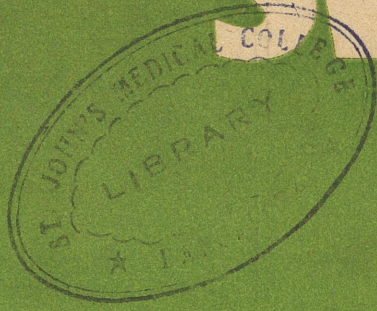


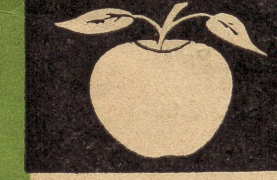
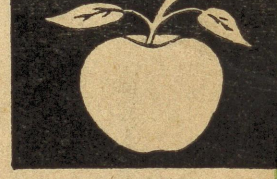
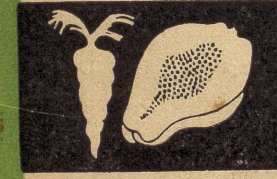
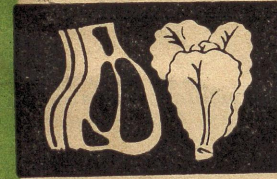
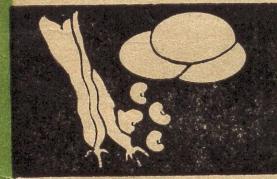
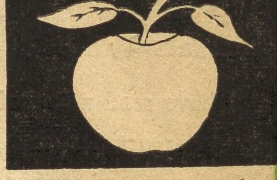
Nutrition

# swasth hind

february 1985



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Magha — Phalguna February 1985  
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Kotla Marg, New Delhi-110 002.

ASSTT. EDITOR : D. N. Issar

Sr. SUB-EDITOR : M. S. Dhillon

SUB-EDITOR : G. B. L. Srivastava

COVER DESIGN : B. S. Nagi

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Articles on health topics are invited for publication in this Journal.

State Health Directorates are requested to send reports of their activities for publication.

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Smt. Mohsina Kidwai  
takes over as  
Union Minister for  
Health & Family Welfare

Smt. Mohsina Kidwai, Union Minister for Health and Family Welfare was born on 1 January, 1932 at Banda, U.P.

Smt. Kidwai took up social work and was instrumental in establishing a Ladies Club at Barabanki with the objective to give the poor and downtrodden womenfolk of the town the basic education in family health and sanitation, child care, ills of dowry system and also to impart sufficient knowledge in reading and writing. She was appointed Convener of District Bharat Sewak Samaj and established a school to give condensed course to destitute women upto Class VIII which opened opportunities for such women to stand up on their own feet and earn their living by getting employment as teachers and nurses.

She also started handicraft and tailoring centres and provided training-cum-earning opportunities to the middle class families who were shy to work otherwise but needed financial support.

She also established a Child Care Centre where destitutes are taken care of.

She was elected to U.P. Legislative Council from Local Bodies Constituency in 1960. In 1966, she was elected as MLC from the Assembly Constituency in a by-election and continued till 1970 and again was elected for 6 years term.

She was appointed State Minister for Food and Civil Supplies in November, 1971 in Uttar Pradesh. She was appointed Cabinet Minister for Social Welfare in 1973 and again in 1974 as Cabinet Minister, Incharge of Small Industries.

She was entrusted organisational responsibilities and was nominated President, Uttar Pradesh Congress Committee in 1976 which post she held till December, 1979.

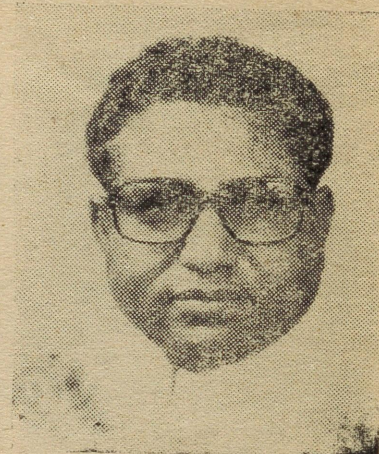
Elected as Member of Parliament in 1978 by-election from Azamgarh and from Meerut in 1980 and 1984, she was nominated for the second time in July, 1982 as President, Uttar Pradesh Congress Committee.

She joined the Union Ministry as Minister of State for Health and Family Welfare in February, 1983. She was Minister of State for Rural Development before joining the Union Cabinet as Minister of Health and Family Welfare on 31 December, 1984.

She has widely travelled. Countries visited include U.S.S.R., Britain, USA, Canada, East Germany, Kenya, Uganda, Tanzania, Mauritius, Hungary, Dubai and Pakistan.

Apart from her hobbies of reading, house-keeping, music and sports she is interested in helping destitute, down-trodden women and children and creating opportunities for them to become responsible citizens of the country.

Shri Yogendra Makwana  
takes over as Minister  
of State for Health &  
Family Welfare



Shri Yogendra Makwana, B.A., LL.B. was born on 23rd October, 1933 at Sojitra, Taluka Petlad in Distt. Kheda of Gujarat State. He had his early education at Sojitra from M. M. High School. Later, he attended Gujarat College, Ahmedabad, for higher education. He studied Law from Sir L. A. Shah Law College, Ahmedabad and City Law College, Ahmedabad.

Shri Makwana is a lawyer by profession. He is very much interested and takes active parts in the activities for the educational, social, cultural and economic upliftment of scheduled castes, scheduled tribes and backward communities. He was Member of (i) Gujarat State Panchayat Council, 1972-75 and (ii) Committee for the Selection of Best Gram Panchayat in Gujarat State. He was also Convenor of (i) Kaira Distt. Youth Congress, 1969-73, and (ii) Kaira Distt. Harijan Cell, 1969-73. He was also General Secretary, Gujarat Pradesh Congress (I) Committee from 1975. Elected to the Rajya Sabha in March, 1973 and re-elected in April, 1976 and again in March, 1982. He became Deputy Chief whip of the Congress(I) Party in Parliament on 2 May, 1979 and was inducted in the Union Council of Ministers on 14 January, 1980. He, as Minister of State for Home Affairs, was instrumental in introducing some of the progressive development and welfare programmes for the weaker sections, especially the Scheduled Castes and Scheduled Tribes. He founded an organisation called Akhil Bharat Anusuchit Jati Parishad for organising the Scheduled Castes, and for achieving their all round upliftment and progress in cultural, educational, economic and social fields. He continues to be its President since its inception in June, 1980 when he was unanimously elected as its President. He took over as Minister of State for Communications on 15 January, 1982. Subsequently he was Minister of State for Agriculture from 29 January, 1983 to 31 December, 1984. Thereafter he was re-inducted into the new Council of Ministers as the Minister of State for Health and Family Welfare.

Apart from his official duties he has also travelled extensively throughout the country to organise the Scheduled Castes and to study and solve their problems and to create awareness among them. He has travelled abroad in countries like Germany, Poland, U.K., France, Switzerland, Italy and Egypt.

# INFECTION

## —a major contributor to malnutrition

P. BHASKARAN

Malnutrition and infections are always coexistent in the poor communities of developing countries. The interaction between these two conditions is often shown to have adverse effects on the child. Infectious diseases common to childhood have been shown to precede and precipitate various nutritional deficiencies. Hence, prevention of common childhood infections gains importance in the programmes oriented towards prevention of malnutrition in the community.

**M**ALNUTRITION is a major public health problem in developing countries and contributes to nearly 90% of the deaths occurring in children under 5 years of age. It is well established that poverty is the major cause of malnutrition. A poor child has to satisfy with a meagre diet that is qualitatively as well as quantitatively substandard and often lives in an environment that is conducive to the spread of infections. The interaction between malnutrition and infection in such situations have been clearly demonstrated by a number of epidemiological, clinical as well as experimental observations. Malnutrition is understood to increase susceptibility to a variety of infections while repeated infections can precipitate malnutrition. The interaction between infection and malnutrition is a two way process.

The outcome of an infectious disease in a host is mainly dependent upon the dose and virulence of the infective agent, besides the genetic make up of the host. A number of environmental factors play an important role in altering the course and outcome of the infectious disease. Malnutrition is one of these environmental factors that leads to adverse interactions with the infective agent and the outcome is often detrimental to the host.

Diarrhoea, whooping cough, tuberculosis, measles and chicken pox have been observed to be the common infections among children which precede and precipitate malnutrition.

### Diarrhoea

Diarrhoea appears to be the most common infectious disease that precipitates kwashiorkor—the most severe form of protein energy malnutrition (PEM).

The epidemiological relationship between these two diseases has been clearly demonstrated by their sequential incidence. The peak diarrhoeal season of every year precedes the peak incidence of kwashiorkor by 2-3 months. Retrospective data collected from hospital records document the contributory role of diarrhoea in as many as 70% of children with severe PEM.

These problems of malnutrition and diarrhoea commence with weaning when diluted and contaminated feeds are introduced in the child's diet. This leads to recurrent episodes of diarrhoea which results in a deterioration of the nutritional status. The impaired nutritional status predisposes the child to further attacks of diarrhoea and systemic infections, by lowering the immune status. Thus a vicious cycle gets established ultimately resulting in the stage of severe malnutrition.

### Measles

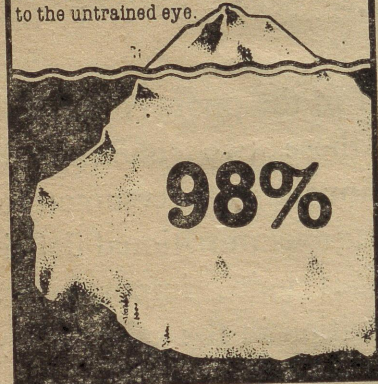
Measles is one of the common exanthematous viral infection occurring in children under 5 years of age. Longitudinal studies carried out in poor communities have shown that 25% of children presenting with clinical signs of kwashiorkor or marasmus have

# HIDDEN HUNGER

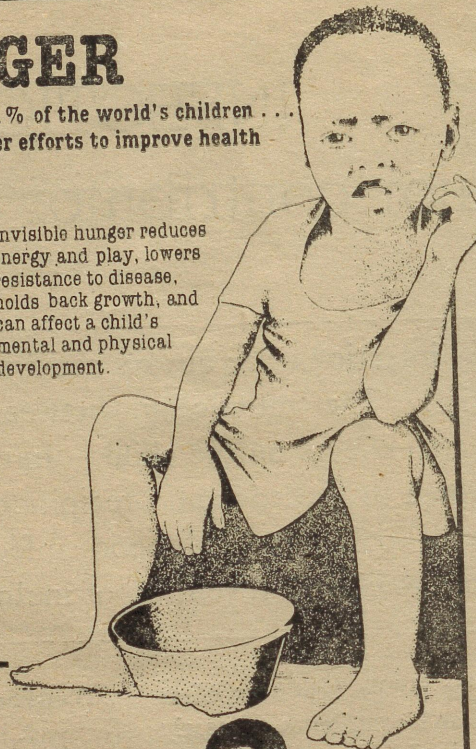
"Visible malnutrition affects less than 1% of the world's children . . . but hidden hunger can still blunt all other efforts to improve health and education" — (UNICEF).

## ICEBERG HUNGER

98% of all child malnutrition is invisible to the untrained eye.



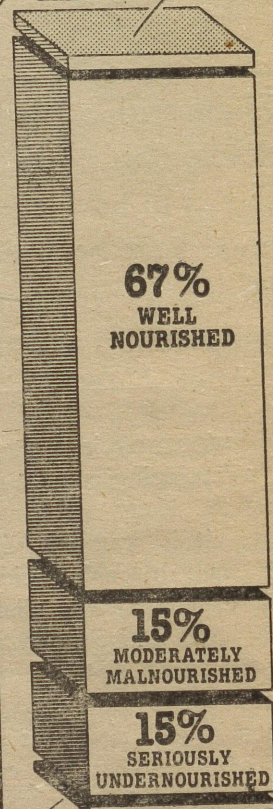
Invisible hunger reduces energy and play, lowers resistance to disease, holds back growth, and can affect a child's mental and physical development.



## AT A GLANCE

A visual guide to the nutritional status of the world's young children.

