

# INTERNATIONAL CONFERENCE ON NUTRITION



## Major issues for nutrition strategies

1992



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## FOREWORD

The following papers have been prepared by FAO and WHO as working documents to stimulate and focus ICN preparatory and follow-up activities by governments, NGOs, the private sector and international agencies. They reflect the eight general themes around which the technical content of the ICN has been developed. The papers, as presented here, are edited versions of the background documents reviewed by the ICN Preparatory Committee meeting held in Geneva 18-24 August 1992.

The development of the theme papers resulted from numerous discussions between FAO and WHO, among many UN agencies and the Advisory Group of Experts for the ICN. A number of individuals and organizations outside the UN system also participated in their preparation. FAO and WHO expect that these papers will continue to be used at the country level and in future *ad hoc* international discussions on new approaches to improving nutrition. Further development of these themes is likely to arise from such discussions, and the papers may be re-issued from time to time to reflect current thinking on each theme.

In particular, FAO and WHO would like to thank the following people for their substantive contributions to the various themes - *Improving household food security*: Joachim von Braun, Howarth Bouis, Shubh Kumar and Rajul Pandya-Lorch, International Food Policy Research Institute; *Protecting consumers through improved food quality and safety*: F. Ed Scarbrough, US Food and Drug Administration; *Caring for the socio-economically deprived and nutritionally vulnerable*: Patrice Engle, UNICEF consultant; *Preventing and managing infectious diseases*: Andrew Tomkins, Institute of Child Health, London; *Promoting appropriate diets and healthy lifestyles*: Benjamin Torun, Institute of Nutrition of Central America and Panama, Pirjo Pietinen, National Public Health Institute, Helsinki; *Preventing specific micronutrient deficiencies*: Vinodini Reddy and K. Vijayaraghavan, National Institute of Nutrition, Hyderabad; *Assessing, analysing and monitoring nutrition situations*: John Mason, ACC/SCN; *Incorporating nutrition objectives into development policies and programmes*: Beatrice Rogers, Tufts University, Boston.

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**IMPROVING HOUSEHOLD FOOD SECURITY**

*Improving household food security*  
*Theme paper No. 1*

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## SUMMARY

Food security is of supreme importance in improving the nutritional status of many millions of people who suffer from persistent hunger and undernutrition and many others who are at risk of facing the same situation. There is a need to clarify the issues involved in achieving food security and to help formulate appropriate policies and measures to strengthen it.

This paper focuses on the conditions necessary for ensuring access to adequate and safe food by the household. Food security means *access by all people at all times to the food needed for an active and healthy life*. At the household level, food security refers to the *ability of the household to secure, either from its own production or through purchases, adequate food for meeting the dietary needs of its members*.

Ensuring household food security is a necessary condition for improving nutritional status, but, by itself, it is not sufficient. The nutritional status of each member of the household depends on several conditions being met: the food available to the household must be shared according to individual needs; the food must be of sufficient variety, quality and safety; and each family member must have good health status in order to benefit nutritionally from the food consumed.

Food insecurity leads to much human suffering. In addition, it results in substantial productivity losses due to reduced work performance, lower cognitive ability and school performance and reduced income earnings. Food security and adequate nutrition are beneficial outcomes in themselves, as well as important inputs to economic development.

Food security has three dimensions. First, it is necessary to ensure sufficient food supply both at the national and local level. Secondly, it is necessary to have a reasonable degree of stability in the supply of food both from one year to the other and within the year. Thirdly, and perhaps the most critical, is to ensure that each household has the physical and economic access to the food it needs.



An adequate food supply at the national level is necessary to achieve household food security. Adequacy of national food supply depends on domestic food production in relation to demand, trade policies, world food prices, foreign exchange availability to import food from the international market and availability of food aid. However, having an adequate food supply at the national level does not automatically lead to food security for all households; there may still be poor households that do not have the means to produce or the purchasing power to procure the food they need.

Inadequate access to food by the household can be either chronic or transitory. Chronic food insecurity is a situation in which households constantly lack adequate access to food. Transitory food insecurity is a condition in which households do not have access to food at certain times; it arises from failure of livestock and crop production, loss of employment, import difficulties, man-made and natural disasters and other adverse circumstances.

Household food security issues differ in rural and urban settings. In urban areas, household food security depends primarily on the level of income, often in the form of paid wages, in relation to prices of food and other consumer goods. In rural areas, household food security is most often determined by food availability and prices, which are commonly related to agricultural productions, and by incomes which are determined by both on-farm and off-farm employment opportunities. The number of the food-insecure people is at present higher in rural areas, but the number of the urban food insecure is growing. With urbanization growing rapidly in most developing countries, chronic food insecurity among the urban poor is likely to become an increasingly important problem in the future.

National, regional and local availability of food depends primarily on production, stockholding and trade. Shortfalls in food production and/or in food availability through trade lead to food insecurity due to price rises or breakdown in distribution channels. At the household level, inadequate access to food is primarily due to poverty; poor households do not have sufficient means to secure the food they need. These are the households which suffer first and most when food supplies fall or food prices rise.

An array of policy measures, suited to the problems and conditions prevailing in each country, can be adopted to achieve food security at the household level. The choice of policies have to be attuned to the characteristics of a country's food security problem, the nature of the food-insecure population, resource

availability and institutional capabilities. However, the aim of the selected policies should be to ensure that all households have the means to secure the food that they need on a sustainable basis, and that they are not subjected to excessive risks of fluctuations in obtaining the necessary food.

### **Selected Policy Measures**

**Overall development strategy and macro-economic policies.** These should create conditions for economic growth with equity. Alternative development strategies can have strikingly different impacts on poverty alleviation and on food security. Country experiences show that much can be done to reduce food insecurity through public action even when national per capita income is low. In order for policies which aim at attaining poverty alleviation and food security to be sustainable in the long run, they need to be accompanied with policies of growth with equity.

The effects on the poor of structural economic imbalances, particularly in low-income countries in the 1980s, have stressed the relevance of macro-economic policies for food security. Macro-economic variables, such as the exchange rate, import/export policies, inflation and budget deficits, can have significant implications for prices, incomes, and employment, especially for the poor. Therefore, to be effective and sustainable, food security policies must be set in a growth-conducive macro-economic framework. Striking an optimal balance between fiscal policy requirements and food security needs presents a difficult policy choice for developing countries implementing structural adjustments programmes.

**Policies and programmes to accelerate growth in the food and agriculture sector and promote rural development.** Growth in the food and agriculture sector is vital for food security. In addition to ensuring an adequate and stable food supply, in most developing countries the food and agriculture sector also provides the livelihood for a majority of the population. Producer incentives and new technologies that increase production and employment in the agriculture sector can help augment incomes, alleviate poverty and improve food security.

Improving access to land and other natural resources can also make a significant contribution to increasing the production and incomes of food-insecure households. Macro-economic policies should complement agriculture sector policies in fostering growth. To ensure that production growth is sustainable in the long run, soil fertility and soil and water conservation need to be promoted.

Policies to increase food production and/or production of crops for sale can have a favourable impact on food security, especially when they increase and/or stabilize production or real incomes of food-insecure households. However, policies for food self-sufficiency at any cost, or "food first" policies that prefer food crops to the exclusion or neglect of cash crops, are not necessarily the best way to achieve food security or to alleviate hunger and undernutrition either at the national level or at the household level. This is especially so when market infrastructure and policies do not inhibit trade.

Agricultural growth stimulates, through multiplier effects, employment and income in the non-agriculture sector as well, which in its turn further enhances food security. At the same time, agricultural growth permits the household to expand household assets, which increases its resilience to adverse impact of falls in production and incomes on food security. Sale of cash crops on the market increases household income and is thus likely to increase food consumption, provided the switch to cash crops does not lead to a change in income control within the household or to decisions for its disposal that could reduce expenditure on food.

**Stabilization of food supplies.** These policies often include stockholding by governments to meet requirements in periods of crop shortfalls and/or during the period before the harvest. Limited stockholding, especially in the form of strategic food security reserves, as a first line of defence in emergencies is useful. However, stockholding is costly and a cost-benefit balance of such policies is required. Price stabilization can be costly and evidence increasingly suggests a "minimalist" approach. One alternative is to rely on trade-oriented policies which enable the country to obtain food supplies from the world markets either on commercial terms or as food aid. In practice, an appropriate policy mix involving some stockholding and some reliance on world markets would need to be adopted in the light of the circumstances of the individual countries. Investments in agriculture are also often needed to improve post-harvest handling, storage, preservation and distribution to reduce losses at all stages. Incentives to promote food processing at the local level and to better utilize and preserve indigenous foods would contribute to security particularly during times of seasonal shortages.

**Credit to the poor households.** Promoting self-employment through private investment can be a useful policy instrument for strengthening food security. Credit programmes that have been found to be most successful for these purposes are those that combine small-scale credit with group motivation, technical advice and assistance. Credit programmes aimed at women have been particularly beneficial to food security.

**Increasing employment opportunities.** This is another key area for action for alleviating rural and urban poverty. The private sector can play a very important role in augmenting employment opportunities in both agriculture and industry. Labour-intensive public works can increase the incomes of poor households and can also be an effective instrument in food security strategy. Such policies can be doubly beneficial. In the short run they can increase the incomes of poor households and thus improve their food security. At the same time they can increase their income earning capacity in the long run by creating productive assets such as irrigation facilities and roads. Public works programmes can reach the food insecure by concentrating on disadvantaged regions where poverty predominates. Self-targeting can also be incorporated in properly designed labour intensive public works, as in employment guarantee schemes.

