

National Conference
on
Eradication of Micronutrient malnutrition
for
Better Health and Higher Economic Growth
October 28-29, 2005, New Delhi

Background and Recommendations

Sponsored By

International Life Sciences Institute – India (ILSI- India)
ILSI Human Nutrition Institute (ILSI HNI)

Co-sponsored By

Department of Women and Child Development,
Ministry of Human Resource Development, GOI
Ministry of Science and Technology, GOI
Ministry of Health and Family Welfare, GOI
Ministry of Food Processing Industries, GOI
UN World Food Program
Indian Academy of Pediatrics
(Sub-Specialty Chapter on Nutrition)
Indian Council of Medical Research

Foreword

For the past six years ILSI-India has been looking closely at micronutrient to which Indian people are most exposed. It organized a number of conferences in different regions with a view to sensitize governments about supplementation, motivate industry to fortify foods of mass consumption and create public awareness about the health problems from micronutrients deficiencies. While the problems and solutions are now well recognized the efforts and consequently the results continue to be poor.

To identify the role different authorities/institutions should play in order to effectively implement the necessary programs and make up micronutrient deficiencies in vitamins and minerals, ILSI-India organized a “National Conference on Eradication Micronutrient Malnutrition for Better Health and Higher Economic Growth” on October 28-29, 2005 in collaboration with the concerned Union Ministries and international organizations.

While underlining the health problems the Conference brought out unmistakably the cost loss in labor productivity and national income from micronutrient malnutrition. At the present state of public health 18-20 per cent loss in labor productivity takes place resulting in 3 per cent loss in GDP. Currently, we are losing more than Rs. 1, 00, 000 crores of GDP which could have been recovered with an expenditure of only Rs. 4800 crores. This expenditure is really an investment in human capital which would have yielded a return of 2100 per cent. Undoubtedly, this investment is the most profitable but unfortunately it is also the most neglected.

The problem of micronutrient malnutrition is only partly a reflection of under-nutrition. For, whatever foods that are made available even to families below the poverty line can be fortified with vitamins and minerals or supplemented by other more nutritious foods to make up for micronutrient deficiencies. The cost would be far too little but the benefit extremely high.

This monograph outlines the coordinated steps that need to be taken by governments, industry and research organizations to eradicate micronutrient malnutrition which will improve health status of the people and enhance the development of the economy. It is our sincere expectation that, with the beginning of the Eleventh Plan, public health program aimed at eliminating micronutrient deficiencies to prevent associated diseases will receive high priority and speedy implementation.

D. H. Pai Panandiker
Chairman, ILSI-India
December 12, 2005

I

Introduction

1.1 The vibrancy and dynamism of a nation depend to a large extent on the health status of its people. In India, where the per capita income is low, a large section of people do not have enough to eat and the food they eat does not contain all the macronutrients, particularly protein, and micronutrients like vitamins and minerals, that make for healthy life. Micronutrient malnutrition in India is worse than even in Sub Saharan Africa.

1.2 Early childhood nutrition is critical. Inadequate or unbalanced nutrition results in lower height for age (stunting), lower weight for height (wasting) and lower weight for age. These deficiencies in childhood nutrition set the pattern for the rest of life. Many non-communicable diseases, like cardiovascular disorders or diabetes, and the capacity to work and consequently earn, have their origin in childhood nutrition.

1.3 People in low income group do not have access to sufficient foods and therefore suffer from chronic under-nutrition. But a much larger number of the people are exposed to micronutrient malnutrition because the diet, though adequate, is not balanced.

II

Energy Intake

2.1 The average dietary energy supply (DES) per person in India is almost similar to DES in other South Asian countries but 20 per cent less than in China. Population below minimum energy requirement is presently 21 per cent.

2.2 Indian diet is heavily weighted in favor of carbohydrates. There is less consumption of animal products and fruits and vegetables and more of cereals and sugar. The animal products content in diet is low partly because a large section of people are vegetarian.

2.3 There has to be greater emphasis on pulses in order to prevent protein energy malnutrition to which nearly 12 per cent of the adult females and 20 per cent of the adult males are exposed.

