Abstract

India, in the past few decades has witnessed phenomenal progress in terms of agricultural production and industrialization, contributing to economic growth and improvement in health parameters, in general. However, malnutrition continues to be a major public health problem. Though there has been marked reduction in the severe forms of undernutrition, mild to moderate protein energy malnutrition as well as micronutrient deficiency diseases such as iron deficiency anaemia, vitamin A deficiency disorders, vitamin D deficiency etc., continue to be significantly high across different age, sex, physiological groups. Concurrently, the prevalence of overweight and obesity is increasing rapidly, due to changing life style practices and dietary habits, exposing the community to higher risk of chronic degenerative disorders in the later part of their life. The prevailing macro and micronutrient undernutrition among the rural population, prevalence of overweight/obesity, hypertension and Type-2 diabetes among adult men and women assessed during the survey carried out by National Nutrition Monitoring Bureau, National Institute of Nutrition, I.C.M.R., in ten States across the country along with secondary data from other sources such as NFHS-3, SRS-RGI etc., are presented and possible strategies to counter them are discussed.

Key Words
Malnutrition, Undernutrition, Underweight, Stunting, Wasting, Body Mass Index, Waist Circumference, Waist Hip Ratio, Overweight, Obesity, Hypertension, Diabetes Mellitus, Recommended Dietary Allowances, Dietary Guidelines

Malnutrition continues to be a major public health problem in the developing world, including India, the most vulnerable groups being women and young children, contributing significantly to very high rates of morbidities and mortalities. During the past few decades, though the severe clinical forms of undernutrition such as kwashiorkor, marasmus, keratomalacia have become rare, the prevalence of sub-clinical forms of undernutrition continues to be very high. However, this marginal change does not commensurate with the rate at which the country has witnessed development with respect to agricultural production and industrial growth. On the other hand, the country is entering into an era of dual burden of malnutrition, i.e. undernutrition as well as overnutrition. Though poverty is the major underlying cause of undernutrition, factors such as maternal undernutrition, faulty infant and young child feeding practices, lack of personal hygiene and environmental sanitation, coupled with recurrent infections and infestations, and a host of socio-economic and
demographic factors largely contribute to very high prevalence of undernutrition in the communities. Concurrently, changing lifestyles, dietary habits, mechanization etc., are significantly contributing to overweight/obesity, leading to increased incidence of chronic degenerative disorders such as type-2 diabetes, hypertension, coronary artery diseases, strokes and certain types of cancers.

The Major nutritional problems of public health significance in the country are, protein energy malnutrition (PEM), vitamin A deficiency (VAD), iron deficiency anaemia (IDA) and iodine deficiency disorders (IDD). Preschool children, adolescent girls, women of reproductive age group, elderly, those belonging to socio-economically backward groups such as scheduled caste and schedule tribe communities, communities living in chronically drought affected rural areas are nutritionally the most venerable segments of the populations.

The Government of India, in its National Nutrition Policy (NNP, 1993)\(^1\), has set nutrition goals for the control and prevention of malnutrition in the country and has recommended several action programmes in its National Plan of action on nutrition (NPAN, 1995)\(^2\).

**CURRENT NUTRITIONAL STATUS**

**Mortality Rates**

Mortality rates such as IMR, <5YMR, MMR are known to reflect overall wellbeing of the communities. The IMR in India as per WHO SEARO (2000) was 69 per thousand live births (47, SRS 2010)\(^3\), which is much higher than in neighbouring countries such as Srilanka (17), Bangladesh (54), Maldives (59). According to World Development Report (2007), the <5YMR in India was 85 per thousand live births (74, NFHS 3: 2006), which is only next to Pakistan, and much higher than that in Srilanka (14). As per WHO SEARO 2000 report, India topped the south East Asian countries with Maternal Mortality Ratio of 540 per 100,000 live births (212, SRS: 2007-09), while in Srilanka, it was 60. With in the country, a wide variation exists between States, with the mortality rates being very low in State like Kerala and very high in the States of Uttar Pradesh, Bihar, Madhya Pradesh etc.