**Income transfer schemes.** Increasing the food consumption of poor households can be accomplished through targeted feeding programmes, food stamps and targeted food subsidies. However, country experiences illustrate the difficulties of achieving universal food security on a sustainable basis through generalized food subsidy programmes. Such programmes involve considerable strain on the resources and administrative capabilities of developing countries. One policy alternative would be to introduce targeted food subsidies instead of general food subsidies. Targeted food subsidies require identification of vulnerable groups and introduction of food distribution schemes which cater to the needs of these groups only. However, these involve costs and administrative infrastructure which are often out of reach of many developing countries. An alternative is to introduce self-targeting schemes, which, for example, select for distribution only those food items which are consumed primarily by the poor or to locate food distribution centres where the poor live.

**National Preparedness Planning and Emergency Relief Programmes.** Programmes involving food distribution and/or public works programmes are of particular importance in these circumstances. National and local level administrative capacities and infrastructure for storage and distribution are important determinants of the effectiveness of relief programmes in coping with food insecurity resulting from emergencies.

The formulation of national preparedness plans and an effective early warning system is essential for prompt and timely response to emergencies. These can benefit from the involvement of local communities and non-governmental organizations, particularly in emergency relief programmes. A strengthened mechanism at the international level such as the International Emergency Food Reserve (IEFR) can be of great importance to secure effective and timely response from the international community in meeting emergencies.

**Coping mechanisms which households adopt in emergencies.** Three basic stages can be identified in the pattern of household coping or the failure thereof: loss prevention, crisis damage containment and household collapse. In order to cope with emergencies effectively, it is important to understand the coping behaviour of the households in order to strengthen their capacity to face emergencies. However, it is obviously not enough to leave the poor households to rely solely on such mechanisms, as they are not adequate to protect them from the life-threatening impact of emergencies. Moreover, when emergencies occur frequently and in quick succession the strength of the coping mechanisms themselves is greatly reduced, thus exposing the households to the most severe effects of adverse situations. Due to lack of resources, inadequate institutional support and other factors, household coping mechanisms are not always efficient or effective in offsetting the adverse impact of emergencies, whether natural or man-made.

Achieving food security on a sustainable basis, that is, keeping pace with growing food needs, remains a global challenge. A long-term commitment to formulate and implement appropriate policies and programmes supported by the allocation of sufficient resources is needed. The primary source and strength for tackling the problems of food insecurity have to be indigenous. However, due to budgetary and institutional constraints, many developing countries face very difficult choices in tackling the problem of food insecurity. The country-specific challenge is to adopt appropriate policy mixes of the type discussed above to meet the country's food security needs.

At the same time, there is a need for a concerted approach by national governments and the international community, including international organizations. Developed countries can play a very crucial role not only in terms of providing financial, food and technical assistance to support the national efforts but also through widening the trade opportunities for the developing countries. A successful outcome of the Uruguay Round of the Multilateral Trade Negotiations in the GATT can contribute significantly to improving food security in many developing countries.

Food security policy must evolve as a basic element of a social security policy, and can only be achieved by proper division of labour between various private and public actors at both the national and international level. Cooperation among agencies and ministries, especially agriculture and health is essential. International agencies have a key role to play in fostering incentives for such cooperation at the country level. Achieving food security requires economic development and large-scale public commitment.

## I. INTRODUCTION

This theme paper, prepared for the FAO/WHO International Conference on Nutrition, is on improving household food security, an issue of supreme importance to many millions of people worldwide. This paper attempts to present the issues, often widely debated, in a clear and consistent manner and reviews policies and programmes to improve household food security. In the process, the linkages between food security and nutritional improvement will be identified.

The purpose of this paper is also to highlight the scope for joint multiple policy instrument use for food security. Many countries focus on just one instrument, such as general food price subsidies, subsidized rationing, feeding schemes, or employment guarantee schemes, for food security. This specialization in instruments and their overextended utilization may result in inefficient and ineffective policy. Many low-income countries in transition from planned to market-oriented food policies may be especially at risk of using a narrow set of administration-intensive instruments for food security rather than employing a comprehensive portfolio of policies.

Even though access to food has been recognized as a basic human right, hunger and undernutrition continue to be serious problems for many people in many countries. Persistent hunger is a condition brought about by regularly not having enough to eat. Undernutrition results from insufficient intake of energy and specific nutrients, or from their impaired utilization by the body, and may or may not coexist with hunger. Food deficiency (hunger) and poor nutritional status are closely related to poverty.

Food security policy has multiple dimensions, ranging from ensuring food supply at the global, country, and local levels to assuring sufficient effective demand for adequate food consumption. The ultimate goal of an effective food security policy is to provide for individuals' adequate dietary intake through availability of, and access to food—a necessary, but not sufficient, condition for nutritional well-being. In order to improve food security, the specific nature of a population's food security problem must be well understood. Building the monitoring and analysis capacity for obtaining such an understanding is part of an effective and efficient food security policy.

In covering these issues, the paper begins by defining the concept of food security, with the objective of clarifying the key issues. The dimensions of the food security problem at different levels are then described and the food insecure in different economic contexts are identified. Policies and programmes for improving food security are reviewed and operational aspects of policy and programme implementation are discussed. The paper concludes by synthesizing recommendations for priority policy actions.

## II. FOOD SECURITY: CONCEPTUAL FRAMEWORK

### 2.1 Definition and Measurement of Food Security

Food security is defined, in its most basic form, as access *by all people at all times to the food needed for a healthy life*. Access to the needed food is a necessary, but, of course, not a sufficient, condition for a healthy life; a number of other factors such as the health and sanitation environment and household or public capacity to care for vulnerable members of society also come into play.

The food security concept addresses people's *risks* of not having access to needed food. These risks can be with respect to income and food production, for instance. Typically, these risks are higher the closer a household is, even in a "normal situation", to inadequate dietary intake. Thus, at the household level, *food security is the ability of the household to secure enough food to ensure adequate dietary intake for all of its members*<sup>1</sup>. An effective *food security policy* aims to ensure that all households have adequate dietary intake and they are not subjected to excessive risks in attaining that intake.

Availability of food and access to food are two essential determinants of food security. The first, however, does not ensure the second; food may be available nationally or locally but a household, for various reasons discussed later, may not have access to it. In this sense, household food security is not necessarily linked to national food availability, although adequate national or local food availability is an essential condition for household food security<sup>2</sup>.

In theory, two types of household food insecurity—chronic and transitory—can be distinguished, which are closely intertwined. Chronic food insecurity is a persistently inadequate diet caused by the continual inability of households to acquire needed food, either through market purchases or through production. Chronic food insecurity is rooted in poverty. Transitory food insecurity, on the other hand, is a temporary decline in a household's access to needed food, due to factors such as instability in food prices, products, or incomes<sup>(1)</sup>. In its worst form, transitory food insecurity can result in famine. *It is typically the chronically food insecure (poor) who are hit hardest by transitory food insecurity*

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<sup>1</sup> A comprehensive technical definition, adopted here, is given in a document prepared by the United Nations Administrative Committee on Coordination-Subcommittee on Nutrition: "A household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety, and culturally acceptable), and when it is not at undue risk of losing such access" (UN ACC/SCN 1991, 10).

<sup>2</sup> In many famine-prone African countries a close relationship is observed between domestic food production, regional and local food availability, and household food security. However, it is also observed that malnutrition may be widespread and a number of households may be food insecure in countries where total food supplies are adequate to meet nutritional needs if better distributed—the case of India is notable in this respect (FAO 1987). High levels of food self-sufficiency tend to coincide with low levels of household food security in many African countries (von Braun and Paulino 1990).

*problems*. The differing nature of household food insecurity may require corresponding differences in responses.

There are important differences in household food security issues in rural and urban contexts. In urban areas, household food security is primarily a function of the real wage rate (that is, relative to food prices) and the level of employment. Although the prevalence rates of the food insecure are, so far, lower in urban areas than in rural areas, it does not mean that the numbers of the urban food insecure will not grow. On the contrary, *urban poverty with chronic food insecurity will become an increasingly important problem in the future* with higher rates of urbanization.

Given the multiple dimensions (that is, chronic, temporary, short-term, and long-term) of food insecurity, *there can be no single indicator* for measuring it. Different indicators are needed to capture the various dimensions of food insecurity:

- Food security, at *country* levels, can, to some extent, be monitored in terms of demand and supply indicators, that is, in terms of quantities of available food versus needs, and net import needs versus import capacity (foreign exchange earnings net of debt service obligations and other necessary foreign exchange expenditures).
- Direct surveys of dietary intake (in comparison with appropriate adequacy norms) are important but they measure existing situations and not the downside risks that may occur. The level of, and changes in, socio-economic and demographic variables such as income, real wage rates, employment, price ratios, share of expenditure on food in total household expenditure, pattern of land ownership and access to it, number of women-headed households, and migration, properly analysed, can serve as proxies to indicate the status of, and changes in, *household* food security. Indicators and their risk patterns need to be continually measured and interpreted to monitor food security status at the *household* level.
- Anthropometric information can be useful complements because they are measured at the *individual* level; yet, they are the outcome of changes in the above indicators, as well as the health and sanitation environment, and other factors, and, most importantly, they indicate food insecurity after the fact<sup>3</sup>.

## 2.2 Determinants of Food Insecurity and Links to Nutrition

### 2.2.1 Food Availability and Fluctuations

In a world increasingly integrated through trade and political-economic ties among nations, sufficient global availability of food is of increasing importance for household food

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<sup>3</sup> A more in-depth treatment of these issues is given in a FAO/WHO theme paper prepared for the ICN entitled "Assessing, Analysing and Monitoring Nutrition Situations"; Haddad, Sullivan, and Kennedy (1991) explore low-cost alternative indicators.



security<sup>4</sup>. So far, the world has largely kept up with the challenge of population growth<sup>5</sup>. However, global food availability cannot be taken for granted in the long run in view of continued population growth, increased land scarcity, and difficulties with achieving sustainable increases in yields of food crops. Availability of food at the household level requires that food be available in the local or community markets, not just nationally, which, in turn, requires relatively smooth market operations, functioning infrastructure, and a free flow of information. As relevant as the household perspective is for guidance of the complex distribution issues, we must not lose sight of global production needs and responsibilities as a foundation for sustained, long-term, improved household food security.

