

Chapter 12: Poor Diet and its Consequences

- **Relationship between agriculture, nutrition and health**
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Chapter 12: Poor Diet and its Consequences

'*Anam Aham*' or 'I am what I eat' is a realisation we have had since ancient Vedic times. This is because the food, along with all the nutrients and other bioactive substances present in food which we eat, literally governs our health and nutritional status. Food is also known to affect our moods, our cognitive abilities and our intelligence quotient. Nutrients and the other bioactive substances play a big role in preventing communicable and non-communicable diseases. Even if a single nutrient is missing from our diet it can lead to adverse health symptoms. If we eat too much of a nutrient it can result in an imbalance in the body with a negative impact on health. Hence the focus is always on a balanced diet. This chapter explains the relationship between the food we eat, the nutrition it provides to our body and the effect on health and disease. It examines the effect of under and overnutrition on health as well as the economy. Initiatives to tackle the problem of malnutrition, that have been and need to be intensified, are discussed.

Relationship between agriculture, nutrition and health

The definition of 'health' as adopted by the World Health Organization in 1948 is as follows:

'A state of complete physical, mental and social well-being and not merely the absence of disease and infirmity'

Unhealthy diets are closely linked with poor health status. In turn, dietary patterns and food choices are determined by a multitude of factors such as availability of foods, pricing, knowledge and awareness, taste preferences, social and cultural norms amongst others. Food, therefore, becomes a common point between agriculture, nutrition and health. It serves as the output of agricultural activities and subsequently plays a major role as a carrier of nutrients thereby resulting in either positive or negative health outcomes depending on how it is consumed.

Food is more than a sum of its nutrients or individual components. Synergism and interaction between different food components often requires a balancing act. This forms the rationale behind the concept of a 'balanced diet' as prescribed by the National Institute of Nutrition, Indian Council of Medical Research (ICMR) Dietary Guidelines for Indians. A balanced diet should provide around 50-60% calories from carbohydrates, preferably from complex carbohydrates, about 10-15% energy from proteins and 20-30% from both visible and invisible fats.

Absolute quantity of food components is equally important as the quality as well as relative proportions. For example, over the years, focus has shifted from total fat intake to intake of healthier fat fractions such as saturated fats. Likewise, carbohydrates are a major affordable energy source in Indian diets. Carbohydrates get preferentially used by the body for energy and thus have a protein sparing action, allowing the human body to utilize proteins for their critical role of tissue synthesis and maintenance. At the same time, in the absence of physical activity, excess carbohydrates in the diet may lead to weight gain and obesity. Qualitatively, complex carbohydrates such as those present in pulses, millets and whole grains (minimally processed with outer bran layer intact) are known for their positive attributes such as low glycemic index, satiety, cholesterol lowering properties etc.

The nutrition we derive from foods is deeply rooted in traditional practices of cooking, preserving and consuming seasonal foods as well as the ancient wisdom of some foods with medicinal benefits. For e.g., fruits and vegetables are known to be rich sources of vitamins, minerals, fibre as well as many non-nutritive yet protective substances such as flavonoids, antioxidants, etc. Including fruits and vegetables in the daily diet may reduce the risk of some non-communicable diseases and certain types of cancers. Swapping (exchanging) an unhealthy snack with a seasonal fruit is also a way to prevent weight gain and eventually reduce the risk of obesity. Some fruits and vegetables are known to boost the immune system. For e.g., Indian gooseberries (*amla*), oranges and other citrus fruits.

A diet consisting of foods from various food groups typically provides most of the daily requirement of nutrients. Food groups can be broadly classified as follows:

- Cereals and Millets
- Pulses
- Milk and animal derived foods such as meat, fish & poultry
- Fruits and Vegetables
- Nuts, oilseeds, Oils, Fats, and Sugars

Based on the degree of processing and/or cooking, intake quantity, degree and nature of interaction with other food components, the above-mentioned food groups provide us with the following nutrients:

- Macronutrients such as Carbohydrates, Proteins & Fats
- Micronutrients such as Vitamins and Minerals

The right food choices practiced consistently over a period of time lead to achievement of health goals specific to different stages of life. Age appropriate dietary guidelines as well as nutrient requirement values serve as guidance for nutrient intake at population level. For example, during the early years of life, optimal growth & development require sufficient proteins to support bone and tissue development. Similarly, adolescents in the age group of 10-15 years demand adequate protein-carbohydrates to sustain the second growth spurt. Physiological conditions such as pregnancy and lactation have higher requirements for most macro and micronutrients such as iron, folic acid and calcium. Whereas, as one grows older, energy requirements are reduced owing to a predominantly sedentary lifestyle with limited physical activity. However, vitamins, minerals and proteins remain critical to ensure healthy ageing.