**Infant and Young Child feeding practices (IYCF)**

According to NFHS-3\(^4\), the IYCF practices in India, especially in the rural areas remains sub-optimal with low proportion (25%) of women initiating breast feeding with an hour of delivery, giving exclusive breast feeding up to 6 months (46%) and initiation of complementary foods during 6-9 months (56%).

**Food and Nutrient intakes**

The National Nutrition Monitoring Bureau operating in 10 States namely, Andhra Pradesh, Gujarat, Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh and West Bengal, collects data on food & nutrient intakes of individuals and their nutritional status in terms of,
anthropometry, clinical examination and biochemical investigations. The recent survey carried out during 2011-12 (NNMB Tech. Rep. # 26) revealed the following:

- The average daily consumption of staple foods such as cereals among adults was satisfactory, compared to recommended levels in Dietary Guidelines for Indians. However, the intakes tended to decline with decrease in age, with the extent of inadequacy being highest among 1-6 year children. The intake of coarse grains such as millets in general tended to decrease over the period except in the state of Gujarat, where the consumption of bajra increased over the period.

- The average consumption of protective foods like pulses, green leafy vegetables and milk & milk products were grossly inadequate in all the age groups. The extent of inadequacy was relatively more among young children as compared to adults.

- The proportion of individuals with inadequate intakes of dietary energy (<70% of RDA) Extent of deficit in the energy intakes (% of RDA) ranged from about 30%-40% in adults, through 40-50% in young children, to a high of about 60%-70% in young adolescents. However, the proportion of individuals with protein inadequacy was relatively less, ranging from a low 10% among young children through 15-20% among adolescents to about 25-30% among adults. The proportion with Protein Calorie inadequacy was relatively higher among pregnant (about 40%) and lactating (30%) women.

- Dietary inadequacy of micronutrients particularly with respect to vitamin A, riboflavin and iron, was very high. About 35-80% of <6 year children were consuming micronutrients such as vitamin A (80%), iron & riboflavin (50%) and total folate, in amounts less than 50% of RDI.

**Nutritional Status of Population**

**Undernutrition**

- According to NFHS-3, the prevalence of Low Birth Weight in general, was about 22%. The overall prevalence of underweight (SD classification using WHO child Growth standards) among <5 year children was about 42%, stunting was 43% (suggestive of long duration undernutrition), while that of wasting 22% (suggestive of short duration undernutrition).

  The prevalence of undernutrition was significantly associated with socio-demographic and socio-economic characteristics, the prevalence being higher among those belonging to underprivileged groups.

- The prevalence of undernutrition (age/sex specific BMI < -2 SD of WHO ref. values) among boys was about 37% among 5-9 year old, 47% among 10-13 year old and 41% among 14-17 year adolescents. The prevalence was relatively lower
among girls with 31% in 5-9 year age group, 35% in 10-13 year age group and 23% among 14-17 year adolescents.

- About 35% of the adult men & women were having chronic energy deficiency (CED) as measured by body mass index (BMI< 18.5).

**Prevalence of nutritional deficiency signs**

- The overall prevalence of severe forms of PEM such as Kwashiorkor among preschool children was conspicuously absent, while that of marasmus was less than 0.1%. About 0.5% had conjunctival xerosis, while 0.3% had Bitot spots, indicative of vitamin A deficiency. About 0.6% of 5-12 year children had palpable goiter.

**Prevalence of Anaemia and Sub-clinical Vitamin A deficiency in eight select States**

- Estimation of haemoglobin levels by cyanmethaemoglobin method revealed that, the overall prevalence of anemia ranged from 70-80% in different physiological groups. However, the prevalence of moderate to severe anaemia was observed to be maximum in pregnant women (50%), followed by pre school children (44%), lactating Women (34%), and adolescents (23%) (NNMB Tech. Rep.# 22).

