# UNIT 13 STRATEGIES TO COMBAT PUBLIC NUTRITION PROBLEMS - II

## Structure



## 13.1 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 your 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.

**Objectives**

After studying this unit, you will be able to:

- enumerate the various immunizations that are available in our 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 foods,
- 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 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:

— life long physical and mental disabilities, and

— death from dreaded diseases

What are these dangerous diseases which can be prevented through immunization? Let us find out.

### 13.2.2 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, Diptheria, 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 hygienic practices followed during delivery particularly for cutting the umbilical cord by the untrained traditional midwives (dais). Women in the reproductive age group of 15-45 years, females are at a higher risk, particularly after abortions and deliveries conducted under primitive conditions in the rural and tribal areas.

Let us learn about poliomyelitis next.

**Poliomyelitis:** 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 Diptheria now.

**Diptheria:** Diptheria is an infection of the throat, nose or larynx and is caused by the bacteria, corynebacterium diptheriae. 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 *pertussia 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. Tetanus vaccine is given to pregnant women. Let us then get to know the immunization schedule being adopted in our country.

### 13.2.3 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 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 in 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 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) and a triple injection Penta valent and one dose each of BCG and measles are given to infants. Look up Table 13.1 carefully and check the age, vaccine and route of 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. First booster doses of OPV and DPT is given around the age of 16-24 months and a second booster dose of DPT is given around 5-6 years of age. 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" in Unit 10 of this course.

**Table 13.1: National Immunization Schedule (NIS) for Infants, Children and Pregnant Women**

| Vaccine | When to give |
|---|---|
| **For Pregnant Women** | |
| TT-1 | Early in pregnancy |
| TT-2 | 4 weeks after TT-1 |
| TT- Booster | If received 2 TT doses in a pregnancy within the last 3 yrs |
| **For Infants** | |
| BCG | At birth or as early as possible till one year of age |
| Hepatitis B-Birth dose | At birth or as early as possible with in 24 hours |
| OPV-0 | As birth or as early as possible within the first 15 days |
| OPV 1, 2 & 3 | At 6 weeks, 10 weeks & 14 weeks (OPV can be given till 5 years of age) |
| Pentavalent 1, 2 & 3 | At 6 weeks, 10 weeks & 14 weeksv (OPV can be given till 5 years of age) |
| Rotavirus | At 6 weeks, 10 weeks & 14 weeks (can be given till one years of age) |
| IPV | Two fractional dose at 6 and 14 weeks of age |
| Measles/MR 1st Dose | 9 completed months-12 months. (can be given till 5 years of age) |
| JE-1 | 9 completed months-12 months |
| Vitamin A (1 dose) | At 9 completed months with measles-Rubella |
| **For Children** | |
| DPT booster-1 | 16-24 months |
| Measles/MR 2nd Dose | 16-24 months |
| OPV Booster | 16-24 months |
| JE-2 | 16-24 months |
| Vitamin A (2nd to 9th dose) | 16-18 months. Then one-dose every 6 months up to the age of 5 years. |
| DPT Booster-2 | 5-6 years |
| TT | 10 years & 16 years |

TT: Tetanus Toxoid; BCG: Bacillus Calmette-Guerin; OPV: Oral Polio Vaccine; IPV: Inactivated Polio Vaccine; JE: Japanese Encephalitis; DPT: Diptheria, Pertusis, Tetanus

***Source:*** Accessed from the website mohfw.gov.in on 1.04.2019.

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 contra-indication 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. Now, before we move on to this section let us recall what you 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:

   In India, we follow an Immunization schedule, under which:

   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 1-1/2 months, 2-1/2 months and 3-1/2 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.

## 13.3 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, you have already learnt about various nutrition intervention programmes implemented by the government. 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.

### 13.3.1 Supplementary Feeding

Supplementary feeding, is the food provided to pregnant, lactating women, children and 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 Nutritional Monitoring Bureau conduct dietary surveys in the country on a regular basis. Surveys from National Nutritional Monitoring Bureau (2012) show that about 54-70% of households in India consume less than 50% of protective foods such as GLV`S, milk & milk products, sugar & jaggery as per the

RDA's. 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 dietary allowances. Problems of inadequate dietary intake are more pronounced in the low income households.

So, what is the outcome of 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 outcome of pregnancy including birth weight and neonatal mortality. Similarly for children (1-6 year), "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 1-6 year aged children 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 be benefited from food supplementation. You have already learnt about these programmes in Unit 10. In this unit, you will learn about supplementary feeding component of these programmes. Let us now consolidate our knowledge and recapitulate the supplementary feeding component of various intervention programmes.

