

Strategy for Elimination of Micronutrient Malnutrition In India

PROCEEDINGS OF THE WORKSHOP
HELD IN JAIPUR
ON NOVEMBER 1 - 2, 1995



Department of Women & Child Development
Ministry of Human Resource Development
Government of India, New Delhi

in collaboration with

The
Micronutrient
Initiative



L'initiative
pour les
micronutrien

THE MICRONUTRIENT INITIATIVE
SOUTH ASIA REGIONAL OFFICE

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Published on behalf of

**Department of Women & Child Development
Ministry of Human Resource Development
Government of India, New Delhi**

by



**The
Micronutrient
Initiative**

**SOUTH ASIA REGIONAL OFFICE
DECEMBER 1997**

CONTENTS

FOREWORD	5
EXECUTIVE SUMMARY	6
CHAPTERS	
1. Background	8
2. Strategies for Control of Micronutrient Malnutrition	11
3. Global and Indian experience in Food Fortification	15
4. Opportunities for Food Fortification	18
5. Blueprint for Action	22
ANNEXURES	
i) List of Participants	25
ii) Abbreviations used	27

Foreword

Nutrition and national development are increasingly being recognised as closely related and interdependent. The strength of nations today is measured in terms of how healthy, well nourished and educated its people are. Recent scientific evidences reveal that micronutrient deficiencies not only result in various deficiency disorders, high mortality and morbidity rates and low productivity, but also contribute to the diet-related non-communicable degenerative diseases like diabetes mellitus, hypertension, cardio-vascular diseases, obesity and cancer. The longevity of human beings has also been found to be closely related to adequate intake of various vitamins and minerals commonly known as micronutrients.

Deficiencies of three micronutrients - vitamin A, iron and iodine - are widespread, affecting more than a third of India's population. To call them micronutrients may be in conformity with the minute quantities needed by the human body but it is certainly not consistent with the nature and extent of damage being brought about by these deficiencies.

These deficiencies could waste as much as 5% of Gross Domestic Product. Micronutrient deficiencies can be prevented and even eliminated if small quantities are consumed by populations on a continuous and ongoing basis. Addressing them comprehensively using an array of low-cost solutions and innovative approaches could cost less than 0.3% of GDP - a Benefit : Cost ratio of 16:1! While existing programmes have had impact in controlling some of these deficiencies, there is an urgent need and considerable potential to strengthen, reorganise and expand interventions to eliminate these deficiencies.

In 1993, the Government of India adopted the National Nutrition Policy which 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 importance of eliminating micronutrient malnutrition has been recognised in the National Nutrition Policy. A combination of interventions involving the promotion of breast feeding and complementary feeding of infants, dietary diversification (e.g., improving food availability and consumption), food fortification and supplementation may need to be emphasised and implemented as the short term and long term remedial measures.

To maximize the effectiveness of these interventions, the strategy is to go well beyond traditional health and nutrition systems using a multi-sectoral approach and supporting interventions with social marketing and communication, legislation and enforcement, and monitoring and evaluation. Eliminating micronutrient malnutrition, therefore, requires collaborative efforts from all the key stakeholders who can make a difference, for example, Government, National Institutions involved in training, research and development, NOGs, private and public sector food industry and the donors. In order to bring together these various actors to contribute towards eliminating micronutrient malnutrition from the country, the Department of Women and Child Development organised a Workshop on Strategy for Elimination of Micronutrient Malnutrition in India at Jaipur on 1-2 November, 1995 in collaboration with Micronutrient Initiative (MI) and UNICEF.

It is hoped that the recommendations of this important workshop that are presented in this report will help develop a plan that comprehensively addresses the problem and suggests both short term and long term measures for ensuring effective and sustainable results and will evoke interest in the key partners viz., Government, private industry, voluntary sector, scientists and research establishments and donor agencies in addressing the problem.



SMT. ASHA DAS
Secretary

Department of Women & Child Development
Ministry of Human Resource Development
Government of India

Place : New Delhi
Date : 19th November, 1997

EXECUTIVE SUMMARY

Micronutrient deficiencies are a major impediment to the health, nutritional status and development of a significant proportion of the Indian population. In the absence of micronutrients, individuals and families suffer serious consequences including learning disabilities, impaired work capacity, illness and death. These deficiencies can be prevented and even eliminated, if small quantities of the micronutrients are consumed by population on a continuous and ongoing basis. Several delivery mechanisms are available ranging from high-dose supplements to food fortification, consumption of micronutrient rich foods to public health measures. Given the extensive prevalence of the problem and the wide array of low cost solutions available, there is a renewed urgency for the launch of a concerted effort using complementary strategies and a multi-disciplinary approach that extends well beyond conventional health and nutrition systems.

The Department of Women & Child Development (Food & Nutrition Board), in the Ministry of Human Resource Development, Government of India, in collaboration with the Micronutrient Initiative (MI), Canada and UNICEF, Delhi organised a Strategy Workshop for the elimination of micronutrient malnutrition in India in Jaipur on November 1-2, 1995. The Workshop was inaugurated by Smt. Binoo Sen, Joint Secretary, Department of Women and Child Development and the valedictory session was chaired by Smt. Meenaxi Hooja, Secretary, Women & Child Development Department, Government of Rajasthan. The proceedings of inaugural and valedictory sessions are given at Annexure-I. The Workshop brought together key representatives from Government Ministries, research establishments and international agencies - all of whom have a role to play in addressing this national problem. While the workshop considered a range of strategies, it had a special focus on food fortification.