2% OBESE

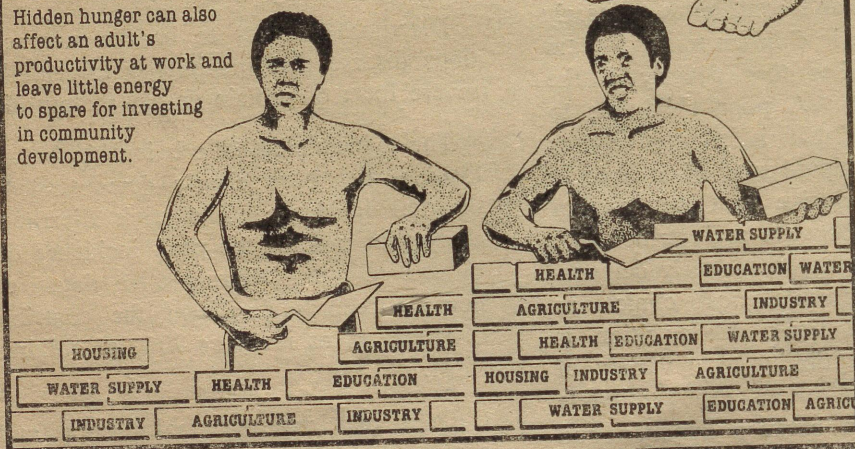


1% VISIBLY MALNOURISHED

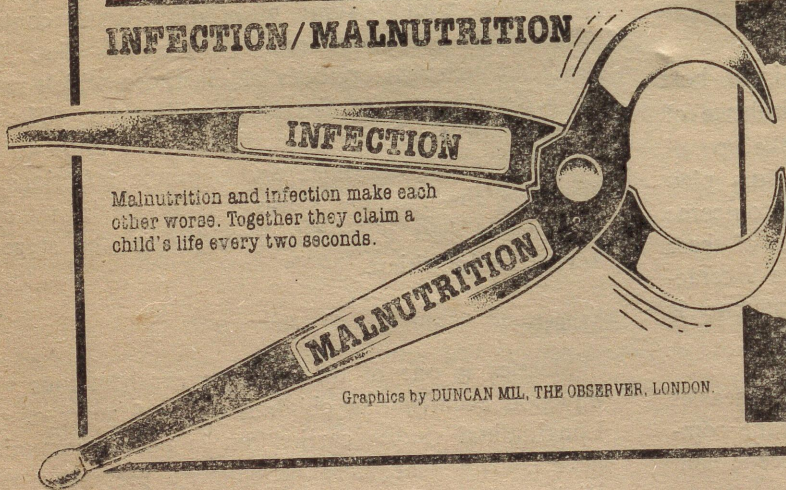
Approx figures (ALL FIGURES EXCLUDE CHINA)

## ENERGY CRISIS

Hidden hunger can also affect an adult's productivity at work and leave little energy to spare for investing in community development.

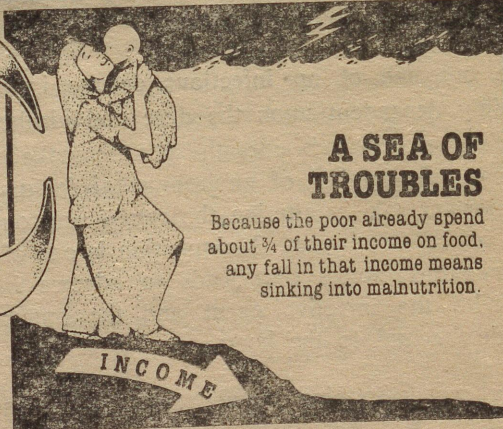


## INFECTION/MALNUTRITION



Malnutrition and infection make each other worse. Together they claim a child's life every two seconds.

Graphics by DUNCAN MILL, THE OBSERVER, LONDON.



## A SEA OF TROUBLES

Because the poor already spend about 1/3 of their income on food, any fall in that income means sinking into malnutrition.

suffered from measles in the preceding 3-6 months period. Measles leads to a significant loss of weight ranging from 1 to more than 5% of the original body weight. Serum albumin levels fall during the acute episode. Added to these initial effects, the increased morbidity due to various infections in the post-measles period for nearly 6 months causes serious disturbances in the growth of the child. These consequences of measles are common to a well nourished as well as a malnourished child. In a well nourished and well-to-do child timely medical care reduces the duration of each morbid episode and proper diet provided during convalescence helps in better growth. However, in an already undernourished poor child, recurrent infections tilt the balance of the nutritional status towards malnutrition. In the unhygienic environment of the nutritionally deprived poor child the vicious cycle between malnutrition and infection quickly gets established resulting in the precipitation of severe malnutrition.

### Tuberculosis

Association between malnutrition and tuberculosis is well recognised. The incidence of tuberculosis in the underprivileged parts of the world is well known. It is observed to be higher among subjects belonging to poorer segments of the population whose habitual diets are far from satisfactory both in quality and in quantity and among whom malnutrition is widespread. Incidence of tuberculosis in children suffering from kwashiorkor is reported to range from 30-50%. The age distribution of the incidence of kwashiorkor and tuberculosis appears to be very similar to each other. Thus there is a strong evidence suggestive of a positive association between malnutrition in children on the one hand and tuberculosis on the other. Similarly whooping cough and chicken-pox are observed to be important infections associated with severe malnutrition. Apart from precipitating severe protein energy malnutrition, infection is shown to lead to individual nutrient deficiencies also. The association between infection and vitamin A status is a well recognized observation. Diarrhoea and Measles are often found to precede keratomalacia resulting in blindness in young children.

Measles is reported to contribute to blindness in a significant proportion of African children. Vitamin A levels in serum are observed to be low in these children during the episode of infection.

Effect of infection on serum iron and folate levels, and increased excretion of ascorbic acid following an episode of infection are well known.

February 1985

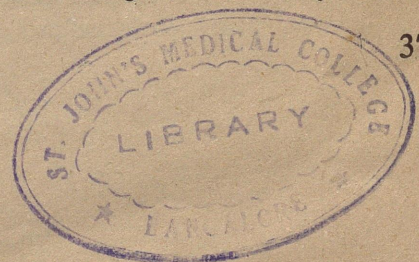


*Nutritional supplements would achieve the desired beneficial results when the metabolic disturbances caused by infections are prevented*

(Photo : CHEB)

### Parasitic infestations

In addition to bacterial and viral infections, parasitic infestations are important contributors to malnutrition in the developing countries. Recurrent episodes of malaria are known to cause anaemia and increase susceptibility to other infections. The association between hookworm infestation and iron deficiency anaemia is too well known. The epidemiological observations associating Ascariasis and growth are controversial. However, the general opinion is that Ascariasis contributes to malnutrition by malabsorption of nutrients, though it is not a major factor.



---

## Effect of Infection on Nutrition

---

### 1 Direct effect

- a Anorexia, vomiting  
Impaired digestion  
and absorption —————> Decreased food intake  
and utilization
- b Loss of nutrients  
and cells Overutili-  
zation, sequestra-  
tion and diversion  
of nutrients —————> Nutrient wastage

### 2 Indirect effect

- a Interaction of infection  
with socio-cultural factors —————> Decreased food intake  
and nutrient wastage

—WORLD HEALTH

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### Mechanisms involved

Infection precipitates malnutrition by various mechanisms:

1. Food intake is decreased because of anorexia.
2. Vomiting is often associated with infection in childhood and contributes to significant loss of nutrients.

Repeated purging as occurs in diarrhoea also leads to loss of nutrients.

Malabsorption of nutrients through gastro intestine often accompanies various systemic infections also.

3. Increased catabolism leads to excessive loss of urinary nitrogen. The cultural factors and lack of knowledge regarding feeding of a sick child further decrease the intake of the necessary nutrients and all these factors finally contribute to negative nutrient balance and lead to malnutrition.

However, in communities where both malnutrition and infectious diseases are co-existent and widespread, it is difficult to draw a cause and effect relationship between the two. While the metabolic alterations induced by infection precipitate malnutrition, impaired

immune functions in the malnourished child tend to aggravate the infection thus leading to a synergistic effect which is ultimately thrusting its adverse effects on the host.

### Preventive measures

Programmes planned to prevent malnutrition in the developing world should be aimed at breaking this vicious cycle. Prevention and control of communicable diseases has a major role in preventing malnutrition among children in poor communities. Nutritional supplements would perhaps achieve the desired beneficial results when the metabolic disturbances caused by infections are prevented.

Control of diarrhoeal diseases involves improving the environmental sanitation, providing clean drinking water and health education regarding personal hygiene. Routine vaccination for Measles, whooping cough and tuberculosis prevents the morbidity contributed by these infectious diseases.

Nutrition and Health education regarding the feeding practices to be observed for sick children and the importance of utilising available medical and health care at the earliest period of the child's sickness will certainly have a significant contribution in preventing malnutrition.  $\Delta$

# FOOD SAFETY

in

## health and development

M. ABDUSSALAM

Between the time food is produced and the time it is eaten, a host of factors intervene that can alter its safety. A group of experts has suggested how governments can best ensure that the food consumed in their countries is safe, wholesome, and nutritious. Action is required in the form of food inspection services supported by realistic legislation, efficient analytical laboratories, and health education of food handlers. But these measures must be complemented by the primary health worker, one of whose tasks is to encourage local food practices that are beneficial to health and discourage those that are harmful.

ACTIVITIES to ensure that food is safe, wholesome, and nutritious are an essential component of any health care system. Although some of the more serious foodborne diseases such as typhoid, cholera, and several parasitic infections have been brought under control in countries with adequate sanitation, they still constitute an important cause of morbidity and mortality in developing countries. Moreover, other foodborne infections and intoxications continue to be highly prevalent in both developed and developing countries, and there are indications that many of them are even on the increase. These include non-typhoid salmonellosis, campylobacteriosis, staphylococcal enterotoxigenesis, *Vibrio parahaemolyticus*, and in some areas, taeniasis and trichinellosis.

Occasionally biotoxins in fish and shellfish and in food grains and other parts of edible plants reach dangerous levels and constitute serious hazards to consumers. Added to these are recently recognized hazards from mycotoxins and residues of harmful chemicals, such as pesticides, heavy metals, drugs, and growth-promoting substances. In some cases chemicals added to food in order to improve its appearance, flavour and palatability, or even to mask certain defects, may be harmful. Although chemicals are implicated in a relatively small proportion of reported episodes of foodborne disease, their long-term

effects in causing malformation or cancer are poorly known and cause concern among the public.

There is no doubt that foodborne diseases and food contaminants continue to be serious health hazards, as well as causing tremendous losses to the food industry and trade. Food spoilage due to fungi, bacteria, insects and rodents is another burden—particularly heavy in developing countries—which adds to the gravity of the situation. Yet many countries give a relatively low priority to food safety in their public health programmes. Even the Alma-Ata conference on primary health care mentioned food safety only by implication when it included “promotion of food supply and proper nutrition” among the eight components of primary health care. One reason for this was the overriding concern with the sheer availability of food. With most of mankind experiencing chronic or temporary food shortages sometimes reaching famine proportions, health officials justifiably worry about whether there will be enough food for all, rather than about its safety or wholesomeness. Nevertheless, given the grim costs of food contamination, action for food safety cannot await adequacy of supply—nor are efforts to achieve both incompatible.

### Expert Committee on Food Safety

In the last 40 years, international organizations have produced a large number of documents on food safety

and initiated many programmes to deal with it. Yet in spite of their efforts foodborne illness continues to increase in the world. Why this should be so is not clear, but it may have to do with the relatively fragmented nature of the programmes, the difficulty of convincing governments of the full importance of foodborne disease, and, most important, the lack of recognition that solving the problem requires the co-ordination of a spectrum of skills including economics, sociology, and anthropology as well as the more traditional disciplines associated with food safety.