Poor or unhealthy diets often lead to negative health outcomes:

- Undernutrition leads to physical and cognitive impairment, and increases susceptibility to infectious diseases.
- Micronutrient deficiencies or in other words possible insufficient intake of iron, iodine, vitamin A, folate etc. can cause severe illnesses and physical impairments, such as anaemia, mental retardation, visual impairment or birth defects respectively.
- Overweight and obesity increase the risk of non-communicable diseases (NCDs) such as type 2 diabetes, hypertension, heart disease, stroke and certain cancers.

Epidemiological shift from communicable to non-communicable diseases

India is in the middle of an epidemiological transition and is simultaneously battling the coexistence of undernutrition, overnutrition, and micronutrient deficiencies. While earlier the majority of deaths were due to communicable, infectious diseases, the death rates are now higher for diet related non-communicable diseases. The many facets of this transition include:

Agricultural transformation: With the advent of the green revolution in the late 1960s, India has moved from being food insecure to self-sufficient in grains. The focus has been on cereal grains especially staple crops such as wheat, rice and maize with relatively less attention towards other nutritious crops such as pulses, millets, coarse grains. This supply-demand equation has affected the share of plate in a typical Indian meal which tends to be cereal (carbohydrate) heavy.

Urbanization: Urbanization including migration to cities in search of work, has led to a change in dietary/consumption patterns. With more women entering the workforce, there's less time to cook meals and hence a reliance on convenience foods and out-of-home consumption. Increase in disposable incomes is another factor resulting in changing consumer habits and preferences.

Food environments/ecosystem: The external as well as personal food environment/ecosystem has experienced a transformation with availability through formal/informal markets, price volatility, online delivery, promotion and marketing campaigns, regulatory ecosystem etc.

Physical activity: Factors such as rise of sedentary job profiles, time spent on gadgets/electronic devices, changing patterns of transportation, modern innovations that have automated some of the household tasks, cultural and safety considerations have led to a decrease in physical activity. As per a WHO statistic, globally, about 25% of adults and more than 80% of adolescents were insufficiently physically active in 2010. Physical inactivity is a leading risk factor for various non-communicable diseases, injuries and premature deaths worldwide.

Healthcare infrastructure: The revamped National Health Mission with a focus on disease control, prevention and surveillance has made a huge impact on healthcare system. Life expectancy at birth in India has risen to 69 years during 2013-17.

Undernutrition and micronutrient deficiencies

Human nutrition describes the processes whereby the body obtains and uses necessary substances obtained from foods (nutrients) to maintain structural and functional integrity. Optimum nutrition refers to an adequate intake of nutrients. Malnutrition is an imbalanced nutritional status resulting from deficiencies, excesses or imbalances in a person's intake of nutrients.

The term malnutrition covers 2 broad groups of conditions. One is 'undernutrition' — which includes stunting, wasting, underweight and micronutrient deficiencies. The other is

'overnutrition' which results from excessive intake of nutrients leading to overweight and obesity when there is excess intake of calories, or other symptoms of toxicity of excess intake of micronutrients.

As per the conceptual framework developed by UNICEF in 1990, the causes of malnutrition can be broadly classified as immediate; underlying and basic (Figure 1). *Immediate causes* act at individual levels. They include inappropriate diet and disease status. Inappropriate diet may be the result of unavailability of food, inappropriate dietary intake, poor feeding practices and personal food preferences. Diseases, particularly infectious ones such as diarrhoea, intestinal worms, respiratory infections, can both be a cause or result of undernutrition. Dietary transition, inadequate physical activity and lifestyle choices may be contributing factors to overnutrition.

Underlying causes act at a household and community level. These are primarily household food insecurity i.e. poor availability or access to food, inadequate health care, and unhealthy household environments. Family size and composition, gender inequalities and household income also affect household food security. *Basic causes* act at a national and international level. These include social, economic and political structures as well as environmental factors. Political instability, availability of health and social services, population size and growth rate, urban migration, natural resources, agricultural output, natural disasters, climate change, humanitarian crisis, international trade agreements and global food prices all affect the nutritional status of the population as a whole.