### 13.3.2 Intervention Programmes to Combat Under Nutrition

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 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 infrastructure based in the community) and the other one is implemented in the schools. These are listed in the Table 13.2 as follows.

**Table 13.2: Supplementary Food Programmes**

| Implemented Through Anganwadi Centers | Implemented Through Schools | Research Action Programmes |
|---|---|---|
| 1) Integrated Child Development Services (ICDS) | National Mid Day Meals Programme | 1) POSHAN (CMAM) (2015-2018)<br>2) The Integrated Nutrition And Health Project (INHP) in Eight States of India (1996-2006) |
| 2) Pradhan Mantri Gramodhya Yojana (PMGY) | | 3) The Bal-Poshan Project, Rajasthan (1993-2003)<br>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) |

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*

In Unit 11 we studied about 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 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 calorie and protein content of ICDS food supplements is given in the Table 13.3.

**Table 13.3: Calorie and protein content of food supplements provided at Anganwadis**

| S.No. | Recipients | Calories (kcal) | Protein (g) |
|---|---|---|---|
| 1. | Children 6 months to 72 months | 500 | 12-15 |
| 2. | Adolescents | 600 | 18-20 |
| 3. | Pregnant and lactating women | 600 | 18-20 |
| 4. | Severely Malnourished Children (6 months - 72 months) | 800 | 20-25 |

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

the anganwadi centres 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 under-nutrition 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 education, or pre-school 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;

under-nourished 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.

Next let us move on to the next programme i.e. Pradhan Mantri Gramodhaya Yojana.

### Pradhan Mantri Gramodhaya Yojana

Pradhan Mantri Gramodhaya Yojana (PMGY), 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 PMGY specifically provides food supplementation to children 6 months-3 years of age *through take home ration* (THR) 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 under-nourished persons may get their due share.

Let us now learn about the research action programmes whose strategies have worked for ICDS.

## B. Research Action programmes

There are many research action programmes which had been/or are being implemented in different states of our country to improve the nutritional status of vulnerable groups in convergence with ICDS. Brief review of some of such programmes are discussed herewith.

### POSHAN (CMAM) Project in Rajasthan

Positive and Optimum care of children through a Social and Household Approach for Nutrition (POSHAN) at Rajasthan is a unique and innovative approach to Community-based Management of Acute Malnutrition (CMAM).

Under this approach, children in the age group of 6 to 59 months are treated at their respective homes and family settings, where the children are most comfortable. As an advantage of this, POSHAN (CMAM) is able to reach to more children than the traditional facility-based care approach.

POSHAN Phase-I (2015-2016) was piloted in 13 priority districts (10 High Priority Districts (HPDs) and 3 Tribal Districts) of Rajasthan with support from development agencies ACF/ AAH, GAIN and UNICEF. A total 2,34,404 children aged between 6 months and 59 months were screened in 41 blocks in 1,574 villages and 9,640 Severely Acute Malnutrition (SAM) children were identified. Out of which 9,117 children recovered from SAM between 8 and 12 weeks of sustained intervention. The programme was concluded in June 2016, with a recovery rate of 88%.

After the successful implementation of the POSHAN Phase-I programme, phase-II of the programme was initiated, which was named as POSHAN Baran project. In this

phase 63 villages of two blocks of Baran – Kishanganj and Shahabad, between July 2017 to March 2018, covered 6,304 children of the same age group.

While screening, 341 children were identified as SAM, who were treated through the CMAM in which the children were given free POSHAN Amrit i.e., a micronutrient enriched, energy dense nutrition supplement as a take-home ration. Apart from this, 402 other children were identified as MAM (Moderately Acute Malnutrition) and were referred to Aanganwadi centers for their treatment.

The regular home visits were utilized to regularly monitor the child's health and counsel caregivers regarding hygiene practices, aspects of managing and treating malnutrition. This helped to ensure compliance with the treatment and provide support to caregivers eventually building their capacities in childcare to follow to achieve optimum care of children. The children discharged from the programme were followed for 4 months to ensure they do not fall back to the same state of malnutrition.

Let us 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) was 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 was implemented in partnership with the Women and Child Development and the Health and Family Welfare Departments of Government of India, Non-Governmental Organizations and Community Based Organizations with support of United States Agency for International Development (USAID). The INHP worked 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 was 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 center. Let us look at these in detail:

*"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 days*. 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" had 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, ARF 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 THR, 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-Eat 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 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 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 cry 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 daily 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.