Dietary Pattern

(per cent kcalories)

	India	Desired
Cereals	76	45
Animal products	2	20
Added fats & Oils	13	13
Pulses	5	5
Sweeteners	10	8
Fruits and Vegetables	4	5
Beverages	0.5	4
TOTAL	100	100

Source: FAO

2.4 The unsatisfactory dietary pattern is one of the reasons for micronutrient deficiency among a large section of people. But it would not be possible to change dietary habits overnight. Hence the missing micronutrients will have to be provided from other sources.

III

Micronutrient Malnutrition

3.1. Micronutrients are important for proper functioning of the human system. These are required in minute quantities but their deficiency can have huge adverse effects. The more critical micronutrients are iodine, vitamin A, iron, folic acid and zinc.

3.2 Iodine deficiency (IDD):

- impacts on brain development and results in loss of IQ and consequently low learning capacity
- leads to goiter, feet deformities, deafness, reproductive failure and high neonatal mortality
- results in low productivity and creativity in adults

3.3 Vitamin A deficiency (VAD):

- causes permanent blindness among children
- reduces resistance to infections
- leads to infant mortality

3.4 Iron Deficiency (IDA):

- alters child behavior and cognitive function
- results in anemia, fatigue
- poor pregnancy outcome and increased risk of maternal death due to hemorrhage

3.5 Zinc Deficiency

- impairs growth of children
- leads to exposure to infections
- results in adverse pregnancy outcomes

3.6 Deficiency of Folic Acid

- causes neural tube defects
- is associated with anemia
- leads to pregnancy complications
- enhances carcinogenesis

3.7 Apart from the five micronutrients viz. iodine, vit.A, iron, folic acid and zinc, there are other micronutrients which are now also considered to be important. These include B vitamins, vitamin C, etc.

Percent of people with micronutrient intake less than 50 per cent of RDA

Nutrient	Children 1-3 age	Girls 13-15 age	Males >18 age	Females >18 age
Iron	72	68	50	68
Vit.A	87	88	83	86
Riboflavin	70	68	55	48
Folic Acid	37	65	38	55

RDA is recommended daily allowance

Source: NMMB

3.8 Micronutrient deficiency is widespread. It has impacted on the health of the children and is reflected in stunting and wasting. Their school performance is below average. They would grow into unhealthy and less educated adults who would be at risk of many non-communicable diseases. With low productivity and absence from work due to illness, their own earnings and their contribution to national income would be low.

IV

Nutrition and Labor Productivity

4.1 The concern about the impact of malnutrition on labor productivity is not new. Various studies have been made since the fifties to link nutrition and wages in developing countries where malnutrition is high and wages are low. There is a two-way relationship between nutrition and wages. Improvement in wages makes better nutrition possible; on the contrary, better nutrition improves efficiency and makes higher wages possible. Due to low wages and poor nutrition a section of workers in lower deciles gets caught into a ‘nutrition wage trap’

4.2 The studies linking wages and nutrition fall into two categories:

- experimental studies and
- statistical studies

4.3 Most of the empirical studies focus on agriculture and establish a relationship between DES and output or wages. The nutrition intake can be measured by the kcal/day or in terms of anthropometric indices like height and body mass index.

4.4 From the rural sample data in the Socio-economic Survey (50th Round) of the National Sample Survey Organization (NSSO) it has been estimated that a 50 per cent increase in calories per consumer equivalent would increase output by 16.5 per cent. Further, the lower the calorie intake is the more significant the output response to increase in calories.

Work Capacity

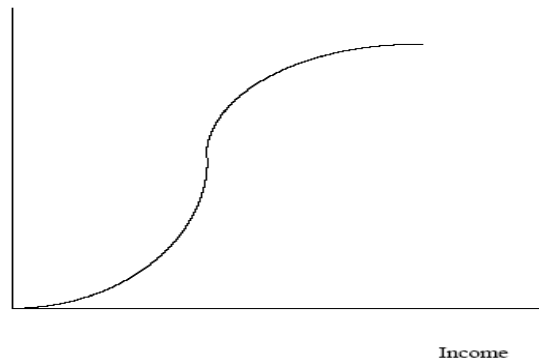


Figure 1: The Capacity Curve

4.5 In the total nutrition pattern micronutrients have a significant place though precise measurement of the impact of micronutrients is not possible. In respect of iron, studies of Indonesian plantation labour revealed that productivity of anemic workers was 20 percent lower. Other studies also came almost to a similar conclusion. Iodine deficiency similarly reduces productivity and work capacity partly from loss of IQ. Such persons choose activities which are less demanding and less well paid.