From the perspective of access, availability and affordability, some of the main causes of malnutrition include:

- Limited access to food and its affordability
- Limited access to adequate health care facilities
- Inadequate social environment at home and local community, especially for women and children
- Geographical segregation and poor accessibility to markets due to lack of roads

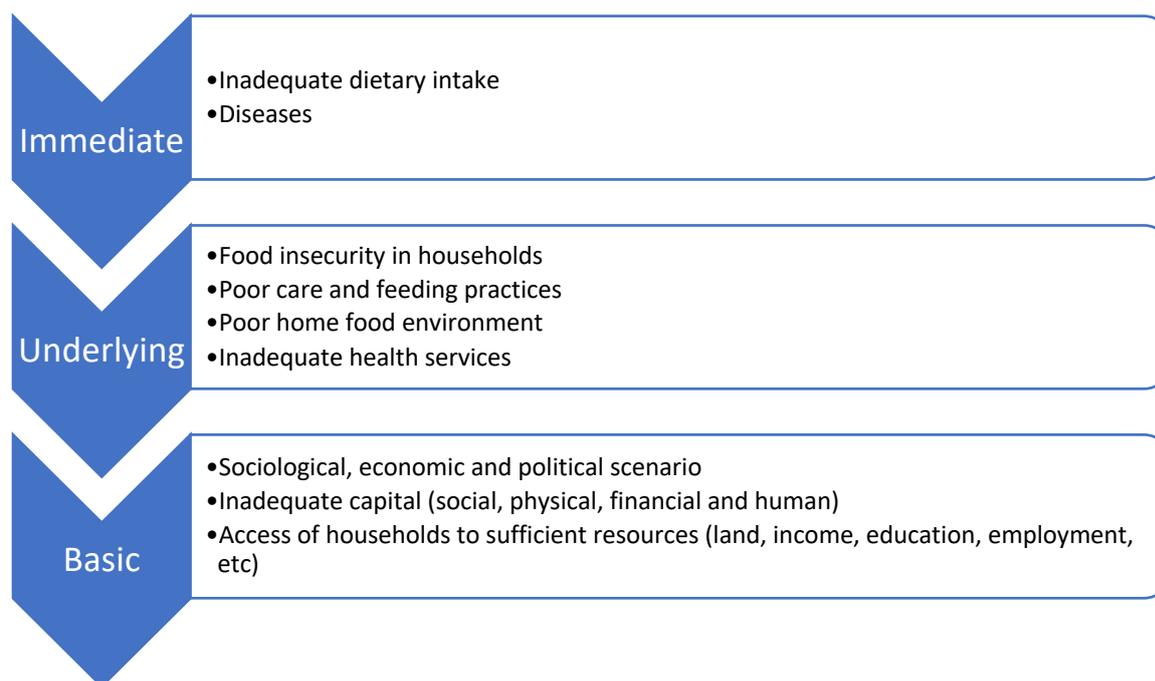


Figure 12. 1: Determinants of Undernutrition

Source: Adapted from UNICEF 1998

The indicators used to measure nutritional imbalance in undernutrition are defined as follows:

- *Underweight or low weight for age*

Weight for age is a term used to describe weight appropriate for a particular age. In case the weight of a child is less than -2 standard deviations from the WHO child growth standards median, the child can be categorized as underweight. However, underweight is a composite indicator as it can reflect wasting, indicating acute weight loss, as well as stunting (long term or chronic growth failure). As per the Comprehensive National Nutrition Survey (CNNS 2016-18), 33% of children under five are underweight. The survey also indicates 10% school going children are underweight.

- *Wasting or low weight for height*

Wasting is an acute form of malnutrition usually due to frequent and prolonged infections where the child loses weight resulting in low weight for height. Wasting may also result from sudden shock (food deficits) such as lack of food due to drought/famine and/ or severe and sudden illness. This type of malnutrition is reversible if proper measures are taken to feed the child frequently with nutrient dense foods. As per the Comprehensive National Nutrition Survey (2016-18), 17% of children under five are wasted. The survey also indicates 23% school going children

are thin (BMI for age is less than -2 SD). Body mass index (BMI) is an indicator of weight status and is used to identify thin, overweight/obese individuals.

- *Stunting or low height for age*

This is associated with long term (chronic) growth failure. In India, stunting is a major issue and is often linked to lack of timely nutritional interventions, caring practices, illness and chronic deficits in food intake. Stunted children not only have reduced physical growth, they also lag behind in academics, which may have negative consequences for their future. As per the Comprehensive National Nutrition Survey (2016-18), 35% of children under five are stunted. The survey also indicates 22% school going children are stunted.

All anthropometric indices are compared to the WHO Child Growth Standards (2006).

- *Micronutrient deficiencies*

Also known as hidden hunger, it is a consequence of inadequate intake of essential micronutrients like iron, vitamin A, vitamin B12, iodine and zinc in the diet.

Micronutrient deficiencies in children are usually not seen in isolation. Children tend to have multiple micronutrient deficiencies due to low intake of food and lack of diversity in diets.