The key recommendations of the workshop are:-

- Micronutrient malnutrition, in particular vitamin A, iron and iodine deficiencies is a matter of serious concern among vulnerable population groups in India.
- While existing programmes of supplementation, dietary modification and food fortification have had an impact in controlling some of these deficiencies, there is an urgent need and considerable potential to strengthen, reorganise and expand interventions to eliminate these deficiencies. These interventions need to be integrated with social communications, economic and regulatory measures and surveillance.
- Provision of nutrients in form of supplements targeted at specific age groups that are at risk for iron and vitamin A deficiencies should be strengthened with innovative approaches and appropriate funding. Food fortification is an approach with immense potential to reach micronutrients to large populations in India at an affordable cost. While several foods are already being fortified today, there are many more promising opportunities using salt, sugar, oils and ready-to-eat foods that can have larger coverage and impact.
- While 'Dietary Adequacy' is the ultimate objective of the control of micronutrient malnutrition, supplementation programmes should be regarded as an interim measure. However, fortification of salt with iodine will have to be done on a permanent basis.
- Besides green leafy vegetables, other foods including foods of animal origin rich in iron and vitamin A need to be consumed by children. The production and consumption of these foods should be encouraged at the community level. Steps should be taken to disseminate information to mothers, health and community workers to promote consumption of vitamin A and carotene rich foods including red palm oil to overcome the deficiency of vitamin A among children.
- The coverage of beneficiaries of mass feeding programmes needs to be increased. Ready-to-Eat Foods (R.T.E) are widely used in the feeding programmes including ICDS. Fortification of RTE with vitamin A and iron at a level to provide 50-75% of daily requirement is recommended.
- Double Fortified Salt (DFS) (salt fortified with iron and iodine) based on NIN technology, is now being marketed on a limited scale by one company. The institutional and community effectiveness studies, if required, should be completed as soon as possible with a view to assess its acceptability so that the Government could take it up on a national scale with appropriate legislative measures adopting usual marketing strategies.

- Iodised salt production should be increased to cover the entire needs in the country along with improvement in quality.
- Fortification of sugar with vitamin A and iron is another opportunity. Appropriate action by Directorate of Sugar may be taken in collaboration with Indian Sugar Mills Association. Fats and oils are also good medium for fortification with vitamin A.
- Supplementation of vulnerable groups with iron and vitamin A should be greatly increased, preferably through an integrated approach for micronutrient malnutrition control.
- The Child Survival and Safe Motherhood and the ICDS programmes have more or less the same objectives. Close collaboration and integration of these two programmes is essential to achieve the desired coverage and compliance by beneficiaries.
- Integration of Information, Education and Communication (IEC) is an essential pre-requisite for supplementation, food fortification and dietary diversification. A special Committee should be set up to review all issues of IEC in existing programmes.
- Urgent steps should be taken to rationalise food standards and the prevention of Food Adulteration Act (PFA) rules to facilitate compliance.
- The private sector should explore the opportunity for food fortification, seek assistance from the research laboratories and experts in product development and testing, request government clearance and create nutritional awareness through their marketing networks.
- Non-Governmental Organizations (NGOs) can be a major partner in creating nutritional awareness on dietary diversification, supplementation and use of fortified foods. They can also help the beneficiaries receive their entitlement from the developmental programmes and provide useful feedback to industry, research institutions, government and donors on the needs of the people to control micronutrient malnutrition.
- Nutrition and medical experts have a role in assessment of nutritional status of populations, linkage with international research and development on fortification experiences in other countries and adapting them to Indian situations. They should help the industry in product development, and network with schools, colleges, NGOs and panchayats, etc. to help them in disseminating simple, meaningful and continued education on nutrition.
- International and Donor agencies should continue partnership with Government, particularly in IEC and sustainable control of micronutrient malnutrition. They should focus on helping NGOs, colleges and schools carry out comprehensive nutrition education campaigns.
- All the key partners, viz., Government, Private Undertakings, NGOs, Scientists, Research Establishments and International/Donor Agencies have an important and collaborative role to play in addressing the problem of micronutrient malnutrition.

BACKGROUND

Essential vitamins and minerals that are needed in tiny quantities, usually a few milligrams or even micrograms per day, are known as micronutrients. Though required in such minute quantities, some of them are so critical to the normal development and functioning of the human brain and body that to describe them as micronutrients is to disguise the fact that normal healthy and productive living is not possible without them.

The Problem

Three micronutrients - iodine, vitamin A and iron - are among the most important of all the nutrients needed by the body because they are vital to develop normal learning and cognitive functions, immunity, work capacity & reproductive health. The body cannot synthesize them, so they must be made available through the diet. Yet they are often missing or not fully absorbed from the daily food eaten by millions, particularly those who live in developing countries.

A few grams of iodine, barely a teaspoonful, represents the cumulative requirement of an average person over an entire lifetime. Yet, if this minute amount is not available regularly, it can cause children to be born with severe brain damage, or give rise to deafness and dwarfism and can lead to high rates of infant mortality, stillbirths and miscarriages. Consequences of vitamin A deficiency range from mild deficiency signs such as Bitot's spots to night blindness or even total loss of vision. Lack of sufficient quantities of iron and folic acid in the body leads to nutritional anaemia which affects all age groups and sexes. The prevalence rate of anaemia has been found to be considerably higher among adolescent girls, pregnant women and infants born to anaemic mothers than others in the population. In fact, nutritional anaemia is also a major cause of maternal mortality.

Unlike the gnawing hunger that results from shortage of food, the hunger of micronutrient malnutrition is rarely noticed, even by those afflicted by it. There are few easily recognisable or visible signs of deficiency, but the consequences are grave. For the individual, these consequences include learning disabilities, impaired work capacity, increased susceptibility to disease and greater risk of death. At the national level, these effects translate into lowered economic productivity, increased expenditures on

health services and sub-optimal returns on investments in education & training.

There are several reasons for such deficiencies. Some population groups may be deficient because their access to micronutrient rich foods is limited by poverty, crop growing patterns, soil quality, climatic conditions or geographical isolation. Sometimes traditional dietary preferences preclude the adequate consumption of foods that are rich in micronutrients. Often the absorption & utilisation of available micronutrients is adversely affected by other inhibiting dietary or health factors.



Deficiencies of iodine, vitamin A and iron today affect almost two billion people around the world, and almost 200 million in India alone, tragically limiting the social and economic development of entire regions. In India 5-7% children are suffering from vitamin A deficiency; and two of every three women of reproductive age suffer from iron deficiency anaemia.

About 167 million people are at risk of Iodine Deficiency Disorders (IDD) and about 6.6 million with mild neurological disorders. The prevalence of nutritional anaemia varies between 47% - 87% in pregnant and lactating mothers and 14%-90% in school children. The prevalence of vitamin A deficiency based on clinical evidence (Bitot's spots) in children up to 5 years of age varies between 0.3% - 3.6%.

This drain on a country's human resource is unnecessary & is tragic. The available solutions needed to eliminate micronutrient malnutrition are simple, effective and inexpensive.

Ending the hidden hunger of micronutrients is potentially the most important and achievable health goal of the decade.