National, regional, or local availability of food is determined primarily by food production, stockholding, and international trade. Variations in any of these can contribute to food insecurity. For instance, increased cereal production variability has been shown to significantly increase food consumption variability with a sizeable effect<sup>(2)</sup>.

Seasonal variations in production and prices are often important factors in contributing to transitory food insecurity of poor households, which, over time, can escalate into chronic food insecurity and nutritional deterioration<sup>(3,4)</sup>. Sudden changes in incomes and prices affect the ability of households, not always in the same way, to obtain food that is available<sup>6</sup>. An important source of fluctuations in seasonal food prices lies in the costs of storage and failure to manage public food stocks adequately.

Such technical issues as the quality and safety of food are also important. Few low-income countries have appropriate standards and administrative capacity for their enforcement.

### 2.2.2 Determinants of Access to Food and Nutritional Well-Being

The 1980s were a particularly harsh decade for many low-income developing countries. Economic growth during this decade was negligible, if not outright negative in

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<sup>4</sup> World food trade increased from 8 percent of production in the early 1960s to 12 percent in the mid-1980s; developing countries, as a group, doubled their food imports per capita, but increases for low-income countries were negligible (FAO 1987). It is quite likely that these low-income countries, especially those whose food equation remains balanced at unacceptably low levels, will participate to a much greater extent in the world food market as they attempt to improve their food security.

<sup>5</sup> Despite the addition of 1.8 billion people to the world's population in the last 25 years, average food availability rose from 2 290 calories per capita per day during 1961/63 to 2 700 calories in 1988/90 (FAO 1992).

<sup>6</sup> For example, a decrease in food prices may reduce the incomes of food producers while benefiting non-food-producing consumers. Surplus farmers who often meet most of their foodgrain needs from home production can choose to maintain adequate levels of food consumption, even if real earnings fluctuate, whereas landless agricultural wage labourers whose real earnings are determined by market wages, hours worked, and retail prices, are highly susceptible to increased variations in production and prices and, therefore, are adversely affected as consumers (Streeten 1987).

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many countries, especially those of sub-Saharan Africa. The impact of these developments on household food security and welfare has been quite severe, as changes in child welfare indicators such as malnutrition, infant and child mortality rates, and incidence of diseases demonstrate<sup>6</sup>. The poor have been particularly hard hit by these macro-economic and external problems, and by the macro-economic stabilization and adjustment programmes that have then had to be adopted by many of the affected countries, which have involved deterioration in real wages, increased unemployment rates, and cutbacks in social sector spending.

At the country level, access to food from the international market is a function of world food prices and foreign exchange availability. However, for many food-deficit and foreign-exchange-deficit countries, recourse to the international market is limited, and food aid offers them an important form of access to food. The global supply and demand for food aid and its allocation among countries are driven by complex factors, not just market forces and charity. Supply by donors is influenced by fiscal constraints, world market prices, and "surplus" production levels. In some instances, allocation of food aid among countries is often a consequence of political tradition. Food aid, while it has played a critical role in times of emergency for some countries, is not a reliable source of food supply for food-deficit low-income countries; it has been observed that when world market prices rise, food aid supply by donors is typically reduced. A more sustainable and reliable measure would be to increase the foreign-exchange earnings of food-deficit countries by augmenting their export surpluses and through improvement in the international trading environment.

*Poverty* is a major determinant of chronic household food insecurity. The poor do not have adequate means or "entitlements"<sup>6</sup> to secure their access to food, even when food is available in local or regional markets. Furthermore, the poor are vulnerable to shocks that are liable to slip them into temporary (transitory) food insecurity. The ability of households to acquire adequate food may be affected by events beyond their immediate control, for example, price shocks, war, deteriorating terms of trade, domestic policy changes, pests, and climatic conditions such as droughts, storms and floods.

Increasing the incomes of households that have malnourished members will often improve their access to food, as well as their nutritional well-being, which is influenced by multiple factors, including food consumption<sup>7</sup>. In general, increases in income, especially for poorer households, are associated with increases in caloric intake of staple foods and with non-staple food consumption, especially meats<sup>7</sup>. Consequently, the income-effect on consumption of micronutrients that are found primarily in meats, such as iron, is high, whereas the income-effect for micronutrients coming primarily from vegetables, such as vitamin A, is lower<sup>8</sup>.

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<sup>7</sup> In three case studies from The Gambia, Guatemala, and Rwanda, a 10 percent increase in income, from a level of US\$100 per capita, resulted in a 3.5 to 4.9 percent increase in household food energy consumption and a 1.1 to 2.5 percent increase in weight-for-age of children (von Braun 1990). Macro level data from a number of developing countries suggest that a doubling of per capita income from \$300 to \$600 results in a reduction of about 40 percent in the prevalence of below standard weight-for-age of children (von Braun and Pandya-Lorch 1991).

In addition to their current income flow, poor households build their *asset bases* out of incremental income. Expanded asset bases reduce vulnerability of households to short-term downturns in income; part of the asset base can be liquidated in times of adversity, an action that helps to maintain or, at least, not further degrade household-level food security.

Increases in household income, while improving access to food, do not always directly contribute to improved nutritional well-being of the household. The additional income may be spent on foods of low nutritional value or it may be spent on non-food items. The effect of income on nutritional status may not always be through increasing food consumption, but indirectly through better sanitation, for instance.

Food security and nutritional well-being arising from food consumed by households is determined by at least five interrelated factors:

- Availability of food through market and other channels, which is a function of factors discussed above;
- Ability of households to acquire whatever food the market and other sources have to offer, which is a function of household income levels and flows and the resource base for subsistence farming;
- Desire to buy specific foods available in the market or to grow them for home consumption, which is related to food habits, intrahousehold income control, and nutritional knowledge;
- Mode of food preparation and to whom the food is fed, which is influenced by income control, time constraints, food habits, and nutritional knowledge; and
- Health status of individuals, which is governed by the nutritional status of the individual, nutritional knowledge, health and sanitary conditions at the household and community levels, and caretaking, among others.

Again, each of these determinants has specific risk attributes that determine food security and nutritional *risk*.

Food security and nutritional well-being are connected through the actual *utilization* of food by individuals, as determined by some of the five above-mentioned factors (for example, health, the composition and energy density of diet, mode of processing and preparing food, and, for infants, the extent of breast-feeding and general child care). While concentrating on the issue of improving household food security, an essential step toward securing good nutritional status, this paper does not cover these other important factors identified here, which, together with food security, determine the ability to achieve good nutritional status.

### 2.3 Principal Consequences of Food Insecurity

Food insecurity, and the frequently extreme efforts taken by affected households to avert it, leads to much human suffering. In addition, it results in substantial productivity losses in both the short and long run due to reduced work performance, lower cognitive ability and school performance, and inefficient or ineffective income earnings decisions designed to hedge against food availability and access constraints. Food insecurity can thus lead to a misallocation of scarce resources and loss (sale) of productive assets. Food is essential to survival and people who are food secure are generally more emotionally secure and better off psychologically than those who are food insecure. Food security and adequate nutrition are beneficial outcomes in themselves as well as important inputs to economic development.

Nutritional status and labour productivity, as measured by wages and/or own-farm output, appear to be positively related<sup>(9-11)</sup>. High levels of morbidity, due in part to insufficient nutrient intake, can reduce work time directly as well as indirectly through the need to take care of sick family members<sup>8</sup>. High levels of morbidity can also divert household resources away from farm or non-farm investments towards medical care.

Cognitive development and schooling performance are impaired by poor nutrition and health, with consequent losses in productivity during adulthood<sup>9</sup>. Poor nutrition and health in early childhood can have long-term consequences affecting a child's later progress during school. For school-age children, nutritional deficiencies are responsible in part for poor school enrolment, absenteeism, early dropout, and poor classroom performance. Educators have often overlooked the fact that nutrition and health interventions can result in significant improvements in schooling performance<sup>(12)</sup>.

Not only does food insecurity in itself have deleterious effects on households and individuals, but efforts at achieving food security may also exact a heavy toll on households, for example, if it involves households spending most of their income on obtaining food, leaving very little else for the basic necessities of life such as housing and health. Households may achieve temporary food security at the cost of substantial asset disposal and future indebtedness—they dig themselves deeper into the mire of poverty. In the extreme case, a household that uses almost all of its resources to achieve food security in the present time renders itself highly vulnerable to becoming food insecure in the future, compared to a household that uses a smaller share of its resources to achieve current food security.

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<sup>8</sup> Surveys from The Gambia and Rwanda find that preschoolers are ill 10 to 17 percent of the time, and women are ill 16 to 29 percent of the time (von Braun, Puetz, and Webb 1989; von Braun, de Haen, and Blanken 1991).

<sup>9</sup> An innovative study in Guatemala tracked down after 14 years most of the schoolchildren who had received supplemental feeding in a study project and found that, in spite of no further feeding interventions, those children who had received the supplements maintained their height advantage and performed better on achievement tests (Martorell *et al.* 1991).

The efforts of the food insecure to secure food may also have important implications for the *environment and for natural resource* utilization. Many of the poor and food-insecure households already live in ecologically vulnerable areas<sup>(13)</sup>, and inappropriate or desperate land use practices can cause environmental degradation, which, in turn, can further undermine the livelihood of the food insecure<sup>10</sup>.

The search for food security may also have important implications for a region's *demographic situation*, especially if it leads to migration (short- or long-term) by the food insecure to other areas in search of employment and income and, in the extreme case, of relief food. This out-migration may result in an increase in the number of female-headed households and in the dependency ratio in the sending area as well as changes in the dynamics of the labour market. The receiving areas, mostly urban slums, experience considerable food security strain from the influx of migrants.

