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### TRENDS IN PROTEIN ENERGY MALNUTRITION SINCE 1990'S AND THE EPIDEMIOLOGICAL APPROACHES FOR TACKLING THEM IN INDIA

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#### ABSTRACT

Protein Energy Malnutrition (PEM) is a public health concern that exists among children in developing countries, and in certain communities of some developed countries mainly resulting from poor nutritional intake, bad hygiene practices and frequent infections. The risk factor for Protein energy malnutrition are multifaceted including low birth weight, inadequate breast milk, delayed complementary feeding, primarily energy deficiency, Infection and infestation and ignorance and poor socio economic status. It is an important indicator of the health and development of nations, therefore it is extremely important to contain it with adequate preventive and curative measures. These measures could vary from clinical management of individual cases to implementation of public health measures such as food fortification, dietary diversification, mass anti-parasite prophylaxis, food supplementation, and health education. The measures should be adapted to the situation in individual countries. This paper briefly explains the challenges in addressing PEM, role of pharmaceutical products and epidemiological approaches in dealing PEM.

#### KEYWORDS

Protein Energy Malnutrition, Stunting, Wasting and Underweight.

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#### INTRODUCTION

Chronic energy deficiency is a condition of the body characterized by low body weight and low energy stores and possibly limited physical capacity due to deprivation of food over a long period of time. As per the definition by Ministry of health and family welfare, GOI, 2011 in the operational guidelines Underweight is a broader term or a complex measure of stunting and wasting both. It is considered as an indicator to judge the changes in the immensity of malnutrition over time. Underweight could be either

due to chronic or acute malnutrition. Since it is easy to measure it is used as a basic indicator to assess population's health status. As far as stunting is considered, it is a long term indicator or past growth failure which may be due to inadequate nutrition over a long period. It is the inability of the children to attain adequate height. On the contrary to stunting, wasting is failure to gain weight, it may occur due to recent inadequate nutrition or may be due acute diarrhoea or any other illness.

Wasting and stunting are very different forms of under nutrition. Stunting is chronic and its causative factors are poorly understood. Stunting usually does not pose an immediate threat to life and is relatively common in many populations in less-developed countries. This is not to say that it is unimportant, just less important than wasting in humanitarian emergencies. Wasting results from an acute shortage of food, is reversible with re-feeding, and has a relatively high mortality rate. For these reasons, wasting is the highest priority form of malnutrition in humanitarian emergencies<sup>8</sup>.

In a cross sectional study (1980-1992) of 79 developing countries based on WHO Global Database on Child Growth, which covered 87% of the total population of under-5-year olds in developing countries, it was found that more than a third of the world's children were affected. For all the indicators (wasting, stunting, and underweight) the most favorable situation - low or moderate prevalence's - occurs in Latin America; in Asia most countries have high or very high prevalence's; and in Africa a combination; of both these circumstances is found. A total 80% of the children affected live in Asia - mainly in southern Asia - 15% in Africa, and 5% in Latin America. Approximately, 43% of children (230 million) in developing countries are stunted<sup>5</sup>. Nearly half the children in India suffer from malnutrition. Malnutrition in India is worse than even certain Sub-Saharan countries<sup>6</sup>. As per the consecutive surveys of NFHS, Madhya Pradesh has the highest percentage of an underweight children (Table No.1).

As mention in Table No.2, Almost half of children under age five years (48 percent) are chronically malnourished. They don't attain the adequate height

or are too short for their age or stunted. Stunting is a precisely long-term indicator of the nutritional status of a population because it does not vary while collecting data in different season or other temporary factors encompassing epidemic illnesses, acute food shortages, or shifts in economic conditions. Acute malnutrition (20%) recorded as wasting, which results in child being tenuous for his or her height. One out of every five children in India under age five years is wasted. 43 % of children under age five years are underweight for their age.