National Action

At the World Summit for Children in 1990 in New York, the Ending Hidden Hunger Conference in 1991 in Montreal, and the International Conference on Nutrition in 1992 in Rome, the Government of India committed itself to virtually eliminate iodine and vitamin A deficiencies by the year 2000 and to reduce iron deficiency anaemia in women by one-third.

In 1993, the Government of India (GOI) adopted the National Nutrition Policy which 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 goals envisaged are in line with the National Nutrition Goals relating to micronutrients.

- Elimination of blindness due to vitamin A deficiency and reduction in prevalence of Bitot’s spots to less than 0.5%.
- Reduction in iron deficiency anaemia among pregnant women to 25%.
- Universal iodisation of salt for reduction of IDD (goitre prevalence < 10%).

Key areas have been identified for direct intervention and they include expanding the nutrition intervention net, empowering mothers with nutrition and health education reaching adolescent girls, ensuring better coverage of expectant women, controlling micronutrient deficiencies and fortifying essential foods with nutrients.

The National Plan of Action on Nutrition (NPAN) which was released in early 1995 to implement the National Nutrition Policy, focuses on a systematic collaboration among national government agencies, State Governments, NGOs, the private sector and international donor community in order to address the complex and inter-related factors that contribute to nutritional status. Micronutrient deficiency is highlighted as a major contributor to large scale malnutrition. Recognising the importance of micronutrient malnutrition in the National Nutrition Policy, two of the six direct interventions listed in the Policy are “controlling micronutrient deficiencies” and “fortifying essential foods with nutrients”. Several delivery mechanisms to improve micronutrient intakes are available ranging from

supplementation (iron and vitamin A) to consumption of natural micronutrient rich foods (e.g. dark green leafy vegetables, carrots, papaya) and fortified foods (iodised salt, vitamin A fortified milk and fats) to public health measures (e.g. improved sanitation, promotion of breast feeding).

Knowledge regarding the ravages caused by micronutrient malnutrition has been available for five decades and programmes in India have been ongoing for at least three decades. Salt iodisation in the country has made commendable progress. Presently, 60% of all edible salt is iodised. High dose vitamin A capsule distribution has been integrated with immunisation, but current coverage is low. Under the Child Survival and Safe Motherhood (CSSM) programme, all children from 9 months to 3 years in the country are expected to be covered. To control anaemia, iron and folic acid tablets are distributed to high risk groups (mainly pregnant women) but coverage and compliance seem to be poor. In some urban areas, fortification of milk with vitamin A is taken up through co-operative dairies by FNB, Department of WCD. Vanaspati (hydrogenated fats) in India is fortified with vitamin A by law.

The Partners

To achieve success in the elimination of micronutrient malnutrition and to do so in the shortest possible time requires a combined effort from all those who can make a difference. The key stakeholders in the elimination of



micronutrient malnutrition include government, national institutions involved in research, training and development, NGOs, private business, particularly the food industry, and communication and marketing organisations.

Each group has a special role to play. The government is at the helm for it lays down policy, provides direction to the effort & can legislate where necessary to ensure compliance. The voluntary non-governmental development sector, which probably has the best understanding of the beliefs, practices, opportunities and constraints at the grassroots level can guide policy at the one end and actively interface with the population groups at the other to inform, educate and persuade them.



Food fortification as a strategy offers the private food industry a unique opportunity to become a key player in resolving a public health problem. The private sector can take the lead in fortifying food items that reach out to a large number of consumers. All enterprises, even those outside the food industry can play an important role by educating their workforce and ensuring that micronutrients reach them and their families and home communities as part of a larger effort in employee social welfare. Fortification programmes will need to go hand in hand with advocacy and social communication. Educators, advertising and marketing professionals, media and grassroot organisations, who are in close touch with communities are all potential partners and key actors in creating awareness and motivation.

The Workshop

The end of 1995 marked the mid-point for the decadal goal of elimination of micronutrient malnutrition by the

year 2000. It was a good time to pause, assess the situation and move on in the most effective direction with renewed vigour. The Strategy Workshop for Elimination of Micronutrient Malnutrition in India was organised by the Government of India in collaboration with UNICEF and the Micronutrient Initiative (MI) to bring together the diverse sectors who can jointly contribute to this effort and achieve the objectives of the National Nutrition Policy and the National Plan of Action on Nutrition. While comprehensive efforts are already under way for iron and vitamin A supplementation through a number of delivery channels, there has been little experience in the country with food fortification apart from the universal salt iodisation programme. The present workshop was organised in order to build on this experience, and to explore opportunities for food fortification to accelerate the ending of hidden hunger. Designed as a participatory forum for extensive exchange of experience and generation of fresh approaches, the bulk of the available time was devoted to panel discussions and small working group sessions to address specific issues in fortification, dietary diversification and communication.

Objectives

- Sensitizing the different groups towards the magnitude of micronutrient malnutrition with a view to seek their active participation in its control;
- Strengthening the emerging partnerships between government, industry and NGOs through creation of a forum for a dialogue on micronutrient deficiency control.
- Strengthening existing interventions relating to nutrient supplementation and dietary diversification using innovative approach.
- Identifying opportunities for food fortification and creating an environment for the private sector and NGOs to participate in the production and distribution of micronutrients.

The sections following this chapter summarize the discussions & recommendations made at the workshop.

STRATEGIES FOR CONTROL OF MICRONUTRIENT MALNUTRITION

Three strategies - dietary diversification, supplementation and food fortification are common to all three micronutrients. The most effective solution for control of micronutrient malnutrition would probably involve use of one or two or all three strategies depending upon the magnitude of the problem & clientele. In addition, public health measures such as promotion of breast feeding and control of parasitic infections would also go a long way in reducing micronutrient malnutrition. Also, it is important to help micronutrient absorption, and including bio-promoters in the diet.

Experience has shown that the most efficient direction involves a multi-sectoral, multi-pronged, beneficiary-oriented approach to the problem. The different sectors - government, private industry, non-government organisations and medical nutrition experts - would need to work together. A multi-pronged attack on the three micronutrient deficiencies would be desirable since there would be synergistic benefits in attacking all three together. A beneficiary oriented approach based on an understanding of beneficiary needs, constraints and motivations, through professional research, information, education and communication would be best for sustainable elimination of the problem. There is need for well-planned, well researched, professionally executed communication based on sensitive cultural and social understanding.