**C. National Programme Implemented in Schools**

The Mid day Meal Scheme is a school meal programme of Government of India designed to better nutritional standing of school age children, about which we studied in Unit 10. Here we will briefly review the supplementary feeding component of the programme.

***National Mid-Day Meals Programme (NMDM)***

We learnt that the supplementary feeding component of the programme consists of:

100 g food-grains (wheat or rice) for primary and 150 g for upper primary child per school day, where cooked meals are served;

3 Kgs. food grains per student per month, where food grains are distributed.

As of now, all states and UTs are providing cooked meals to all primary school children. All the states are distributing food grains under the programme too. 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 NMDM, 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 ICDS?

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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 enrollment in primary schools.

   d. PMGY specifically provides food supplementation to children 3-6 years of age.

   e. Project Poshan CMAM 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 biotechnology.

## 13.4 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 β-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; β-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 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 oil palm. 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

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:

## 13.5 CLEAN WATER, SANITATION, STREET FOODS AND STRATEGIES FOR IMPROVEMENT

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 some initiatives taken by the government, 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.

### 13.5.1 Importance of 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 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, eg. 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 immemorial 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 to improve the quality and quantity of water supply.

Let us now learn about sanitation and some strategies to improve urban sanitation in India.

### 13.5.2 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.

To accelerate the efforts to achieve universal sanitation coverage and to put focus on sanitation, the Prime Minister of India launched the 'Swachh Bharat Mission' on 2nd October, 2014. Sawchh Bharat Mission basically aims to clean up the roads, streets and infrastructure of India's cities, towns and rural areas by 2nd October, 2019. Under the campaign provisions for setting up of toilets both at households and community levels are also provided.

Another campaign initiated in 1999 by Government of India naming 'Total Sanitation Campaign or Nirmal Bharat Abhiyaan (NBA), also focused on the construction of

low cost toilets and solid & liquid waste management. The NBA also laid emphasis on to motivate the family members of rural households to use toilets through awareness creation and health education programmes.

National Rural Drinking Water Programme (NRDWP): NRDWP is a Centrally Sponsored Scheme aimed at providing every person in rural India with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. As per the data of 2017, 1.7 million rural habitations provided drinking water under the National Rural Drinking Water Programme, out of which 1.3 million (77%) habitations are fully covered (defined as having at least 40 litres per capita per day (LPCD)), 19.3% habitations are partially covered (safe water is available but below 40 LPCD) and 3.73% are "water-quality affected habitations"–meaning those with contaminated water

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 Ahmedabad, advances micro-credit to women 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.

Ahmedabad Parivartan: Over 1000 slums (informal settlements) and nearly 1500 chawls (tenements) Ahmedabad, 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 program 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 Bank – 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.

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 some of the initiatives taken up by the government to improve the quality of street foods.

### 13.5.3 Street Foods and Strategies for Improvement

What are street foods? Street foods are ready to eat foods and beverages, prepared and/ or sold by vendors and hawkers, especially in streets and similar public places. India has a rich history of street food vending reflecting the traditional local culture. Their easy availability couples with wide variety and delicacy of the offering, not to forget the comparative low prices, have made street foods popular with the all sections of society, including the elite and international tourists.

Street food vendors typically operate from semi-permanent premises and use portable booths food carts or trucks to sell their items. Street food business are usually owned and operated by individuals or families. Apart from providing livelihood opportunities for countless number of people nationwide, these businesses also make a substantial contribution to the local economy. The Ministry of Urban Poverty Alleviation, GOI, has estimated that there are about 100 Lakh street vendors in the country. About 20% of them, that is, 20 Lakh are expected to be street vendors.

However, on the negative side, street vending is often associated with poor environmental conditions with vendors paying little attention to the safe handling of food, hygiene and sanitation. The microbiological quality of the foods served is therefore poor. Vendors

also often use non-permitted food colours. Thus, street food in India is often perceived as being unhygienic and a major public health risk.