### III. DIMENSIONS OF THE FOOD SECURITY PROBLEM

#### 3.1 How Many Are Food Insecure?

It is difficult to know exactly how many households are food insecure, given definition and measurement difficulties and inadequate data. It is even more difficult to identify the number of *individuals* who are food insecure, given intrahousehold inequalities of differing natures in different regions as well as changes over time. Improved knowledge of these issues is needed for effective policy-making. Yet, lack of precision should not stand in the way of devising and implementing policies and programmes for improving food security.

Efforts have been made to arrive at rough estimates of the number of food insecure. The Food and Agriculture Organization (FAO) and the World Bank have spearheaded these efforts, joined in recent years by the International Food Policy Research Institute (IFPRI), the World Hunger Programme of Brown University, and other researchers<sup>(14-22)</sup>. Because of differences in definitions, assumptions, country coverage, and data quality (among other factors), the estimates vary widely, ranging from about 300 million to 1 billion.

These estimates give a rough indication of the *incidence of food deficiency* among the poor, *not of food insecurity*. These estimates disregard fluctuations and risks in the availability of, and access to, food, the key features of food security, and they relate to food energy deficiencies only. Frequently, they are derived indirectly from income, as in the case of the World Bank studies just cited, and are not derived directly from actual calorie consumption information (as does the IFPRI study). While food deficient households are

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<sup>10</sup> Kumar and Hotchkiss (1988) find that in the poor hill areas of Nepal, increased deforestation forces women to allocate more of their labour time to collection of fuelwood, to the extent that they spend almost as much time on collecting fuelwood as on farm labour, with probable adverse effects on agricultural production, child care, and nutrition.

obviously food insecure, they are not necessarily the only food-insecure households. There may be a number of households that may be barely coping, and at risk of becoming food deficient, say, the next year; such households are also food insecure. There can be considerable fluctuations into and out of food deficiency, and, hence, into and out of food insecurity. Estimates of food deficiency, based on cross-sectional survey information, understate the prevalence of food insecurity<sup>11</sup>, but we do not know by how much. Thus, crucial information about the scale of transitory food insecurity is lacking.

There are indications of considerable progress in poverty alleviation in the 1960s and 1970s, with a somewhat mixed performance in the 1980s<sup>(23,24)</sup>. Without much doubt, the incidence of poverty (that is, the proportion of the population that is poor and, thus, food insecure) is declining. However, given population dynamics, especially the rapid population growth rate in sub-Saharan Africa, the number of the food insecure has been increasing, despite the reduction in incidence of poverty, and appears set to continue increasing.

Severe food insecurity that degenerates into famines is disappearing. Today, only a few African countries such as Sudan, Ethiopia, and Mozambique, exhibit symptoms of famine, unlike the late 1960s and early 1970s or even the early 1980s. The *risk* of famine events, however, continues to exist in more countries, because of political, economic, and environmental shocks and insufficient preparedness and famine prevention policies<sup>(25-27)</sup>.

### 3.2 Where Are the Food Insecure?

We have an approximate idea of how many food-insecure people there are; we similarly have an approximate idea of where they are located. Essentially, all estimates concur that South Asia, particularly India and Bangladesh, holds a large proportion of the developing world's food-deficient, particularly the extreme poor, followed by East Asia and sub-Saharan Africa. Incidence of food insecurity is high in Africa and South Asia, somewhat high in the Middle East and North Africa, but considerably lower in East Asia and Latin America and the Caribbean.

The IFPRI study on location of the food-energy-deficient by agro-ecological zone found that the incidence of food poverty, thus defined, ranged from 23 percent in Central America, to 26 percent in South America, 35 percent in Asia, and 38 percent in sub-Saharan Africa<sup>(28)</sup>. In the aggregate, food poverty tended to be lowest in the wet zones and highest in the arid zones. In most instances, the distribution of the poor mirrors the population distribution in the agro-ecological zones.

Some of the countries with large food security problems, measured according to three criteria—low average levels of calorie consumption, large fluctuations in and low levels of food consumption, and large numbers of absolute poor—are listed in Table 1. This is not an exhaustive list, but it makes two points: (i) there is some overlap of countries among

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<sup>11</sup> For example, in a Philippine data set, out of 323 households with average calorie adequacy above 80 percent of requirements (that is, not food deficient in a chronic sense), 197 dipped below 80 percent at least once during a 16-month period (Haddad, Sullivan, and Kennedy 1991).

**Table 1 - Examples of countries<sup>a</sup> with different food security problems, according to three indicators**

Indicator 1		Indicator 2		Indicator 3
Very Low Level of Average Food Consumption <sup>b</sup>		Large Fluctuations and Low Levels in Food Consumption <sup>c</sup>		Existence of Large Numbers of Absolute Poor <sup>d</sup>
Mozambique	Burkina Faso	Philippines		Brazil
Ethiopia	Rwanda	Indonesia		Mexico
Somalia	Haiti	Syria		India
Bangladesh	Kenya	Algeria		Pakistan
Malawi	Central African Republic	Morocco		China
Nepal	Zambia	Rwanda		
Chad	Guinea	Côte d'Ivoire		
Sierra Leone	Sudan	Tanzania		
Madagascar	Angola	Cameroon		
Nigeria	Bolivia			
Uganda	Senegal			
Zaire	Namibia			

<sup>a</sup> The list of countries included in this tabulation is selective because of lack of suitable data. Exclusion from the list does not indicate absence of food insecurity problems.

<sup>b</sup> Average food energy consumption in 1989 below 2 100 kilocalories per capita<sup>(29)</sup>.

<sup>c</sup> Average energy consumption in 1989 below 2 300 kilocalories per capita and above average coefficients of variation in food energy consumption during the period 1972-1983<sup>(30,31)</sup>.

<sup>d</sup> This group includes middle-income countries with pockets of poverty (such as Brazil, Mexico) as well as large low-income countries whose regional differences in fluctuations tend to be cancelled out (India, Pakistan, China).

indicators, that is, some countries suffer from food insecurity as defined by more than one criterion; and (ii) it is important to identify the *nature* of the food insecurity problem to accurately identify which countries have which problem.

### 3.3 Who Are the Food Insecure?

Depending on factors such as agro-ecological characteristics, access to land, diversity of income sources, and state of development of the economy, food-insecure households can be members of different socio-economic and demographic groups in different areas. Nevertheless, some common characteristics of the food insecure emerge, of which poverty is a central one. *The poor* face the most severe constraints in their own food production and in their access to food from markets, which renders them vulnerable to food security crises. A number of common *sociodemographic* characteristics emerged from a recent comparative study that looked at *income source patterns* of malnourished rural poor in 13 survey areas in Africa, Asia, and Latin America<sup>(32)12</sup>.

- Food-insecure households *tended to be larger* and to have a *higher number of dependents*, and they tended to have a *younger age composition*;
- *Ownership of land* or access to even small pieces of land for farming had a substantial impact on the food security status of rural households, even when income level is controlled for; the prevalence of food insecurity tended to be higher among *landless* or quasi-landless households who were much more dependent on other riskier sources of income than farm income and on the diversification of the rural economy;
- Women's income had an important influence on the food security status of the household, and women-controlled income was more likely to be spent on food and nutrition than male-controlled income;
- The relationship between income diversification and malnutrition is difficult to generalize—the relationship is context- and location-specific and a result of household coping strategies. A typology of food-insecure households needs always to be aware of this location and context specificity.

Typically, the food insecure spend a high share of their income on staple food consumption and/or allocate a high share of their production resources to subsistence food production in normal years; yet, they may barely meet their needed levels of dietary intake. Different types of risks affect various groups of food-insecure households and their members differently (Table 2).

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<sup>12</sup> In this study, the poor are defined as those whose food energy consumption fell below levels at which healthy life is assured.



**Table 2 - Sources of risks of food insecurity and affected populations**

Risks	Households and People at Risk of Food Insecurity
<ul style="list-style-type: none"> <li>● Crop production risks (pests, drought, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>● Smallholders with little income diversification and limited access to improved technology (for example, improved seeds, fertilizer, irrigation, pest control)</li> <li>● Landless farm labourers</li> </ul>
<ul style="list-style-type: none"> <li>● Agriculture trade risks (disruption of exports or imports)</li> </ul>	<ul style="list-style-type: none"> <li>● Smallholders who are highly specialized in an export crop</li> <li>● Small-scale pastoralists</li> <li>● Poor households who are highly dependent on imported food</li> <li>● Urban poor</li> </ul>
<ul style="list-style-type: none"> <li>● Food price risks (large, sudden price rises)</li> </ul>	<ul style="list-style-type: none"> <li>● Poor, net-food purchasing households</li> </ul>
<ul style="list-style-type: none"> <li>● Employment risks</li> </ul>	<ul style="list-style-type: none"> <li>● Wage-earning households and informal sector employees (that is, in peri-urban areas and, when there is a sudden crop production failure, in rural areas)</li> </ul>
<ul style="list-style-type: none"> <li>● Health risks (infectious diseases, for example, resulting in labour productivity decline)</li> </ul>	<ul style="list-style-type: none"> <li>● Entire communities, but especially those households that cannot afford preventive or curative care as well as vulnerable members of these households</li> </ul>
<ul style="list-style-type: none"> <li>● Politics and policy failure</li> </ul>	<ul style="list-style-type: none"> <li>● Households in war zones and areas of civil unrest</li> <li>● Households in low-potential areas that are not connected to growth centres via infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>● Demographic risks (individual risks affecting large groups)</li> </ul>	<ul style="list-style-type: none"> <li>● Women, especially when they have no access to education</li> <li>● Female-headed households</li> <li>● Children at weaning age</li> <li>● The aged</li> </ul>

The most severe food security problems arise from combinations of common risks that simultaneously hit household members in demographic risk groups. For example, children in poor smallholder households that have limited income diversification may be affected if their households experience a bad crop or loss of employment, and are located in an area of civil unrest, and so on. The possible combinations are numerous in reality. In order to improve household food security, the specific risks need to be identified so that effective and efficient risk-reducing actions can be developed.