Other assessment criteria include anthropometric measurements like MUAC (Mid-Upper Arm Circumference), presence of clinical signs and symptoms like oedema (swelling), skin changes (pallour, dryness, dermatitis, etc.), hair changes, night blindness, deformity of bones, etc.



The **Poshan** (Prime Minister's Overarching Scheme for Holistic Nutrition) **Abhiyaan** was launched by the Prime Minister on 8 March 2018. It is India's flagship program of the Ministry of Women and Child Development to improve nutritional outcomes for children, adolescents, pregnant and lactating mothers by leveraging technology, a targeted approach and convergence.

For implementation of POSHAN Abhiyaan the four-point strategy/pillars of the mission are:

- Inter-sectoral convergence for better service delivery
- Use of technology (ICT) for real time growth monitoring and tracking of women and children
- Intensified health and nutrition services for the first 1000 days
- Jan Andolan

Read more about at:

<http://poshanabhiyaan.gov.in/#/>

<https://icds-wcd.nic.in/nnm/home.htm>

<https://niti.gov.in/poshan-abhiyaan>

Overnutrition and associated consequences

Over nutrition is a state where the nutritional intake exceeds the nutritional needs and then manifests itself as overweight and obesity in case of excess intake of energy. Overweight is a condition which is characterized by excess body fat. Obesity is a consequence of long-term positive energy balance i.e. having more calories than actually required. Based on the WHO guidelines for Asia Pacific (2004), Body Mass Index (BMI) between 23 to 24.9 kg/m² is a determinant of overweight whereas obesity is marked with a BMI of 25 or more (Table 1).

Table 12. 1: BMI Classification

| Classification | BMI (kg/m ²) |
|----------------|--------------------------|
| Underweight | <18.5 |
| Normal | 18.5 to 22.9 |
| Overweight | >23 |
| At risk | 23 to 24.9 |
| Obese I | 25 to 29.9 |
| Obese II | >30 |

Source: Mishra, 2009

India ranks third, after US and China, in terms of obesity prevalence. As per the National Family Health Survey (NFHS-4) data, obesity amongst Indian adults has nearly doubled in the last decade. By 2030, 290 million Indians will be overweight while 52 million would be obese.

Globally, prevalence of childhood and adolescent obesity has increased tenfold in the last four decades. As per the Comprehensive National Nutrition Survey (2016-18), about 4% school going children (5-9 yrs. old) and 5% adolescents (10-19 yrs. old) are overweight or obese.

Let us examine the factors which can increase the risk of being overweight or obese:

Birth weight: Low birth weight is defined as weight (at birth) less than 2500g. Both low birth weight and high birth weight is linked to obesity in adult years. Infants born preterm or those small for gestational age are at risk of larger waist circumference and a higher BMI as adults. This is due to change in gene programming while the baby is still in the womb.

Genetics and familial causes: Genetics affects hormones involved in fat regulation and if both parents are obese the likelihood of obesity is more in children. Familial history can also be linked to the family's eating pattern and parents' own eating behaviours and child-feeding practices.

Socio economic status: Obesity was known to be common in prosperous countries and people from higher socio-economic status of developing countries, owing to the higher

accessibility and availability of food. Financial security may lead to indulgence in calorie dense fast foods and a lifestyle involving less of physical activity, use of labour-saving gadgets and increased screen time. However, recent evidence suggests that obesity prevalence cuts across socio-economic status and is gradually on the rise.

Dietary pattern: Over the past few decades, the food and the home environments have changed tremendously. Our modern eating environment has had an effect on the way the people eat. Fast food outlets and conveniently available food has led to availability of foods high in fats, sugar and energy. The portion sizes have increased, and people are making unhealthy food choices.

Sleep: Insufficient sleep is now linked to metabolic disorders. It has been observed that short sleepers may be obese and short sleeping adults/children may suffer from obesity related disorders (Horne, 2008).

Physical inactivity: Besides changes in the nutritional habits, daily physical activities and recreational activities have also changed dramatically over the past two generations. The ubiquity of modern technology and motorization in our life has greatly contributed to a decrease in physical activity and significantly reduced energy expenditure (Corzilius, 2007). Growing urbanization and use of personalized transportation have resulted in children going to school in automated means of transportation. Schoolwork and academic competitiveness have led to reduced physical activity and participation in sports is negligible.

Obesity is associated with diet-related non-communicable diseases (NCDs). Disease conditions like insulin resistance (impaired response of body to insulin), diabetes, dyslipidemias (abnormal amounts of lipids in blood), hypertension (high blood pressure), cardiovascular diseases and certain types of cancer are higher in obese individuals.