It was for this reason that WHO and the Food and Agriculture Organization of the United Nations (FAO) jointly convened an Expert Committee from 30 May to 6 June, 1983 to address these issues from as wide a perspective as possible. The experts were drawn from a broad range of disciplines, including food science, public health administration, clinical medicine, veterinary public health, microbiology, behavioural sciences, economics, chemistry, and agriculture. Since previous expert groups of FAO and WHO had already produced recommendations on specific aspects of food safety such as food microbiology, food additives, pesticide residues, meat, fish and milk hygiene, zoonoses, and parasitic diseases, the Expert Committee decided to concentrate on devising a broad strategy that would be useful to policy makers in constructing and developing national programmes. It undertook to propose broad measures whereby countries could assess their needs, fix priorities, and formulate valid technical policies for dealing with food safety as a basic component of their health care system.

### The problem

Numerous infections and toxic agents can become foodborne and there is little doubt that they cause relatively heavy morbidity throughout the world. However, the reporting and surveillance of these diseases are very incomplete, and in some countries dramatic outbreaks of "food poisoning" in urban areas are the only ones that find a place in newspapers and less commonly in official statistics. Most of the smaller outbreaks and sporadic cases, especially in rural areas, go unreported. Even in the few countries that have well developed systems of disease surveillance, only a small fraction of foodborne disease is recognized and reported. Studies based on special searches for illness in one such country, for example, suggested that the ratio of actual to reported cases may range from 25:1 to 100:1.

In developing countries this ratio is certainly far more unfavourable, and quantification of the prob-

lem is virtually impossible. However, some idea of its gravity may be formed from a review of studies based on active surveillance of diarrhoea in children, which is largely caused by foodborne pathogens.

From this review WHO's Diarrhoeal Diseases Control Programme estimated that in 1980 there were about 1000 million cases of acute diarrhoea in children under 5 years of age in Africa, Asia (excluding the People's Republic of China), and Latin America. Of these children about 5 million died; this means 10 child deaths every minute around the clock. The surviving children suffered accentuated malnutrition and decreased resistance to disease. In other age groups too, diarrhoeas and other foodborne diseases take a heavy toll in the developing world.

The economic and social impact of food contamination has not been studied systematically but a few estimates of losses from individual diseases have been attempted. For example, an estimate of the costs to the Federal Republic of Germany attributable to salmonellosis alone in 1977 was DM 240 million (US \$ 100 million) or about DM 4 (\$ 1.65) per head of population. Similar information from the USA confirms the serious economic consequences of foodborne salmonellosis; there, the yearly losses are estimated to be \$ 200—300 million.

There is no doubt that the economic losses suffered by developing countries due to food contamination are much higher than those experienced by developed countries. Apart from the direct costs of processing or rejecting contaminated food and treating the diseases caused by it, one has to consider the loss of work output and earnings of patients resulting from morbidity, disability, or premature mortality. There may be other direct losses in the value of food itself, in the form of interference with trade with industrial regions or from adverse effects on the tourist industry, which brings in much-needed foreign exchange to many developing countries.

Sometimes even the preventive measures undertaken by government agencies dealing with food may have dramatic social and economic consequences. Twenty years ago the US Food and Drug Administration warned the public against eating smoked fish from the Great Lakes after seven deaths from botulism had occurred following the consumption of such fish. As a result, consumption of all kinds of fish went down throughout the country and 20,000 workers were threatened or affected by lay-offs. Most of them had to be paid unemployment allowances amounting



*We need not only adequate food for all but food which is safe, wholesome and nutritious too.*

(Photo : United Nations)

to millions of dollars. A promotional campaign costing another million dollars was needed to regain public confidence.

The Joint Expert Committee advised countries to make systematic studies of the impact on health and social conditions of foodborne contaminants so that their food safety system may be developed on cost-effective lines.

#### Factors affecting food safety

Pathogenic bacteria, which are the most frequent cause of foodborne infection and intoxication, can multiply or persist in food at dangerous levels under certain conditions of mishandling. These have been studied in North America and Europe.

The kinds of mishandling most commonly implicated are preparing food far in advance of consumption and leaving it at room temperature, inadequate cooking of raw food, and insufficient reheating of previously cooked foods. The most common sources of contaminants are raw ingredients or persons handling food who are actively infected with or "silent carriers" of pathogens. Comparable studies have not been carried out in developing countries, but the occasional investigations of outbreaks there indicate that the situation is very similar. For example, outbreaks of staphylococcal intoxication and other forms of bacterial foodborne disease have frequently been observed in connection with wedding parties or temple feasts where large quantities of food are prepared a day or two in advance and stored at ambient temperatures in warm humid climates. Furthermore, spices contaminated with dust and bacterial spores are often added *after* the food has been cooked; these can develop dangerous levels of bacterial growth if left for some time at room temperature.

Apart from the foregoing factors, which determine the presence and entry of contaminants into foods and their subsequent survival or growth leading to infection or intoxication, there is a series of other elements that have an indirect influence on the pattern of foodborne disease. A full understanding of these is also necessary in order to plan food control systems and other preventive measures. Unfortunately, they form a vast complex of factors involving the production and distribution of food, the behaviour and habits of consumers, the processing, transport, and storage of food products, and the environment and climate of the region. Change may be difficult because of economic or social constraints.

The adverse effect of economic factors on food safety can be illustrated by considering the food systems, they engender. In *low-income rural systems* most of the food is grown locally, prepared at home, and consumed fresh. In these systems contamination may come from unclean ingredients, especially polluted water, from mishandling in storage and preparation, and from exposure to flies, etc., after cooking. In *low-income urban systems* the foregoing hazards of the rural system are compounded by purchase of cheap foods of questionable quality and safety from street vendors or from shops with poor sanitation and lack of refrigeration. Furthermore, bad housing and increased population density have a negative effect on sanitary conditions and facilities. In *high-income systems*, both urban and rural, there is a greater tendency to purchase industrially processed semi-prepared or prepared foods, which are more amenable to food control. These systems also benefit from a more sanitary environment, cleaner water, and improved storage facilities such as freezers and refrigerators. However, raw animal foods (meat, poultry, fish, and shellfish)—which are consumed in larger quantities in these systems—are often contaminated with pathogens by the time they arrive in the kitchen at home or in a restaurant and can be dangerous if insufficiently cooked or reheated.

Food habits exert a strong influence on food safety. Most of them are protective in a real or magical sense, but many do have a negative effect on health. Harmful food habits include a taste for raw or undercooked food or for hazardous additives (colouring, thickening, or sweetening agents). Other hazards arise from erroneous traditional beliefs; for example, in some parts of the world the consumption of raw meat is considered to be invigorating and health-giving, as is the stripping of milk from the teats of goats or cows directly into the mouths of children. Many mothers believe that intestinal worms in children are essential for the digestion of food or that fluids should be withheld during episodes of diarrhoea.

Among other hazardous factors the Expert Committee considered the use of antimicrobial substances and pesticides in agriculture, the use of chemicals in processing and preparation, problems of food service, and mass catering. A problem of importance in developing countries is the street vending of various types of raw and prepared food, which is difficult if not impossible to control. However, because of the economic advantages this form of marketing offers to public and vendors alike, health authorities cannot easily put a stop to it.

The Expert Committee underlined the importance of clarifying the role of the foregoing direct and indirect factors in the epidemiology of foodborne disease and urged health workers to take full cognizance of their influence, even though many of them lie outside the normal sphere of their professional activities.

#### Strategies to improve food safety

It is self-evident that the consequences of the consumption of unsafe food are always superimposed on the existing health status of the individual or the community, frequently marked by malnutrition. Furthermore, these episodes occur within the framework of the cultural, economic, ecological, and social conditions of the community, country or region concerned. In evolving a strategy of food safety, it is therefore essential to understand the interaction of these factors with the epidemiological situation and with the various control measures that might be feasible under the prevailing circumstances. Also, it is important that food safety activities should be an integral part of the health care delivery system and closely linked to its nutrition component. However, one must recognize that the health agencies alone cannot solve the totality of this complex problem. It requires a broad national commitment and the collaboration of departments concerned with health, agriculture, commerce, and finance, and the cooperation of the food industry, biomedical and agricultural scientists, and the consuming public.

To plan strategy one needs also to identify the main foodborne hazards causing morbidity and mortality, including critical factors that lead or contribute to illness. Unfortunately, complete information on all these aspects is lacking even in many industrial countries. The Expert Committee urged countries to strengthen their disease surveillance and food monitoring programmes and asked FAO and WHO to cooperate with them and carry out further international comparisons of information received from national programmes. The two organizations were also asked to establish and maintain early warning systems to report serious disease episodes and the finding of dangerous pathogens in food entering international commerce. All such information activities should be part of the overall disease reporting system at both national and international level.

#### *Hazard analysis and critical control points*

Because of the strong economic implications of food safety, the selection of strategies should give careful consideration to their cost-effectiveness and

## Detection of Khesari Dal in Pulses

Indian Standards Institution (ISI) has prepared an Indian Standard which prescribes quick test method for determination of presence of *khesari dal* in pulses. For determining its presence, 50 ml. of dilute hydrochloric acid should be added to the 'dal' and kept on simmering water for about 15 minutes. If a pink colour develops, it indicates the presence of *khesari dal*, which is considered as a toxic material.

The Standard prescribes methods of test for determining quality characteristics of pulses which have not been processed. It also provides for methods for determination of size, mass, impurities and foreign odour of pulses intended for human consumption.

For proper assessment of the quality of foodgrains including pulses, it is necessary that only uniform methods of test are adopted throughout the country. It is expected that this standard will help the farmers in assessing the quality of their produce and also help in fixation of their price on a scientific basis so as to narrow down the misunderstanding between the purchasers and the sellers.

— PIB

health benefits. It is known that faulty practices can be detected during food processing and preparation, often in time to prevent the occurrence of foodborne-disease outbreaks. One approach to lowering costs and achieving greater effectiveness in their detection is the application of the "hazard analysis critical control point" system, which is already being fostered and coordinated by FAO and WHO. To carry out a hazard analysis one first identifies each potentially hazardous ingredient in a product, observes each sequential step of the processing or preparation operation, and tests foods during certain steps for the presence of microbial or chemical hazards. The parts of the operation frequently found to be hazardous are known as the *critical control points*; these are the ones that must be performed correctly to ensure the safety of the final product. Once the critical control points have been determined for a particular food or operation or group of operations, the food worker or handler must be taught to apply the necessary control measures at each such point, and these measures should be monitored and evaluated by health inspectors or other regulatory staff. This system has been

Food habits exert a strong influence on food safety. Most of them are protective in a real or magical sense, but many do have a negative effect on health. Harmful food habits include a taste for raw or undercooked food or for hazardous additives. Other hazards arise from erroneous traditional beliefs.

adopted by certain food processing plants and food service establishments to great advantage, including cost savings.

#### Interventions

As with strategies, the Expert Committee laid down certain general principles for the selection and application of interventions and their evaluation. All interventions must take place within the context of the norms, practices, and recognized needs of the society concerned. They should not be allowed to disrupt the fundamental values of society. Another important principle is that before the major elements of a food safety programme are implemented, they should be subjected to careful cost-benefit analysis in the context of the existing social and biomedical environment.

In the long chain of events from food production to ultimate consumption, one must differentiate between strategies and interventions to be applied (a) to the food production, processing and distribution system, and (b) to the food service system and to home preparation and consumption. Food control activities will be dominant in the former and health education in the latter, although both approaches are needed all along the chain.

The Expert Committee considered both drinking-water and water used for food preparation as "food". It not only emphasized the importance of a potable water supply but also recommended that food and potable water control should be integrated into a single safety system.

The following direct interventions were among the applied food safety measures discussed by the Expert Committee.

- *Education of the public*, including that of food handlers, and *ensuring community participation* are among the most important measures for the implementation of food safety programmes. They are especially critical where inspection is weak or impossible, as in most rural areas in the developing countries and in homes everywhere. Proper health education will induce people to take measures to protect themselves from food-

borne hazards and to cooperate actively with regulatory agencies in enforcing compliance with food legislation.