The location specificity of food security risks also relates to the existence or the lack thereof of community or state social security systems to mitigate against risks.

#### IV. REVIEW OF POLICIES AND PROGRAMMES FOR IMPROVING HOUSEHOLD FOOD SECURITY

##### 4.1 Types of Policies and Programmes and their Effects on Food Security

A wide range of alternative policies can be pursued; there is not just one general optimal set of policies for improving household food security. Characteristics of the food security problem and institutional capabilities need to be considered when making policy choices, as must economic and fiscal costs of desired actions.

##### 4.1.1 Development Strategies and Macro-economic Policies

One can broadly distinguish between a strategy of "growth-mediated security" and of "support-led security"<sup>(33)</sup>. The first approach is "to promote economic growth and take the best possible advantage of the potentialities released by greater general affluence, including not only an expansion of private incomes but also an improved basis for public support"<sup>(34)</sup>. The second approach, one of targeted programmes, is "to resort *directly* to wide-ranging public support in domains such as employment provision, income redistribution, health care, education, and social assistance in order to remove destitution without waiting for a transformation in the level of general affluence"<sup>(35)</sup>. Obviously, the two approaches are connected, especially in the long run.

Much can be done to reduce food insecurity through national public action, even when national per capita income is low, as the well-known experiences of countries such as China<sup>(36)</sup>, Sri Lanka<sup>(37)</sup>, and Costa Rica<sup>(38)</sup> demonstrate.

*Long-run* effects of alternative development strategies for growth and poverty alleviation have shown the striking relevance of choice of strategy<sup>(39-41)</sup>. Similarly, the *short-run* effects for the poor of structural maladjustments in low-income countries in the 1980s, discussed in an earlier section, have stressed the relevance of macro-economic policies for food security<sup>(42-43)</sup>. Discussion of policy for improving food security must not be limited to direct food and agriculture-related policies. *Non-agricultural* and *economy-wide*

*policies*, such as industrial protection and fiscal policies, are highly relevant for prices, income, and employment of the poor and, thus, for food security in the short and long run<sup>(44)</sup>.

An important issue concerning macro-economic policies is the impact of structural adjustment programmes which are currently being implemented in many countries. The structural adjustment programmes aim at creating conditions which would ensure growth on a sustainable basis. It is conceivable that in the absence of such programmes growth would falter or the economy might even backslide, thus increasing the food insecurity of the poor. In that sense, such adjustment programmes are deemed necessary. But they take time, often considerable time, before their fruits are visible. And in the meanwhile they often have an adverse impact on the food security of the poor, at least in the short term. This is often due to cuts in food subsidies, as well as in health, education and other social services which the adjustment programmes often entail for achieving fiscal balance at the macro level. Striking an optimal balance between the conflicting fiscal policy requirements with the food security needs presents a difficult policy choice for many developing countries that are implementing structural adjustment programmes.

#### 4.1.2 Storage, Trade, and Food Aid Policies for Stabilization

There is a continued strong feeling among policy-makers, not only in low-income countries, that storage under public control is essential for food security. At the time of the 1974 World Food Conference and even into the 1980s, "food security" was largely understood as a matter of national and international trade and of storage policies to deal with production fluctuations<sup>(45)</sup>. It is now increasingly well understood that production fluctuations, infrastructure, government policy, location, and sectoral diversification are important determinants of a country's demand for storage and stabilization of food availability and prices. The stabilization drive needs to be attuned to a country's specific production risks (for example, whether it is prone to droughts or floods) and trade risks (for example, whether it is landlocked)<sup>(46,47)</sup>. The response of local- and farm-level storage to public policies is an important consideration, especially in circumstances where post-harvest losses are significant and where local market disruptions occur frequently. Technical improvement of storage to cut losses remains of high relevance in many countries.

Price stabilization is an expensive proposition and increasingly so the more stability is attempted. Frequently, low-income countries cannot afford it financially or administratively and, therefore, need to search for optimal levels of stabilization<sup>13</sup>. Administrative and opportunity costs of the resources engaged in stabilization need to be

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<sup>13</sup> For country experiences and policy proposals, see the innovative work of Pinckney on Kenya and Pakistan (1988, 1989), and of Ahmed and Bernard (1989) and Ravallion (1987) on Bangladesh.

accounted for. Benefits are in terms of a more stable investment climate and, more relevant to this paper, of reduced short-term stress on households to adjust<sup>14</sup>.

Yet, there is increased evidence that argues for a "minimalist" approach to price stabilization. A recent review of domestic price stabilization schemes in developing countries suggests the following principles to governments to minimize the cost of mitigating adverse effects of price instability: "rely on market mechanisms when possible; avoid schemes that require physical handling of the commodity; do not try to stabilize prices too much; and try to mimic prices that would be established in a freely functioning market" <sup>(48)</sup>.

Countries that operate under severe foreign exchange constraints find it difficult to increase commercial food imports in order to cope with food shortages. Having to allocate scarce foreign exchange to food imports (over and above their normal allocation) destabilizes their imports of investment goods, with consequent adverse effects on the economy. For such countries, it would, therefore, be highly desirable to establish at the international level an emergency food import financing facility or to make the existing International Monetary Fund's Food Financing Facility an effective tool<sup>(49)</sup>. In the long run, the preferred approach should be to increase the import capacity of such countries by augmenting their export surpluses and by increasing access to market for their export.

Food market and trade interventions are widespread not only in low-income countries, but to an even greater extent in high-income countries. High-income countries' stabilization policies can destabilize world markets, and also restrict access to their markets. An international mechanism needs to be developed that (i) stabilizes overall food supply in times of global food scarcity, (ii) introduces criteria for food aid allocation to countries in times of need, and (iii) represents a sufficient transfer to beneficiaries in need. Food aid needs will probably increase in the 1990s in Africa where food import needs will widen during times of foreign exchange shortage before technological improvements and export earnings can be hoped to close the gap.

#### 4.1.3 Promoting Growth in Food and Agriculture Sector and Rural Development

Increased food and crop production is a key factor in strengthening food security. *Production-oriented policies and programmes* that aim to increase food production and/or production of crops for sale can have favourable impacts on food security if they increase and/or stabilize the real incomes of the people facing food insecurity. The impact of these policies is mediated through changes in food prices and incomes and is influenced by trade policies discussed below. Growth in food supplies and food processing can have a dual effect on food security by reducing food prices, which benefits food-purchasing households

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<sup>14</sup> Of most importance is the prevention of drastic price shocks. When real prices of cereals more than tripled and cereal/livestock terms of trade increased eightfold in Sudan in 1985, child malnutrition prevalence rates (those children with weight-for-heights below 80 percent of standard) rose from 5 to 20 percent in Kordofan (Teklu, von Braun, and Zaki 1991).

in rural and urban areas, and, depending on the nature of growth, by promoting employment. As incomes of poor households increase, their absolute expenditure on food consumption also increases, although the relative share tends to decrease.

Increasing production of food and other crops needs to be done in ways that particularly *benefit the rural poor*. This requires increasing the productivity of small-scale farmers through targeted measures such as production incentives, development of marketing infrastructure, and more research on rainfed and other disadvantaged areas. The impact of such production increasing programmes can be strikingly enhanced if they are accompanied with effective extension services, farmer education as well as nutrition education programmes. It is necessary to focus such programmes on local nutrient-rich foods as well as on livestock and fisheries. The role of kitchen gardens can be particularly valuable. Programmes to increase production and incomes in enterprises controlled by women can also contribute significantly to the improvement of household food security; many studies have shown that earnings by women are likely to be utilized for increasing food consumption. Expanded food processing opportunities, especially small-scale enterprises, can significantly improve household food security.

*Technological innovation and commercialization in agriculture* induce economic gains through stimulating agricultural growth, improving employment opportunities, and expanding food supplies, which involve and benefit the poor and help to alleviate poverty<sup>(50-52)</sup>. Adoption of technological innovations can be greatly facilitated by effective extension services and education of farmers. A policy of self-sufficiency in food production or adoption of a "food first" policy that emphasizes food crops to the exclusion of cash crops is not necessarily desirable or crucial for alleviating hunger and undernutrition, when market infrastructure and policies do not impair trade. The "green revolution", the irrigation, seed, fertilizer, and pest control package for rice and wheat, in particular, has expanded farm and non-farm output, employment, and wages, and stimulated migration, and thus has contributed to both household and regional food security, especially in high-potential production areas, such as the Punjab of India<sup>(53)</sup>, the Muda Irrigation Scheme in Malaysia<sup>(54)</sup>, and the Laguna Province in the Philippines<sup>(55)</sup>. Of course, technological innovation and commercialization should not be restricted to crops, but should also encompass livestock and fisheries. In the future, biotechnology can be increasingly important in developing technological innovations.

Where market infrastructure is not well developed, it should be strengthened in the long-term interest of achieving food security on a sustainable basis. The sale of cash crops on the market often increases household income more than producing only food crops. Thus, it is likely to increase food consumption, provided the switch to cash crops does not lead to a change in income control at the household level and consequently in decisions for its disposal that could reduce expenditure on food.

In some instances, however, the poor have failed to reap the benefits, or have even lost, from technological change or commercialization. These adverse effects, where they have occurred, are mostly attributable to inelastic demand for the promoted commodities or

to adverse institutional developments such as limited access to credit and other inputs, eviction of tenants, coerced production, or forced procurement<sup>(56,57)</sup>.