4.6 It is obvious that there is a close relationship between nutrition and productivity generally as also between micronutrients and work output. The quantification in terms of elasticities from different studies cannot be expected to be the same for the reason that there are other factors that cannot be completely isolated. Education, social environment, etc. can make considerable difference to productivity, apart from nutrition. Besides, it is also possible that short term results may be different from long term results. But the conclusion that more intake of micronutrients in conditions of deficiency improves activity level, work output and earnings, remains well established.

V

Malnutrition and GDP

5.1 Improvement in gross domestic product (GDP) is derived from higher labor productivity from better nutrition, higher life expectancy from better health and more working days from lower absenteeism due to reduction in disease. It has been indicated that nearly a half of the economic growth in UK and France in the eighteenth and nineteenth centuries was accounted for by improvements in nutrition. Nutrition is investment in human capital from which the country can derive higher growth in the same manner as investment in machinery and equipment. The intimate relation between energy intake and per capita income is clearly discernible.

LOG OF GDP PER CAPITA AS A FUNCTION OF DES PER CAPITA*

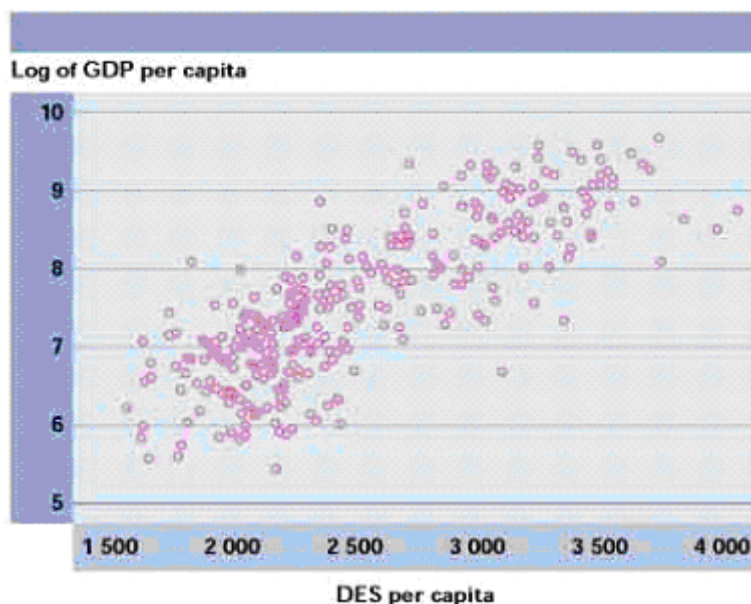


Fig 2. * kcal per day

Source: FAO 2000. Undernourishment and economic growth; the efficiency cost of hunger. By J. Arcand. FAO Economic and Social Development Paper No. 147. Rome

5.2 A focused study of macro and micro nutrients was done by ADB and UNICEF with seven countries (Bangladesh, Cambodia, People's Republic of China, India, Pakistan, Sri Lanka and Viet Nam). The productivity costs in respect of different nutrients for India were found to be equal to 3.85 per cent of GDP.

Productivity Costs of Malnutrition

(Per cent of GDP)

PEM	Iodine	Iron	VAD
Deficiency	Deficiency		
1.4	0.3	1.25	0.9

5.5 Improvement in micronutrient status of the country would significantly increase the rate of growth of the economy. If micronutrient deficiencies are corrected in the next five years, the increase in GDP in 2009-10 from nutrition strategy alone, at today's prices, would be Rs.1 trillion per year. This loss can be avoided if proper attention is paid to eradication of malnutrition.

5.6 Studies presented at the Conference brought out that the loss from disability adjusted life years from micronutrient malnutrition could range from 0.67 to 6 per cent of GDP.

VI Nutrition Strategy

6.1 Undoubtedly, the nutrition issue is extremely important and should have a high priority in public health programs. While the need for nutrition strategy has been recognized action has been slow and consequently improvement has been far too small to make any impact.