Economics of malnutrition

The adverse effect of malnutrition is poor health consequences for individuals - impairment of growth and development in children, poor cognitive development and as a result reduced chances of succeeding in life. Poor education usually results in poor job prospects and reduced earning capacity, thus perpetuating the vicious cycle of poverty and malnutrition. Let us discuss the economic impact of malnutrition in greater detail.

Impact on individuals: Impaired physical growth and cognitive development

Early-life undernutrition and its effects often persist life-long, leaving the individual susceptible to infectious diseases, impaired physical growth, impaired cognitive development, delayed maturation, lower muscle strength and reduced bone density. Many children are born undernourished because their mothers have poor nutritional status prior to and/or during pregnancy. The nutritional status of women and girls is poor due to limited availability and access to food, traditional and cultural practices - women eat the last and least, early marriage, repeated pregnancies and frequent infections along with poor access to health care and sanitation. This phenomenon is known as the 'Inter-generational' cycle of malnutrition.

Impaired physical growth reduces work capacity, labour productivity and increases absenteeism from work. This results in lower income levels, lower standards of living and an overall poorer quality of life. Poor educational performance leads to loss of employment opportunities. This in turn prevents reduction of poverty levels. Loss of productivity due to malnutrition is estimated to be more than 10% of an individual's lifetime earnings.

Impact at a household, community and country level

Morbidity due to malnutrition has an economic impact at the household and national level. Cost of medical care and hospitalization as well as the resultant loss of earnings can be catastrophic for families living below poverty line. There is also a huge fiscal cost for the government. In terms of medical and social care needed, increased morbidities put a strain on national health care and welfare systems.

A study found that stunting resulting in 1% loss in adult height is associated with a 1.4% loss in productivity. The loss in adult income from being stunted may be up to 22%. Malnourished and weak adults have lower manual productivity particularly in the agricultural and other manual or labor-intensive sectors. Another study observed that elimination of anemia can lead to 5-17 % increase in adult productivity.

According to another report by Save the Children (Crosby et al, 2013), economic cost of micro-nutrient malnutrition for India is between 0.8 per cent and 2.5 per cent of its GDP, which is equivalent to \$15–46 billion.

India faces the human and economic threat posed by NCDs. NCDs account for about 40% of all hospital stays and roughly 35% of all recorded outpatient visits. NCDs not only affect health, but also productivity and economic growth. The probability of dying during the most productive years (ages 30-70) from one of the four main NCDs is a staggering 26%. India stands to lose \$4.58 trillion before 2030 due to NCDs and mental health conditions. Cardiovascular diseases, accounting for \$2.17 trillion, and mental health conditions (\$1.03 trillion), will lead the way in economic loss (Bloom et al., 2014).

Initiatives for tackling malnutrition

Nutrition is a multisectoral problem. Solving the issue of malnutrition is a challenging but not insurmountable feat as the causative factors are interactive and complex.

In 2012, the World Health Assembly identified six global nutrition targets- reducing stunting and wasting in children under 5 years, halting the obesity epidemic, reducing anemia in reproductive age women, reducing low birth weight and increasing exclusive breastfeeding rates. In 2015, world leaders adopted the Sustainable Development Goals which included the goals to eradicate hunger and end all forms of malnutrition by 2030.

India has implemented several food security programs such as the Mid-Day Meal Program, Annapurna Scheme, Integrated Child Development Services scheme, Public Distribution System, National Food Security Act, National Horticultural Mission etc. However, despite a decline in rates of undernutrition, malnutrition continues to be a persistent problem in India. Hence a multisectoral solution is required. A holistic approach that allows for physical,

economic, social and ecological access to a macro and micronutrient replete diet is required. This approach should include a partnership between all stakeholders i.e. governments, UN agencies, NGOs, food industries, researchers, farmers and civil society. Malnutrition should be tackled at the farm, processing and consumption stages.

Social safety net schemes have an important role to play in promoting the 'Eat Healthy' philosophy. Table 2 outlines the beneficiaries and the provisions of three large scale food security programs.