Despite efforts are being made to improve the nutritional status of young children, especially through the implementation of Integrated Child Development Services (ICDS) programme, there has not been much improvement in the nutritional status of children under three years of age in recent years. Though there is some decrease in the stunting and underweight children but wasting seems to increase. As indicated in Table No.3, the percentage of children who are too short for their age (stunted) decreased by less than one percentage point per year over the seven years between the two surveys, from 51 percent in NFHS-2 to 45 percent in NFHS-3. The percentage of children who are underweight also decreased, but only by three percentage points. Over this period, the percentage of underweight children decreased by 4 percentage points in urban areas, but by less than 2 percentage points in rural areas. Wasting (low weight-for-height) among young children has actually become somewhat worse over time, increasing from 20 percent in NFHS-2 to 23 percent in NFHS-3.

According to all three measures of nutritional status, the lack of proper nutrition in India is a particularly serious problem in rural areas. In rural areas, half of young children are stunted, almost half are underweight, and one out of every five is wasted. Although nutritional deficiencies are lower in urban areas than in rural area seven in urban areas under nutrition is very widespread. In urban areas, 40 percent of young children are stunted, one-third is underweight, and 17 percent are wasted. Among the three measures of nutritional status, the differential in prevalence between urban and rural areas is most prominent for the prevalence of underweight

children. Children in rural areas are almost 40 percent more likely to be underweight than children in urban areas. The prevalence of stunting is 28 percent higher in rural areas than in urban areas.

According to NFHS-1 (1991-92) and NFHS-2 (1998-99) child malnutrition sets in very early in life as nearly 12% of 0-6 months old children are underweight. It increases rapidly and by 24 months, more than half the children are underweight. It is obvious therefore that for preventing malnutrition, the crucial period is birth to two years. By comparing the all the three surveys it can be said that nutritional parameters seem to have improved somewhat, even though the levels of malnutrition remain exceptionally high.

Under nutrition is not simply a result of food insecurity, but due to inappropriate infant feeding and care practices, lack of safe drinking water and sanitation resulting in frequent infections and poor access to health care-both preventive and curative-worse in rural areas compared to urban areas. Immunization coverage which is an easily identifiable health care input has only marginally improved from 36% in NFHS-1 (1992-93) to 44% in NFS-3 (2005-06). Infant feeding practices e.g., offering semisolids to the child between 6-9 months has shown some improvement in most states and particularly in Gujarat, Jammu and Kashmir, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh. It is obvious, that it is the household feeding that has the key to improving nutrition in the first two years<sup>6</sup>.

Considering the above trends, stunting seems to be a major problem. Failure to achieve expected height/length as compared to healthy well-nourished children of the same age is a sign of stunting. Stunting is an indicator of linear growth retardation that results from failure to receive adequate nutrition over a long period or recurrent infection. It may be exacerbated by recurrent and chronic illness. It is an indicator of past growth failure. It is associated with long term factors including chronic energy deficiency, frequent infection, sustained inappropriate feeding practice and poverty. Stunting often results in delayed psycho-social and cognitive development and poor school performance

The total prevalence of stunting or Severe Chronic Malnutrition can be classified as severe and moderate if children have Z-scores below 3 standard deviations (-3SD) and children with Z-scores between 3 standard deviations (-3SD) and below 2 standard deviations (-2SD) from the median of the NCHS reference population respectively In a study of Determinants of Chronic malnutrition among preschool children in Bangladesh. The overall prevalence of stunting was 44 %, 18% of children were severely stunted. They also found the association between parents' education, household economic status, media exposure, number of under-5 children, place of delivery, child's age, birth order, months of breast-feeding, birth size, mother's BMI, mother's height, age of household head, measles vaccine, supplementation of diet with liquids and regional differentials were significantly associated with severe as well as moderate stunting<sup>11</sup>.

Under nutrition is one of the most concerning health and development issues in India as in other parts of the world. Under nutrition encompasses stunting (Chronic malnutrition), wasting (Acute malnutrition) The high mortality and disease burden resulting from under nutrition call for urgent implementation of interventions to reduce their occurrence and consequences and this would include determined action on the social determinants of undernutrition<sup>8</sup>.

### **Challenges**

In the 1970s, poverty and poor access to health and nutrition services were the major causes of under nutrition. In the 1990s, poor infant and young child feeding and caring practices rather than poverty is emerging as the major factor responsible for under nutrition in childhood<sup>9</sup>.

