and develops good will and interest in the target population.

Group approach is an effective communication method, when want to address the nutrition issues to a group of people such as adolescents, mothers of young children, urban slum dwellers, etc. In the group approach, the educator/communicator should know the interest of the group, leadership patterns and the type of group being approached. The choice of message to be communicated must relate directly to them. For example, pregnant mothers should have the discussion on issues related to pregnancy.

There are several methods of communication under group approach as discussed earlier in Unit 16. Lecture cum demonstration has proved a favourite method of keeping participants interested and in imparting information. Organizing discussion meetings, so that target group is able to discuss their problems and find solution, are another method of communication with the group. Role play and drama are participatory in nature and are based on the assumption that some situations cannot be expressed just by talking and hence have to be dramatized.

Mass approach comprises the institutions and techniques by which specialized groups employ technological devices such as press, radio, films etc to disseminate messages. Mass media is more important in creating awareness and interest in new ideas among general population groups.

We can simultaneously use all three approaches to bring about a change in behaviour in the target population. For example, to promote exclusive breast feeding for infants up to 6 months, we can use mass media approach to generate awareness in the general population. Simultaneously, we can use focus group discussions under group approach where the mothers can be involved in understanding the reasons for exclusive breastfeeding and developing positive attitude towards it. Inter-personal communication can be used to address any specific problems faced

by individual mothers and help identify solutions to it. Thus synergy between the three approaches would help in bringing about changes in behaviours.

Having learnt about implementation of NEC, we will next discuss two main approaches which have contributed to successful public health programmes. But first let us answer the questions given in check your progress exercise and recapitulate what we have learnt so far.

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Check Your Progress Exercise 1

1. Why do we need a multidisciplinary team to produce support materials?

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2. Answer the following briefly

a) Purpose of a training strategy

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b) Training

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3. Answer the following briefly with examples

a) What are the three types of skills needed by the community health worker to do their job well?

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b) Different steps involved in planning a training programme.

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4. Enumerate the various communication methods that can be used in the community.

.....
.....

There are many approaches which have demonstrated a successful delivery of a public nutrition programme. We will now study two main approaches which have been used to deliver successful public health programmes. These approaches are social marketing and community participation. Let us start with social marketing first

17.7 SOCIALMARKETING: A KEY TO SUCCESSFUL PUBLIC HEALTH PROGRAMMES

In Unit 15, we briefly introduced you to the social marketing approach theory, under theories of nutrition education. Social marketing has proven to be a

very effective approach in accomplishing the objectives of many public health programmes. In this section, we will study in detail about the different aspects of social marketing approach.

We will learn what social marketing is, the difference between a social product and a commercial product and the marketing mix of social marketing process.

7.6.1 What is Social Marketing ?

The term social marketing describes the application of marketing principles to the design and management of social programmes. It is a strategic social change management approach involving the design, implementation and control of culturally acceptable programmes. Social marketing is a systematic approach to solving problems. It is related to service utilization, product development and acceptance and behaviour adoption. Since it is an approach and not a solution, there is no programme template for others to copy. However, we can study an example, where social marketing approach was used in a programme to improve child-feeding practices in Indonesia.

"A mother in Indonesia explained to the team that the reason she does not add green leafy vegetables to her child's rice is because the green leaves are difficult for a baby to digest; she knows because when she tried, they made her baby's stool green. However; later after being counseled by a doctor on the radio and her local community health worker she feeds her child a mixed food with green leaves. So do 85% of the women in this province. By following this and other advice related to improved child feeding, 4000 of the children under 2 years have significantly improved nutritional status

This example shows that by using social marketing approach, women were able to improve feeding behaviours related to child nutrition. You would be surprised to know that since the introduction of social marketing two decades ago, the programmes using this approach have continued to show good results. The programme example highlighted above was selected as it illustrated a range of social marketing activities. Mass media and individual counseling were combined to promote and educate about a product (a homemade infant food) for daily use.

Social marketing may involve both the selling of a commodity and the selling of an idea or practice. Social marketing almost always begins with promotion of a health related attitude or belief. The fundamentals of social marketing approach come from marketing principles as follows:

- the focus is on consumer needs,
- programme organization and management may be structured to reflect a marketing operation. For example, health workers' job descriptions and their training are restructured so they become better sales agents for the programme, not just deliverers of the services,

commercial avenues are sought for products traditionally kept in the health and nutrition sector, and the result orientation of marketing implies that progress towards achieving goals is constantly measured.

However, there is a difference between a social product and a commercial product. Let us find out the difference between the two products

17.7.2 Social Products and Commercial Products

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You must be wondering if there is a difference between a socially beneficial product or commercial product. Yes, there is a difference between the two. The difference is listed as follows:

- social products are often more complex to use than commercial ones,
- they are often more controversial,
- their benefits are often less immediate
- distribution channels for social products are harder to utilize and control,
- the market for social product is difficult to analyze
- audience for social products often have very limited resources, and
- the measure of successful "sales" or adoption of social products is more stringent than for commercial ones

The extra challenges mean that the research and the planning stages of a social marketing effort must be particularly sound. Before we plan any programme, using a social marketing approach, we will have to understand marketing mix of a social marketing process. Let us understand the marketing mix concept.

17.7.3 The Marketing Mix of Social Marketing Process

Social Marketing conceives of the consumer as the center of a process involving four variables: product, price, place, and promotion. A successful programme is organized around a careful analysis of each of these variable and strategy, including how they will interact.

A proposed Product (whether a commodity, idea, or health practice) must be defined in terms of the users' beliefs, practices, and values

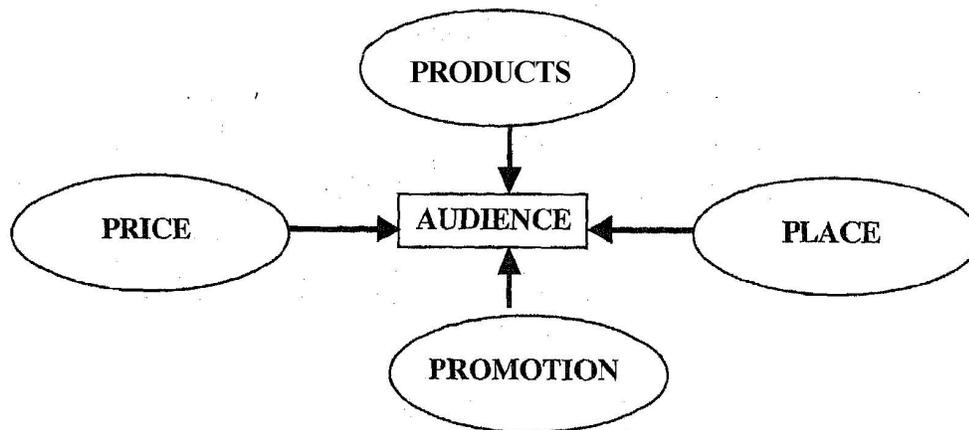
Price can refer to a monetary expenditure, an opportunity cost, a status loss, or a consumers' time. The fact that a rural woman pays no money to get her child the vitamin A dose at the health centre doesn't mean that it costs her nothing. The day of travel, the inconvenience to family, or the risk of side effects may seem too costly relative to perceived benefits. The price of a particular product is never fixed, it varies according to the target audience segment, and often according to the individual.