Table 12. 2: Food Security Programs and Schemes in India

| (A) INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS): WHAT IS IT? | |
|--|--|
| <ul style="list-style-type: none"> • Flagship programme for early childhood care and development • Launched on 2nd October 1975 • Now governed by provisions of National Food Security Act (2013) • Target beneficiaries: Children between 6 months to 6 years, Pregnant women & Lactating mothers • Number of beneficiaries as of 31st March 2019: <ul style="list-style-type: none"> a) Operational Anganwadi centres: 13,72,872 (13.72 lakhs) b) Number of children between 6 months to 3 years: 39,58,4766 c) Number of children between 3 years to 6 years: 30,78,9356 d) Number of children between 6 months to 6 years: 70,37,4122 e) Number of Pregnant women and Lactating mothers: 17186549 f) Total beneficiaries: 87,56,0671 | |
| INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS): WHY IS IT IMPORTANT | |
| <ul style="list-style-type: none"> • ICDS scheme offers a package of six services including supplementary nutrition and nutrition and health education • The scheme is jointly administered by Ministry of Women and Child Development (three services) and the Ministry of Health & Family Welfare (three services) • Under the National Food Security Act (2013), the supplementary nutrition provisions are entitled for every pregnant woman and lactating mother till six months after child birth; and for every child in the age group of 6 months to 6 years (including those suffering from malnutrition) for three hundred days in a year • Supplementary nutrition categories: | |
| Beneficiary | Type of meal/supplementary nutrition |
| Children between 6 months to 3 years | Take Home Rations (THR) with 500 calories and 12-15g protein |
| Malnourished children between 6 months to 3 years | THR with 800 calories and 20-25g protein |
| Children between 3 years to 6 years | Morning snacks and hot cooked meals in conformity with ICDS norms |
| Malnourished children between 3 years to 6 years | Additional 300 calories of energy and 8-10g of protein in addition to the meal/food provided to the children of this age group |
| Pregnant women and Lactating mothers | THR with 600 calories and 18-20g protein |

INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS): TELL ME MORE

- The ICDS scheme addresses inter-generational cycle of malnutrition by improving nutritional and health status of pregnant women and lactating mothers. It also reduces the risk of malnutrition associated/linked morbidity and mortality amongst children between 6 months and 6 years of age.
- Nutrition education to promote the use of healthy balanced diets through dietary diversification is an important component of different Government programmes such as POSHAN Abhiyaan and Anganwadi Services.
- Ministry of Women and Child Development has advised all the States/UTs to ensure use of relevant fortified food articles (wherever supplied) in the administration of the Supplementary Nutrition Programme.
- Use of iodized salt is mandatory for cooking the food under supplementary nutrition programme

(B) MID-DAY Meal (MDM) Scheme: WHAT IS IT?

- Largest school feeding programme launched with a view to enhance enrolment, retention, attendance and simultaneously improve nutrition levels amongst school going children
- Launched as centrally sponsored scheme (National Programme of Nutritional Support to Primary Education) on 15th August 1995
- Now governed by provisions of National Food Security Act (2013)
- Target beneficiaries: 9.12 crore primary and upper primary school children in the age group of 6-14 years

MID-DAY Meal (MDM) Scheme: WHY IS IT IMPORTANT?

- The scheme is administered by Ministry of Human Resource Development
- Food norms under the scheme are as follows:

| Primary students (class I to V) | Upper primary students (class VI to VIII) |
|--|--|
| 100g food grains | 150g food grains |
| 20g Pulses | 30g Pulses |
| 50g Vegetables | 75g Vegetables |
| 5g Oil and Fat | 7.5g Oil & Fat |
| Salt & Condiments (As needed) | |

- The MDM guidelines are designed in such a manner that children get sufficient amount of carbohydrates, proteins and micronutrients such as iron and folic acid.
- The primary school children are provided with 450 calories and 12g protein while children in upper primary classes get 700 calories with 20g protein
- MDM scheme addresses the issue of hunger and protein-energy malnutrition amongst the age group of 6-14 years thereby positively impacting learning outcomes in school
- Vegetables (sourced locally by schools) can be a good source of vitamins, minerals, phytochemicals and fiber in the meal. Vegetables with high Vitamin C content can also alleviate iron deficiency by boosting the absorption of iron from the meal.
- After infancy, children in school going age experience the second growth spurt up to late adolescence i.e. 19 years. This is a crucial phase for nutrition intervention to correct height deficits.

- The school health programme administered by National Health Mission (Ministry of Health and Family Welfare) complements the MDM scheme through services such as Immunization, Micronutrient supplementation, De-worming, Health promotion, Capacity building of school teachers.

MID-DAY Meal (MDM) Scheme: TELL ME MORE

- Rice constitutes ~85% of the food grains consumed through MDM. Fortification of food items in a systematic manner through Food Corporation of India (FCI) (starting with rice) has been approved for MDM. Kitchen gardens are also being promoted in each school.
- As per guidelines on food safety and hygiene for school kitchens in MDM scheme issued by Ministry of Human Resource Development dated 13th Feb 2015, the States/UTs must consider engaging CSIR institutes/NABL accredited laboratories and FSSAI notified laboratories for testing of MDM food samples for microbiological and chemical parameters
- The testing charges for protein and calories have been fixed as INR 1200 (excluding taxes) for MDM meals vide order number 15022/01/2019-QA dated 8th April 2019

(C) PUBLIC DISTRIBUTION SYSTEM (PDS): WHAT IS IT?