- *Food control activities* must be planned and implemented and backed up by the requisite legislation and infrastructure. A well planned, well trained, incorruptible inspection service supported by realistic legislation and efficient analytic services is the core of government action in this field. Unfortunately, half-hearted measures characterized by partial coverage, inadequate status of inspectors, outdated legislation often copied from elsewhere, and poor laboratory support are quite common and reflect the low priority accorded to food safety in health programmes.
- *Voluntary food quality control* by industry, trade, and food service establishments is beneficial and in their own interest, as it promotes consumer confidence. Government inspection services should encourage such voluntary control as far as possible.
- *Supportive interventions*, such as environmental sanitation, including the provision of potable water, zoonoses control, and improvement of the nutritional quality of food are important. The provision of medical care to those affected by foodborne disease also comes under this category.

#### Evaluation

Continuous evaluation of all intervention and strategies is essential but very frequently ignored. Evaluation should be provided for at the planning stage. Its objective is to assess, as accurately as possible, the health, economic and social impact of the measures taken so that the usually scarce resources available for food safety may be judiciously allocated or reallocated and strategies modified as required. Details of the Expert Committee's proposed approaches to the evaluation of food safety programmes are annexed to its report.

Courtesy : W. H. O. Chronicle Vol. 38, No. 3.

# Dietary Fibres, Health and Diseases

DR SURESH CHANDRA

Recent clinical studies indicate that dietary fibres play an important role in the control of various diseases. A little knowledge and awareness of this ingredient in diet may make a person free from such problems.

Now a days much emphasis has been given to dietary fibre in human diet. Diet therapy has always been important to medical practice since long. Recently many studies indicate that dietary fibres protect human beings from various diseases. It is much useful in the treatment of diabetic mellitus, obesity and some cardiac conditions, though dietary fibres are not digested by human intestine. Dietary fibres are various combinations of cellulose, hemicelluloses, pectins, gums and lignins. It is commonly known as 'roughage'.

## What is dietary fibre?

Currently accepted definition of fibres describes "it is plant cell-wall of poly-Sacchrides and lignin which resist digestion by the enzymes of the human gut". These roughages are made up of many complex chemical structures (such as Cellulose, lignin, hemicellulose, pentosans, gums and pectins). It includes crude fibre which is mostly the building material of cells or basic tissues. Actually crude fibre contains 22% to 50% of total dietary fibre. Previously fibre was considered to be just one of the unavailable sources of energy in the diet which incidentally had a laxative effect. However, recent observations have confirmed that increase in fibre intake could cause a decrease in the incidence of a number of diseases. Several epidemiological studies could clearly show that some diseases are more prevalent in those communities whose people take less dietary fibres.

## Role of dietary fibre

Though dietary fibres are not digested by human intestine but they promote regular bowel movements. It makes the stool soften and helps more frequent fecal elimination, in other words it prevents constipation. However, certain leguminous vegetables such as beans which contain fibre can cause flatulence or gas formation. Fibre ingestion increases excretion of bile acids, sterols and fats. Roughage has a high capacity for binding water. This means foodstuff in

the intestines can swell up about 15 times the weight of fibre in it. This makes stool heavier and bulkier.

## Sources of dietary fibre

Dietary fibres are found in plant source only. The bran, a by-product of flour milling is the most concentrated form of the fibre. It has been used as a laxative since long time. It has high water absorbing capacity. Bran contains about 44.0% dietary fibres. It makes stool softer and induces faster transient time. The transient time is the interval between consumption of food and its elimination from body. Quicker elimination and bulkier stools are beneficial to health in many ways. Fibre is a quite large amount in cereales, pulses, vegetables, fruits and nuts. The fibre content of *dhals* is always lower than corresponding whole gram. Although non-vegetarian diets are enriched with calories but are poorest for dietary fibre. Whole wheat atta used for the chapattis is better from fibre point of view. The vegetables and fruits are having the dietary fibres but less in quantity.

## Excessive high dietary fibre

Various studies have been conducted on effects of high dietary fibre on human health. It was observed that intake of excessive high dietary fibres for a long period may create some adverse effect. Excessive dietary fibres impair absorption of minerals, e.g., calcium, iron, zinc and phosphorus. Quick passage of foods through the stomach and intestines leaves very little time for absorption of such nutrients.

High fibres in diets may induce clinical deficiencies of these minerals. But such problems do not arise when these requirements are fulfilled by common foodstuffs. These deficiencies are possible only when a person will take a very huge quantity of dietary fibres for a long period.

(Contd. on Page 48)

# PROMOTION OF FOOD SUPPLY AND APPROPRIATE NUTRITION

The "promotion of food supply and proper nutrition" is considered, since the Declaration of Alma-Ata in 1978, as one of the 8 activities to which primary health care must address itself. The Nutrition Unit of WHO, Geneva, presents in a document entitled *Nutrition in Primary Health Care* the Joint WHO/UNICEF Nutrition Support Programme. It stresses the many factors that must be considered for improving the primary health care worker's action at community level. This careful approach is synthesized in the following two tables that sum up for each of us the "sacred equipment" necessary for being good servants of the people's health "in a developing country or region, with high infant and pre-school mortality rates, a high birth rate, where protein-energy malnutrition (PEM) is prevalent and some specific nutritional deficiencies common, with a low level of environmental sanitation and a high prevalence of communicable diseases, a low coverage of medical and other services, and where although the population is mainly rural, exhibits, at the same time, a rapid and disorganized urban growth". At the end of this document is a very useful bibliography. This dynamic paper may be requested from the Nutrition Unit of WHO, Geneva.\* Ref. : NUT/UWM/81.4.

## TASKS INVOLVED IN CARRYING OUT THE PROMOTION OF NUTRITION AND PREVENTION OF PEM\* AT THE HOUSEHOLD LEVEL

Tasks	Persons responsible	Competence and knowledge required
<ul style="list-style-type: none"> <li>* Breastfeeds the child as long as possible and introduces complementary foods progressively as from the 5th month.</li> <li>* Prepares food for children with special attention to complementary foods using local foodstuffs.</li> <li>* Applies adequate food and culinary technologies in the preparations used to feed her young.</li> <li>* Prepares foods in a hygienic way and boils left-over foods before giving them to the child. Keeps food covered.</li> <li>* Feeds the child at least 4 times a day and regularly adds fats or oils plus sugar to the child's food.</li> <li>* Feeds her child with patience when ill and takes particular care to feed him/her well during convalescence.</li> <li>* Sends/taks her children to feeding programmes, day care centres (when existent and if appropriate).</li> </ul>	Mother Grandmother Elder daughters Other mother surrogates Father	<ul style="list-style-type: none"> <li>* Understands the relationship between the health of the child, its growth and development and the type and amount of food it receives.</li> <li>* Knowledge and ability to prepare food that is suitable for children of different ages from commonly available food-stuffs, particularly the preparation of complementary foods.</li> <li>* Knows the food value vs. cost of the more important items.</li> <li>* Knows that food is a common vehicle for diarrhoea and how to prevent it.</li> <li>* Knows the advantages of breastfeeding and is aware of the dangers of bottlefeeding. If forced to bottlefeed, knows how to prepare suitable formulae and administer them in a hygienic way, in sufficient quantity (this is particularly important in the urban setting).</li> <li>* Understands the weight chart and knows that baby is well if it gains weight.</li> <li>* Knows that an ill child needs food and that sufficient food is essential during convalescence.</li> </ul>
<ul style="list-style-type: none"> <li>* Home visiting to become acquainted with the feeding patterns of children, beliefs about foods, food availability, social and other factors that constitute risks for proper nutrition of the child.</li> <li>* Home visits for education, information and demonstrations for mothers and surrogates on tasks and competences as defined for family members.</li> <li>* Assessment of nutritional status of under threes (weighing, arm circumference), inspection of weight chart and reinforcement of knowledge of growth chart.</li> <li>* Identification of the children that fail to thrive leading to more attention, special care, referral, food supplementation, etc.</li> </ul>	Primary health care worker Community health volunteer	<ul style="list-style-type: none"> <li>* Understanding the reasons why the noted tasks, competences and knowledge of the recipient persons are important in promoting better nutrition and preventing PEM.</li> <li>* Ability to develop good human contract with individuals and groups and to impart knowledge through relevant messages delivered in plain language.</li> <li>* Through understanding of the weight chart, its use, and how to interpret progress and nutritional status from it.</li> <li>* Use a portable balance correctly and note weights in growth chart. Use an arm circumference band or tape and interpret findings.</li> <li>* Knowledge of the foods used in the community technologies and preparations used, patterns in feeding, prices of foods breast-feeding practices, food taboos, etc.</li> <li>* Knowledge of the interrelationship between infectious diseases and nutritional conditions especially diarrhoea, measles, tuberculosis (and malaria where prevalent). Thus the importance of immunizations, oral hydration etc. in preventing PEM.</li> </ul>

Tasks	Persons responsible	Competence and knowledge required
<ul style="list-style-type: none"> <li>* Feeds her child according to recommendations of CHW and Health Volunteer.</li> <li>* Feeds supplements as indicated by CHW and Health Volunteer.</li> <li>* Has her child weighed at least every 2 weeks and its progress recorded on the growth chart.</li> <li>* Takes the malnourished child to proper referral level as indicated by CHW.</li> <li>* Inform CHW when child has returned from higher level of health care.</li> <li>* Follows special indications from higher level on treatment of concomitant diseases.</li> </ul>	Mother Grand Mother Elder daughters Other mother surrogates	<ul style="list-style-type: none"> <li>* Understands the relation between malnutrition and food and pays more attention to the child's diet than to "tonics" etc.</li> <li>* Knows how to prepare and administer the malnourished child's food following the recommendations of the CHW.</li> <li>* Knows how to use, prepare and administer food supplements following recommendations of CHW.</li> <li>* Understands the meaning of the growth chart and its relation with the child's improvement or worsening.</li> <li>* Understands and is able to follow therapeutic measures for treatment of concomitant diseases prescribed by higher levels of health care.</li> </ul>
<ul style="list-style-type: none"> <li>* Identifies and visits homes of children suffering from PEM at least twice a month.</li> <li>* Classifies child according to degree of severity using growth chart and clinical signs.</li> <li>* Identifies risk factors and directs actions against them.</li> <li>* Follows guidelines on home treatment and rehabilitation of children suffering from PEM according to degree of severity.</li> <li>* Educates on treatment and demonstrates use of ordinary foods for above purpose.</li> <li>* Distributes food supplements and demonstrates their use. Educates on the special cares (quantity, timing, way of administration, patience, etc.) needed in feeding children with PEM.</li> <li>* Has the mild-moderate cases participate in feeding schemes, day care centres.</li> <li>* Refers cases of complicated or unresponsive cases of severe PEM to higher levels for treatment/rehabilitation.</li> <li>* Explains the therapeutic measures indicated at higher level on return from referral.</li> <li>* Keeps close watch on the treatment indicated from referral. Sees that the child is taken to control.</li> <li>* Gives preventive treatment of Vitamin A to all children suffering from PEM.</li> </ul>	Primary health care worker Health volunteer	<ul style="list-style-type: none"> <li>* Ability to explain in simple language the threat to life posed by PEM and that recovery depends on how the child is fed.</li> <li>* Can classify PEM using weight, arm circumference and clinical observation.</li> <li>* Can identify oedema, skin changes and wasting as signs of severe PEM.</li> <li>* Understands the dietary treatment of PEM.</li> <li>* Knows what local common foods and special supplements can be used in the treatment of PEM and how to prepare them.</li> <li>* Knows the importance that the way (spacing, patience, quantities, etc.) in which the food is administered is crucial for the adequate treatment and rehabilitation of PEM.</li> <li>* Knows why, when and where to refer children for treatment and rehabilitation.</li> <li>* Understands the role of certain infections in producing and aggravating PEM.</li> <li>* Knows how to explain and help to follow indications for treatment from higher referral level.</li> <li>* Can identify anaemia in PEM and treat it.</li> <li>* Understands danger of Vitamin A deficiency in PEM.</li> </ul>

\*NUT Unit, World Health Organization, 1211 Geneva 27, Switzerland.

PEM = Protein-energy malnutrition.

(Reproduced from the Appropriate Technology for Health, Newsletter No. 13, 1983).