  The prevalence of anaemia among 1-5 year children was significantly (p<0.05) higher among those belonging to Hindus, ST communities, Households engaged in agricultural labour, illiterate female head of household and those with out a sanitary latrine

- Estimation of blood vitamin A levels by Dry Blood Spot technique using HPLC revealed that, about 68% of 1-5 year children had blood vitamin A levels of <20µg/dL, indicating sub-clinical vitamin A deficiency. The prevalence ranged from least of about 52% in Karnataka to a high of about 88% in the State of Madhya Pradesh (NNMB Tech. Rep.# 23).

  The ‘odds’ of having higher prevalence was significantly (p<0.05) higher among Muslims, ST/OBC communities, those with family size of ≥8 and among those who did not receive massive vitamin A dose during the preceding year.

**Prevalence of Vitamin D Deficiency**

Studies carried out in various parts of India have revealed that the problem of vitamin deficiency is wide spread especially among children and women. The extent of Vitamin A deficiency (blood vitamin D levels <50 nmol/L) ranged from about 50% to 80% in different age/sex physiological groups. The prevalence was relatively higher among urban compared to rural communities and those belonging to high income group compared to their poorer counterparts.
Prevalence of Overweight/Obesity, Hypertension & T2 Diabetes among adults

Overweight/Obesity

- About 23% women and 20% men were having overweight/obesity (BMI ≥ 23.0). About 14% of men (AC: >90 cm) and 23% women (AC: >80 cm) had Waist circumference higher than the WHO cut-off levels. About 51% of men and 64% of women had Waist Hip Ratio higher than the WHO cut off levels (Men: ≥ 0.90; Women: ≥ 0.80), indicative of abdominal obesity.

  The prevalence of overweight/obesity was significantly higher among those belonging to Christian community, castes other than SC/ST/OBC, living in pucca houses, engaged in business/service, literates, having per capita monthly income of ≥ 900 Rs., and large farmers.

Hypertension

- About 22% of men and women had hypertension (Systolic BP: ≥ 140 mm/Hg and/or Diastolic BP: ≥ 90 mm/Hg) as per JNC – VII Criteria.

  Prevalence of HTN was significantly higher among those belonging to communities other than SC/ST/OBC, Christians, engaged in Business/service, higher income groups, those living in pucca houses, literate adults, consuming tobacco, & alcohol.

T2 Diabetes

- Estimation of fasting blood glucose by ACCUCHEK revealed that the prevalence of diabetes mellitus (FBG: 110 – 126 mg/dL) was about 6.8% in men and 4.8% in women, while that of impaired Glucose tolerance (FBG: ≥ 126 mg/dL) was about 8.4% in men and 9.0% in women (as per recommendations of American Diabetic Association, 2004).

  Prevalence of Diabetes was significantly higher among those belonging to communities other than SC/ST/OBC, Christians, engaged in Business/service, higher income groups those living in pucca houses.

Time trends in the food and nutrient intakes and prevalence of undernutrition.

Nutritional Status

  Data collected at different points of time between 1975-79 and 2011-12 revealed that:

  - The average consumption (CU/day) of cereals & millets at the household level has decreased significantly from about 505 g to 368g, that of milk from 116 ml to 95 ml and that of sugar & jiggery from 23 g to 14g, while that of pulses & legumes, vegetables, edible oils etc., remained same.
Similarly, the average intake of (CU/day) dietary energy decreased from 2350 Kcal to 1852 Kcal, that of proteins from 62 g to 49 g and iron from 17 mg to 13 mg, while that of other micronutrients remained essentially similar.

The prevalence of severe forms of PEM such as kwashiorkor & marasmus became negligible.

Among 1-5 year children, there was decline in the extent of underweight (76% to 41%) and stunting (82% to 46%) and wasting (27% to 19%), over the period.

The prevalence of chronic Energy Deficiency (CED) (Body Mass Index <18.5) declined from about 59% in males and 52 in females to about 35%, while there was steep increase in the prevalence of overweight & obesity (from about 2-3% in men & women to about 20-23%).