6.2 Nutrition strategy can consist of four important complements:

- Supplementation
- Food Fortification
- Biofortification
- Dietary Management

6.3 The choice of the strategy or strategy mix has to depend on a number of considerations. Each component has a different time dimension. Supplementation can give results in the short term if it is administered efficiently. Food fortification will show results in medium term since fortified foods will provide only a part of the RDA.

6.4 Biofortification is the process of breeding food crops that are rich in bio-available micronutrients. Such enrichment traits are available within the genomes of major staple foods like, wheat, maize, beans, cassava, etc., that can allow for substantial increase in iron, zinc, vit.A, as well as other nutrients without affecting crop yields. Biofortified foods, however, are yet to take off and it may not be before 7-8 years when they will become marketable commodities.

6.4 Dietary management presumes that people have enough purchasing power to balance their diet with a variety of foods which will offer all the nutrients that are required. This goal cannot be reached until there is substantial improvement in per capita income.

Supplementation

6.4 The Government of India had taken steps to correct nutritional deficiencies as early as the sixties. The National Goiter Control Program was launched in 1962, the National Nutritional Prophylaxis Program in 1970 and the National Vitamin A Prophylaxis Program in 1971. After the International Conference on Nutrition an action plan was developed and ICDS was made a focused project.

6.5 ICDS aims to provide supplementary nutrition to children in the age group 0-6 as also pregnant women. The project is implemented through the State Governments with 100 per cent funding from the Centre.

6.6 At the end of 2004, 5413 projects were operational with 591,000 anganwadi centers (AWCs) and benefited 37.7 million children and 7.5 million pregnant women. Additional assistance is available to children in BPL families. The nutrition program is also supported by CARE and WFP. The National Common Minimum Program (NCMP) has recommended that every child should be covered under ICDS and the Supreme Court has suggested expansion of AWCs..

Currently,

- 44 per cent of children under three years of age receive 2 doses of vit.A a year
- thirty per cent of the pregnant women receive about 60 iron-folate tablets
- Ten per cent of the adolescent girls receive weekly iron-folate supplements

6.5 The coverage is far too small and the biological impact of these intervention measures has been far not been adequate mainly for lack of proper management and training, of monitoring and supervision, of resources and functionaries.

Fortification of foods

6.6 There are a variety of commonly consumed foods that can be fortified with necessary vitamins and minerals to enhance the intake of micronutrients. The following are important:

- iodine: salt, water
- iron : wheat flour, bread, milk and milk products, infant foods, biscuits, rice flour, salt, fish sauce, spices
- vitA : fats and oils, sugar, milk and milk products, rice, tea, MSG

6.7 Fortification of wheat flour with iron is in progress though the percentage of fortified wheat flour is very small. Fortified biscuits, bread, beverages, milk, vanaspati, etc. are in the market. But the total intake of micronutrients from fortified foods by common man would be extremely small.

6.8 The progress in respect of fortification is limited:

- iodized salt is only about 37 per cent of total consumption of salt
- Foods fortified with iron are less than 1 per cent
- Foods fortified with vit.A are less than 1 per cent
- Fortification is yet to extend to zinc and folic acid

6.9 Fortification has not really taken off partly because of lack of clarity in Prevention of Food Adulteration Act and partly because of lack of consumer demand

Choice of Nutrition Strategy

7.1 Nutrition strategy will have to be devised keeping in view acceptability, feasibility, benefits and costs. In the case of supplementation, the cost of materials is small. For instance, vit.A tablets cost less than two rupees per year per child and iron tablets less than Rs.25 per year per pregnant woman and lactating mother. The cost of supplementation is high because of the additional cost of administration, training, monitoring, etc. The advantage is that it can give results in the short term.

7.2 Food fortification is presently the least cost strategy. The additional cost to the consumer would be about Rs.10 per month for fortified wheat flour, bread, salt, milk, etc and cost to

industry will vary from 0.5 to 2 per cent of the cost of production, depending on the product. Government does not have to spend on fortification. Fortificants are not expensive and the cost is included in price. It is really the beneficiary who bears the full burden of fortification which fortunately is small. But the benefit of fortified foods will take time and the results will be seen only in the medium term.