Equally important in the fortification of food is the accurate identification of foods for fortification, such that the selected foods are in keeping with the food habits of the people being targeted. It would be necessary to educate consumers on the need for consuming fortified food items, even at a marginally higher cost. The role of demand creation and the importance of an informed consumer is paramount. It is important to understand the consumer's needs, concerns and practices and build programmes and messages around these. This is an area where private sector could and should be usefully involved. A close partnership between the various players would contribute to the development of an operational strategy, identify opportunities for food fortification and emphasise sustainability and sensitisation. However, for the private sector to be able to participate willingly and enthusiastically, it would be necessary to change

legislation pertaining to fortification such that it becomes less punitive. There is need to distinguish between deliberate adulteration of foods and inadvertent insufficiency of additional vitamins, and ensure that the latter does not get punished as it were the former.

In planning and implementing micronutrient programmes, a careful situational analysis should be made to assess the nature, magnitude and dynamics of the problem to develop a strategy and action plan and to ensure effective implementation of this plan. Management concepts should be brought to bear on the problem of micronutrient malnutrition. These concepts include understanding beneficiary needs and constraints, creating an informed demand on this basis and ensuring availability and delivery of products or services for which this demand pull has been created.

Several activities are needed ranging from involvement of community health workers and children in spreading information about good nutrition to ensuring standardised polythene packaging for fortified foods to include non-vegetarian foods in the diet, if acceptable. Industrial and commercial organisations could undertake to provide nutrition education to their employees, provide supplementation to employees and their families and ensure the use of fortified foods. Dietary habits that can promote or inhibit the absorption of micronutrients should be addressed. Human productivity and fitness gaps that could make a dramatic difference to the national economy should be bridged.



Messages for mass communication should be carefully designed and must be distinct from the messages for health workers. Care should be taken that misleading or confused messages are not beamed out.

2.1 Dietary Diversification

The objective of dietary diversification is to ensure that people get micronutrients in sufficient quantities through their daily diet. Dietary diversification to include more micronutrient rich foods is an ideal and sustainable long term solution. Improvements can be made through the introduction of



new crops, better cooking or preservation methods or the promotion of more varied diets through nutrition education.

A diversified diet, rich in vitamin A, would constitute an important, sustainable approach for vitamin A nutrition. However, this change in diet can only be brought about

through a strong information, education and communication programme which in turn would need to be based on knowledge, aptitude and practices (KAP) study. There is need to identify locally available and consumed sources of vitamin A and iron, review traditional dietary practices & assess feasibility of recommending locally available foods as rich sources of vitamin A.

Potentially useful data is available from a wide range of universities, home science colleges and research centres but is being wasted or under-utilised because there was no central data bank. A mechanism for collecting all data related to micronutrients under one roof, would go a long way in ensuring proper use of rich data. Such data, either freshly collected or identified from existing sources, could be used for promoting behaviour change.

Such behaviour change campaigns could be aided by the government who could make free space at prime time available on the television channels. The government could review nutrition curricula in the schools and increase availability of micronutrient rich foods through horticulture, social farm forestry and encouragement of the agricultural sectors. In particular, government could consider promoting the consumption of Red Palm Oil, particularly through the feeding programmes.

NGOs could undertake demand creating through their interpersonal contacts with the beneficiary communities, by encouraging corporations to promote nutrition education among their employees, by promoting kitchen gardens and holding demonstrations for their employees.

ICMR is proposing to take up integrated health projects in different parts of the country, using the district as the operating unit, with special emphasis on management of micronutrient deficiencies. Such projects could establish a framework that could be replicated elsewhere in the country.

Government could make it mandatory for all food product packaging and advertising to carry messages related to nutrition, just as cigarette packages carry messages of the harm done to health.

Potentially enormous resources and good intentions available in the form of corporate social responsibility are not being tapped. Resources could be available in the form of equipment, managerial skills, space and a host of other corporate strengths.

Individuals should take upon themselves the responsibility for carrying out small time bound activities that could together amount to a large step forward.

2.2 Supplementation

Supplementation with micronutrients in capsule, tablet or liquid form to target groups can be an effective preventive and curative strategy where dietary diversification or food fortification cannot reduce the deficiency quickly. Giving the micronutrient orally or by injection can provide sufficient storage in vulnerable population groups for a committed period. Iodised oil injections or capsules provide enough iodine for a period of one or two years, while vitamin A mega doses can give sufficient reserves for 4 to 6 months.



Taking up vitamin A supplementation, as a case example for all three micronutrients to create a generic framework, the kind of questions that would have to be answered are:


- What is the estimated requirement of vitamin A in the country or estimated expected demand ?
- Are there sufficient quantities of vitamin A available to meet the estimated requirements ?
- What are the existing ways in which the vitamin A is used in the country by the health sector ?
- Is there a scarcity or non-availability of vitamin A in the country for the health sector? If so, would it be possible to re-deploy the existing quantity or increase the production capacity of vitamin A in the country ?
- Is the necessary raw material, capital, operating resource and technology available and is there an enabling environment for the same ?
- What is the existing production range for vitamin A - in terms of tablets, capsules and liquids ?
- How is it packaged and labelled ? Is there any scope of improving packaging ?
- What are the mechanisms with regard to procurement, storage, supply and distribution, in health sector ?
- What is the current mode of distribution ? Is there a potential role for the industry and NGOs in the delivery system ?
- Can the government create an enabling environment for the industry and the NGOs to actively participate in their delivery systems and what are the next steps required ?

- How can the supplements be delivered to the people who need them the most ? Who is currently delivering them, how & when is it done ? Are there any incentives? Do the workers have the necessary skills to do it ? Skills being defined as technical and counselling skills.
- What is the perceived cost to the beneficiaries in terms of time and in terms of social and psychological costs, given the cultural environment in which the beneficiary is operating ?
- Who pays for the actual cost of the supplements and their delivery ? Does the government or the public health system continue to pay for it or does the industry have any role in terms of contributing to the payment ?
- Should all those who avail of the public health get the supplements free ? Is the government subsidising the cost of the supplement for the people who can afford to pay? If so, how to avoid or reduce it ?
- What is the role of industry in terms of ensuring the timely availability of vitamin A in the appropriate quality and adequate quantity ?
- What efforts are being made in terms of new formulations, attractive packaging, slow release formulations and daily versus weekly dosages ? What efforts are being made for identifying ways to make the product more acceptable, reducing the side effects, and improving effectiveness ? (More applicable to Iron and Folic Acid rather than to vitamin A).