The food insecure who are subsistence farmers will benefit from their own increased food production for home consumption, which insures them against market risks. When subsistence-oriented farm households are given the option of adopting cash crops that offer higher returns, they tend to adopt these crops quickly, yet they also tend to maintain substantial resources in food production for home consumption as an insurance mechanism<sup>(58,59)</sup>. Thus, in environments with risky markets, the joint promotion of food crops and cash crops is required in support of food security enhancement. Agroforestry systems which enable crop diversification can help reduce short-term economic risks. They can also be instrumental in reducing environmental risks by positive influence on soil fertility and soil and water conservation.

There are other, somewhat more indirect, effects of growth in agricultural production on food security that are noteworthy. First, off-farm non-agricultural activities often contribute a significant proportion of total household income<sup>15</sup>. Much of this non-agricultural employment and income is derived from increased demand for local goods and services, which, in turn, is partly the consequence of multiplier effects of agricultural growth due to commercialization and technological change<sup>(60,61)</sup>. Second, poor households build up their asset base out of incremental income. Agricultural growth permits an expanded asset base, which makes households less vulnerable to short-term disruptions in their income, as discussed earlier.

While landowning households benefit most from the direct income effects of agricultural growth, landless and small food-deficit farmers benefit most from the indirect effects on off-farm employment generation<sup>(62)</sup>. These indirect employment effects helping the poorest households are further facilitated by *infrastructural development*<sup>(63)</sup>.

#### 4.1.4 Other Income and Employment Generation Policies and Programmes

Besides agricultural production-oriented programmes and policies, other programmes for generation and diversification of employment and income can reduce risks for food-insecure households. These other income-generation programmes differ from food production-oriented programmes in that they stimulate or stabilize demand for food but they may not directly expand supply of food simultaneously. This section reviews two such income-generation actions: (1) labour-intensive public works for food security; and (2) credit to the poor for consumption stabilization and self-employment. Both can be part of effective community development. Other income generation programmes such as home gardening and backyard livestock production promotion can be important, too, but are not discussed here.

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<sup>15</sup> Among 13 household-level surveys conducted in developing regions in Africa, Asia, and Latin America, the share of non-agricultural income in total income ranged from 13 to 67 percent; in half of the survey locations, the non-agricultural income share of households was about or exceeded 50 percent (von Braun and Pandya-Lorch 1991).

Labour-intensive public works programmes can address, simultaneously, three central problems facing many low-income countries today—food insecurity, growing unemployment, and poor infrastructure<sup>(64)</sup>. They go a long way toward direct and sustainable poverty alleviation and strengthening of self-help capacities. Food aid can be, directly or indirectly (monetized), a component of the wage payments.

The household food security effects of labour-intensive public works programmes are a function of *programme design*. For instance, a short-term project may result in expenditure patterns by the poor that treat project income as "windfall profits." An example from Guatemala hints at that behaviour<sup>16</sup>. A similar explanation may be attributed to the small food consumption benefits observed during the short work season of the Bangladesh food-for-work programme<sup>(65,66)</sup>. In contrast, long-term benefits from improved rural infrastructure produce more secure income flows and substantial consumption improvements for the lowest-income households<sup>17</sup>.

Public works programmes can be a viable instrument for *famine prevention* as demonstrated by the Employment Guarantee Scheme (EGS) from Maharashtra, India. The employment guarantee feature of the EGS<sup>18</sup> also triggers "relief works" automatically at local levels<sup>19</sup>. Such a feature enables crises that otherwise might be too small to trigger public action to be addressed—an important lesson for dealing with the problem of localized famines in Africa.

*The target group* of labour-intensive public works programmes, the food-insecure poor, are successfully reached through a variety of mechanisms and design features that include wage rate policy, regional targeting, and specific selection of households (displaced) and household members (women). Properly designed public works programmes have a unique feature in favour of poverty alleviation, with low administrative costs. They can also be self-targeting; at defined wage rates, the working poor identify themselves by turning up

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<sup>16</sup> Almost complete independence was observed between expenditure from food aid income and expenditure from income from other sources in the context of food-for-work schemes in Guatemala City (Bell, Hay, and Martinez 1989). Consumption effects seemed significant as 65 percent of households in this small sample increased their food consumption as a result of food aid.

<sup>17</sup> For example, rural Bangladesh villages with better infrastructure development (gauged by a number of criteria) had 12 percent of their households that were food insecure (that is, consuming less than 80 percent of caloric requirements) compared to 20 percent in villages with poor infrastructure (Kumar 1988). This difference is explained by higher incomes (18 percent more employment was available for the landless) and lower prices of marketed items in villages with better developed infrastructure.

<sup>18</sup> The scheme provides an unlimited guarantee of employment to all adults in rural Maharashtra who are willing and able to work at the given wage.

<sup>19</sup> Between 1972 and 1987, Maharashtra State, as a whole, suffered from a serious crisis in only one year, 1979-80, although different districts suffered from local crises at different times. The EGS responded automatically to crisis situations in affected districts, even when the overall situation in the state was above average (Ezekiel and Stuyt 1989).

at public works schemes<sup>(67)</sup>. When increased demand for food is induced through a large public works scheme, food must be forthcoming locally or inflation may result, which also hits non-participating households. Food aid can play a role in mitigating such effects if it enables food supply to be expanded according to the demand induced by public works programmes.

*Credit to the poor* for consumption stabilization and for promotion of self-employment through private investment is an important mechanism for improving food security in the growing and diversifying rural economies of many low-income countries. Many interesting innovations have occurred in programmes of this type in the 1980s. These programmes are most likely to succeed in areas where agricultural growth is proceeding well and where there is good infrastructure coverage and market activity; non-farm activities can easily be further stimulated. Programmes that have been found to be most successful in generating self-employment for the poor and stabilizing their consumption are those that combine small-scale *credit* with group motivation, technical advice, and assistance, such as Bangladesh's Grameen Bank<sup>(68)</sup>. Group loans for poor households without collateral have been found to be an effective mechanism that ensure repayment as long as the group size remains small and peer pressure can operate.

#### 4.1.5 Targeted Distribution and Food Subsidies

Food income transfers are a widely used means of alleviating food insecurity. They have, especially in the 1980s, come under attack for their potential adverse effects on markets and for their high fiscal costs. In the current climate of structural adjustment, there is additional pressure to eliminate these programmes, except for those that can be justified on strong humanitarian and/or developmental grounds.

#### Targeted Feeding Programmes

Except in the context of emergency relief, feeding programmes are generally aimed at those persons especially vulnerable to malnutrition, usually children and women of child-bearing age at low income levels. Targeting of feeding and food distribution programmes is achieved through various means, depending on the level of nutritional need and the objectives of the programmes<sup>(69)</sup>. *Geographical targeting* works well when a high prevalence of food insecurity is identified in selected areas. *School feeding programmes* can be used to target school-age children. *Means tests and vulnerability tests* are also sometimes used. Food distribution to the general population is rarely cost-effective, partly because of leakages, in improving household food security. Care should be exercised that the administrative costs of targeting do not overwhelm the feeding programmes.

Feeding programmes rarely increase the food intake of targeted persons by 100 percent of the food given, due to sharing of food with household members or substitution with home-produced and purchased food. Feeding programmes are not easy to administer. They are, however, a politically and socially more acceptable means of operating a targeted income transfer programme, and have been shown to have the potential to increase food



intake by a greater extent than comparable cash income transfers could achieve. The income elasticity of food expenditures tends to be less than unity and not all of the increased expenditure goes to increasing calorie intake. Some also goes to improving the quality of the diet in terms of taste and convenience of the food<sup>(70)</sup>.

In many of these programmes, the feeding component serves additional objectives besides improving food consumption, such as encouragement of school attendance (and learning) and of attendance by low-income women at ante- and post-natal clinics, provision of preschool child care to poor working mothers, and provision of training and skills to low-income women so that they reduce their dependency on low-paid, erratic, and heavy work in the casual labour market.

### Food Stamps and Other Income Transfers

Interest in food stamp programmes as a means of providing a food-mediated income transfer to low-income households and as an alternative to food subsidies has increased in recent years. Food stamp programmes are expected to retain the higher food consumption effects of food-based income, as well as to reduce the administrative burden and costs imposed by food handling and transport<sup>20</sup>.

Experience with food stamp programmes is mixed; they have not been as easy to administer as supposed. In Zambia, large-scale counterfeiting of food coupons has led to the virtual elimination of such programmes. In Sri Lanka, the income-verification procedure for food stamps has excluded wage-earning workers on tea plantations, although they appear to be a nutritionally needy group<sup>(71)</sup>. These problems are not unique to food stamps, but are also encountered with in-kind transfers. It is common knowledge that even the largest and most successful experience with food stamps, that of the United States, still misses a large proportion of eligible households<sup>(72,73)</sup>. However, little empirical information is available on food stamp programmes in the developing world, even from Sri Lanka, which in 1979 replaced its decades-old food subsidy scheme with food stamps. When the food stamp subsidy scheme began in 1979 in Sri Lanka, its benefits constituted 83 percent of the benefits from the price subsidies, but by 1981/82, this share had been reduced to 43 percent by diminishing real value of the stamps due to inflation<sup>(74)</sup>. The food stamp scheme was not successful in helping the bottom 20 percent of households whose per capita calorie consumption declined by about 8 percent between 1978/79 and 1981/82. The drawback to fixed, nominal-value food stamps is that they do not protect the consumer from short-term price fluctuations, even when periodically adjusted for inflation<sup>(75)</sup>.

To be cost effective, targeting of food stamp programmes has to be based on a means test. This is not perfect even in the United States and is especially problematic in low-income countries where income records are virtually unavailable or misleading. Although it has been suggested that food stamp programmes could adopt some of the methods used for

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<sup>20</sup> It has been estimated that with a general subsidy, to get \$1 worth of food to the malnourished would cost \$12 (Reutlinger and Selowsky 1976).

targeting child feeding and food distribution programmes, such targeting could preclude those food-insecure households who do not have undernourished children. In addition, extreme cases could exist where such targeting could encourage growth faltering.