(Contd. from Page 45)

### Dietary fibre and human diseases

Various epidemiological studies diverted the attention of scientists towards high prevalence of few diseases in western countries than developing countries like Africa and India. In Africa, large amounts of vegetable products containing high dietary fibres are eaten. These people are free from many diseases which have become so common in Western community. Over the past few years as these people moved to the cities and adopted Western eating habits, the incidence of digestive disorders showed an increase in them also. Dietary fibre shows an association between intake and prevalence of following diseases:

#### *Atherosclerosis*

It is the condition in which the walls of blood vessels become thick due to substances called plaque are deposited on the arterial walls. These plaques consist of major component of cholesterol. This condition most often creates various heart diseases, e.g., coronary heart diseases, angina and cerebrovascular accidents. Various studies show that increased intake of dietary fibres over a long period reduces blood cholesterol significantly. It is due to the increased excretion of bile acids which are the agents of removing cholesterol formed in the body. Hence, fibre has a beneficial effect of positively reducing cholesterol and thereby reducing the risk of atherosclerosis.

#### *Diverticular diseases*

This is the common problem which arises due to inflamed pouches of large intestine. Oftenly they burst and produce secondary infection. Common diverticular diseases in human beings include polyps of intestine, piles and appendicitis. Dietary fibres have definite role in prevention of these diseases. The cereals dietary fibre is very effective in relieving the sluggish emptying symptoms of diverticular disease. Soft stool due to high dietary fibre helps to relieve the pain associated with diverticular problems and some times it avoids the need of surgery. Undue pressure due to constipation produces strain to vein of large intestine leading to piles (hemorrhoids). To some extent this disease can be relieved by increased intake of dietary fibres.

#### *Intestinal cancers*

Some studies indicate that dietary fibres lessen the prevalence of intestinal cancers. Colon cancers are more prevalent in developed countries where persons are taking very low quantity of dietary fibres. Highest rates are found in Western countries for example, age

## SOURCES OF DIETARY FIBRES IN FOODSTUFFS

Food (per 100 gms. of edible parts)	Total Dietary fibres (gms.)
<i>A. Cereals and its products</i>	
1. Wheat	17.2
2. Rice	8.3
3. Wheat flour white	3.1
4. Bran	44.0
<i>B. Milletes</i>	
1. Red Gram (Whole)	20.4
2. Red Gram (Dhal)	14.0
3. Bengal gram (Whole)	25.6
4. Bengal gram (Dhal)	8.5
5. Green gram (Whole)	15.4
6. Green gram (Dhal)	13.5
7. Black gram (Whole)	19.5
8. Black gram (Dhal)	14.5
9. Beans	7.3
<i>C. Tubers</i>	
1. Potato	4.0
2. Sweet Potato	7.2
<i>D. Vegetables</i>	
1. Spinach (Palak)	3.6
2. Amaranth	3.4
3. Brinjal	2.0
4. Cabbage	2.8
5. Ridge gourd	5.7
<i>E. Fruits</i>	
1. Banana ripe	2.4
2. Mango ripe	2.3
3. Guava	3.6
4. Apple, peel	3.7
5. Apple fresh	1.4

adjusted yearly rates for men of 30 to 65 years old are, in Connecticut 51.8 per 100,000; in Scotland 51.5 and New York 45.3. Lowest rates have been reported from Africa; those for Uganda being 3.5, Mozambique 5.5 and Nigeria 5.9 and for Bombay (India) 14.6. Reasons may be that high fibre diet passes through the alimentary canal more quickly; and viruses or chemical materials have less time to interact in the intestines. Thus fibre seems to have a role in prevention to certain extent of intestinal cancers.

#### *Diabetes mellitus*

Trowell (1975) studied that fibre depleted diets promote development of diabetes and high fibre diets in the prevention of diabetes. Recently, clinical studies have documented that fibre supplemented diets lower post-prandial glucose concentration in blood and decrease glycosuria in diabetic patients. High fibre diets lower insulin requirements of lean diabetic patients and allow insulin to be discontinued in certain patients. Hence dietary fibres have definite role in prevention and control of diabetes mellitus.

#### *Obesity*

Heaten (1973) suggested for the first time, that dietary fibres have relationship with obesity. Now a days the obesity is a burning problem of higher socio-economic communities throughout the world. This makes a man sluggish, inactive and exposes him to various diseases like diabetes, cardiac diseases and cerebrovascular accidents. Providing bulk food without high caloric density may well prevent excessive energy intake resulting in decreased body weight.

Dietary fibres can displace available nutrients from the diet. Among the complex of substances that constitute dietary fibre, mucilages, gums and pectins can bind considerable amounts of water and, therefore, increase the potential for caloric dilution.

In overview, role of dietary fibres in human diseases depends on its behavior within gastrointestinal tract. The fibre content and the composition of the ingesta influence the time required for passage through the gut as well as the rate and site of nutrient absorption. Moreover, disparate effects are observed, dependent on the type of fibre, anatomical location within the gut and characteristics of the material available for mucosal uptake. Changes in glucose, lipid and sterol absorption occur. These are cholesterol metabolism. Recent clinical studies indicate that dietary fibres play an important role in the control of various diseases. A little knowledge and awareness of this ingredient in diet may make a person free from such problems.

## Dietary Fibre

Dietary fibre includes the indigestible complex carbohydrates formerly considered inert. Epidemiological observations have suggested that lack of fibre may contribute to some disease, including coronary heart disease. Investigation of the effect of dietary fibre on assimilation of fats and on lipid metabolism is in its early stages. Some vegetable fibres may reduce serum cholesterol values. In several animal species and in a few isolated human cases, atherosclerosis may have been reduced by feeding oat bran, wheat straw, alfalfa, rice bran, or various other high-fibre substances. Addition of similar fibre substances to the diets of humans with hypercholesterolemia has produced variable results, although pectin and gums seem to have the most cholesterol-lowering effects. The effectiveness of lipid-lowering, fat-modified diets may be enhanced by an increase in vegetable-derived fibre and protein.

The composition of fibre varies greatly. Some fibres bind cholesterol better than others, limit absorption, and enhance excretion. Water-holding capability and certain exchange properties may also be relevant in elimination of cholesterol.

*(An extract from the Report of Inter-Society Commission for Heart Disease Resources, on Optimal Resources for Primary Prevention of Atherosclerotic Diseases, published in Circulation, Vol 70, July 1984.) Reproduced, from Heart News October 1984.*

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# Nutritional consequences of rural development projects

KALYAN BAGCHI & UMESH KAPIL

There are some important questions for which answers are to be obtained in order to develop strategies for maximising nutritional impact of agricultural and rural development projects. The Indian Council of Medical Research is in the process of sponsoring such operational research. The authors assert that in any developmental project, the problem of malnutrition will remain unchanged except for some small coincidental improvements, until and unless nutritional goals are specifically incorporated.

MALNUTRITION IS A PROBLEM of considerable magnitude in India and in most other developing countries. Direct nutrition interventions were and are being made for controlling the problem. Limited success and high costs of these programmes have prohibited their widespread use. It has become increasingly clear that the vast problem of malnutrition can only be controlled by an overall improvement in the socio-economic situation of the country with clearly defined nutritional goals in the national development strategy. The concept of inter-sectoral national food and nutrition policy has emerged out of these realisations. While direct nutrition intervention programmes may be effective in solving some specific nutritional deficiencies, e.g., endemic goitre, xerophthalmia and nutritional anaemia, the vast problem of child under-nutrition and malnutrition can only be approached through an overall national development strategy with emphasis on those who are socio-economically deprived.

Improvement in the economic development process by itself is no solution of nutrition problems especially in the market-oriented developing countries,

unless the process is guided at least in part by nutritional considerations. The "trickle-down" effect of economic growth is a relatively slow process which will not be able to control the problem of malnutrition. The Green Revolution in India and other developing countries have shown that expanded food production is insufficient to solve the malnutrition problem of the poor agriculture dependant rural population whether with marginal land holdings or working as landless labour. In any development project, the problem of malnutrition will remain unchanged except for some small coincidental improvements, until and unless nutritional goals are specifically incorporated.

Most developing countries are agriculture-based with a predominantly rural population. Agricultural and rural development projects are now important components of national development strategies, and are usually regarded as important approaches in solving malnutrition of the rural poor. In fact, existing malnutrition of alarming proportion has been used extensively to argue for projects and policies aimed at increased agricultural production, increased farm incomes and increased income of rural poor and variety of other goals. However, in general, the nutritional effects of such projects have been assumed. At best, improved nutrition has been the implicit goal of agricultural and rural development activities. The explicit goals, on the other hand, have been such things as increased food or non-food production, improved resource productivity, higher earning of the farm sector, self-sufficiency in basic foods and most commonly, a combination of these.

## Nutritional and project planning

MOST AGRICULTURAL AND RURAL development projects in developing countries are planned, executed and evaluated on the basis of explicit goals of which improved nutrition is not usually a part. Unless nutritional goals during project planning, execu-

tion and evaluation are incorporated, potential nutritional gains will be obtained only by coincidence. Though the need for such incorporation is becoming widely recognized, effective approaches for doing so in an operationally acceptable manner are not yet available.

Why have past development programmes, not included explicit nutrition objectives? There are several reasons for this lapse. The important ones are:

1. Improved nutrition has been assumed to be linked directly to expanded food production. Thus, it was thought that as long as the impact of the programme on food production is considered, nutritional impacts are assured.

2. It is believed that increase in mean incomes are a good proxy for improved nutrition. Again, mean incomes for a population do not reflect the maldistribution of incomes. The question is, whose incomes are increased through these development projects?

3. The assessment of the nutritional effects is perceived to be too difficult, too expensive and/or too time-consuming, or the estimates that could be made are too unreliable to be useful for project or policy design. This was thought to be a futile exercise.

4. There is no real interest in agricultural or rural development sectors in human nutrition. This is understandable. Each sector has its own priority objectives and targets.

#### Factors influencing Nutritional Status

In this context, it would be useful to list the major factors which influence the nutritional status of an individual.

These are:

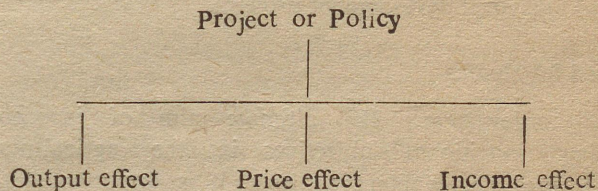
- (1) amount and kinds of food available in the market or on the farm;
- (2) ability of the household, to which the individual belongs, to obtain available food;
- (3) desire of the household to obtain food to which it has access;
- (4) utilisation of the obtained foods to meet nutritional needs.

The above four factors may be inter-related. Changes in one may be ineffective unless others are changed simultaneously. For example, increased availability of food does not ensure increased consumption

by the vulnerable population. Thus, the project output in many cases looks promising on the surface, but in reality, has only marginal effects. Some good examples:

Project Output	Nutritional implications
1. Increased food availability	Malnourished people might have no access to additional food due to low purchasing power
2. Improved ability to obtain food by increased income generation	No desire to obtain more or improved foods but purchase non-food commodities or spend money on investment and savings
3. Direct feeding or other food transfers	Corresponding adjustments in food purchase, e.g., substitution in place of supplementation
4. Better nutrition awareness	Does not improve access to food
5. More work opportunities for woman for increased income	Less time for child care, child feeding and for breastfeeding
6. Production of non-food cash crops with increased income	Price increase of food's adversely affecting the poor. Increased income might not produce nutrition improvement if money is spend on non-food items

In interpreting nutritional outcomes of agricultural and rural development projects, quite often the conclusions are based on assumptions. It is important to have a clear idea of the possible influence of agricultural and rural development projects on nutrition. The influence can be in three broad categories.



**Output effect:** There are important questions for which answers are to be obtained. The important ones are:

Does increased food or non-food production ensure a better nutrition for household with malnourished members?

*In case of food*, does the additional output go for malnourished households? If for market supply, does this lower the price? Is there a desire in the malnourished household to take advantage of the lower price? If the price remains stable, then there is no positive effect on malnourished groups. *In case of*

30/22  
non-food production, how much of the additional money generated goes to the rural poor? Increases in income to well-nourished groups, worsens the competitive purchasing power of the poor. In case the poor gets more income how to ensure that they go for food and for the malnourished members? Increased income might be used for non-food necessities. With appropriate guidance, the increased income can be channelled for nutrition improvement.