The concept of Place refers to the channels through which products flow to users and the points at which they are offered. Product availability and distribution may involve not only retail and wholesale supply system, but also the efforts of health providers, volunteer workers, friends and neighbours.

"Place" may be a store, a health center, an anganwadi or even a person such as a traditional birth attendant who carries a supply of ORS.

In any social marketing activity, Promotion requires more than simple advertising. It requires extensive consumer education to assure appropriate use

of products. Motivational strategies are also essential in encouraging adoption of new ideas and social products.



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Figure 17.1 depicts the marketing mix in the process of social marketing and shows consumer (audience) being the center of the process.

Thus using these 4 'Ps' of social marketing, we can use the social marketing approach to promote positive health and nutrition behaviours. How do we do that? Let us find out. In order to know how social marketing can promote positive nutrition and health behaviours, we will focus on four aspects: two purposes and two techniques. These aspects distinguish social marketing from other health education efforts. Let us first look at the two purposes

1. The first purpose of social marketing is to bring about a change in behaviour and not just imparting information. Social marketers have their eye on what it will take to get people to try something new, whether it is going to the health center or cooking green leafy vegetable every day for the children. When it comes to promotional education, unless the information is relevant to changing the behaviour, it is not included.
2. The second purpose of social marketing is demand creation. Social marketing concentrates on half of the marketing equations that is often ignored - creation of demand. Far too often, we think only of supply, building health clinics, producing nutritious infant foods etc. but often the health clinics are empty and infant foods not bought. Demand has not been realized because we have not understood consumer needs and desires and catered to them. We are only beginning to recognize and learn how to find out what consumers look for in health services or seek in an infant food, and how to adapt our service and products for them. When we do this, we make programmes more cost effective.

Having learnt about the purpose of social marketing, now let us look at the two techniques basic to social marketing:

- a. Social marketing uses formative research technique to understand consumer

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demand. We have already studied about it in the previous unit. In promoting behaviour changes and in creating demand, social marketing uses, as social marketing expert, Dick Manoff has called it, a feed forward approach that minimizes "feed back shocks", or as others would call it, formative research. That is we go in the community to consumers, to find out what they want. This helps us to shape our products and fine tune the promotional angle. For example, breast milk can be promoted, as the best food for young babies and as protective since it has antibodies. However, our most motivational appeal to mothers may be that it is a convenience food, as it does not require any cooking, if convenience is what mothers want.

- b. Finally social marketing requires creativity, not just in message design where persuasive, captivating and memorable messages are the goal, but also implementing qualitative research free of researcher bias, and in developing programme strategies through creative interpretation of research findings. Too often we find that good research has been done but has been poorly implemented for programme needs.

Thus, we learnt how we can use social marketing approach in promoting positive health and nutrition behaviours. Let us now move on to the second successful approach i.e. community participation.

17.8 COMMUNITY PARTICIPATION

What is 'Community'? A community is referred to as stable, small, autonomous and self contained unit such as colonies of pioneer settlers, primitive tribes, villages and immigrant areas. The same term has also been used for towns and cities. Whatever be the size or complexity of a community, it has certain characteristics. These include occupation of a territorial area, common interests, common pattern of social and economic relations, common bond of solidarity, network of social institutions and some degree of group control. Community means more than just people who live together; it implies sharing and working together in some way.

When people live together in a community, they may have certain problems which they might want to solve together. Before problems can be solved, the community members must first understand all the factors involved. This will help them to make decisions about solving these problems. This brings us to the term community participation (CP). Community participation means adopting a 'bottom-up' approach where members of the community make the decision rather than 'top-down' approach where the decisions are made by senior persons in health services - the so called 'experts'. Participation by a community may vary in degree depending upon the extent of their participation. We will now discuss various aspects of community participation. These are spectrum of community participation, types of community groups, the process of dialogue in community participation and benefits of community participation

Let us discuss each of these in details. We will begin with spectrum of community

participation.

17.8.1 Spectrum of Community Participation

The American planner Sherry Arnstein suggested that there is a continuum of participation. Figure 17.2 shows simplified version of Arnstein's ladder of participation. At one extreme, there are actions that are really forms of manipulation. Manipulation means controlling people like puppets even though we pretend to let them make decision. At the opposite extreme, there is total participation or complete control of its affairs by the community.

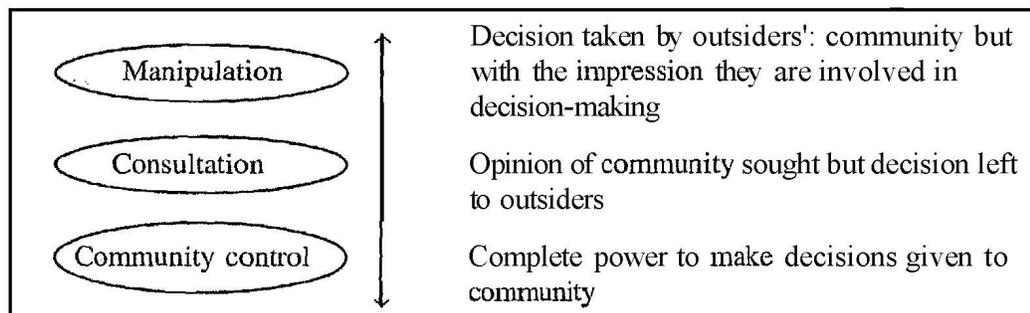


Figure 17.2: Simplified version of Arnstein's ladder of participation

You must be wondering as to why do we need a community approach. An important justification for community participation is the need to shift the emphasis from the to the community. Many influences on behaviour are at the community level and not under the control of individuals. This includes social pressure from other people, norms, culture and the local socio economic situation. There are many types of groups formed in a community. These groups can facilitate implementation of programme interventions. Let us find out about these groups

17.8.2 Types of Community Groups

Before we learn about different types of community groups, let us first understand why do we form community groups, why don't we just work with individual members of a community? We want to form community groups because forming community groups helps community members agree on common problems and recognize that they can solve these problems by themselves, external help as required.