### Food Price Subsidies and Rationing

Consumer food price subsidies are very widespread and have been introduced in nearly every low- and middle-income country in the past few decades. A comprehensive review of the origins and effects of programmes currently found in many developing countries, such as ration shop schemes in India, Pakistan, and Bangladesh, and food subsidies in Egypt, show that they were established to assure consumers access to a specified quantity of food staples at fixed (subsidized) prices<sup>(76)</sup>.

Two of the most common types of food price subsidies are: (i) *generalized price subsidies*, which are lower market prices for a commodity that benefits all consumers, and (ii) *limited (rationed) access to a commodity* by some or all members of a community at a price lower than that prevailing in the open market. Generalized price subsidies are much more costly in terms of fiscal and economic costs than limited access subsidies and are also more regressive in the distribution of economic benefits. Programmes that provide fixed-quantity rations have, in general, been successful in reaching the population groups to which they were directed. However, while costs are lower relative to generalized price subsidy schemes, there are inevitably problems with leakages and corruption in limited access programmes that require close supervision and management<sup>(77)</sup>. The experiences of Egypt, Sri Lanka, and the Philippines illustrate the difficulty of achieving both universal household food security, through rationed distribution of food, and targeted income transfer goods in one programme in a cost-effective manner<sup>(78-80)</sup>.

There are several favourable characteristics of food subsidy programmes. In countries and regions that are frequently subject to serious food shortages, (subsidized) public distribution helps to move emergency supplies into them such as to improve the food security of the poorest groups. Food subsidies increase the real incomes of households with access to the subsidies. In a number of programmes surveyed, food subsidies accounted for 15 to 25 percent of the total real incomes of low-income households that received subsidies<sup>(81)</sup>. Food price subsidies generally increase household food consumption<sup>21</sup>. Furthermore, subsidy programmes have a positive and significant effect on food consumption of preschoolers, although they may result in decreased consumption of other foods and leakage to other household members<sup>(82,83)</sup>.

Traditionally, food aid has been used to support different types of food subsidies, an action that has been viewed as a mixed blessing. By promoting food subsidies, food aid has

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<sup>21</sup> Daily energy consumption increased by 115 calories among the poorest decile in Sri Lanka as a result of the subsidized ration-shop scheme (Gavan and Chandrasekera 1979). In a pilot food subsidy scheme in the Philippines, average daily calorie consumption increased by 130 calories (Garcia and Pinstrup-Andersen 1987).

been perceived as inhibiting domestic food production growth in the short run, and, in the long run, as misallocating resources, both public and private, such as to create a dependency on externally subsidized food. Empirical evidence does not support such a general conclusion. Many countries, such as India, South Korea, and Taiwan, that used to be major food aid recipients, no longer depend on it. The so-called disincentive effects of food aid on domestic agriculture have been exaggerated and many recipient countries with high levels of food aid have subsequently achieved above-average agricultural growth. The actual effects of food aid are very much a function of recipient countries' food and agricultural policies<sup>(84,85)</sup>. In order to utilize food aid effectively for improving household food security and contributing to development, *governments need to protect their producers from the potential disincentive effects of food aid*. This is best achieved by a joint expansion of supply and demand for food, the latter being achieved through labour-intensive development, including public works, already discussed above.

The actual role of food aid has undergone some changes. Although it is still largely used to provide emergency relief and balance-of-payments support to food-deficit low-income countries, food aid is increasingly being designed and used for developmental purposes. Thus, food aid is basically a resource in direct or indirect support of the food security policies and programmes discussed above and of relief, discussed in the next section, not a "programme" or "project" in itself. Where food aid is provided to food-deficit countries for open market sales and for budgetary support for development activities, it is increasingly recognized that these funds can provide incremental support for activities that can contribute to sustainable food security.

#### 4.1.6 National Preparedness Plans and Emergency Relief Programmes

Today, food emergencies that deteriorate into famines are national and international *policy failures*. They are, in most cases, an indication of lack of preparedness and political commitment. The basic concept of preparedness entails public commitment to intervene effectively and on time; to build institutional capacity at international, national, regional, and local levels; to detect and diagnose indicators of distress; to prepare programmes and projects on a continuous basis; and to execute development and relief undertakings at times of need. The stock holding, trade policy actions, and food aid utilization (including relief employment programmes) just discussed are an integral part of preparedness and response to emergencies. Production and income generation policies also discussed earlier are the basis for effective emergency prevention.

Emergency relief involves *food, capital, and institutional capacity* for effective response. One of the major constraints in dealing with emergencies lies with the last two at national and local levels. At the same time, the international food emergency response capacity, for example, through the International Emergency Food Reserve (IEFR) needs to be developed into an effective instrument by making it truly multilateral and by increasing its resources. Non-governmental organizations (NGOs) play a key role in overcoming institutional deficiencies, but the need still remains for *overcoming the capital constraints* of effective emergency operations.

Relief management entails the establishment by the government of a system equipped with executive powers to take appropriate action in food handling and distribution (including emergency food aid from donors) with a network extending to local, provincial, and regional levels. Countries prone to emergencies need to prepare national preparedness plans to cope with emergencies. Effective *early warning systems* are an essential component of such preparedness. A *free press* and a *transparent political environment* at the local and central levels are important for assuring early responses to early warnings. Well-structured *relief legislation* that incorporates the basic policies to which the government (central and local) is committed is also important<sup>22</sup>.

The specific components of relief action and their scheduling are a function of the nature of the emergency and the country's circumstances. All activities with short-term household food security impacts, such as targeted feeding programmes, national food distribution, expanded food imports through trade and food aid, expanded employment programmes, and household access to savings or credit can be elements of the relief action. Narrow targeting of relief has proven difficult in emergency situations<sup>(86)</sup>.

#### 4.2 Operational Aspects of Household Food Security Measures

Various private and public actors that act on behalf of improving household food security can be distinguished. These actors range from the food-insecure households themselves to communities, non-governmental organizations, local governments, national governments, international agencies, and bilateral donors. A perspective needs to be developed and articulated about which actors can contribute what actions that are best for improving household food security, and what would be suitable divisions of responsibilities and comparative advantages among these actors.

##### 4.2.1 Household Coping (Private Response)

Households adopt a variety of coping mechanisms and strategies, which are not always efficient or effective, due to lack of resources, inadequate institutional support, and other factors, to offset the impact of production shortfalls and market uncertainties. Three basic stages can be identified in the pattern of household coping or the failure thereof. These stages take a household from *loss prevention* through *crisis damage containment (loss management)* to, at the extreme, *household collapse*<sup>(87,88)</sup>. The first stage involves elements of risk minimization such as savings, investments, accumulation of assets, and diversification of income sources. The second stage involves divestment of assets, calling in of loans, and searching for new credit. Although the opportunity costs of protecting future income streams from past investments rise, households are forced to dispose of productive assets when financial markets are not in place, which makes it more difficult for households to quickly recover after a food emergency. If adverse conditions persist and adequate external help is not forthcoming, households may have no choice but to sell all their remaining assets, subsist on unusual collected famine foods, and migrate to other areas for

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<sup>22</sup> See Drèze (1988) on India's famine code.

relief. As households move along this "coping path", coping becomes increasingly indistinguishable from suffering. Coping with food insecurity can involve difficult life-threatening effects on food-insecure households and selected vulnerable members.

#### 4.2.2 Community-Based Systems and Grass-Roots Action

Households do not usually act in isolation but in the context of a community. Community-level action for food security in low-income countries is widespread to a greater extent in rural areas than in urban areas. Considerable diversity exists in terms of institutions and actions, and community-based actions can include joint savings, labour pooling, common fields, local tax collection for welfare in cash and in kind (zakat), and so forth. Village studies have contributed considerable insights into community-level actions for food security and nutritional improvement and into points of entry for strengthening such actions through policies and programmes<sup>(89-92)</sup>. It should, however, be noted that in situations of widespread and intense food insecurity, positive community action of this type stops or fails, and often negative actions emerge, such as stealing of food, crops, etc.

#### 4.2.3 Non-governmental Organizations and Private Voluntary Organizations

NGOs and private voluntary organizations (PVOs) can, to a considerable extent, remedy food security emergency problems that state programmes fail to. NGOs and PVOs can bring resources—financial, technical, and managerial—that are lacking at the local level and combine them with local participation in identifying needs and bottlenecks. As NGOs and PVOs are more likely to work with community participation, they can be effective in finding sustainable solutions as well in mobilizing community resources to tackle food insecurity issues. Their ability for effective programming is diminished when there is state involvement dictating rigid terms of operation. Clearly some oversight and coordination are required by the state, but this needs to be kept to a minimum.

#### 4.2.4 State and Its Branches

Governments have the key role to play in food security policy. Strategy formulation, policy design and implementation, monitoring, and evaluation of progress are all central functions of government. These functions can be fulfilled successfully only if a sound capacity to analyse food security problems is established and used by policymakers. At what level of the government these functions can best be located is a function of the size of the country and its institutional capacities. The division of responsibility between local and central government for ensuring food security, with much weight accorded to the former, merits attention.

### Local Government

Local governments are usually in a better position to assess the food security needs of the population and to suggest policies and programmes for actions, if needed. They, however, frequently lack the technical, administrative, and financial resources for effectively designing and implementing activities. Efforts to promote local participation are based on an assumption that this would increase the relevance and success of development efforts. However, to the extent that local elites control the political process, development programmes may be seen as a threat to the status quo.

