UNIT 2 PUBLIC NUTRITION: MULTIDISCIPLINARY CONCEPT

Structure

2.1 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, the unit 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.

Objectives

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 MULTIPLE CAUSES OF PUBLIC NUTRITION PROBLEMS

We read in Unit I 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 inalnutrition 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 lcvcl, respectively. The multisectoral nature of malnutrition becomes obvious when we look at the underlying causes. These causes are numerous and usually inter elated. 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.

OUTCOMES	Malnutrition, disability and death
Immediate Causes at Individual Level	1) Inadequate dietary intake 2) Disease
Underlying Causes at Household/ Family Level	1) Insufficient access to FOOD 2) Inadequate maternal and child CARING practices **3)** Poor water/sanitation and inadequate HEALTH services 4) Inadequate and/or in appropriate knowledge and discriminatory attitudes limit household access to actual resources
Basic Causes in Society	I) 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 Worlcl'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 lo adopt a multidisciplinary approach to solve the public nutrition problems. We will now study about the inultidisciplinary approaches to solve nutritional problems.

2.3 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 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 lo find answers to some of these questions. Let us start with the role of agriculture in improving nutrition.

2.4 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 counti-ies, 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 five fold. 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.

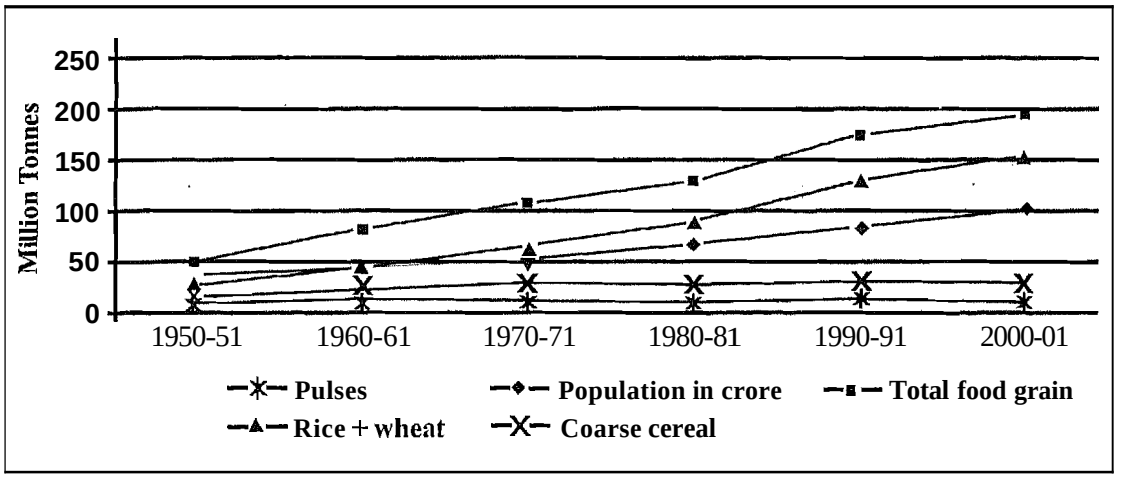

Figure 2.2: Trends in production of important food items

Source : Agricultural Statistics at a Glance, M/O Agriculture

At the national level, food production appears to be sufficient to meet the countiy's needs. In actual practice, however, food consumplion does not follow normal distribution but is skewed. In the last two decades, there has been a progressive decline in pulse consuniption, 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 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.

Table 2.1: Average nutrient intakes among pre-school children

	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)	0.50	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

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 overnutsition 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

We know that vegetables and fruits constitute an integral past 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 tones) after overtaking Brazil (31.2 million tones). It ranks second to China in vegetable production with a figure of 90.8 million tones 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 nutiition 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 these 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.

2.5 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.

2.6 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 nut itional 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

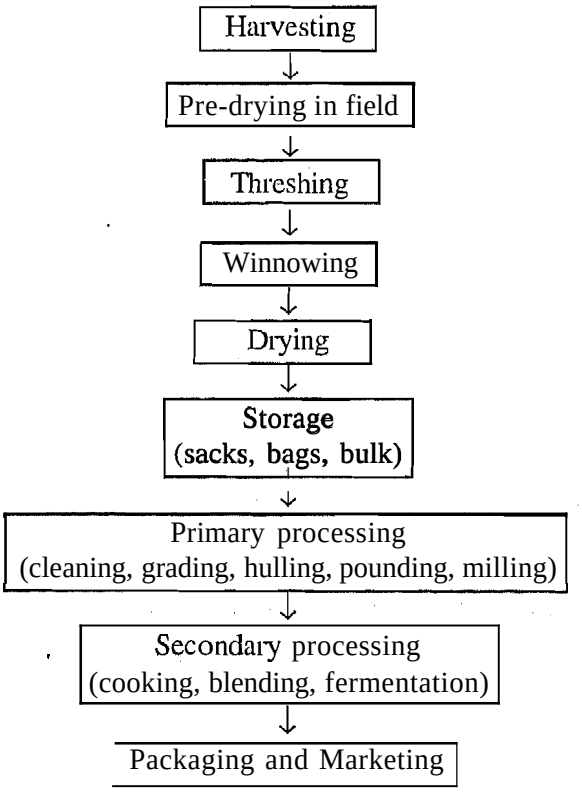

Figure 2.3 : Plow chart for post harvest system of food commodity

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 lossess 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-hasvesting 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.