There are different types of community groups which can be formed in a community. These are:

- a. **Self help groups** - run by people for their own benefits
- b. **Representative groups** - elected and answerable to the community.
- c. **Pressure groups** - a group of self appointed citizens taking action on what they see to be the interest of the whole community.
- d. **Traditional organizations** - well established groups, usually meeting the needs of a particular section of a community (mothers' union, parent-teachers' association).

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e. **social groups** - exists mainly to organize a social event e.g. music group, sports club etc.

f. **Welfare group** - exists to improve welfare for others e.g. operating feeding programme.

Thus, we can identify these groups in the community and seek their support in implementation of nutrition education communication programmes. You would also realize that community participation is a very slow and gradual process. To begin this process, the field worker has to visit the community groups, establish a rapport with them and initiate dialogue to invite their participation. Let us now look at the process of dialogue in community participation.

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17.8.3 The Process of Dialogue in Community Participation

The technique of carrying out a dialogue with the community depends upon the skills of the field worker. You will note from the Figure 17.3, how the field worker initiates a dialogue asking their needs and gradually makes the community aware of other needs. For example, health and nutrition may not be the felt need of the community in the beginning, but the field worker can make them aware of these needs gradually.

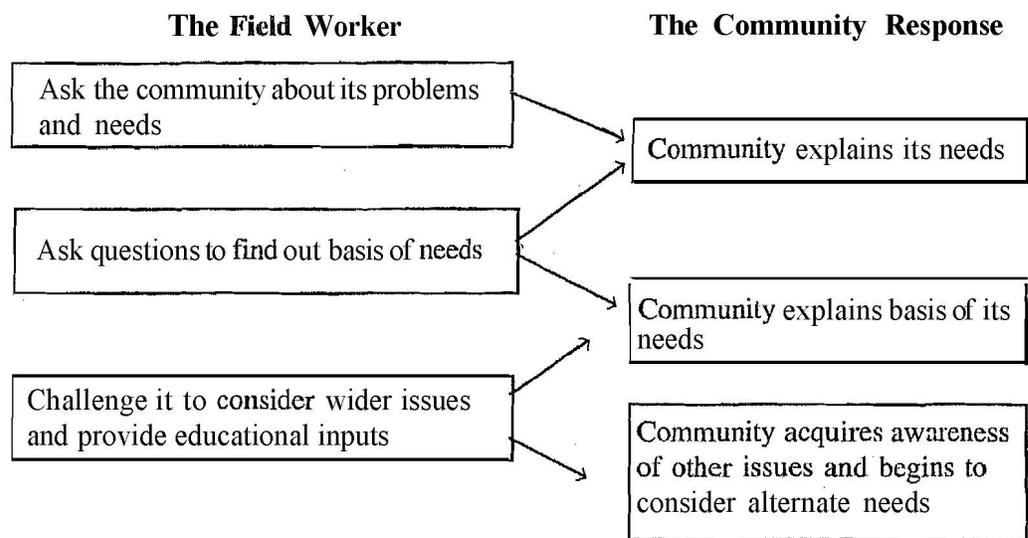


Figure 17.3: Process of dialogue in community participation

Why do we want to involve community in our programme? What are the benefits of community participation? Let us now study these aspects.

17.8.4 Benefits of Community Participation

What are the benefits of community participation? Community participation helps the members of the community to collectively seek solutions to their problems. It gives them a sense of ownership for their community and helps them to pool their resources to help solve their common problems. Some Of the benefits Of community participation are that it:

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- encourages cooperation with other people and enables them to accomplish things which they would not be able to do it alone,
- provides contact with other people so that members can increase their knowledge and experience,
- helps develop the skills and talents of individual members,
- makes programme relevant to local situation,
- ensures community motivation and support,
- improves utilization of services,
- promotes self help and self reliance,
- improves communication between health worker and community, and
- enables the development of primary health care.

Thus, we learnt that there are several benefits of community participation. That why many public health programmes have been able to accomplish their objectives by involving community during planning and implementing process.

A very good example of the importance of social marketing and community participation comes from the USAID sponsored "Social Marketing of Vitamin A Rich Foods Project" carried out in Thailand over a period of three years. This project showed:

- a. Significant improvement in knowledge, attitude, and practices in the intervention area.
- b. Substantial improvement in the vitamin A and nutritional status of the target population, and
- c. The sustainability potential of such interventions which was reflected in the behaviour of local government officials integrating food and nutrition activities into routine work and personal schedules.

Community participation leads to a better relationship between the community and the health worker. Instead of a servant-master relationship, there is trust and partnership. It has been proven that the programmes that have adequate participation by community are sustained compared to those which have no or inadequate community participation.

In addition to the two approaches discussed above, public health programmes have also sought participation of school children in promoting health and nutrition messages. School children have been instrumental in changing behaviours, because they are enthusiastic, curious, open to new information and willingness to learn. School children can influence the behaviours of following community groups:

- younger children
- children of the same age groups, and
- family and community

Thus learnt how we can use different approaches during the implementation of nutrition education programme and bring about a change in behaviours of target population.

17.9 LET US SUM UP

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In this unit we learnt that there are three main aspects of implementation process. These are production of support materials, training and executing communication interventions. Production of support materials requires need for a disciplinary team and pretesting before they can be produced in large scale. Training is a very major aspect of implementation.

We studied about how to design and conduct a training programme. Designing and conducting an effective training programme involves developing a training strategy, developing training guidelines and a plan for training programme. We also learnt about the various steps of a training plan which are assessing learning needs, defining learning objectives for the programme, deciding on content area, arranging content, selecting appropriate training methods, selecting appropriate learning aid and putting the schedule in a time frame. We also discussed many communication methods which can be used by the educators to disseminate messages to the target population. We concluded the unit by studying two approaches, that is, social marketing and community participation that have proven to be very effective in delivering successful public health programmes.

17.10 GLOSSARY

Commercial venues	: places involved in producing, transporting, or merchandising a commodity.
Innovative approach	: an approach characterized by new things or new ideas.
Traditional healers	: healing done by application of knowledge, skills, and practices based on the experiences indigenous to different cultures. These services are directed towards the maintenance of health, as well as, the prevention, diagnosis, and improvement of physical and mental illness. Examples of traditional health service providers include herbalists, faith healers, and practitioners of Chinese or Ayurvedic medicine.