**Micronutrient Fortification of Foods**

Several foods such as milk & milk products, edible oils, wheat flour, edible salt, food supplements under ICDS programme (eg. In Andhra Pradesh, by A.P. Foods) are being fortified with micronutrients.

The National Institute of Nutrition has successfully developed the technology of double fortification of salt with Iron & Iodine to tackle the twin problem of IDA & IDD. Studies carried out in tribal communities of A.P and Residential schools have revealed significant improvement in the iron & iodine status over a period of use of DFS salt as cooking salt\(^\text{16}\).

Recent study conducted among residential school children revealed significant improvement in the iron status of the subjects when fed with iron fortified rice (Ultra Rice)\(^\text{17}\), a technology developed by PATH, USA.

**Programmes under implementation for the improvement of health & nutritional status of Women and Children.**

The Government of India has formulated National Plan of Action on Nutrition (NPAN-1995) under National Nutrition Policy (NNP-1993) and has been implementing several programmes all over India, which are as follows:

Several nutrition programmes have been conceived and are being implemented in India during the past few decades for the prevention and control of both macro and micronutrient malnutrition in the population. They include supplementary feeding through ICDS, distribution of iron and folic acid tablets, massive dose vitamin A supplementation, Mid-day meal programme etc. Also, several poverty alleviation and developmental programmes are being implemented by National and State governments, for the overall socioeconomic development of the communities.
Supplementary feeding of 6 months to 6 years children, pregnant & lactating women, through Integrated Child Development Services (ICDS) scheme in the rural, tribal areas and urban slums.

Distribution of iron and folic acid tablets to pregnant women, lactating mothers and 1-5 children, for 100 continuous days.

Periodical supplementation of massive dose of vitamin A to children from 9 months to 5 years of age.

Mid day Meal Programme, wherein one hot cooked meal is provided to all the children in the primary schools.

Fortification of foods such as milk, vanaspathi, wheat flour, salt etc. with micronutrients.

Micronutrient fortification of supplementary foods under ICDS programme, in some of the States.

Provision of essential commodities at affordable price through Public Distribution System (PDS) and Targeted Public Distribution System (TPDS) for below poverty line households throughout the year, all over the country, to ensure household food security.

Other indirect programmes under implementation to control malnutrition include, Universal Iodization of sal, Universal Immunization of <1 year children, Provision of safe drinking water and environmental sanitation, Diarrhoea control programme, Acute respiratory infection control programme, Periodical deworming, Mobile medical services for inaccessible rural and tribal areas.

Programmes such as Reproductive & child Health programme (RCH), National Rural Health Mission (NRHM), Janani Surakhsa Yojana, Integrated Management of Neonatal and Childhood Illnesses (IMNCI), Sabala etc., are being implemented to improve the health and well being of children and women of reproductive age group.

In addition, several income generation and poverty alleviation programmes such as Food for work programme in drought affected areas, Jowahar Rojgar Yojana NREGA etc are being implemented.

**Way Forward**

There is an urgent need to improve and strengthen implementation of existing short term measures such as supplementary nutrition programmes, immunization and health cares services, medium term measures such as food fortification in terms of quality and coverage.

Implementation of Long term measures mentioned below will go a long way in overall improvement and sustenance of health and nutritional status of the communities:
Development & implementation of State specific Nutrition Policies and Programmes.

Initiation of Nutrition Surveillance system for continuous monitoring of the situation, analysis of underlying causes, development of appropriate strategies and timely initiation interventions.

Strengthening of existing nutrition intervention programmes, in terms of supplies, coverage of target beneficiaries and supervision.

Strengthening of IEC activities, especially regarding infant & child feeding practices, nutrition during adolescence, pregnancy and Lactation,

Bio-fortification of foods,

Dietary diversification, promotion of home gardening, through Krishi Vigyan Kendra (KVK),

Improvement in literacy status,

Environmental sanitation and personal Hygiene including safe drinking water,

Programmes for Economic development, especially at grass root level, through income generating activities, and

Population control.

REFERENCES:


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