Following are the programmes were formulated to tackle the problem of inadequate dietary intake and poverty but couldn't achieve the expected outcomes: Public Distribution system: The exclusion and inclusion errors in BPL (Below Poverty Line) system due to inadequate selection criteria, bureaucratic procedure of enrolment. It is difficult to identify the real poor. Hoarding by the middle in times of crisis, issues of quality and quantity, people don't get enough amount as they are expected to have. In some of the rural areas there are categorization in

BPL and state BPL in which wheat and kerosene was provided to both state BPL and APL whereas sugar and housing was provided to BPL only.

ICDS: Integrated Child Development Services: It is centrally sponsored scheme, which aims at providing services to pre-school children in an integrated manner so as to ensure proper growth and development of children in rural, tribal and slum areas. Due to limited coverage it had very limited impact on the Children's Nutritional status. It reached to only one quarter of children in need. Universalization of ICDS is the agenda to be taken up in 11th Plan but this will not help to reduce malnutrition, unless priority is given to under threes (or rather twos) regarding exclusive breastfeeding for six months, and home based semisolid food 3-4 times a day after that. Access to health care both preventive and curative and narrowing the urban rural differential is crucial for reducing morbidity load and mortality and improving nutrition<sup>10</sup>. What is needed is changing priorities in ICDS instead of starting new programs. The job description and responsibilities of AWW must change and should be in the collaboration with the health system must get a boost. This is envisaged in the National Rural health Mission but there is still many a bridge to cross<sup>7</sup>. In most of the cases, the field health workers are unaware of the schemes themselves.

MGNREGA: The Mahatma Gandhi National Rural Employment Guarantee Act aims at enhancing the livelihood security in rural areas by guaranteeing hundred days of wage employment in a financial year to rural household whose adult member volunteer to do unskilled manual work. It started with supply driven approach which later become demand driven where beneficiaries transformed in to claimant. An evaluation study of 20 districts in 2006-07 found a shift in MGNREGA workers family expenditure pattern on food and non-food items. The survey revealed a drastic reduction in the number of families spending more on food, whereas a rising number of families were spending more on non-food items<sup>3</sup>.

There have been many others programme like Mid-day meal, Annapurna, antodyaanna scheme but all of these were somewhat lacking in one or the other

aspects. The gap not only lies in targeting, coverage and performance but also in implementation coordination and design. Community participation is also lacking. Prevention and management primarily should to be at the household level and should become an integral part of an Aanganwadi Workers (AWW's) activity and responsibility with active support and collaboration of the health infrastructure. In February 2003, researchers from several institutions met in Ballagio, Italy to define what could be done to save the lives of approximately six million children who die annually from preventable causes. The analysis showed that breastfeeding was the single most effective preventive intervention which could prevent 13-16% of all childhood deaths in India. Adequate complementary feeding between 6 to 24 months could prevent an additional 6 percent of all such deaths<sup>1</sup>.

#### **Role of pharmaceutical products**

There is very important role played by the pharmaceutical industries in prevention and control of iron deficiency, iodine deficiency disorder and nutritional support to household patient. But synthetic nutrients cannot be used as a substitute for natural foods in national supplementary feeding programmes. These programmes should not be looked upon just as relief operations, but as a means of educating the community in wholesome dietary practices so as to improve household diets; and they should be based on a combination of natural foods<sup>12</sup>. PEM cannot be treated only with the food supplements but also with the comprehensive approach ensuring proper well balanced diet, food security and poverty alleviation

#### **Epidemiological approaches**

PEM is not a simple problem with a simple solution. It results from the complex interplay of social and biomedical factors. Hence, PEM is a social disease. A holistic and multi-pronged approach is needed with a strong socioeconomic policy reform by the Government. The policy of the Government should focus on addressing the underlying causes of malnutrition, with particular attention to the inequities in income distribution, the need for greater agricultural productivity, necessary improvement in the purchasing power of families, and on food

conservation, processing, marketing and pricing mechanisms.

The mere screening of growth of the children, educational action to change behaviours, and the suggestion of offering nutritious food to poor mothers/caretakers do not solve the problem of PEM. Food and nutrition education, in the presence of widespread food shortages, ends up in teaching people to eat what they cannot afford or do not have and, thus, has only limited potential. It reflects an attitude, such as 'keep them poor, but teach them'. The crux of the problem is poverty, food insecurity, skewed land distribution, etc. These are the social determinants of PEM. A mere behavioral and medical approach would only deal with the proximal cause but not with the distal and the causes of the causes of PEM<sup>4</sup>.