17.11 CHECK YOUR PROGRESS

- 1). How do we conduct pretesting?
- 2). Enumerate the need of a Multidisciplinary Team in Production of Support Materials .
- 3). What are Different steps involved in planning a training programme ?
- 4). What is Purpose of a training strategy?
- 5). What is Social Marketing ?

NUTRITION EDUCATION PROGRAMME: EVALUATION

STRUCTURE

- 18.1 Learning Objective
- 18.2 Introduction
- 18.3 Evaluation — Basic Concept
- 18.4 Purpose of Evaluation of NEC Programme
- 18.5 Developing an Evaluation System for NEC Programme
- 18.6 Types of Evaluation
- 18.7 Major Features of Evaluation
- 18.8 Conducting a Dynamic and Participatory Evaluation.
- 18.9 Contribution of Nutrition Education Programme to Changes in Behaviours
- 18.10 Let Us Sum Up
- 18.11 Glossary
- 18.12 Check Your Progress

18.1 LEARNING OBJECTIVE

After studying this unit you will be able to:

- explain the concept and purpose of evaluation,
- elaborate on different features of evaluation,
- describe different types of evaluation, and
- develop skills to conduct an evaluation.

18.2 INTRODUCTION

So far so good. Our NEC car has been on the road for several months now and has gathered several months of experience in implementation, It is time to evaluate the journey and answer questions like "are we taking the NEC car towards its destination, the planned objectives? Could the journey of implementation been shorter, easier, less expensive? What have we learnt, so that we can plan a better journey next time?"

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In fact, the time to evaluate is not at the end of the programme, but evaluation should be integrated in the whole process from start to finish, and must necessarily assess the effect of all types of interventions in a nutrition education communication strategy. In this unit, we will discuss the concept and purpose of evaluation and different types of evaluation. How to develop an evaluation system? What are the major features of an evaluation system? How to conduct dynamic and participatory evaluation of a NEC programme. These are the major aspects covered in this unit.

18.3 EVALUATION-BASIC CONCEPT

We briefly introduced you to the concept of evaluation as one of the steps in the management of public nutrition programmes. In this section, we will explain the concept of "evaluation" in greater detail especially in relation to nutrition education programmes. You already know what evaluation is? Very simply stated evaluation means "to judge the value (f something)". Before Me go further, let us first understand evaluation through scientific definitions given by many experts. Although evaluation has been defined in various ways, presented herewith are two of the most appropriate definitions in this context

- 1) "Evaluation is a systematic and scientific process, determining the extent to which an action or set of actions were successful in the achievement of pre-determined objectives. It involves measurement of adequacy, effectiveness and efficiency of health services"
- 2) "Evaluation is also defined as the systematic application of social research procedures for assessing the conceptualization, design, implementation, and utility of intervention programmes".

You may note here that both the definitians stress the importance of planning the evaluation at the same time as the programme is planned and implemented. It is too late to think of evaluation at the end of programme implementation. You may recall that in Unit 14, section 14.4, we discussed about eight stage model of planning evaluation. This is the model which can be used in nutrition education programme also. Thus evaluation is an integrated part of programme planning and management, whether it is a training/education programme, a specific nutrition intervention, development activities, or education of the public.

Further, you may have made note of the following two terms - effectiveness and efficiency - used in the definitions above. These terms are used very frequently in evaluation. Let us understand what they mean:

- **Effectiveness** — It means whether or not a programme achieves its stated objectives, i.e. did it work?
- **Efficiency** — It means the amount of effort in terms of time, manpower, resources and money required to reach the objectives - was it worth the effort? In simple terms, therefore, evaluation is a process which helps us to know whether the programme we planned/implemented worked OF not and was it worth the effort or not.

Having understood the concept of evaluation, we come to the next important aspect of evaluation as to why do we do evaluation. Let us study the purpose of evaluation next.

18.4 PURPOSE OF EVALUATION OF NEC PROGRAMME

Although we briefly discussed the purpose of evaluation in Unit 14, section 14.5, we will recapitulate it here. Evaluation is conducted because programme managers and planners must distinguish useful current programmes from ineffective and inefficient ones. They should also plan, design, and implement new efforts that effectively and efficiently have the desired impact on the target group. In order to do all this, they must obtain answers to a range of questions, such as:

Is the strategy based on priorities from a broad analysis of the nutrition situation, needs assessment and cultural and behavioural aspects?

- Are the interventions selected likely to reduce significantly the nutrition problems?
- Is the most appropriate target population selected?
- Will the various interventions reinforce, or counteract each other?
- Is the intervention being implemented in the ways envisioned?
- Is it effective?
- How much does it cost?
- If the nutrition education programme is one of several interventions, how can its effect or impact be separated from the impact of other interventions?

Therefore, we evaluate to answer the above questions. We evaluate to aid future planning and to improve programmes, to increase our understanding of nutrition education practice and finally to add to the body of knowledge upon which our work is based. Thus, we evaluate for the following reasons:

- Firstly, to achieve operational efficiency and to study the effects of nutrition education practice so that we can feed our findings back into practice and improve it.

Secondly, to obtain data that permit interpretation of programme effectiveness so as to obtain administrative support, community support and donor support. One reason why there is widespread skepticism regarding the cost-effectiveness and impact of NEC is that such programmes have been poorly evaluated.

- Thirdly, to strengthen the scientific basis of practice of nutrition education and communication,

Box 1 highlights the reasons for evaluating nutrition education programmes.

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Box 1	Reasons for Evaluating Nutrition Education Programmes
To assess:	
<ul style="list-style-type: none">● impact or effect,● how programmes are planned and executed,○ how programme personnel perform,○ how effectiveness can be improved,● the utility of a programme, and● to satisfy the programme sponsors	

Thus, you would note here that evaluation is done to assess whether or not changes have taken place as a result of the programme activities. Evaluation should show whether :

- the change took place or not,
- if the change took place, then did it happen as a result of the programme, and
- the amount of effort required to produce the change was worthwhile.

You would realize the evaluating NEC programme involves making some important decisions. For example, What changes should you measure? How should you measure those changes? How can you prove that the changes took place as a result of the programme, including knowledge and behaviour changes? All these decisions should be related to the objectives of the programme,

18.5 DEVELOPING AN EVALUATION SYSTEM FOR NEC PROGRAMME

You might recall reading in Unit 15, section 15.5, that during the conceptualization phase of NEC programme, the last step listed under the key elements of intervention strategy, was "evaluation". So the plan for evaluation was already conceptualized before formulation and implementation of the NEC programme. Thus, you now realize that evaluation should be built into all phases of programme planning, implementation, and management right from the conceptual stage. There are two main aspects which we need to keep in mind while developing an evaluation system:

- **Firstly** - Goals and objectives of the programme should be linked to evaluation. You may recall reading about setting of objectives of a NEC programme in Unit 16, section 16.2. They should be elaborated in such a way that we are able to assess whether a change has occurred or not at the end of the programme.