In recent past, several initiatives have been taken by the Government to improve the quality of street food in India. Some of the initiatives are described herewith:

1. Swachh Bharat Swachh Pakwan - This is the project of the Ministry of Tourism which aimed at upgrading the skills and hygiene standards of street food vendors to enable these people to serve excellent brand ambassadors of the variety that India offers.
2. Surakshit Khadya Abhiyan - This abhiyan has been launched by The Ministry of Consumer Affairs, Food & Public Distribution in partnership with industry body, CII, The National Association of Street Vendors of India (NASVI) and Voluntary organization in Interest of Consumer Education (VOICE) to promote awareness about food safety with a special focus on street food vendors.
3. Food Safety and Standard Authority of India (FFSAI) has a project called Clean Street Food to enhance the popularity of street food by transforming it into a global brand itself. By building on the lessons of past initiatives in the food area, the project would focus on to train street vendors in aspects of safe food and hygiene so that they may improve the quality of their offerings and thereby be in a position to attract more customers and increase their earnings. Apart from this, the project will play a big role in the social and economic uplift of the street vendor community by providing them with skill training under the Government's flagship Pradhan Mantri Kaushal Vikas Yojana (PMKVY). Besides help India's food streets to emerge as new tourist attraction by themselves as in many other parts of the world. In summation the project 'Clean Street Food' intent to achieve the following objectives:
   - Make a global brand out of Indian street foods
   - Raise health & safety standards of street foods
   - Reduce incidences of street food-borne diseases
   - Help street vendors to improve quality of offerings, attract more clients & earn more
   - Enable street food operators to move up in life
   - Transform lives of millions of people at bottom of pyramid.
4. Another initiative taken up by the FSSAI is 'Clean Street Food Hub'. A clean Street Food Hub may be defined as "a hub or cluster of 50 or more vendors/shops/ stalls selling popular street foods, 80 percent or more of which represent local and regional cuisines and meets the basic hygiene and sanitary requirements". It excludes fine dinning.

   To upgrade the existing food streets across the country and provide safe & hygienic local eating experiences for domestic and international tourists alike FSSAI with the support of state government bodies has framed benchmarks for hygiene and sanitary conditions including food safety and hygiene requirements, personal hygiene, location and facilities, street food hub, water supply and quality, pest control, leftover and waste disposal. Large scale training capacity building of street food vendors would also be an integral part of this initiative. Credibility may be provided by recognizing such streets as 'Clean Street Food Hub' through plaque/certificate of excellence. Some of the general requirement/guidelines for a Clean Street Food Hub are given below:

   - The street food vendors shall be registered under Food Safety and Standard (Licensing and Registeration of Food Businesses) Regulation 2011.
   - FSSAI Registration number and Food Safety Display Board (FSDB) should be displayed on the cart/kiosk.

A right example for such kind of a Clean Street Food Hub is situated in the state Ahmedabad. The Food Safety and Standards Authority of India (FSSAI) declared *Kankaria Lake* area in Ahmedabad as country's first 'Clean Street Food Hub'. The 15th - century *Kankaria Lake*, with around 66 street food vendors, serves popular street food to approximately 12 million people each year.

**Check Your Progress Exercise 3**

1. What is meant by genetic or food biotechonology?

   .....

   .....

2. Answer the following briefly

   a. Five different foods which have been successfully produced with enhanced content of β carotene through genetic/food biotechnology.

      .....

      .....

   b. Two important minerals that have been added to wheat and rice through genetic/food biotechnology.

      .....

      .....

3. What are the harmful effects of consuming contaminated water?

   .....

   .....

4. Answer the following briefly:

   a. Four main activities, which the Water boards could take up to improve, water quality in the country

      .....

      .....

   b. Three important strategies to improve urban sanitation

      .....

      .....

5. Read the following statements 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 the 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. *Kankaria Lake* are of Ahmedabad has been certified as first Clear Street Food Hub.

In the above section, we learnt how improving drinking water and sanitation services is critical to combat malnutrition. Let us now review the last (but not the least) strategy, namely improving food and nutrition security to combat public nutrition problems.

## 13.6 IMPROVING FOOD AND NUTRITION SECURITY

You 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.

### 13.6.1 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 preschool children, pregnant and lactating women, nearly covers all blocks in the country. The Mid-day meal programme aimed at improving dietary intake of primary school children and reduction in the school drop out rates.

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 not available at affordable prices to poor. Poor people continue to have diets which are of low nutritional quality. Box 1 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.

| Box 1 | Progress Achieved, Current Problems Paradigm Shift and Challenges in the Area of Food Production |
|---|---|

**FOOD PRODUCTION**

***Progress Achieved:***

The country has achieved self-sufficiency in food grains to meet the needs of the growing population;

There are ample food grain stocks.

***Current Problems:***

'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.