**Income effects:** The most significant effect of agricultural and rural development projects on nutrition is probably brought about by changes in income of malnourished groups. Low income farmers, agricultural workers and workers in rural service are some of the potential beneficiaries. Increased income will cause increased demand for food if the desire is created. Does the project have an in-built educational component to create this desire? If there is a simultaneous income increase among well-nourished groups, there will be stiffer bidding for food.

**Price effects:** These are important for the distribution of food and real income among the malnourished and well-nourished groups. In most projects, price effects are indirect.

It is obvious that answers to many of the questions mentioned above will vary from one region to another based on geographical and cultural characteristics, and unfortunately in most cases, these are not available. Without such information, it is difficult to predict the nutritional outcomes of agricultural and rural development projects.

#### Need for studies

In order to reach the ultimate aim of incorporating nutritional objectives in the agricultural and rural development projects, it is important that interdisciplinary studies be conducted in these areas. Without a clear understanding of the various interactions between nutrition and health on the one side and agricultural and rural development projects on the other side, incorporation of nutritional objectives in such projects would be unrealistic. There are several specific issues involved in these interactions:

- (1) To what extent are nutritional objectives incorporated in the existing agricultural and rural development projects?
- (2) If these are not appropriately incorporated, how can these be done in the most efficient manner without disturbing the main non-nutritional goals of such projects?

### Improving Technology for making Soyabean Products

The Union Civil Supplies Secretary, Shri M. Subramanian called for improvement of the technology to make the various soyabean products acceptable to consumers. Inaugurating a seminar on soyabean at New Delhi on 18 December, 1984, Shri Subramanian said that Government was prepared to give the necessary assistance for research and development in the field, but the industry should come forward to make investment in pilot projects. The equipment, he added, should be modernised not by depending on imports, but by applying indigenous ingenuity with a view to achieving process stability and economic viability of the end product.

Soyabean is the richest, cheapest and easiest source of protein and oil. Having a vast multiplicity of uses as a cereal, pulse, oilseed, vegetarian meal and milk, it rightly deserves the title of 'wonder crop' of the century. It has already received widespread hold in our agricultural system. Estimated soyabean area during 1983-84 is Ten lakh hectares (Madhya Pradesh alone accounting for more than 80 per cent), estimated production being 11.20 lakh tonnes.

—PIB

- (3) How are the ongoing successful agricultural and rural development projects influencing, either in a positive, neutral or negative way, the nutritional status of the concerned population, and how to improve the situation?

It is important to understand the various interactions and their influence on the health and nutritional status of the rural poor. Some of the areas need researching are:

- (1) *An analysis of the health and nutritional implications of national food and agricultural policies in India and their actual and potential effects on nutritional status of population in the lowest economic levels:* India has well established food and agricultural policies. During the last few Plan Periods, nutrition has been given a priority position and has been recognised as important components of food, agricultural and health strategies. While considerable work has recently been done to determine the nutritional components of the health care system, similar studies in the food and agricultural strategies have not yet been done

in a systematic manner. In the ultimate development of a national nutrition policy of India, it is imperative that this preliminary analysis be undertaken urgently. This is of great urgency since the Planning Commission is in the process of gathering formation for the development of a national nutrition policy for India.

Not all agricultural improvement policies produce positive effects on nutritional status of rural poor. Increased cereal production at the cost of the pulse production increases the price of the only protein source of rural poor with the consequent reduction in intake. A careful analysis of the various components of national food and nutrition strategy for their nutritional relevance is urgently needed.

(2) *Review of existing rural development projects in various parts of the country in order to determine the implicit or explicit nutritional objectives:* Rural development projects are of great importance for a country like India. Ministry of Rural Development and other agencies are sponsoring various types of rural development projects in different parts of the country. It is possible that in some nutritional objectives are explicit and in some implicit. It is important that a situation analysis be made urgently in order to determine the nutritional implication of these projects and to assess whether nutritional status of the rural poor are being improved as a result of these projects. The purpose is to incorporate wherever possible nutritional objectives and modify the programme through which such objectives could be achieved without changing the general pattern of the projects. An outcome of such a project will also provide valuable data for the national nutrition policy.

(3) *Workload of women farm workers during agricultural and farming seasons and its correlation with pregnancy outcome:* Women take on active part in agricultural work in many parts of the country. Some specific types of agricultural activities are mostly done by women. During intensive agricultural and farming seasons, women undertake an extremely strenuous load of agricultural work in addition to the workload at home, without any significant improvement in their dietary intake. In some situations, apparently simple tasks like fetching water and fire-wood entail large energy expenditure. Several studies have been conducted in different parts of the world to indicate that such strenuous workload on women, who are already malnourished, both outside and inside their home puts a

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## STUDY OF FRUIT-RIPENING PROCESS

A team of Australian researchers will examine the use of calcium to slow down the ripening and aging process in fruit and vegetables after harvest. This research will be important to developing countries in tropical regions which do not have the facilities to refrigerate fruit.

Researchers in the School of Food Technology at the University of New South Wales in Sydney are working under a grant from the Australian Centre for International Agricultural Research.

The fruit-ripening project, led by Associate Professor Ron Wills, will examine the use of calcium to improve the quality of fruit and vegetables after harvest. It has been known for many years that browning and pitting in fruit and vegetables stem from a lack of calcium in the produce, but no method was available to add the amount of calcium needed to prevent their occurrence.

Working in New Zealand, Professor Wills and Mr K.J. Scott, of the NSW Department of Agriculture, developed a vacuum infiltration method of dipping apples after harvest which can introduce enough calcium into the fruit, eliminating the disorders without damaging the produce.

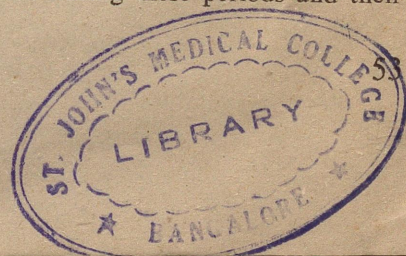
Studies have found also that the method can delay the ripening of a range of other fruit without refrigeration. The treatment has potential in tropical countries which do not have the technical infrastructure to refrigerate fruit but could apply a simple dipping treatment.

Professor Wills said the research grant would enable his team to examine other produce that might benefit from the application of calcium and to investigate the feasibility of introducing such a system in Indonesia.

—AIS

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great strain on their pregnancy performance. It is important to undertake studies in different parts of India of a longitudinal nature to make an inventory of the workload of women during intensive farming and agricultural seasons, their dietary intake and nutritional status during these periods and their



pregnancy and lactation performance when these occur. This would give an insight into the maternal nutritional status that is being talked about as a starting point of the infant and child nutrition.

(4) *Health and nutritional status of infants and young children of mothers in active agricultural work:* It is obvious that during intensive agricultural and farming seasons, women will be unable to provide sufficient time or energy for child feeding and child care. It is important to determine the health and nutritional status of infants and children of these mothers during farming and non-farming seasons, and also to identify the important causative factors which might produce adverse effects. There are excellent studies in Africa that infant and child malnutrition follow a seasonal pattern according to the workload of the mothers in agricultural work.

(5) *Effects of income generation of rural women on health and nutritional status of their offspring:* Rural poverty is described as a major factor in malnutrition of mothers, infants and children. Income generation of rural women is regarded as an important measure in the amelioration of this problem. However, it is not clear without the increased income can really produce any significant improvement in the health and nutritional status of their offspring. Is the increased income used for better diet of the offspring or is used for purchase of non-food items

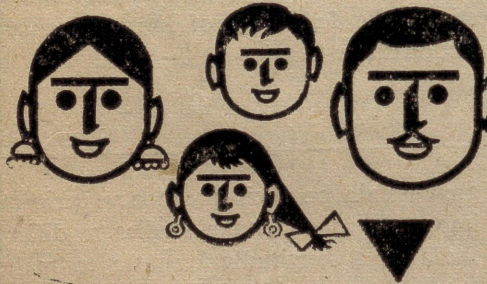
or taken away by their husbands? Studies in Thailand, Mexico and Sudan have shown that increased income leads to increased calorie intake of the adults but with no change in the calorie intake of infants and pre-schoolers. If the increased income is not matched by an increased desire to procure a better diet, this measure will not produce a positive nutritional impact. It is not known as to what happens in the ongoing projects? Secondly, for increased income women have to stay outdoors thereby reducing the time spent at home for child caring and child feeding. Infants and young children are kept in charge of older siblings with undesirable effects. It is important to precisely pinpoint how income generation in rural women influences nutritional status of their offspring and how nutritional objectives could be built in such projects.

(6) *Nutritional role of women extension workers:* Women extension workers are in a position with designated roles. In a rural setup, they can be quite effective in certain areas of nutrition promotion and can be complementary to the role of the community health care workers. It is important first to analyse the nutritional implications of the role of women extension workers and to suggest methods by which these could be maximised for nutrition promotion. This will need modification of their training programme.


Courtesy : KURUKSHETRA,  
Nov. 1984.

**Keep a gap of three years  
between two children**

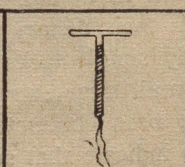
**Choose any method**

  
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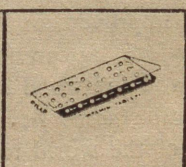
Nirodh



Copper T



Oral Pill



The research efforts over the past several years have borne fruit in developing a practical measure to control anaemia in the population through iron fortified salt. This programme needs to be effectively implemented to achieve this goal.

## Control of Anaemia Through Fortification of Salt with Iron

DR B. S. NARASINGA RAO

**A**NAEMIA is one of the major nutritional problems of India. It is particularly common among children and women of child bearing age. The condition can become severe during pregnancy. Anaemia is considered to exist when haemoglobin (g. per 100 ml) in blood goes below a particular level, i.e., 13 g. in case of men, 12 g. in case of women and older children, 11 g. in case of younger children and pregnant women. On this basis, nearly 40% of men, 70% of women are known to suffer from anaemia in rural India. In urban areas, however, prevalence of anaemia appears somewhat lower than in rural areas.

Iron deficiency is the most important nutritional factor leading to anaemia. In addition, deficiency of folic acid can result in anaemia particularly among pregnant women and young children. Iron deficiency appears to be caused mainly by poor absorption of iron from cereal-millet based diets consumed in India. Low intake of dietary iron, due to lowered food intake often seen among the poor further aggravates iron from cereal-millet based diets consumed in India, and the consequent reduced haemoglobin concentration in blood, particularly when it becomes severe (viz. Hb level below 10g./100 ml) is reported to lead to a number of deleterious effects of great socio-economic relevance. Some of these effects are: (i) impaired work capacity, (ii) poor outcome of pregnancy, (iii) poor learning ability, and (iv) impaired resistance to infection.