We need to integrate evaluation into programme planning.

- **Secondly**, we should also justify the use of resources or inputs i.e. men, material money etc. through an evaluation process. We need to conduct evaluation of inputs used during the intervention process.

Thus we will look at these two aspects i.e. integrating evaluation into programme

planning and input evaluation briefly. Let us first study how we can integrate evaluation into programme planning.

18.5.1 Integrating Evaluation into Programme Planning

Goals and objectives of a nutrition education programme that, we studied earlier, are identified through assessment of the existing nutrition situation, an analysis of the problems which can be solved by nutrition education, a description of the various actors and target groups and a list of the systems that can support nutrition education activities. Goals and objectives for nutrition education programmes are all based on the assumption that there is room for improvement and that nutrition education is the right strategy to be used. Specification goals and objectives is very important, both for an education programme itself and for the evaluation. For the programme they give direction, expected results and time frames, and for the evaluation, they give criteria for measurements. Programmes often suffer from poorly developed objectives, which also make evaluation difficult

You may recall reading earlier in Unit 17 that objectives can be classified as nutritional, educational or communication in nature, whatever be the objectives, it is important to note, that objectives must be formulated precisely, specifying expected outcome(s) and how, where, and under what conditions results will be achieved. For educational programmes, the following elements of an objective are suggested: An objective should contain:

the expected change - outcome (e.g. behavioural, nutritional status), the conditions under which the expected change is to take place, including, for example, the geographical area, time, target group and activities used, and the criterion, or the extent the expected change that will satisfy the objective. In other words, comparing change with the norms or standards or expectations laid out for the programme;

To illustrate, an objective could state that the proportion of mothers exclusively breastfeeding their children for first six months of age will increase from 16% to 20% in two years in X district as a result of NEC activities.

Sometimes we also need to evaluate certain factors affecting the implementation process. These are known as contextual factors. It is important to analyze contextual factors that may not have been directly addressed in the objectives but that have a bearing on implementation. These factors include the religion, race and ethnic background and sex of the target group in the community, and general socio-economic and political issues. Such an evaluation is known as contextual evaluation and can focus on factors that may impede a programme, thereby, enabling the researcher to plan strategies to cope with them.

Let us study the other aspect - evaluating inputs used in the implementation of the programme.

18.5.2 Input Evaluation: Evaluating During Intervention

Input evaluation takes a critical look at the adequacy and appropriateness of the resources being used to carry out the programme. A programme can be said to

have at least four types of inputs. These are:
the programme plan,
the material resources, and
human resources such as programme staff; and time, particularly that allocated for the initial phase, evaluation, feedback, and follow-up.

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Many evaluations of otherwise well-designed programmes show that programme planners consistently under-estimate time and effort needed to adopt a new practice. NEC programmes, which are conceptualized and formulated well may fail at the implementation level. Hence, continuous monitoring is essential. In fact, evaluation can be planned at various levels. We studied earlier that it is ideal to plan evaluation of NEC from the conceptualization phase and thus causal analysis and formative research form part of an evaluation. Evaluation can also be undertaken during the phase of formulation. Since during this phase, there is still time to reflect, not only on the relevance of intervention but also on the order in which activities should develop. We can measure the knowledge, attitudes and practices of the target population before the intervention to provide a basis for comparison afterwards. You will be surprised to know, that you do not have to wait until the end of NEC programme to conduct evaluation, we can do an evaluation even during the implementation phase since there are lessons to be learnt from the experience. We will learn more on this topic in the next section, Here, let us now test our knowledge about what we have learnt so far.

Check Your Progress Exercise 1

1. What do you mean by evaluation?

.....
.....

2. "Evaluation is an integrated part of programme planning and management"

Do you agree with this statement?

Yes No

Give reasons for your answer.

.....
.....

3. Why do we need to evaluate a nutrition education programme?

.....
.....

4. What are the major aspects you need to keep in mind while developing an evaluation system?

.....
.....

Having learnt about the concept of evaluation and how to develop an evaluation system, we come to the next issue, that is, how to carry out the evaluation process. Can we conduct different types of evaluation, which would be an evaluation for

a change in outcomes, processes and or inputs? In the next section, we will study about these aspects.

18.6 TYPES OF EVALUATION

There are different types of evaluation conducted in a programme. You can choose the type of evaluation for your programme based upon the purpose/objective of the evaluation and the questions you want to answer. For example, you may want to know whether the expected change in objectives/outcome has occurred or not. You may also want to analyze and document the entire process of implementation, review critically and learn lessons from it. There are different types of evaluation you can adopt. Let us learn about these different types of evaluation. Primarily, evaluation can be classified as

- Process evaluation
- Summative evaluation
- Formative evaluation.

We will study about these briefly now. Let us start with process evaluation

18.6.1 Process Evaluation

Process evaluation, as the name suggests, is a for monitoring progress. The major emphasis in process evaluation is on documenting and analyzing the way the programme works in practice, to identify and understand important influences on its operation and achievements. The primary purpose is to improve understanding of how a programme achieves what it does. It indicates whether the strategies and activities being implemented are likely to generate the expected results. Process evaluation also indicates whether the work is done on time. If the activities do not meet expectations, they may be changed or even stopped, It is much better to change a programme during implementation than await a retrospective analysis to find out where it went wrong and who was responsible for the failure - when it is too late. Examples of processes which could be evaluated would be community mobilization, women's group formed, review meetings held with counterparts etc.

There are several factors which should be considered while planning a process evaluation. These factors are: objectives, target population, strategies and activities, scheduling, and resources used in the programme. For NEC programmes in particular, the behavioural objectives, primary and secondary audience groups and the types of communication strategies being used will be important considerations.

Process evaluation results have a number of uses, depending on the purpose of the evaluation, at what stage of development the programme is, and the funding agency. An important function of process evaluation is to provide information about the congruence between programme design and implementation. The results should, therefore, be fed back to project managers and staff on a continual basis. A plan for use and dissemination of process evaluation findings should be made

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when planning the evaluation system. It is important to present the findings in ways which correspond to the needs and competencies of the relevant stakeholders. Having looked at the process evaluation, let us look at the other type of evaluation i.e. summative evaluation.