#### **Stabilizing food prices as social protection**

Rapidly rising food prices and increased food price volatility are major threats to food security. While price volatility often has domestic and international causes, excessively low food commodity prices can have seriously damaging consequences to poor farmers.

#### **Monitoring**

It is extremely important to monitor the efficiency and success of programmes and schemes. Strict and effective frameworks need to be put in place to ensure that schemes are producing the intended results, as millions of rupees are being spent every year on them. Some recent developments in this regard have been encouraging; for example, schemes like MGNREGA<sup>1</sup> are being subjected to participatory monitoring mechanisms such as social audits. Such arrangements also need to be put in place for the schemes, to empower marginalised groups to ensure that these schemes actually benefit them.

#### **Coordination**

The various parties involved in the feeding programmes, non-governmental Organizations, health workers and the people itself. For social protection to be strong and effective, all must work together. Currently, there have been efforts made in this regard but they need to be co-ordinated and intensified.

#### **Political will**

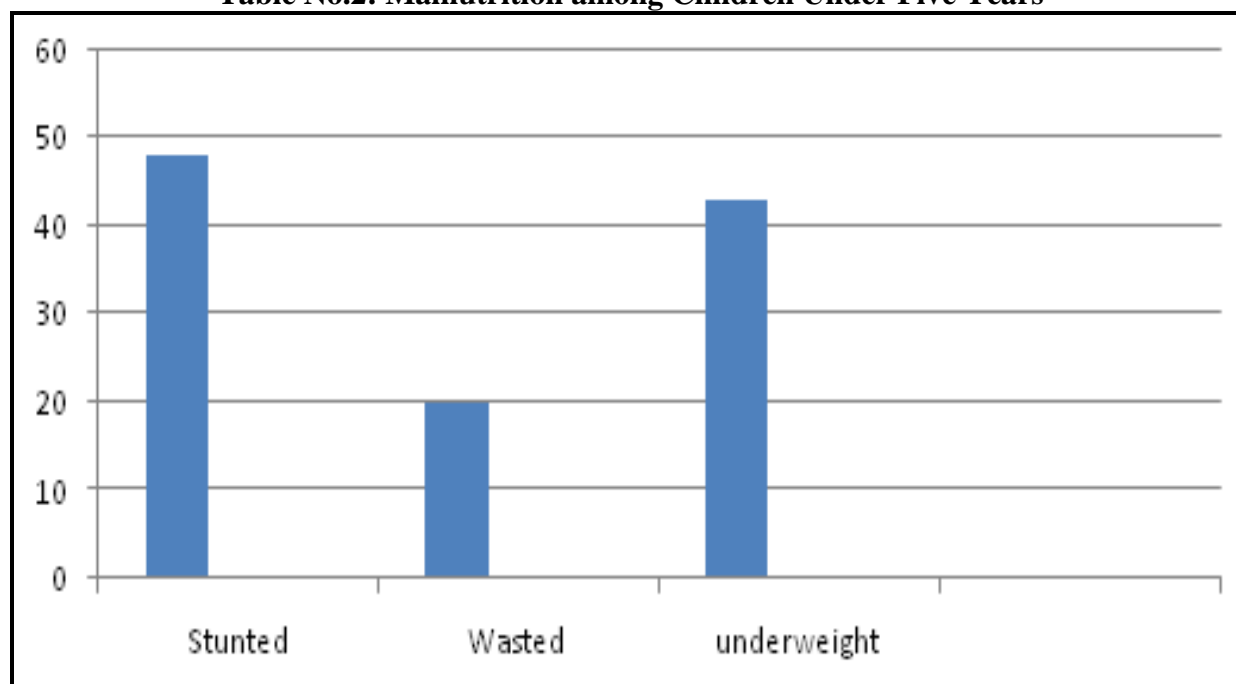
The active role of political leaders is important to give emphasis on nutrition making it a national priority, as well as for ensuring the commitment of funding and other resources necessary for effective programme implementation. It should be ensured that all programmes reach priority target group's i.e, children under two years of age, adolescent girls, and pregnant and lactating women.