- Launched as 'Targeted' public distribution system (TPDS) scheme in June 1997
- Operated under the joint responsibility of Central government and State/Union Territory governments
- Now governed by provisions of National Food Security Act (July 2013)
- Target beneficiaries: 75% rural and 50% urban population; coverage of almost two-thirds (80.5 Crore persons) of the total population at an all India level under two categories: Antodaya Anna Yojana (AAY) and Priority Households (PHH)

PUBLIC DISTRIBUTION SYSTEM (PDS): WHY IS IT IMPORTANT?

- TPDS is administered by Department of Food & Public Distribution (Ministry of consumer affairs, food and public distribution) with a vision to ensure food security for the citizens
- Subsidized food grains are provided to identified eligible households as per the following entitlement norms:

| Category of beneficiary | Number of Households | Foodgrains entitlement (per month) | Issue price (per kg) | | |
|-------------------------|-----------------------|------------------------------------|----------------------|-------|---------------|
| | | | Rice | Wheat | Coarse grains |
| AAY | 2.5 crores | 35kg per family | Rs 3 | Rs 2 | Rs 1 |
| Priority households | 16.1 crores (approx.) | 5kg per person | Rs 3 | Rs 2 | Rs 1 |

- In 2018, India ranked 103 (of the 119 countries) on the Global Hunger Index. The index includes measurement of 'inadequate' food supply which is an important indicator of hunger.

PUBLIC DISTRIBUTION SYSTEM (PDS): TELL ME MORE

- Rice forms >50% of the food grains distributed through PDS. Government of India has approved the centrally sponsored pilot scheme on 'Fortification of Rice and distribution under Public Distribution System' on 14th February 2019. The rice would be fortified with Iron, Folic acid and Vit B12. The pilot scheme has been approved for an initial period of three years beginning 2019-20 with a focus on 15 districts to begin with.

Policy level reforms

Poverty reduction: Increased purchasing power will allow people to consume a more diversified diet that incorporates foods rich in fruits, vegetables and protein. Effective implementation of employment programs such as the National Rural Employment Guarantee Act (NREGA) and increased investment in skill development programs will help reduce rates of unemployment and consequently lead to a reduction in household food insecurity.

Let us discuss how the existing programs can be implemented more effectively, the food environment improved as well as other efforts needed to tackle the problem of malnutrition in India.

Restructuring of existing programs: More effective implementation and monitoring of existing programs, particularly the Public Distribution System, is required, Decentralization of programs, increasing the diversity of foods provided by subsidy programs, increased funding, scaling up of successful pilot programs, and enabling vulnerable individuals to access their benefits is required. Existing health and nutrition programmes need to be reoriented to also target the challenges of rise in NCDs. Prevention and early detection of NCDs will help in more effective management. The infection-malnutrition cycle can be prevented by improving health infrastructure and sanitation services.

Agricultural reforms: India was able to attain self-sufficiency in food production by land reforms, irrigation programs, subsidies and incorporation of new technologies. While ensuring food production continues to keep pace, new issues like climate change, low crop diversity, indiscriminate use of chemical fertilisers and pesticides, improper use of available water, unavailability of water, loss of soil quality, fluctuating crop prices, and financial struggles of farmers, need to be addressed. Improving processing and storage methods to reduce wastage at the farm gate and investment in new farming technologies are other areas that need attention.

Education: Consumer behaviour patterns need to be modified. Educating the consumer about an adequate diversified diet, cooking and processing techniques to improve nutrient retention, infant child feeding practices, lifestyle, and sanitation is required. This can be provided by family counselling, local community campaigns, mass media campaigns and school-based interventions. Panchayats, NGOs and Self-Help Groups do play an important role in dissemination of information. In addition, people should also be educated regarding health and nutrition programs that they are eligible for to ensure proper utilization of the available schemes.

Supplementation programs: Supplementation programs such as the Mid-Day Meal (MDM) program and Integrated Child Development Services (ICDS) in vulnerable populations such as children, pregnant women, lactating women, and the elderly may help reduce nutrient gaps. Provision of fortified foods or food supplements such as fortified complementary foods, multiple micronutrient powders, iron fortified cereals, and lipid based nutrient supplements can be useful in combating micronutrient deficiencies such as iron deficiency anaemia. In recent years, the Food Safety and Standards Authority of India (FSSAI) has nudged various stakeholders to increase the development and use of fortified staples such as oil, salt, milk, wheat flour and rice. Fortified foods have now been incorporated into the Public Distribution System, MDM, and ICDS schemes by various state governments.