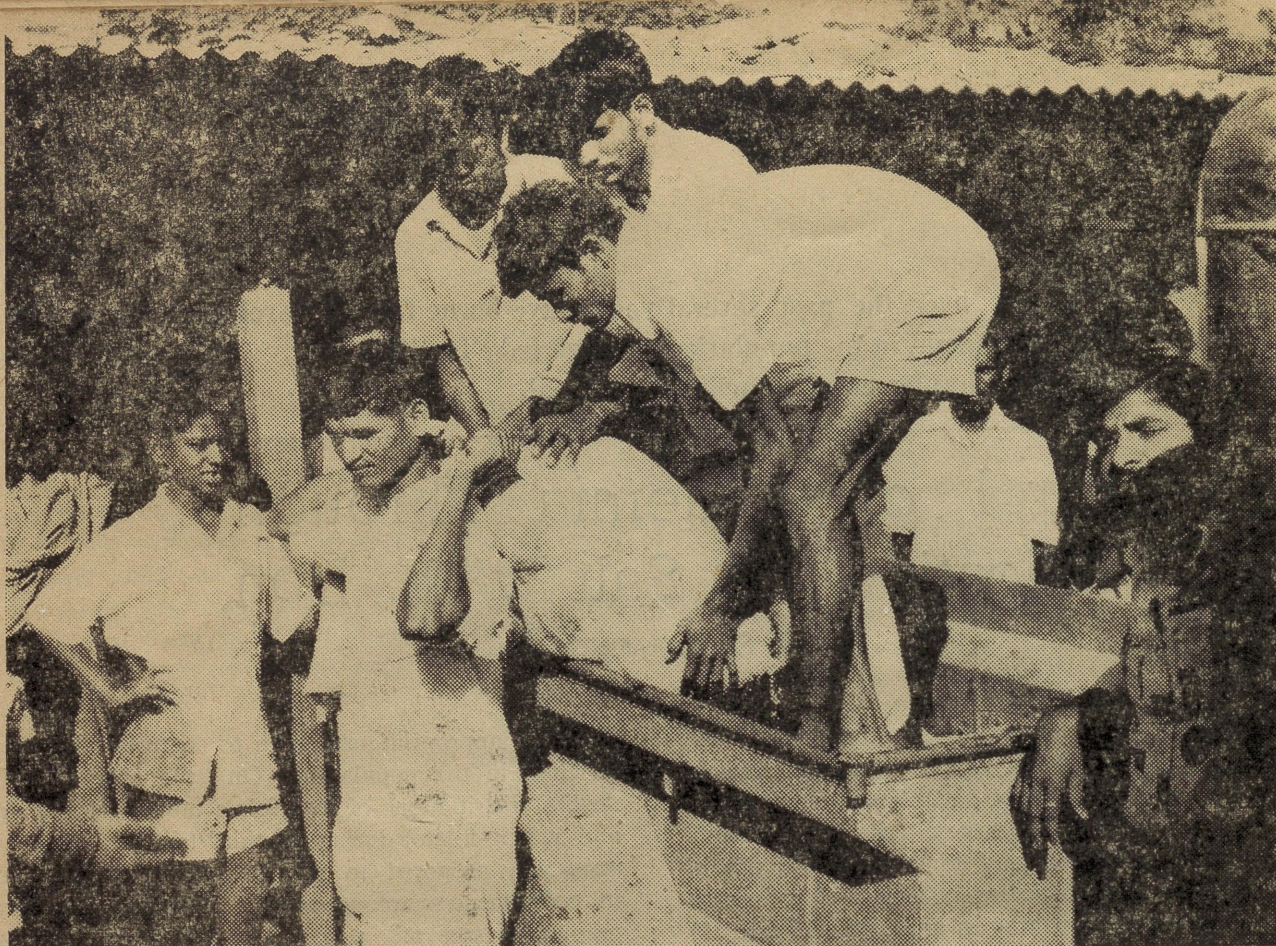
### Strategies for prevention and control

Its widespread nature and health implications make anaemia an important health problem requiring urgent solution. Realising this, the National Institute of Nutrition (NIN) has been directing its research efforts for

designing appropriate strategies to control and prevent anaemia in the population. On the basis of NIN studies, distribution of iron folate tablets (60 mg iron and 500 ug folate) during the third trimester of pregnancy was proposed to prevent severe anaemia and its consequences among pregnant women. This programme is currently a part of MCH services in our country.

It is realised that iron deficiency anaemia is widespread among all segments of our population. A strategy for improving iron status of the entire population was therefore envisaged. Increasing the iron intakes through fortification of a suitable dietary article was considered as the most practical strategy for improving the iron status of our population and preventing iron deficiency anaemia among them.

Iron fortification programme, however, requires a suitable vehicle to carry iron. Such a vehicle must be universally consumed and manufactured at a limited number of centres. Under Indian conditions, salt appeared to be the most appropriate dietary article satisfying these requirements. Next a suitable iron compound with good bioavailability had to be chosen. Since cooking salt marketed in India is rather crude with about 4% moisture, addition of iron compounds like ferrous sulphate, an iron compound of choice, poses problems of stability and colour development. After a series of laboratory studies at the Institute, it was possible to identify a formula to fortify common salt with iron so that a stable preparation with satisfactory absorption of added iron resulted. According to this formula, salt is crushed to a coarse powder and mixed uniformly with iron, i.e., ferrous sulphate (3.5 mg/g), orthophosphoric acid (3.5 mg/g) and sodium acid sulphate (5.0 mg/g). In this formula, fer-



*Transportation of iron fortified salt*

(Photo : NIN)

rous sulphate provides iron at 1 mg/g of salt. Orthophosphoric acid prevents development of colour and sodium acid sulphate helps in improving absorption of iron. In place of  $\text{FeSO}_4$  and orthophosphoric acid ferric phosphate can be used but it will be more expensive.

#### **Community studies**

After the above formula for the fortification of salt was developed, the fortified salt was tested in volunteers for its absorption using the radioisotopic technique. Iron absorption from the fortified salt, when given with a cereal based meal, was satisfactory and per cent iron absorbed from the fortified salt was comparable with that from the meal itself. The fortified salt was stable without colour development or deterioration in its quality when stored for 8 months or more. It was found to be acceptable by families for cooking in the same way as the ordinary salt.

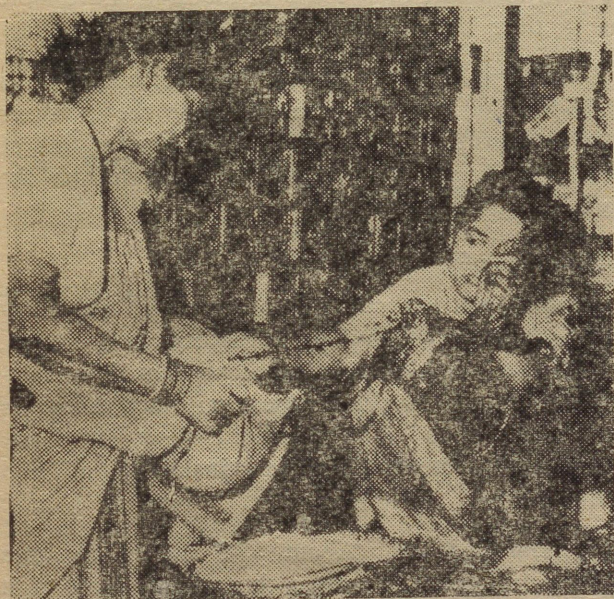
Two long term community studies were carried out to demonstrate the effectiveness of the iron fortified salt to prevent and control anaemia in the population. In one of the studies, iron fortified salt was supplied to and continuously used for nearly 18 months by children aged between 5-15 years living in a hostel attached to a residential school. Another study was a multicentric one, sponsored by UNICEF through Department of Food and co-ordinated by National Institute of Nutrition. It involved a large population, both rural and urban at three locations of the country. Iron fortified salt was supplied to rural households at two rural centres (Hyderabad and Calcutta) and urban household in Madras. Results of both the studies indicated that iron fortified salt was acceptable to the communities studies and its consumption was accompanied by a significant increase in the haemoglobin levels and a reduction in incidence of anaemia. Its long term consumption for

12-18 months was not associated with any untoward effects whatsoever.

Based on the results of these community studies, it has been recommended to the Government of India to consider fortification of common salt with iron as a public health measure to control and prevent widespread iron deficiency anaemia known to exist in our population. Government of India (Ministry of Food) have accepted these recommendations and have initiated necessary administrative and technical measures to implement the programme on a national level in a phased manner.

### The safety aspect

Some reservations are expressed against continued intake of additional iron through fortified salt by the entire population over a prolonged period as this programme would envisage. It is feared that such a continuous intake of extra iron over and above that derived from diet would result in unnecessary loading of body with iron which may increase the risk of infection. This programme envisages an intake of only 10-15 mg. of additional iron and its absorption is, however, limited by the diet with which



*Fortified salt was found to be acceptable to families for cooking in the same way as the ordinary salt.*

(Photo : NIN)

it is consumed. A close examination of various pieces of currently available evidence on the possible hazard of excess intake of iron indicates that con-

trol of anaemia with moderate amount of iron as the current salt fortification programme envisages is safe and is not likely to lead to any increased rate of infection in the population. It may on the other hand improve immune status and other functional capacities of the population.

Salt is currently iodized to control goitre in the endemic areas, i.e. sub-Himalayan belt. Anaemia is also present in these areas. In order to control both the nutritional disorders in these areas, the feasibility of fortifying salt with both iodine and iron was explored at NIN. Addition of iodine (or iodate) to the iron fortified salt (as developed now) indicated a rapid loss of iodine on storage. Hence a new formula for the fortification of salt with iron and iodide has been developed wherein both iron and iodine are stable for over 6 months. Studies on the availability of iodine and iron from the salt containing iron and iodine added according to this formula are currently underway at NIN.

Thus the research efforts of the Institute over the past several years have borne fruit in developing a practical measure to control anaemia in the population through iron fortified salt. This programme needs to be effectively implemented to achieve this goal.

—Nutrition News

## CALORIES DO COUNT

Calories in your diet provide energy to fuel your body. But, if you eat more calories than you burn off in physical activity, the extra calories get stored as fat. When people eat more calories than they need, and get fat, extra stress is put on their hearts. The heart of a very overweight (obese) person works almost twice as hard as the heart of a slender person. Overweight people tend to develop high blood pressure more readily than people of ideal weight, and are more likely to get diabetes (a disease caused by the body's inability to use sugar properly). According to **Heart News** overweight person who chooses to avoid physical activity, makes it even harder to get rid of extra weight. Some foods are more concentrated in calories than others. Fats have more than twice the number of calories as proteins and carbohydrates. High-fat foods which are concentrated source of calories include :

Fats of all kinds (butter, ghee), Salad dressing, Fried foods, Fatty meats, Luncheon meals, Potato chips, Chocolate, Sauces, Bacon fat, Sausage, Gravies and other Snack chips.

Other foods are high in sugar. They also contribute to extra calories in the diet. Some of these foods are:

Celas and other sweetened drinks	
Candy	Sugar-coated
Cakes	Cereals, Jelly,
Cookies	Jam
Donuts (also high in fats)	Syrups, Pies
	Ice Cream (also high in fats)

# GAS IN YOUR TUMMY

DR RAKESH TANDON

The gas trouble is indeed very common. Every third patient consulting a physician has this complaint. One of the aims of the treatment should be to ensure normal bowel function and this can be best achieved by providing the individual a high fibre diet, that is, a diet with a fair amount of roughage.

**G**AS, GURGLING, FLATULENCE, flatovent, burping, belching, bloating, and distension are only some of the terms used by patients to describe their "gas trouble". Distinction between these terms are often neither appreciated by the patients nor by their treating physicians. An all encompassing word, turbulence, was coined by a great contemporary American poet, Ogden Nash, to cover all these 'windy' conditions while composing the following verse:

**'How do I feel today? I feel as unfit as an unfiddle. And it is the result of certain turbulence in the mind and an uncertain turbulence in the middle.'**

(Marriage Lines, p. 64, Aldine Press, Letchworth)

Prima facie, these symptoms sound rather trivial but they can be very incapacitating to the patients. It is their persistence and frequent recurrence that bother the patients. Besides the physical discomfort caused by "gas", the patients suffering from it are apprehensive of the social embarrassment, caused by increased passage of gas per rectum, i.e. farting or flatus. Since farting has acquired over the years a connotation of rudeness, flatus is the preferred term.

The gas trouble is indeed very common; every third patient consulting a physician has this complaint. And, it has certainly been recognised for a very long time since remedies for it are mentioned abundantly in Ayurvedic literature. Indeed, air in the body *Vatah* is considered as the most important of the *Tridoshas*, imbalance of which is the cause of all diseases. The other two are *pitah* and *Kapha*. Some

of the indigenous medicines and *choorans* may help, but for a rational treatment a scientific analysis of the gas and an understanding of the mechanisms of its production are essential.

## Volume of intestinal gas

The intestinal tract of a fasting individual contains less than 200 ml gas; he passes flatus about a dozen times a day, the total amount of gas discharged per day averages to about 600 ml. There is, however, a wide variability in the quantity and frequency of flatus passed by individuals; diet being the most important determinant. There are patients who are unable to digest milk properly; they tend to have a 'gassy abdomen'. Green vegetables such as cabbage, sprouts, spinach and, most importantly, beans tend to produce an excess of gas. Therefore, people who are used to taking these kinds of foodstuffs have more gas in their hollows than others have.