2.7 APPLICATION OF SCIENCE AND TECHNOLOGY TO IMPROVE FOOD SUPPLY

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 lilcely shortages arising 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 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 of 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 farm-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 productibn 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 expertize 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 consuiners 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 for 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?

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   .....

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.

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

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

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

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2.8 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.

2.8.1 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 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 consunzed.* 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.

2.8.2 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 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 comtnunity, 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 rereview 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 stil! 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 inf astructure and health care. Ultimately, it is related to failure of governance at various levels.

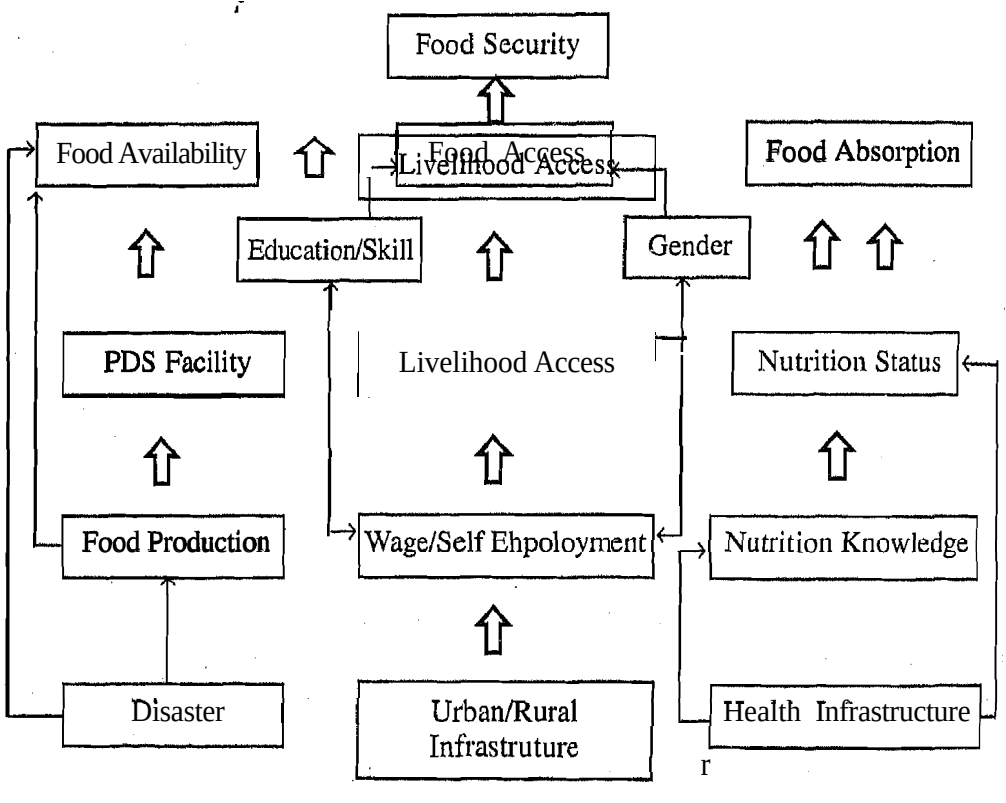

Figure 2.4 : Food security - concept diagram

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

2.8.3 India's Food Security System

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 of 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 an 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 highlights 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

- Increasing food production – building buffer stocks
- Improving food distribution – building up PDS
- Improving household food security through:
  - improving purchasing power,
  - food for work programme, and
  - direct or indirect food subsidy.
- 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 or 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.

2.9 FOOD BEHAVIOUR

Food is not merely a means to survival but the fuel that drives the human body and 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 and habits of its people. Let us look at the cultural factors next.

- *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 iteins 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 paradigin 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.

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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2.10 LET US SUM UP

In this unit we learnt that there are multiple causes of malnutrition and accordingly we 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 recalls that food security is defined 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. 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.

2.1 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.

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 protect themselves from disease. Their 'promoting human health are still und many have antioxidant activity.

2.12 ANSWERS TO CHECK YOUR ESS EXCERCISES

Check Your Progress Exercise 1

1. Multisectoral approach involves organizing activities that would involve teams of scientists (both social and natural), technologist, 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.

2. a) True

   b) False – India ranks only second to China in vegetable production, but per capita consumption of vegetables is very low in India.

   c) False – 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.

3) Science and technology can help improve food supply by: (a) increasing food production through better agricultural technology; (b) ensuring effective conservation and utilization of foods through the application of modern technology.

Check Your Progress Exercise 2

1) Food security may be defined 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. Nutrition security, on the other hand, refers to a balance between biological requirements in energy and nutrients and the quantity and quality of foods consumed. The four main factors which determine food and nutrition security: These are : Inappropriate caring and feeding practices, gender discrimination, Unsafe water and sanitation, and Natural disasters.

2) There are many factors which affect the food behaviour. These are physiological and socio psychological factors, cultural factors, and social factors.