7.3 The best nutrition strategy has to be a combination of the three. It is important to have immediate results in respect of targeted population. For them supplementation can be more useful. For the larger sections of population, fortification will be beneficial and practical. A combination of the two should give the best results until biofortification becomes a reality.

VII

Action Plan

8.1 It is imperative that an action plan is devised for coordinated and quick results. That plan has been formulated with reference to the targets to be achieved. The problem is undoubtedly huge and it may take some time before eradication of micronutrient malnutrition is completed. But a substantial dent can be made with dedicated efforts and proper management in a period of five years. The Tenth Plan had set ambitious targets but the achievements fell far short. In the next five years the following combination of measures should be aimed at.

Child Nutrition:

- to encourage exclusive breast feeding at least for the first 6 months (current media publicity should continue for at least three years)
- to complement and supplement mid-day meal at school with foods like milk, fortified biscuits and candies, etc.

Supplementation:

-
- to administer regularly 2 doses of vit A to all children under 5 years of age
- to administer iron tablets to all pregnant women and lactating mothers
- to administer iron tablets to at least 70 per cent of adolescent girls in rural areas

Fortification:

- to make universal double fortification of salt with iodine and iron mandatory
- to motivate industry to promote fortification of at least 50 per cent of marketed wheat flour, bread, biscuits, milk, edible oil, sugar and tea, with relevant fortificants and take steps to facilitate fortification.

7.10 These targets can be achieved only if there is complete coordination between different Ministries at the Centre, between the Centre and the States and between public and private sectors.

Who Should Do What ?

Inter Ministerial Group

An inter-Ministerial Group with senior officers from the concerned Ministries should be set up to meet each week to coordinate the measures that are necessary for quick and efficient results. This Group will be the nerve centre for implementation of the decisions to eradicate malnutrition.

DWCD

- The Departments of Women and Child Development at the State level have to be strengthened and responsibilities and accountability firmly indicated to achieve the targets for supplementation that have been set out.
- The centre should have a monitoring and surveillance machinery to keep track of the progress at the State level and take corrective action wherever necessary.
- The anganwadis should be restructured with the block being the coordinating agency for the relevant group of villages
- The Community should be involved in the efforts to eradicate malnutrition

Research Organizations

- To provide scientific inputs for supplementation and food fortification
- To undertake research on emerging health and nutrition problems

Food Industry:

- To make intensive efforts to market fortified foods particularly in rural areas
- To bring out consumer packs of fortified foods with minimal extra cost
- To label food packs by major nutrients for information of the consumer

Ministry of Information and Broadcasting

- To undertake a publicity program using electronic media to deliver the strong but simple message that fortified foods are more healthy

Ministry of Health

- to prescribe the choice and levels of fortificants in respect of different foods used as vehicles for delivery of micronutrients.
- To give equal priority to fortification as to immunization since both prevent disease and cost less than the treatment of disease.

Ministry of Food Processing Industry

- To popularize the incentive scheme for fortification
- To prepare spots for TV display

Ministry of Finance

- To neutralize excise duties payable on fortified foods until such foods become popular

Ministry of Consumer Affairs & Civil Supplies

- To distribute fortified wheat flour in place of wheat through PDS

- Other fortified foods that should be distributed through PDS are edible oils, sugar, salt and weaning foods

State Governments

- To exempt fortified foods from VAT
- To strengthen departments dealing with women and child development
- To create information network and report to the Centre progress of supplementation every month
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ILSI-India has been addressing these issues for the last six years and to an extent made a dent in motivating industry to fortify foods and sensitizing the State Governments to use fortified foods for child nutrition. ILSI-India would keep up this effort and with the assistance of the Ministries bring out technical brochures about fortification of foods for use by industry and brochures about nutrition information for use by the consumer.

7.11 A coordinated effort on the part of different stakeholders is necessary for making fortification a success. Micronutrient malnutrition, which has persisted in spite of the intention and effort of Government for the past 45 years, can be largely eradicated in the next 5-7 years if the different stakeholders act decisively in coordination to implement decisions taken by the Inter-Ministerial Group.