***Paradigm shift needed:***

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.

***Challenges:***

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.

***Opportunities:***

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 .

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.

## 13.6.2 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 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:

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.

**Check our Progress Exercise 4**

1. What is meant by Public Distribution System (PDS) and Targeted Public Distribution System (TPDS)?

   .....

   .....

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, paradigm shift, challenges and opportunities in food production?

   .....

   .....

## 13.7 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 street 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.

## 13.8 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.

## 13.9 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

**Check Your Progress Exercise 1**

1. Immunization is a process that increases an organism's reaction to antigen and therefore improves its ability to resist or overcome infection. 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

2. The common vaccine preventable diseases are: Tetanus, Poliomyelitis, Diptheria, Pertussis, tuberculosis and measles

3. Fill in the blanks:

a. tetanus

b. birth.

c. DPT, polio

d. 9

e. 16-24.

**Check Your Progress Exercise 2**

1. Supplementary feeding, is the food provided to pregnant, lactating women and children and 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.

2. The target group, calories and protein supplied by ICDS supplementary food is given in the table as follows.

**Target group, calorie and protein content of ICDS food supplements**

| S.No. | Recipients | Calories (kcal) | Protein (g) |
|---|---|---|---|
| 1. | Children 6 months to 72 months | 500 | 12-15 |
| 2. | Adolescents* | 600 | 18-20 |
| 3. | Pregnant and lactating women | 600 | 18-20 |
| 4. | Severely Malnourished children | 800 | 20-25 |

* Supplementary feeding provided to adolescents in some states only

3. Four Research Action Programmes whose strategies have worked for ICDS are:

   POSHAN (CMAM)

   The Integrated Nutrition and Health Project (INHP) in Eight States of India (1996-2006)

   The Bal-Poshan Project, Rajasthan (1993-2003)

   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)

4. a. True

   b. True

   c. True

   d. False, PMGY specifically provides food supplementation to children 6 months to 3 years of age

   e. False, NSPE does not provide health package to school children. Although it has been strongly recommended that it should provide a health package in addition to supplementary foods to school children.

**Check Your Progress Exercise 3**

1. Genetic or food biotechnology is a plant breeding science. It means the transfer (transgenic) 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.

2. a. Genetic approaches have been successful in producing β-carotene-rich wheat; β-carotene-rich maize; β-carotene-rich potato; β-carotene-rich-sweet-potato; β-carotene-rich-cassava.

   b. Two minerals which have been added to staple foods through genetic / food biotechnology are: Iron and Zinc

3. Water contaminated with faecal matter forms the single most important factor in the spread of gastro intestinal diseases (diarrhoea, dysentery or even cholera)

4. a. Four activities which the Water boards could take up to improve water quality in the country are:

      i. Set-up water-purification plants at the source from where water will be drawn and distributed.

      ii. 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.

      iii. Make village panchayats responsible for ensuring enough water (quantity and quality); the maintenance of taps and bore-wells; and for rain-water-harvesting.

      iv. Encourage Food-for-Water-Management Schemes which can employ the youth of the village.

   b. Three important strategies to improve urban sanitation are:

      i. The Media should play an active role and influence the public and policy makers to provide for improved sanitation services.

      ii. Women should be trained in the construction and maintenance of low-cost-latrines.

      iii. Migrant population who should be kept out of city limits, but provided with minimum levels of water and sanitation.

5. a. True

   b. True

   c. False, In India, we do not have a regular system to regulate the hygienic condition of the street foods.

   d. True

**Check Your Progress Exercise 4**

1. The Public Distribution System (PDS) & Targeted Public Distribution System (TPDS) are food subsidy programmes implemented by Govt. to provide food security to the poor people in India. PDS supports grain prices and assures buffer stocks when supplies fell short. PDS provides cereals and other essential items to card holders at subsidized rates. TPDS was introduced in 1997 by the Govt. Under this system, subsidized food grains are provided only to people below the poverty line.

2. a. True

   b. True

   c. True

   d. False- The production of pulses has been falling steadily. We need to increase production of pulses and make them affordable to increase consumption.

   e. True

3. The progress achieved, current problems, paradigm shift, challenges and opportunities in food production are presented as follows:

   *Progress Achieved:* the country has achieved self-sufficiency in food grains to meet the needs of the growing population; there are ample food grain stocks.

   *Current Problems:* '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.

   *Opportunities:* Achieve substantial improvement in nutrition security; Achieve decline in macro and micronutrient under-nutrition