2.3 Food Fortification

Food fortification through the addition of micronutrients to common foods can be an effective strategy if there is an





appropriate food to enrich. An appropriate food is one that is widely consumed by the target group, is centrally processed, and whose taste and appearance do not change with the addition of the micronutrient.

Examples of successful fortification include the iodisation of salt, fortification of sugar, margarine and edible oil with

vitamin A, and enriching of cereals with iron. Through short-term supplementation with therapeutic doses and long-term strategies such as food fortification and dietary diversification, millions of people with micronutrient malnutrition can overcome the barriers that prevent their full participation in social and economic life.

GLOBAL AND INDIAN EXPERIENCE IN FOOD FORTIFICATION

3.1 Global Experience

Experience of most developed countries with food fortification is now over half a century old and so deeply ingrained into the system that staples such as dairy products, flour and even pasta products are expected and assumed to



have certain standard levels of nutrients and micronutrients. Undoubtedly related to this measure is the fact that disorders caused by deficiencies of micronutrients which were found in all those countries a few decades ago are almost entirely absent today. The trend has caught on in developing countries too in recent years with private industries showing interest and initiative.

Effective food fortification requires selection of a suitable vehicle, an appropriate fortification method or process, a delivery system that would take the fortified food from the production centres to the consumer, and finally, advocacy, communication, monitoring, regulation and enforcement.

There are valuable lessons to be learnt from the salt iodisation experience since it was the only large scale fortification programme that has been carried out in so many countries.

The greatest challenge in the case of iron is to identify a form that would be adequately absorbed without altering the taste or colour of food. Notwithstanding this, there has been a lot of development work in recent years, especially in the iron fortification of common salt and flours. Fortification of common salt with iron has been successfully attempted in India before universal iodisation was launched.

Progress is also being made on the fortification of rice with vitamin A using a new technology involving reconstruction of fortified rice powder into simulated rice grains which then have to be added to milled rice in a given ratio. This was being tried out in Indonesia and results of initial trials are expected soon. Progress has also been made on the double fortification of salt with iodine and iron. National Institute of Nutrition (NIN), Hyderabad, is testing a new process to develop a stable formulation and the results of these tests are awaited. Simultaneously, work is being carried out at the University of Toronto using a micro-encapsulation technique. This is undergoing field trials. Between the two, there is reason to hope that a workable technique would soon be available.

Experiments are under way in Central America to examine the double fortification of sugar with iron and vitamin A. There is also experience with fortification of spices, sauces and condiments in Thailand and South Africa. In addition, there is a growing trend in developing countries for fortification of processed foods such as noodles, cereals, soup, cubes, cookies and milk powder. The latter has been remarkably successful in Mexico in reaching micronutrients to nearly 90% of all school children. In Tanzania, the government is working with a multinational company to fortify an orange drink powder for distribution to school children. All these international experiences demonstrate that food fortification could be a cost effective and feasible solution to the micronutrient malnutrition problem but calls for the involvement of all stakeholders in the fortification process - the producers of staple foods, policy makers, food processing companies and the government.

3.2 Indian experience

The country is self-sufficient in the production of iodised salt. Regulations banning the sale of non-iodised salt have been issued in all States/U.T.'s except three. There is evidence of increased appreciation at the State level of the importance of iodised salt. Even though, the technique of salt fortification is not difficult, the iodisation effort faced problems of poor demand (in the absence of education and monitoring) and small manufacturers who could not be brought into the fold. Improvement in monitoring



requires that laboratories are set up at regional levels and spot-testing kits promoted. For improved uptake there is a need to create greater awareness among the public which in turn would lead to increased consumption. There is a need for improved distri-

bution to ensure that iodised salt is available to all.

Fortification of salt with iron has been successfully experimented by the Food and Nutrition Board in early eighties. Two plants were also set up but the same could not be pursued due to the launch of the universal iodisation of salt programme.

Since then, pioneering work has been carried out by the National Institute of Nutrition on the double fortification of salt with iron and iodine. Tests have shown good stability of iron and iodine. Consumer acceptance of salt is good. Institutional studies with double fortified salt are in progress.

3.3 Ready- to- Eat Foods (RTE)

Considerable advances have been made in India with the formulation of low cost, ready-to-eat energy foods that do not need cooking at the point of distribution. This dramatically increases the opportunities for distribution of the energy food that saves time and makes distribution independent of hygiene levels at the distribution points. These benefits make it possible to reach this energy food out to remote and rural regions.

This energy food is currently being supplied by Modern Foods Industries Ltd., a Government of India undertaking, to a large number of anganwadis in Uttar Pradesh & Bihar and has been well accepted. Corn soya blend is being provided by CARE to the Integrated Child Development Services (ICDS) in ten States. It is made of 69.7% corn meal, 22% soya flour reinforced with a vitamin and mineral pre-mix. It could be used as the base flour in cooking tasty

and nutritious recipes for children. WFP is providing RTE called India mix in anganwadi centres which is re-inforced with vitamins and minerals and is also used as base flour.

The Karnataka State Agro Corn Products Ltd. (KSACPL) has been working on addressing protein calorie malnutrition and additionally in tackling micronutrient deficiencies. Low cost food with high nutritive content has been fortified with vitamin A, Niacin, Folic Acid, Calcium, Iron & Iodine. Implemented since 1979, the company has been providing these energy foods to about 30 to 40 lakh beneficiaries



per day through the ICDS, the AKSHAYA & the AHARA programmes. Funded by the UNICEF, the central and the state governments, such projects have covered the states of Andhra Pradesh, Karnataka, Madhya Pradesh, Rajasthan, Sikkim. These products have been well accepted and could be adopted in other states too.

3.4 Key Issues

- It is important to ascertain consumption patterns of foods before selecting them for fortification. There could be fairly high inter-state and inter income-group variations which could lead to uneven distribution, and give rise to concerns of toxicity in the upper-end consumers even while malnutrition persists among other groups.
- It is important to create an awareness of entitlements among end-beneficiaries that alone would lead to real supply of the benefits to those who need them, since there would be a demand that would ensure the supply.