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18.6.2 Summative Evaluation

Summative evaluation is the systematic use of research techniques to measure outcomes and overall programme effectiveness. For example, it is not enough to know that radio programmes were broadcasted, products distributed, health workers trained, or even that programmes were listened to, understood and acted upon. The ultimate goal is not people hearing advice but taking it, changing their behaviour and ultimately improving their own and their children's health and nutrition as a result of the advice.

Summative evaluation examines questions such as: Did the programmes achieve its explicitly stated goal? What was the magnitude of the programmes impact? What were the unexpected outcomes? What parts of the programme were most, or least, successful? An example of summative evaluation would be - proportion of pregnant women who started consuming 100 iron folic acid tablets increased from 20% at base line level to 25% percent at the end of the programme in 2 years. In addition to this, summative evaluation would also examine other issues as slated above e.g. did the women have problems accessing the tablets. Did they complain of side effects? etc. An useful evaluation looks at the process of the intervention's effects, as well as, measuring its overall impact. In order for a final health status outcome to be achieved, a series of interim steps must be successfully completed. The evaluation of these steps includes investigating whether:

- the target population had access to the channels of communication used by the programme,
- the messages actually reached the population through those channels,
- the content of the messages was learned and retained by the audience,
- members of the target audience actually changed their behaviours in response to the programme, and
- the nutritional status of the target groups improved as a result of these changes in behaviour

Thus you may have realized that summative evaluation uses techniques to measure outcome and also overall programme effectiveness. The third and the last type of evaluation is formative evaluation. Let us study this briefly

18.6.3 Formative Evaluation

Formative evaluation is done to monitor the progress during the programme implementation. Formative evaluation, as the name suggests, typically involves gathering information during the early stages of your project or programme, with a focus on finding out whether your efforts are unfolding as planned, uncovering any obstacles, barriers or unexpected opportunities that may have emerged and

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identifying mid-course adjustments and corrections which can help insure the success of your work.

Essentially, formative evaluation is a structured way to provide programme staff with additional feedback about their work. This feedback is primarily designed to fine tune the implementation of the programme, and often includes information that is purely for internal use by programme managers. An example of formative evaluation would be that, a radio programme on nutrition may be evaluated to get a feedback on how well it is received by the target audience. Planners and implementers then use the assessment to improve further on it. Formative evaluation can be informal or formal.

As elaborated by Robert Stakes "When the cook tastes the soup, that's formative, when the guests taste the soup, that's summative." Isn't that interesting! Programme planners may choose to incorporate any type of evaluation in the evaluation plan. You have looked at different types of evaluation and you have also learnt how to develop an evaluation system. Let us now learn about major features of evaluation.

18.7. MAJOR FEATURES OF EVALUATION

You know that it is important for the evaluator to know what they want to evaluate and how they want to evaluate. The evaluator's challenge is thus twofold. It is to determine:

- a) exactly what questions to be asked during evaluation i.e. determining evaluation questions, and
- b) the strategy and methods to employ for answering these questions i.e. selecting evaluating strategy and methods.

These now become the main features of the evaluation because the entire evaluation process will center around these two issues. Let us review these features in detail.

a) Determining evaluation questions

The evaluator's first task is to work with project planners and implementers to understand the explicitly stated, measurable objective of the programme. We gave you examples of several questions earlier when we discussed purpose of evaluation. The questions are established at the programmes onset, and most likely include desired level of exposure to messages, knowledge of information, first trials of new practices, adoption of behaviour, and impact on nutritional status, morbidity and mortality. In addition, however, the evaluator must consider other issues mentioned as follows:

the relative importance to project planners of different measurable goals.

For example- Is the primary goal a change in practice or nutritional status?

- characteristics of the target audience and the importance of its different subgroups. For example, were these groups more likely to learn or change or not?

- expectations: For example, are people expected to change immediately in response to the intervention or the change will be gradual? Is the change expected to be short term or permanent?
- expectations regarding changes in the health delivery system itself, for examples. delivery and quality of nutritional services.

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Further the evaluator must take into consideration the needs of users of evaluation findings. For example, do the users primarily want to know about the impact of intervention, or about various process indicators? Do they have questions regarding cost effectiveness and administrative efficiency

Not all significant questions can be answered in a summative evaluation. The evaluation process is one which continues selection among alternatives, and can carefully determine priorities in terms of audiences, funds, and time constraints.

Thus the evaluator should prepare a list of questions for which he seeks an answer, keeping in view various issues discussed earlier. Now the evaluator has to know what strategy and methods to use to get the answer of these questions. Let us look at the strategy now.

b) Selecting evaluation strategies to answer the questions

Once the list of appropriate questions has been selected, the evaluator must determine which methods of data collection and analysis are appropriate for seeking answers. No one model, approach or methodology will be successful in every programme. An effective evaluation strategy should incorporate a number of different methodologies. Distinct questions are often best answered through different designs. Distinct designs, which present alternative ways of approaching the same question, can provide particularly strong evidence of programme impact if their results are consistent.

Several research tools can be used in evaluations of communication interventions.

Few examples include:

- Large-scale survey conducted both before and after the intervention to measure impact regarding a group's knowledge, attitudes, and practices relating to the target nutrition problem. The "after" survey should determine access and exposure to mass media channels, messages and so on. Ideally, a group or cohort of individuals is surveyed several times to measure progress in the intervention.

These surveys most commonly employ quantitative methods of data collection.

- Demographic data (including socioeconomic status, age, literacy and education) help determine whether changes in practice occur only for certain groups of people.
- Observational studies are useful to test the validity of self-reported data.

Qualitative research tools such as focus group discussions, semi-structured interviews and various participatory methods.

Next thing, which comes to our mind, is that which method should we use in

the evaluation process. There are two types of methods which can be used in an evaluation strategy. These are quantitative and qualitative methods. Let us learn about these briefly

c) Quantitative methods and Qualitative methods

Quantitative methods are research methods concerned with numbers and anything that is quantifiable. They are therefore to be distinguished from qualitative methods. Counting and measuring are common forms of quantitative methods. The result of the research is a number, or a series of numbers. These are often presented in tables, graphs or other forms of statistics.

Qualitative methods involve methods of data collection and analysis which are non quantitative.

These methods are designed to help researchers understand people and the social and cultural contexts within which they live. Qualitative data also helps to understand and complement the quantitative data. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions.