**Table No.1: State wise percentage of Underweight**

S.No	State	NFHS1*	NHFS2	NHFS 3
1	Delhi	40.9	34.7	33.1
2	Andhra Pradesh	45.0	37.7	36.5
3	Arunachal Pradesh	38.4	24.3	36.9
4	Assam	49.2	36.0	40.4
5	Chhattisgarh	0	60.8	52.1
6	Gujarat	48.1	45.1	47.4
7	Himachal Pradesh	43.7	43.6	36.2
8	Haryana	34.6	34.6	41.9
9	Jammu and Kashmir	0	34.5	29.4
10	Karnataka	50.6	43.9	41.1
11	Kerala	27.0	26.9	28.8
12	Meghalaya	44.4	37.9	46.3
13	Maharashtra	51.4	49.6	39.7
14	Manipur	26.8	27.5	23.8
15	Madhya Pradesh	0	53.5	60.3
16	Orissa	52.4	54.4	44.0
17	Punjab	46.0	28.7	27.0
18	Rajasthan	44.3	50.6	44.0
19	Tamil Nadu	45.7	36.7	33.2
20	Uttaranchal	0	41.8	38.0
21	Uttar Pradesh	0	51.8	47.3
22	West Bengal	54.8	48.7	43.0

\*National Family Health Survey

**Table No.2: Malnutrition among Children Under Five Years**



Source: NFHS 3(2005-06); WHO child growth standards

**Table No.3: Trends in Malnutrition in Children Under Three Years**

S.No	Stunted		Wasted		Underweight	
1	NHFS2	NFHS 3	NHFS2	NFHS 3	NHFS2	NFHS 3
2	51%	45%	20%	23%	43 %	40%

Source NFHS 3

**Table No.4: Stunting, Wasting, and Underweight among Children Under Five Years by Residence**

S.No		Urban	Rural
1	Stunted	40 %	51%
2	Wasted	17%	21%
3	Underweight	33%	46%

Source NFHS 3

## CONCLUSION

The National Nutrition Policy (1993) advocates a comprehensive, integrated and inter-sectoral strategy for alleviating the multifaceted problem of malnutrition and achieving the optimal state of nutrition for the people. The effectiveness of the entire Supplementary feeding and food security programme is dependent to a large extent on the state governments/Union Territory Administrations and the constitution of State Nutrition Councils. There is a need for consistent approach in planning. Most of the schemes are launched when their immediate need is felt and responded in emergency rather than well planned initiatives for ex- NRC's (*Nutrition Rehabilitation Centre*) has emerged as a quasi-vertical model with emphasis on identifying and referring undernourished children from village to institution. The labeling of all severe under nutrition is done as SAM (Severe acute malnutrition) for which NRC is designed. Whereas programme should aim in correction of SCM which is more prevalent than SAM which requires multispectral approaches that promote adoption of practices to improve the quality of local diets and improving child feeding practices. Strategies have to be thought out to enable mothers to breastfeed and offer complementary feeding.

The decentralisation of ICDS<sup>1</sup> and Mid day meal has been proved beneficial. The success lessons and from the experience of states should form the basis of planning at central level. Examples of Kerala, Orissa and Chhattisgarh have shown that it is possible to provide nutritious Take Home Rations in

a decentralized, viable and sustainable manner by Self Help Groups (SHG)/ federations of SHGs with a variety of menus and models. Maternal nutrition and health greatly influence child nutritional status. Low body reserves during pregnancy can lead to low birth weight and continued under nutrition in her children. For improving maternal nutrition, we have to look at the cultural practices that are prevalent. A mother eats last in the family and so is deprived to her fair share of food from the family pot. Giving a certain quantity of supplementary food in pregnancy (20 kg has been suggested) will not help as experience has shown that this goes into the family food basket and is not consumed by the pregnant woman only. Considering immediate causes is important but underlying causes should not be forgotten in order to achieve success or remove under nutrition completely. Better governance is very important for effective functioning of food-based programmes and this requires universality, community participation and decentralization.

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## CONFLICT OF INTEREST

I declare that I have no conflict of interest.

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