- A step-wise model of change confirms the intuitive recognition that behavioural change is a slow, long drawn process. This makes it all the more important to make a multi-pronged effort, pushing for the change at every opportunity.
- While a commercial organisation necessarily has a business responsibility and a defined target audience from which it cannot be diverted, it does not follow that such companies do not understand their responsibilities to society. In fact, within the boundaries of their larger business objectives, such companies often make significant efforts to improve nutrition education which, being done with quality and power, has the potential to impact audiences beyond those immediately targeted by them. The school education campaign being carried out by private companies such as Kellogg's is a case in point.
- The private sector could play another important role in this effort by strengthening the distribution systems to rural areas, ensuring availability of marketing support services and putting the required publicity and delivery systems in place.
- Legislation currently in force is inappropriate. Under the present law, foods that fall short of the ingredients as indicated on the label are termed "adulterated" and adulteration is a criminal non-bailable offence. This forces even the most socially responsible of manufacturers to shy away from undertaking food fortification. This entire issue should be reviewed by the authorities so that food fortification on a large scale would become possible.

OPPORTUNITIES FOR FOOD FORTIFICATION

This chapter synthesises issues and recommendations related to the major fortification vehicles; salt, sugar, oils, milk and ready-to-eat foods (based on individual working group presentations).

4.1 Salt

Iodised salt: There are two key needs for strengthening the salt iodisation programme:-

- i) Increase production of iodised salt from 34 lakh tons to 50 lakh tons per annum.
- ii) Improve the quality of the iodized salt to ensure adequate iodine levels in salt at the consumption level.

Actions required to achieve these objectives are:

- 1) Review the PFA act to replace the word common salt with iodised salt, and, if DFS was implemented, with Double Fortified Salt.
- 2) Soften the labelling clause because iodine and iron are non-injurious substances.
- 3) Standardise the maximum allowable particle size to make fortification more effective.
- 4) Bring small manufacturers (up to 10 acres) into the fold since they contribute about a third of the total production, under the control of the government.
- 5) Enact legislation to market salt in polypacks only
- 6) Strictly enforce the ban on sale of non-iodised salt
- 7) Railways to supply wagons on time and provide covered wagons during monsoon
- 8) Ensure adequate and proper storage facilities in consuming areas.

Salt is not only an ideal vehicle for iodine fortification but one which could certainly carry iron as well. A Double Fortified Salt (DFS) has been developed by NIN and has also been produced for limited marketing by a private company, using a modified formula. Community trials have established acceptability and stability of the DFS - Institutional studies are in progress at NIN.

However, there is an urgent need for more conclusive trials on the effectiveness of DFS. Institutional trials should be carried out preferably by independent agencies which have not been involved in the development of the salt.

ICMR needs to resolve the issue of double fortification of salt as early as possible.

International experiences from DFS should also be taken into account, subject to transfer of technology being assured. Once effectiveness of DFS is established, the following are the important steps:

- 1) Given that the issue of double fortified salt would fall under two ministries - the Ministry of Human Resource Development and the Health Ministry - effective co-ordination between the concerned ministries would be necessary to make DFS a reality.
- 2) The PFA act would need to be amended to permit the production and sale of double fortified salt. Legislation should be worked out specifying salt quality, size, packaging and labelling.
- 3) DFS should be manufactured to specified compositions and specifications. Technology that has already been developed should be freely licensed to other private parties.



- 4) Quality control would be very essential and would primarily be the responsibility of the producers but this would periodically be checked by the Salt Department authorities.
- 5) Polyethylene packaging for DFS would be mandatory since DFS is subject to degradation and cannot be sold loose.

- 6) Promoting the concept of DFS to the public is a major exercise and government participation in promoting DFS would be needed. Marketing strategies for specific brands of DFS would be the responsibility of the producers.
- 7) It was estimated by experts at the working group that the additional cost of Re.1 per kilo of salt would make this salt unattractive for poorer families. Subsidisation might be required to promote DFS. This could be done by state governments who could purchase salt from private manufacturers and effect the subsidy from their own available sources. This subsidised salt could be distributed through the public distributions system only to the low income families. Additionally, centrally sponsored supplementary feeding programmes such as mid-day meal programmes could use DFS.

4.2 Oil

While there are problems with using oils as vehicles (wide variations in consumption pattern, regional variations in the type of oil consumed, unorganised sector in the rural areas, very low volumes consumed), these vehicles deserve serious considerations since oils and fats are almost a natural medium for vitamin A and a necessary ingredient for the absorption of vitamin A. However, the mandatory fortification of vanaspati should be reviewed in an effort to establish similar arguments for the fortification of oils. Vanaspati is consumed by households as a substitute for ghee which is a natural source of vitamin A. Since vanaspati, which was a hydrogenated oil, did not contain vitamin A, the government had therefore, taken the step 30 years ago of making it mandatory to have vitamin A in vanaspati. However, no other oil is currently fortified with vitamin A.



As a first step, it is proposed that at least the public sector brand 'Dhara' which is sold in very high volumes and through the public distribution system (PDS) to low income groups be fortified with vitamin A. It would require a relatively simple directive from the government. Most organised oil refiners will follow.

Further, oil that is being provided to the ICDS project could be fortified with vitamin A. Just as the Government of India has recently issued very clear instructions that all ICDS projects can only purchase iodised salt, so also instructions on purchase of fortified oil could be introduced to great advantage.

4.3 Milk

A scheme to fortify milk with vitamin A was launched in 1980 by the Food and Nutrition Board. It is being implemented by the co-operative dairies of the State Governments/Union Territories. 2000 I.U. of vitamin A is used per litre of milk. The cost of fortification is reimbursed on 100% basis for first three years and thereafter, the dairies or the state governments are expected to continue the scheme at their own cost. Currently, only a limited number of co-operatives are implementing this scheme.

However, it was noted by the working group that at the present levels of consumption of milk, most of the vulnerable groups would not be reached through fortified milk. Given that milk is a perishable product and production is highly decentralised, it does not seem feasible that milk could be efficiently fortified to the benefit of the lower income target groups particularly in rural areas. Since toned and double toned milk available to urban populations have reduced amounts of vitamin A, it is morally important to fortify the milk for urban population.

4.4 Sugar

There are mainly three types of sugar that are consumed - Crystal sugar, Khandsari sugar and Jaggery. Crystal sugar is available most frequently from the organised sector while the latter two are largely produced in the unorganised sector. Crystal sugar is amenable to fortification and has been fortified at international levels with both iron and vitamin A. Technical expertise and some information on acceptability of this food item is potentially available. The country is self-sufficient in the production of sugar and the sugar industry has been

growing very fast after the recent deregulation.