Having understood the meanings of quantitative and qualitative methods, the critical issue which arises is fitting both the methods to the purpose of the evaluation. The use of both qualitative and quantitative, and multiple methods, can strengthen the validity of findings, if results produced by different methods are congruent and/or complement each other.

Box 2	The Use of Qualitative vs. Quantitative Methodologies in Evaluation
The use of qualitative vs. quantitative methodologies in evaluation	
<ul style="list-style-type: none">● Qualitative methodologies are useful in monitoring and process evaluation● Outcome/impact evaluation is often quantitative● Both types of methodologies strengthen validity of findings	

The evaluation should examine the project itself, rather than only the project's impact. It may provide an opportunity to analyze the administrative model, the extent of institutionalization achieved, and so on. The results will help planners refine basic programme designs. The evaluation may also provide an understanding of how and why specific interventions were successful, rather than just the degree to which they were. The evaluation may determine for what types of people the project worked, in what circumstances, and for how long. Such insights are invaluable for making decisions about directions of future interventions or about fundamental policies.

Another important thing, which you have to remember, is that evaluation should be participatory and all those involved in the programme should participate in the evaluation. We will now study how do we conduct a participatory evaluation.

18.8 CONDUCTING A DYNAMIC AND PARTICIPATORY EVALUATION

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You must be wondering who are the people who should participate in an evaluation. The persons concerned with evaluation may be divided into four categories. These are population itself, change agents in the communication process, evaluation specialists and sponsors and government representatives. Let us study these briefly. Let us start with population

- Population with whom the programme is conducted should be invited to participate in an evaluation process since the actions to be evaluated, concern them directly.
- The change agents in the communication process play an important role in evaluation process, as they learn from the process and can also improve their performance.
- The evaluation specialists, internal or external to the project provide technical expert for the evaluation.
- Participation of sponsors and government representatives will allow them to see the impact of the activities which they have promoted so that they can raise more funds and consider further expansion of the programme.

When we involve community in the evaluation, it helps to create a bond of trust with the community. We can find out their feelings about the benefits and weaknesses of our activities, we can draw on their experiences and insights on what has happened. Evaluation becomes a learning process and the community is able to reflect on its experiences and plan future activities. An evaluation should ensure participation of all the people involved in the NEC programme.

There are three types of tools which have been proposed, to carry out a dynamic and participatory evaluation. These are: Causal analysis, hippopoe table and dynamic model. We will review these briefly now. Let us start with Causal analysis

- Causal analysis : We discussed causal analysis of the nutritional problems in the conceptualization phase. This can help determine the relevance of the interventions. You may recall that causal analysis consists of creating an intersectoral setting and network of factors which affect nutritional status of population. It helps to select an appropriate intervention, develop communication between intersectoral teams and for evaluating the relevance of the intervention. Causal analysis also enables us to identify confounding factors which can influence the success and failure of the intervention

Hippopoc table: Once the causal analysis is completed, a hippopoc table is constituted. In hippopoc table, as highlighted in Table 18.1, inputs, procedures, outputs and outcomes of the intervention are organized in the form of a table. The inputs are the elements which will be transformed into outputs by intervention. For example, money, materials and even type and number of people who carry out education activities. The processes are the activities undertaken to transform inputs into outputs. For example, training the educators, community mobilization

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etc. The outputs are the results of activities carried out in the intervention. They correspond to specific objectives of the intervention. They are direct effects of interventions. For example: support materials, trained educators, etc. All these should contribute to the long term objectives of any nutrition project that is improvement of nutritional status.

Inputs	Processess	Outputs
<ul style="list-style-type: none"> ● Amount of funds ● Type, number of equipment used ● Type and number of people trained 	<ul style="list-style-type: none"> e Community mobilization ● Training e Development of support materials 	<ul style="list-style-type: none"> ● Number and type of groups formed ● Number and type of educators trained ● type and number of support materials produced

Table 18.1: Hippopoc Table — An example

Once the hippopoc table is developed, we can seek answer to following questions:

- Has the nutritional problem to be solved been clearly carried out?
- Has the causal analysis been carried out?
- Has the formative research to understand the behaviours and the channels of communication of the target population been carried out?
- Have the objectives been clearly defined in terms of modification of the nutrition related behaviours and in terms of acquisition of attitudes, knowledge and skill development?
- Have the messages been clearly developed?
- Has the multimedia plan taken into account the results of the tormative research and the specificity of the various media in the relation to the objectives to be achieved?
- Have the communication support materials been pretested before producing them on large scale?
- Have the participants been trained and retrained before the start of the communication activities?
- Were the activities carried out in accordance with the plan?
- The outcome of the analysis is matched at the end with programme objectives to determine success?

When we seek answers to these questions, we are assessing what we did and how we did, as planned for the NEC programme.

Dynamic model

In the dynamic model, the relationship between the inputs, processes and outcomes

are illustrated in the graphic form. The graph could be used by all those involved in the education programme to provide basic information in the project, to determine its successes and failures and to plan for improvement.

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Thus we studied that evaluation is like an energy source that can be drawn upon, for development of participatory communication activities. Evaluation is not simply an activity external to the intervention. It is a crucial component of nutrition education.

Let us now assume that we have conducted an evaluation of the NEC programme and we find that changes have taken place in the target audience in terms of positive behaviours. We would now have a question to ask ourselves. The question is that can we say with certainty that changes in behaviours took place as a result of implementation of our programme? We would like to find an answer to this question. Let us find out about it in the coming section

18.9 CONTRIBUTION OF NUTRITION EDUCATION PROGRAMME TO CHANGES IN BEHAVIOURS

You have implemented a NEC programme and let us assume that evaluation shows that changes in behaviours took place in target audience as expected. Now does it really matter what factors helped your programme? Perhaps not. But if your programme was an experimental pilot project testing out a new approach that you want to repeat elsewhere, you would have to make sure that the improvements occurred because of the new methods and not for any other reason.

If the objectives have been clearly defined at the outset, it is not usually difficult to show that change has taken place in your community. However, it is much more difficult to show that it took place because of your own efforts and not because of another reason. There are two ways of showing that change was caused by your own efforts. These methods are :

- 1) by using a control group, and
- 2) indirect method without using a control group for comparison.

This is called proving 'causality'. Let us study these methods in detail. Let us study the first method first

1. Using control group: In the control group method, we can set up two test groups. One test group that receives the nutrition education and the other group as a 'control' which does not receive the education. The two groups should be as close as possible in age, education, income and other factors likely to influence impact. If the group that received the education achieves a better performance than the control group, this will provide a strong evidence for the success of the communication process. Figure 18.1 depicts the process of comparing changes in test group and control group, if a control group was set up in the beginning of the programme.