Intersectoral coordination: The nutritional policies and programs currently available often fall under the aegis of multiple government agencies such as Health and Family Welfare, Women and Child Welfare, Human Resource Development etc. Policies are formulated centrally but implementation is at the state level. Collaborations with environment, forests, agriculture, and public works sectors will help to appropriately tailor programs to the specific region. Such efforts have already been initiated. FSSAI has introduced initiatives such as the Eat Right movement which involves collaborations between Civil Society Organizations, Industry and Professional Associations, NGOs, national and international agencies, academia and corporates. Food safety and nutrition resources are being integrated into existing central and state programs.

India currently faces the triple burden of malnutrition. Access to an adequate, safe, and nutritious diet is a basic human right. Food security is vital to ensure optimal growth and development, maintenance of health, improved productivity and sustainable development of the nation. Malnutrition is a multifaceted problem which can only be combated by an integrated multi sectoral approach.

India contributes to 18% of the world population and is projected to surpass China as the world's most populous country by 2027. Several strides have been made but there are miles to traverse and further actions are required to ensure that India and the global community meets the commitment to Sustainable Development Goals.

Summary

- Food is a common point between agriculture, nutrition and health. It serves as the output of agricultural activities and subsequently plays a major role as a carrier of nutrients thereby resulting in either positive or negative health outcomes depending on how it is consumed.
- A diet consisting of foods from various food groups (cereals, millets and pulses, fruits and vegetables, milk, egg and flesh foods, fats and sugars) typically provides most of the daily requirement of nutrients (carbohydrates, fats, protein, minerals and vitamins).
- The right food choices practiced consistently over a period of time lead to achievement of health goals specific to different stages of life.
- Poor or unhealthy diets often lead to negative health outcomes - undernutrition, overnutrition and micronutrient deficiencies.
- There has been an epidemiological shift in causes of mortality and morbidity -from communicable (infectious) diseases to non-communicable diseases. Diet-related non-communicable diseases include type 2 diabetes, hypertension, heart disease, stroke and certain cancers.
- The shift has been related to agricultural transformation, urbanization, changes in the food environment, physical activity levels and health care infrastructure.
- There are several causes of malnutrition.

- Indicators of undernutrition include underweight, stunting and wasting/thinness. BMI is a useful indicator of weight status.
- Malnutrition impairs physical growth and cognitive development in individuals.
- Morbidity due to malnutrition has an economic impact at the household and national level. Cost of medical care and hospitalization as well as the resultant loss of earnings can be catastrophic for families living below poverty line. There is also a huge fiscal cost for the government.
- In terms of medical and social care needed, increased morbidities put a strain on national health care and welfare systems.
- India has implemented several food security programs such as the Mid-Day Meal Program, Annapurna Scheme, Integrated Child Development Services scheme, Public Distribution System, National Food Security Act, National Horticultural Mission etc.
- Several measures are needed to transform the food ecosystem and existing programs to intensify the fight against malnutrition. These involve restructuring of existing programs, agricultural reforms, behaviour change communication, focussing on micronutrient malnutrition in the food supplementation programs and intersectoral coordination.

Key Words

Anthropometry – study of measurements of the human body

BMI – Body Mass Index, an indicator of weight status of the body

Dyslipidemias - elevated total or low-density lipoprotein (LDL) cholesterol levels, or low levels of high-density lipoprotein (HDL) cholesterol

GDP – Gross Domestic Product which measures the value of economic activity within a country

Hypertension - condition in which the blood pressure in the arteries is persistently elevated.

Insulin resistance -impaired response of body to insulin

Low birth weight – birth weight less than 2500g

Morbidity – the rate of disease in a population

Mortality - death

NCD - non-communicable diseases like cardiovascular diseases, diabetes, cancer, etc.

Stunting – low height for age

Wasting – low weight for height

Exercises

1. Describe the relationship between the food you eat and the status of your health.
2. Give reasons why we see a shift in causes of mortality and morbidity from communicable to non-communicable diseases.
3. Discuss the basic, underlying and immediate causes of undernutrition.
4. What are the best anthropometric indicators to study the prevalence of undernutrition among children in a community?
5. Discuss the economic cost of malnutrition on the individual and the nation.
6. Who are the beneficiaries and what are the provisions of the following food security schemes of the government?
 - a. ICDS
 - b. MDM
 - c. TPDS
7. Discuss measures to intensify the efforts to reduce the prevalence of malnutrition in India.

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