In the Indian context, concerns are:-

- Poor reach of crystal sugar to the needy and poor sections of society;
- The volume of sugar (especially crystal sugar) that is produced by the organised sector;
- The most widespread use of sugar is in tea and tea is known to be an inhibitor of iron absorption. There is no known research that has examined this problem but the hypothesis is that a stabiliser could be added to sugar to solve the problem.

To further develop a sugar fortification programme, information is needed in the following areas:

- The type of sugar consumed by different socio-economic groups and socio-cultural groups, distribution of consumption within the family;
- Consumption among children in the ages of 1 to 5 years;
- Consumption among pregnant women. If sugar was fortified with vitamin A, it would be important that this be consumed by pregnant women;
- Purchase patterns of sugar by type of sugar and by different consumer groups; source from which purchased, frequency, volumes and prices.

The distribution of sugar is an issue to be considered since different kinds of sugars travel to consumers along different paths. The feasibility of reaching the appropriate target groups with fortified sugar would



be higher if it were supplied through the public distribution system.

Further, there is a double pricing system in the case of sugar. Sugar distributed through the public distribution system sells at a price that is fixed by

Government of India while the rest of the sugar sells at a price fixed by the producers.

One option is that an intermediate agency would need to take responsibility for producing and making available fortified sugar to the public distribution system. To explore this further, the government would need to take the following actions:-

- 1) Initiate discussions with the sugar industry to sensitise the industry and arrive at some broad principles for fortification.
- 2) Provide tax incentives for the upgradation of research facilities and quality control in the sugar industry to compensate for the additional expenditure involved in assessing micronutrient levels in sugar.
- 3) Rationalise PFA norms to differentiate between injurious and non-injurious nature of offences and between sub-optimal levels of ingredients or additives versus adulteration.
- 4) Undertake nutrition education to create awareness of the need and of entitlements.
- 5) Provide feedback on the programme, to inform about the progress and about problems being faced.

International agencies could assist in:-

- 1) Obtaining information on the consumer profile
- 2) Transferring technology and adapting it to Indian conditions, factories and machines
- 3) Transferring technology for field test kits and easy tips for testing the presence of micronutrients in sugar

Key steps that could be undertaken by the Government of India for launching a national sugar fortification programme are:-

- The initiation of dialogue with the sugar industry and arrive at a basis for fortification.
- Determination of standards in consultation with the inter-ministerial co-ordination committee and the concerned research institute.
- Notify specifications of sugar that should be available in public distribution system by the concerned government department.
- Programme launch providing for about six months time to the producer to start implementation of the

programme on the production line. (By that time the public would need to have been made aware of the product. Evaluation of the programme would be carried out by the research groups, the National Sugar Research Institute as well as non-government organisations).

4.5 Ready-to-Eat Foods (R-T-Es)

There is a growing trend in developing countries for fortifying several processed foods such as noodles, cereals and soups, cubes, cookies, orange drink powder and chocolate milk powder sold in single sachet servings and fortified both with iodine, iron and vitamin A.

In the Indian context, many foods including energy foods could be considered for fortification. The choice should be made on the basis of the distribution network. Ongoing programmes such as the ICDS scheme and the mid-day meal schemes provide an ideal opportunity for reaching out to the needy groups. For this sector, foods should be packaged in bulk, retaining flexibility according to the requirements of the centre, such as 5Kg, 2 Kg, 1 Kg and ½ Kg packs. The additional cost of fortification of these foods could be borne by the government or other donor agencies.

In addition, bread and semi-processed foods such as soya fortified flours and extruded foods could be distributed through the public distribution system at a subsidised price.

There is a wide range of commercial foods such as breakfast cereals, biscuits and bread which could also be fortified. Semi-processed food could also be fortified for purchase in the commercial sector and all these would be sold at a price that the market could bear.

Important actions to be taken by each of the partners are:-

The industry should take the responsibility of defining quality standards, of ensuring laboratory testing and training facilities, and ensuring that approved labelling and standardised procedures are followed.

Government should extend coverage of the different feeding programmes, quality control and monitoring from production to consumption, tax exemption or duty exemption on certain nutrients and subsidisation of raw materials for a fixed period. IEC support through the visual media or through the press, decentralisation of production units and development of an education curriculum for implementation would also be required. Multi-centre research and regional laboratories for biochemical and food analysis would also be required.

Partners outside the government would need technical inputs for education, information and communication support that they might decide to provide. Donor support would come in the form of support for technology transfer.

A short term action plan should include setting up of a pilot project, creating awareness, initiating research to identify socio-cultural attitudes, practices and food acceptances and assessing the efficacy of existing programmes.

There should be proper evaluation of current fortification efforts with a view to identifying those which could be scaled up to enable wider coverage. Efficient and cautious use of donor support is recommended focusing on managerial and technical expertise.

Case studies of the use of fortified foods have shown technical feasibility but not examined biological impact. Such studies are, in fact, needed and should be carried out where information is not available.

BLUEPRINT FOR ACTION

Micronutrient malnutrition, in particular deficiencies of vitamin A, iron and iodine among vulnerable population groups in India is a matter of serious concern. While existing programmes have had impact in controlling some of these deficiencies, there is an urgent need and considerable potential to strengthen, organise and expand interventions to eliminate these deficiencies.

5.1 Interventions

Supplementation

These interventions targeted at specific age groups that are at risk of iron and vitamin A deficiencies should be carefully reviewed to ensure appropriate logistics management & strengthened with innovative approaches and appropriate funding. Close collaboration and integration between the Child Survival and Safe Motherhood (CSSM) and the Integrated Child Development Services Scheme (ICDS) is essential to achieve the desired coverage and adequate compliance by beneficiaries.

Food Fortification

Food fortification is recommended as an approach with immense potential to reach micronutrients to large populations in India at an affordable cost.