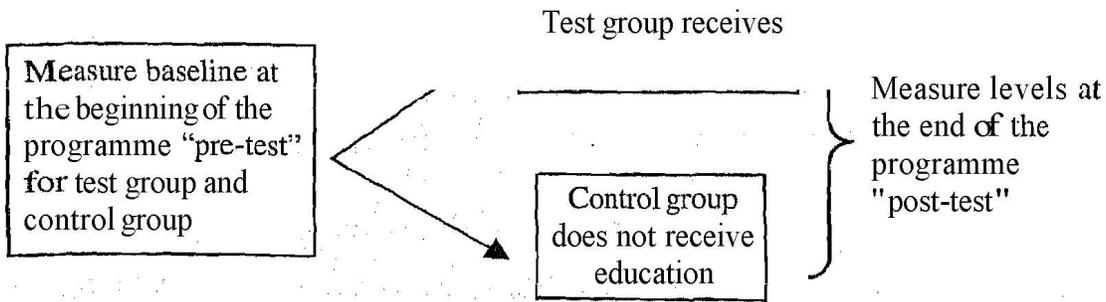


Figure 18.1: Comparison between test group and control group

Thus, using a control group method, we can assess the change before and after the intervention. If the test group shows a positive change in behaviour and the control group does not show any change, then we can say that the change in the test group occurred as a result of our interventions.

Let us look at the other method i.e. indirect method.

2. Indirect method without controls: If it is not possible to set up a control group, we will have to use an indirect method for excluding other reasons for any changes. We would have to carefully look at other possible explanations to the changes that took place. We could interview in the community and ask them why they changed their behaviour — was it because of the education programme or were there other reasons? Figure 18.2 depicts the process for determining changes without the use of control group.

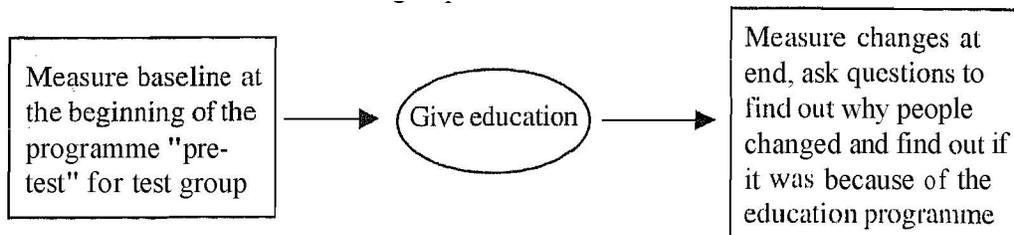


Figure 18.2: Measuring change without the control group

We can note from the Figure 18.2, that we conduct a baseline survey in the beginning of the programme to determine the current behaviours. We provide education and then conduct a survey again to determine why people changed behaviours and if it was as a result of our interventions.

So you saw how using the two methods, we can assess that changes occurred exclusively due to the nutrition education programme. We have now studied all aspects of an evaluation process. You can now develop an evaluation system, decide what methods to use and conduct an evaluation of the nutrition education programme. We will now recapitulate what we studied and review the main points, which should be considered while planning an evaluation system in a NEC programme. These are as follows:

- i) Integrate evaluation in the programme from the planning phase.

- (ii) Clarify the purpose of the evaluation. Prepare a set of realistic, achievable and measurable indicators for success.
- (iii) Develop an evaluation system, which takes account of all phases of the nutrition education communication project.
- (iv) Whenever possible, set up control groups who do not receive the education. If controls are not possible, collect data that will help to show that it was the programme's effort that led to improvements.
- (v) Decide if the evaluation should be internal or external, or both.
- (vi) When evaluating inputs, make sure that programme objectives are properly specified and that indicators are measurable and that the activities are relevant and feasible.
- (vii) Use multiple methods (triangulation) in data collection and analyses. This will strengthen the validity of findings if the results produced by different methods are congruent.
- (viii) In analyses, be careful to control for extraneous confounding factors and bias.
- (ix) Don't limit to finding out if you have reached your objectives look out for any unplanned benefits or unexpected problems
- (x) Learn from your failures as well as successes. Find out programmes succeeded or failed and what lessons can be drawn for the future.
- (xi) Allocate adequate time to nutrition education programmes, with the timing of the evaluation clearly identified

NOTES

Thus we learnt that it is very important to conduct evaluation of a NEC programme. We must incorporate evaluation plan into NEC programme right from the conceptualization phase. In fact, we can conduct evaluation during any phase of the NEC programme. The reason why so many well planned NEC fail at the implementation level is because they have not in-built the evaluation plan into them. If we include an evaluation plan in the NEC programme, would be more likely to achieve success in NEC programme. This will also give more credibility to nutrition education practice and the programmes would not be seen with skepticism, With the discussion above we end our study of evaluation.

Check Your Progress Exercise 2

1. What is the ultimate goal of nutrition education communication?

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2. Explain these terms briefly

a) Process evaluation

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b) Summative evaluation

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3. What are the main features of evaluation?

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4. How will you show that change took place because of the education programme?

18.10 LET US SUM UP

In this unit, we learnt about the concept and purpose of evaluation, Evaluation is an integrated part of programme planning and management and should be planned from the beginning of the nutrition education programme. However, evaluation can be conducted during any phase of the nutrition education programme. Evaluation involves showing whether; the change has taken place or not, if the change took place, then did it happen as a result of the programme and if the amount of effort required to produce the change was worthwhile. We learnt about how to develop an evaluation Different types of evaluation are process evaluation, summative evaluation and formative evaluation. We studied about two features of evaluation. These are determining evaluation questions and selecting evaluation strategies to answer these questions.

We also learnt as to how we conduct a dynamic and participatory evaluation. We concluded the section by discussing about the methods used to assess if the changes in behaviour in a nutrition education programme took place as a result of our efforts.

18.11 GLOSSARY

Pilot project	: activity planned as a test or trial.
Control group	: a specific group designated in a research study where participants are used as a standard for comparison and do not receive any treatment.
Semi structured	: interviews conducted with a fairly open framework which allow for focused, conversational, two way communications.

These are used to give as well as to receive information.

18.12 CHECK YOUR PROGRESS

- 1).What are the purpose of Evaluation of NEC Programme ?
- 2). What are the major aspects while developing an evaluation system ?
- 3). What is the ultimate goal of nutrition education communication ?
- 4). What is Evaluation?
- 5). What are different types of evaluation conducted in a programme ?

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