About two-third of the gas in the abdomen is swallowed and the rest is produced in the intestines from two sources: one by bacterial fermentation of food residue, and the other by diffusion from the blood into the intestines.

## Composition of gas

Intestinal gas is a mixture of five gases, viz., nitrogen, carbon dioxide, hydrogen, methane and oxygen, in the order of decreasing concentration. The relative proportions of these gases vary depending on three main factors: (a) the amount of swallowed air, (b) the type and amount of intestinal bacteria, and (c) the diet.

(a) *Swallowed air*: About 2-3 ml. of air goes down your food pipe with each swallow. Most of it is burped out but a small portion of it passes down the intestines. Swallowing of air is very much increased in a state of anxiety or when there is a painful throat or chest. Also, chronic chewers of tobacco, betel nuts, pan-masala or chewing gums are prone to swallowing more air than others. The swallowed air contains mostly atmospheric nitrogen and, therefore, its passage is odourless.

(b) *Bacteria* : Carbon dioxide, hydrogen and methane are the main gases produced by bacterial fermentation of food residue. Different bacteria produce different proportions of these gases and the flora is determined mostly by the kind of food the individual takes. People living in certain parts of the world such as India where personal hygiene is generally poor, may be harbouring more bacteria in their intestines than others. Such individuals are likely to produce more "gas".

Certain inherent defects in an individual could also lead to the growth of a particular kind of bacteria in the intestines and hence the production of a specific type of gas. For example, the production of methane seems to run in families, and it is this gas that produces the most offensive and obtrusive kind of flatus. It is methane that also is responsible mostly for floating stools.

(c) *Diet* : Carbohydrates are generally totally absorbed in the intestines but in cases where a specific carbohydrate is not fully digested, the undigested sugar forms a good substrate for bacterial fermentation and gas production. The best example is of milk sugar (lactose) in certain adults who do not have the power to digest it. This loss of digestive power could also develop temporarily after an episode of gastroenteritis or any other acute intestinal infection. Similarly, legumes like beans contain indigestible forms of carbohydrates, viz., raffinose and stachyose, which are fermented in the large intestine by the action of bacteria and lead to significant gas production.

#### **Clinical disorders**

They include burping, aerophagy, belching, borborygmi, distension, and pain in the abdomen and excessive gas formation and passage of flatus.

*Burping* : Burping is the term given to noisy eructation of air-under voluntary control. This happens secondary to sucking of air, and is commonly seen in infants sucking in milk from the bottle. Indeed, the mother is advised to put the child in an upright posture after each feed to encourage burping. Often adolescents learn the trick of burping and use it as a means of fun. In others, especially adults, this could either be the results of fast eating, gulping in large quantities of food and with that some air, or due to an underlying nervous stress. An unexpected onset of burping could, however, indicate a medical problem such as cardiac ischaemia and should not be ignored.

*Aerophagy* : As implied by the term, it refers to swallowing of air but it is in fact sucking in of air by gulping action. This occurs frequently in individuals under nervous stress. The swallowed air distends the abdomen, make the individual uncomfortable and is followed by burping.

Individuals sucking air during sleep are helped by a change of sleeping posture or by using an extra-pillow during sleep.

*Belching* : Belching is a sudden, noisy and involuntary release of air from the stomach. Individuals, who are not able to burp out the "swallowed" air easily end up with belching which is not under their control. The unexpected explosive release of air can cause the individual much embarrassment. It, however, does not indicate any underlying disease.

*Borborygmi* : Many individuals, particularly the asthenic type, are sometimes aware of gurgling in their abdomen. This is because of the movements of the intestines which contract regularly. In states of poor digestion, large amounts of unabsorbed carbohydrates reach the lower portions of the intestines. As a result hydrogen and other gases are produced. These stimulate further the intestinal movements.

Large intermittent gurgling with visible peristalsis over the abdomen may be a sign of intestinal obstruction. This has to be seen and evaluated by a physician because this may require an active medical or surgical intervention.

#### **Passage of flatus**

The various causes of excess gas production in the abdomen have already been alluded to. Of these, carbohydrate malabsorption, particularly the inability to digest lactose, i.e., the milk sugar, is the commonest cause leading to excess production of hydrogen and other gases. Methane, as mentioned above, is perhaps the most offensive of all gases.

Bad odour from mouth is most commonly due to exhalation of short chain fatty acids. These are by-products of fat produced during its digestion. Such individuals should be advised to reduce their fat intake. Adding fibre, such as bran, in the diet and also giving neomycine by mouth can significantly reduce the bad odour of their stools and flatus. Beans and

Y 30/92  
other vegetables that are known to produce excess of gas should be eliminated from the diet in case the patients has the complaints of excess passage of flatus.

### Distension and abdominal pain

Abdominal distension in our community is most often due to fat or fluid in the abdomen or an organ enlargement. Certain intestinal infections, particularly giardiasis and certain diseases like gallstones and emphysema of the lungs can produce gaseous distension. If these have been excluded, then "gas" could be the reason. Swallowed air can get trapped in the upper part of the stomach and intestines, and cause discomfort and distension of the abdomen. This is called "gas-bloat" syndrome. Similarly, gas produced in the intestines may get trapped in one of the recesses of large intestine called the splenic flexure and produce distension and pain. This is called "splenic flexure" syndrome. It is caused by spasm of the large intestines which may be relieved spontaneously, or with drugs as mentioned below.

Bloating of the abdomen with air can also occur in the young as well as elderly people habitually towards the evening. This does not require any specific treatment. Simply lying down in a resting posture would suffice.

### Treatment

Explaining to the patient the mechanism of production of gas in the abdomen as well as the reasons for passage of excess flatus goes a long way in relieving the anxiety of the patient. Other measures for reducing the gas production have already been mentioned and they include dietary manipulation, and a voluntary effort to avoid swallowing air.

There is a very poor correlation of the amount of air in the abdomen and the abdominal discomfort and bloating. The same amount of air can lead to discomfort to one individual while it may not bother in the least another person. The pain seems to be more because of abnormal contraction of the intestines rather than because of an excess of air.

The frequent observation that certain foods "turn to gas" in a patient may possibly be because of the tendency of these foods to stimulate abnormal motility of the gut rather than their ability to "gassify". Trapping of air in certain recesses of the gut, as

mentioned above, are also results of abnormal contractions of the intestines. Hence one of the aims of the treatment should be to ensure normal bowel function and this can be best achieved by providing the individual a high fibre diet, i.e., a diet with a fair amount of roughage. One of the best ways of providing roughage in the diet is by leaving the flour unrefined or unbleached, and perhaps by adding *Jsabgole* (ispghula) in the diet. The roughage in the food improves intestinal motility and helps in proper stool formation and evacuation.

Drugs for relaxing the intestines or for reducing the spasm of the large intestines may also be helpful but should be used by the patients only with the advice of their treating physicians. There are certain popularly known drugs such as charcoal and simethicone which are known to absorb gas and have been recommended for treating flatulence. They are, however, of limited value because of the poor correlation mentioned above of the amount of gas and the patient's discomfort.

Lastly, physical exercise is of great help to the patients suffering from any form of *burbulence*. The jogging mania of the seventies is certainly good for both bowel and heart. In fact, the age old saying "after dinner rest a while and after supper walk a mile" should be modified now to "after dinner walk a mile and after supper twice the mile".

In the end, the following tips may be recommended for *preventing* the gas trouble.

1. Observing personal hygiene.
2. Maintaining normal bowel activity by taking adequate roughage in the diet (high fibre diet and *Isabgole*).
3. Avoid milk, very greasy food, and green leafy and root vegetable.
4. Avoid air swallowing aerated beverages and constant chewing.
5. Avoid anxiety states.
6. Regular physical exercise. ○

(Based on a public lecture at the All India  
Institute of Medical Sciences,  
New Delhi)

Swasth Hind

# BOOKS

**Food Additives: A technology out of control?**  
Millstone, E. *New Scientist* 1984 Oct 18; 104 (1426):  
20-24

Food industry defends the extensive use of additives with reference to three considerations—(a) By using additives the industry can expand the range of products available to consumers particularly in cities; (b) it can extend the life of the product on the shelves of a warehouse, shop, fridge or larder; and it can make products appear and taste more attractive than they otherwise would. Information about food (and additives) is primarily in the hands of private corporations, and minimally in the hands of governments and substantially unavailable to consumers. The problem assumes an alarming situation when in a year we consume several kilograms of preservatives, colourings and flavourings knowing nothing or very little about what effects these chemicals may have upon us. It is estimated that out of more than 3500 additives in current use less than 10 percent are regulated and use of flavourings (more than 3000 in use) along with starches and enzymes are not specifically regulated and so their use is barely monitored. Human epidemiology as a science in relation to food additives, is almost entirely useless. The regulation of food additives is based entirely on animal tests. The government does not conduct safety evaluations on particular additives nor does it commission independent research and relies entirely on data or information furnished by industrial research labs. The interests of the consumer require a policy of complete disclosure of toxicological data, the regulation of additives and the composition of food products. The need for research programmes in the use of food additives, their toxicology, human epidemiology, food processing and market research is urgent and imperative.

—NML

## Road traffic accidents in developing countries.

Report of a WHO International Conference on Road Traffic Accidents in Developing Countries. *World Health Organization Technical Report Series*, No. 703, 1984. ISBN 92 4 120703 5. 36 pages. Price : Sw. fr. 5.-. Also available in Arabic and French. Spanish edition in preparation. Available from the SEARO, World Health Organization, Indraprastha Estate, New Delhi-110 002.

This new WHO publication is the report of a WHO International Conference on Road Traffic Accidents in Developing Countries, which was held in Mexico in 1981. One of the main aims of the Conference was to define basic principles for the formulation of road safety policies at national and international levels. The report points out that fatality and casualty figures are rising rapidly in most developing countries, where, more over, the death rates (relative to either population or number of vehicles) are considerably higher than in the industrialized world. These developments are

## Authors Of The Month

**Shri P. Bhaskaram**  
Senior Research Officer,  
National Institute of Nutrition,  
Indian Council of Medical Research,  
Jamai-Osmania P.O.  
HYDERABAD-500007 (A.P.)

**Prof. M. Abdussalam**  
Director,  
International and Scientific Cooperation,  
Robertvon Ostertag Institute of Veterinary  
Medicine,  
C/o World Health Organization,  
GENEVA.

**Dr Suresh Chandra**  
C/o Extension and Training Division,  
National Institute of Nutrition,  
Jamai-Osmania P.O.  
HYDERABAD-500007 (A.P.)

**Dr Kalyan Bagchi & Umesh Kapil**  
Indian Council of Medical Research,  
Ansari Nagar,  
NEW DELHI-110029

**Dr Rakesh Tandon**  
Associate Professor,  
Deptt. of Gastroenterology,  
All India Institute of Medical Sciences,  
Ansari Nagar,  
NEW DELHI-110029.

**Dr B. S. Narasinga Rao**  
National Institute of Nutrition,  
Jamai-Osmania P.O.  
Hyderabad-500007 (A.P.)

causing a serious and rapidly growing public health problem.

Beginning with a section on the development of road safety and transport policies, the report goes on to discuss briefly practically every aspect of prevention of road traffic accidents. For example, there are sections on the screening and training of drivers, construction and maintenance of roads, safety factors in the design of vehicles, and legislation and law enforcement.

The main emphasis, however, is on the relationship between road safety and public health. It is pointed out that road accidents largely affect young people, causing much disability. Moreover, the burden on health services diverts scarce resources of skilled manpower and equipment from other major health problems, and, humanitarian considerations apart, there is an overall economic loss to the community. In this regard, the report contains an important section on appropriate technology for protection against injuries. Two other sections discuss the organization and management of road safety programmes and the role of public health authorities.

This report should increase awareness among governments of the public health consequences of road traffic accidents and encourage interested authorities to implement desirable counter-measures, with special reference to the health aspects of the problem. Public health officials and decision-makers in other fields responsible for road safety will find much useful information in this book.  $\Delta$

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*design by Peter Davies.*