Several foods are already being fortified today in India with micronutrients. For example, vanaspati is being fortified with vitamin A, ready-to-eat foods with

vitamin and mineral pre-mixes, milk with vitamin A, bread with soya flour and vitamins, etc.. However, there are many more promising opportunities that can have larger coverage and impact:-

- Iodisation of salt will continue as a permanent measure with increased production to cover the entire population accompanied by improved quality and monitoring. Pioneering work done in India has shown that double fortification of salt with iodine and iron is technically feasible. It is proposed that institutional studies be completed as soon as possible to prove efficacy followed by community studies to assess effectiveness and consumer acceptability. This will enable government to formulate appropriate legislative measures for commercial production and expanded coverage.
- Fortification of sugar with vitamin A and iron is another opportunity that could be pursued by the Directorate of Sugar in collaboration with the Indian Sugar Mill Manufacturers Association.
- Fats and oils are good vehicles for fortification with vitamin A. Besides vanaspati, there is an urgent need to pursue fortification of vegetable oils.
- Fortification of ready-to-eat foods with iron and vitamin A is recommended along with the need for their expanded production and coverage.

Dietary Approaches

Dietary adequacy is the ultimate objective for the control of micronutrient malnutrition. The production and consumption of foods rich in vitamin A and iron at the community level should be encouraged. This would need information dissemination through various channels such as mass media, person to person approach and school education.

5.2 Support Measures

IEC: For all three interventions, integration of information, education and communication is an essential pre-requisite. A special committee should be set up to review all issues of IEC in existing programmes.

Standards and Regulations: Quite often existing food standards and laws included under the Prevention of Food Adulteration Act (PFA) obstruct proper development of food fortification. Rationalisation of the PFA Act & Rules to overcome these obstacles and easy compliance is an urgent priority.

5.3 Roles and responsibilities of key partners:

Private Industry

The food industry should assume a lead role and responsibility in the endeavour in four specific ways:

- Explore opportunities for food fortification and double fortification of existing and new products, i.e., industry should not only be responsive to requests from Government, but should also be proactive in identifying feasible options.
- Reach out to research laboratories (such as CFTRI, NIN or ICMR) and experts and seek ideas for fortification, seek assistance in product development and testing at institutional and community levels and request government clearance and endorsement of fortified products.
- Utilising powerful marketing tools and media, widely employed for commercial and consumer products for marketing fortified products.
- Disseminate the message of micronutrient malnutrition control through employees, their nuclear families, the villages and communities in which the employees live and the wider network of dealers and vendors. A private company could be a powerful ally in IEC even if it is not directly involved in the production and distribution of fortified foods.

Non-Governmental Organisations

Given their direct interaction with beneficiary groups, NGOs can be major partners in delivery of interventions. Their role as a catalyst to the programme is very important.



Three possible actions that they could undertake:

- Educate vulnerable populations on proper nutrition and advise them on dietary diversification, supplementation and use of fortified foods.

- Help beneficiaries to assert themselves and get their entitlement from development programmes.
- Provide useful feedback to industry, experts, research institutions, government and donors on the needs of the people in the context of micronutrient malnutrition control strategy, progress and real impact.

Medical and Nutrition Experts

Five areas in which experts can take action personally and for their institutions:

- Speed up baseline and subsequent surveys of biological status and be pragmatic in that process.
- Link with international research, development and fortification experiences in other countries, adopt and adapt them to Indian situations. Become the champions on the technology front and enhance domestic capability in fortification technology.
- Reach out to Indian industry and help out in process engineering and product engineering for fortified products.
- Link with schools, colleges, NGOs, panchayats and Nagar palikas and help them disseminate simple, popular, meaningful and continued education on nutrition.
- Work with industry to get practical experience and return after that to research and policy making so that a much greater degree of mutual understanding may result.

Donor Agencies

- Should continue the partnership with Central and State Governments particularly in IEC and sustainable development rather than on donation based programmes.
- Should focus on helping NGOs, colleges and schools to carry out comprehensive nutrition education campaigns.
- Should allocate resources to support concept advertising and promotion of nutritious foods and malnutrition control while each company can spend on promotion of its own brand.

Government

While the government is the residual source of responsibility and the refuge of the people, the other partners could greatly alleviate the burden on government in carrying out solutions to enable the government to focus on achieving economic growth and realising the country's vision to be a significant global economic power in the Twenty First Century. Government should focus more on policy and planning roles and rely on industry and NGOs for implementation and delivery. There is a strong case for more public investment in nutrition with massive benefits in terms of better productivity that improved nutrition can provide. Government should allocate resources to supplement those of industry and donors and supplement concept promotion expenditure on fortification.

Administratively, there is need for better co-ordination and management with an emphasis on multi-sectorality between Departments of Health, Women & Child Development, Industry, Food Processing Industries and Civil Supplies in addressing micronutrient malnutrition as a super-ordinate societal goal.

5.4 Summary

- 1) The approach to elimination of micronutrient malnutrition necessarily has to be multi-sectoral, calling for close co-ordination across different government departments and also across non-government and private sector organisations.
- 2) People should be empowered to manage their own nutrition through dietary adaptations and self-sufficiency rather than perpetuate dependence on supplements.
- 3) Given our already high technical knowledge base on the subject, the use of relevant modern management processes could be very useful in tackling micronutrient malnutrition.
- 4) The accelerated economic development in the country coupled with government commitment to social development offers opportunities that could be used to advantage to address the problem of micronutrient malnutrition.
- 5) There is need for communication, education and social mobilisation down the hierarchy and to the people.
- 6) The relative ease with which staples could be fortified and the extensive reach of fortified staples presents a strong case for advocacy of mandatory food fortification of appropriate vehicles.

Strategy Workshop for Eliminating Micronutrient Malnutrition in India 1-2 November, 1995

Venue: Hotel Clarks Amer, Jaipur

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Abbreviations

CFTRI	:	Central Food Technological Research Institute
CSSM	:	Child Survival and Safe Motherhood
DFS	:	Double Fortified Salt
GDP	:	Gross Domestic Product
GNP	:	Gross National Product
GOI	:	Government of India
ICDS	:	Integrated Child Development Services
ICMR	:	Indian Council of Medical Research
IDD	:	Iodine Deficiency Disorders
IEC	:	Information, Education and Communication
KAP	:	Knowledge, Attitudes and Practices
KSAPL	:	Karnataka State Agro Corn Products Ltd.
MI	:	Micronutrient Initiative
NCAER	:	National Council of Applied Economic Research
NCERT	:	National Council for Educational Research & Training
NGO	:	Non-governmental Organisation
NIN	:	National Institute of Nutrition
NNP	:	National Nutrition Policy
NPAN	:	National Plan of Action on Nutrition
PDS	:	Public Distribution System
PFA	:	Prevention of Food Adulteration Act
RTE	:	Ready-To-Eat
UNICEF	:	United Nations Children's Fund



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