### Central Government

Central governments, and in some large countries, provincial governments as well, have greater financial, technical, and administrative resources than local governments for designing overall food security strategy as well as detailed plans and activities. In too many instances, however, projects are implemented with little or no input from local communities, or are not modified to fit differing local needs. There is an urgent need in most countries with food security problems to establish explicit cooperation at central government levels in policy and programme formulation, and, to begin with, joint information generation and analyses by agriculture, forestry, fishery, food-distribution, and health-related bodies (ministries and administrations).

#### 4.2.5 Donors/International Agencies

Donors and international agencies supporting food security can play their supportive roles best in an enabling policy environment, that is, in the context of countries' and regional cooperations' food security strategies. Their assistance in developing such strategies, including institutional support, can be an important part of food security policy and programme assistance. Clarity in division of labour among agencies is needed in order to avoid diluted programmes, conflicting policy promotions, and wasteful use of scarce resources, both financial and in terms of organization and institutional capacities. Food security assistance policies of donors and international agencies suffer from a lack of such clarity.

## **V. TOWARD POLICY ACTIONS: PRINCIPLES AND PRIORITIES**

### 5.1 Addressing the Risks

It must be emphasized that food security policies and programmes need to build on comprehensive assessments of interrelated national, community, and household food security problems and on evaluations of the public and private capabilities to deal with these problems at all three levels. Such assessments should be undertaken in the context of building a long-term *institutional capacity* for such assessments where it does not exist on a significant scale, or in the context of improving and maintaining such capacity in many countries. For small

countries, regional cooperation for forming such capacity can be advantageous (the Southern African Development Coordination Conference [SADCC] in southern Africa sets an example).

Practically all low-income countries and many middle-income countries have substantial numbers of food-insecure households and individuals. However, the dimensions, causes, and consequences of food insecurity differ widely from country to country, and even within the same country, so that *no general blueprint for prioritization* can be suggested or should even be considered. Nevertheless, the acute problem of famine mitigation and prevention in the (few) remaining famine-prone countries and the much larger problem of poor households' chronic and transitory dietary deficiencies of both macro- and micronutrients in rural and urban areas require the highest attention from national policy-makers and the global community.

This theme paper has reviewed food security policies and programmes that address specifically or generally the risks for households to become food insecure. These risks can originate from different sources and the effectiveness of actions in dealing with these risks in the *short* and *long run* can vary. For example, a programme that raises yields of food crops and is environmentally sustainable may not have much of an impact on household food security in the short run whereas a short-term feeding scheme on its own may not have much of an impact in the long run. Table 3 that follows on *risk problems and policy choice* links the food security risks with policies and programmes discussed in Chapters III and IV.

The following guidance can be derived from this table:

1. Crop production risks are best addressed directly through technological change and commercialization of agriculture in the long run. In countries with high risks of food availability and prices, *joint* promotion of technological change in staple foods and commercialization of agriculture is called for. In ecologically fragile environments, crop diversification can reduce crop production risks and contribute to ecologically sound production systems.
2. Short-term food availability and (related) food price risks can be addressed through a large array of options including macrolevel policies, stockholding, trade and aid policies, and programmes such as public works, provision of consumption credit, food subsidies, feeding programmes, and income transfers that strengthen the entitlements of food-insecure households. Sustainable agricultural production policies address these risks in the long run.
3. Employment and income risks can be tackled in the long-run through (agricultural) production policies, and in the short-run through entitlement strengthening as indicated. Labour-intensive public works would have both short- and long-run risk-reduction effects, the latter through creation of assets that generate future income streams.

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4. Food security policies alone, with the exception of those feeding programmes that have strong ties to health care, have only a limited impact on mitigation or prevention of health risks, which, together with food security risks, establish nutritional risks. Other policies and programmes are needed in conjunction. Promotion of behavioural change through (nutrition) education can have favourable effects for dealing with most of the risks. Long-run benefits result from human capital enhancement effects of short-term subsidies and transfer policies.

The typical problem of combined *chronic* and *transitory* food security problems of poor households requires a well designed *portfolio of food security policy actions*. Such a portfolio builds on problem assessments (nature of risks) and instruments that are available, which are influenced by institutional capacities. Throughout this review, a number of

**Table 3 - Food security risks and policy choices**

Policy Choices	Crop Production Risks	Availability and Price Risks	Employment and Income Risks	Health Risks
<b>(Agricultural) production policies</b>				
Technological change	III	III	III	I
Commercialization, diversification	II	II	III	
Promotion of behavioural change; education	I	II	III	II
<b>Other income and employment generation policies</b>				
Public works	I	ss,I	sss,II	
Credit		ss	sss	s
Macrolevel policies	ss,II	ss,II	s,I	
Food stocks, trade, food aid policies	sss,I		s	
<b>Subsidies and transfer policies</b>				
Feeding programmes	sss	sss	ss,II	
Food stamps (including transfers)	ss	sss	s,I	
Food price subsidies; rationing	sss	ss	s,I	

Extent of positive impacts:

- I, II, III = some, moderate, high long-term impact.  
s, ss, sss = some, moderate, high short-term impact.  
s,I = mix of short- *and* long-term impact.



*complementary actions* that need to be undertaken in conjunction with food security policies and programmes were identified. These complementary actions include the development of an adequate market infrastructure and policies that do not impair trade. The rapid development of rural financial markets open to all individuals, which permits consumption-smoothing, is another complementary action.

## 5.2 Principles and Institutional Arrangements for Priorities

The instruments for dealing with food availability and price risks and with employment and income risks of the food insecure are increasingly well understood so that setting *ambitious targets* for improving household food security on a country-by-country basis in the 1990s is possible. However, *political commitments* and *resources at national and international levels* are needed to underwrite ambitious targets. Sustained improvement of food security is not achievable with just a few cheap interventions. Food security requires large-scale public resource commitments.

Countries need to identify their worst food security problems, in terms of risks and population groups exposed to them, and give highest priority to tackling them. These may be risks of macro- and/or micronutrient deficiencies or diet quality problems or, for instance, chronic seasonality problems. Such a "*worst first*" rule has typically the advantage of offering high returns in terms of food security improvement for the resources invested. Solutions to the worst food security problems tend to be achievable at relatively low cost.

Because of its country specificity, cost aspects of improving food security are not comprehensively addressed by this paper. A guiding principle is to achieve food security fast, yet in a sustained way, with a portfolio of policy instruments where the marginal benefits of each measure (in terms of food security improvement) about equal their marginal costs. Following such a principle guides toward using optimal combinations of measures and forces moving beyond perfecting single policy instrument and overextended reliance on single (short-term) interventions. Investment in food policy research capacity is a precondition for the success of such an approach.

*Food security improvement* efforts need to take note of and address, from the outset, the reinforcing detrimental linkages between food insecurity, disease, poor sanitation, and inadequate education. Otherwise, forging ahead with food security measures alone will have a limited impact on *nutritional improvement*.

Institutional capacity is a precondition not only for *monitoring* a changing food security situation but also for *evaluating* the impact of food security policies and programmes. Only when the state of food security and its change for the better or worse is transparent will appropriate action be forthcoming and international support for action be sustained. Combining monitoring capacities in governments and international agencies dealing with agriculture, health, and planning is a needed action. Impact evaluation and programme adjustments require grassroots participation. A small and clear-cut set of *indicators*, derived from representative surveys that are comparable over time, is needed for

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this purpose. Such indicators can include the prevalence of households below the minimum per capita food energy consumption cutoff point, prevalence of micronutrient deficiencies (vitamin A, iron, iodine), and child and adult anthropometric indicators, among others, in relation to the fundamental sources of *risks* for household food security stated above.

Institutional capacity is also important to facilitate *implementation* of food security policies and programmes. It is imperative that the various institutions involved in this activity are linked. A legal basis for such institutional capacity is needed so that sustained consistent action is assured, rather than erratic interventions. A comprehensive "anti-famine" code at country-level is an example of such a legal basis.

A *long-run view* of food security improvement needs to be established and institutionalized through the International Conference on Nutrition. Renewed acceleration of agricultural growth with sustainable technology remains a precondition for household food security given high *population* growth rates, increasingly limited land bases, and dependence on agricultural employment and income by a large proportion of the rural food insecure. Otherwise, availability, price, employment, and income risks will accelerate. Reducing fertility to achieve rapid transition to stabilized population through appropriate social, health, and education policies must figure prominently among long-term priorities. However, improved food security through public action today will yield long-term benefits as the pressure on the poor for private food security provision through large families is reduced.

Food security policy must evolve as a basic element of a *social security policy*, to be achieved by proper division of labour between the various private and public (including international) actors; such a division of labour depends on country and community circumstances and capabilities. Proper *incentives for cooperation* on the task of nutritional improvement must be set and institutionalized; given the nature of political and administrative processes, the recognized need for cooperation and coordination among agencies and ministries, for example, agriculture and health, must be continuously reinforced, otherwise, it can be quickly forgotten after the International Conference on Nutrition. The related United Nations agencies, such as FAO, WHO, United Nations Children's Fund (UNICEF), WFP, International Fund for Agricultural Development (IFAD), and others, as well as the World Bank and the IMF, have a key role to play in setting good examples and in fostering such cooperation at country levels.

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**PROTECTING CONSUMERS THROUGH IMPROVED  
FOOD QUALITY AND SAFETY**

*Protecting consumers through improved food quality and safety*  
*Theme paper No. 2*

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## SUMMARY

The causes of nutritional problems are broad, and eliminating such problems is not merely a matter of increasing or altering food supplies. A safe and adequate quality food supply is essential for proper nutrition, foods must have appropriate nutrient content and must be available in sufficient variety, they must not endanger consumer health through chemical and biological (i.e. bacterial, parasitical and viral) contamination and they must be presented honestly. Food safety and quality start at the farm and continue throughout the processing and distribution chain to storage and final preparation by the consumer or food service industry. Good agricultural and manufacturing practices, including processing, distribution, and marketing are essential to ensure consumer protection. Any factor that leads to exposure to hazardous chemicals or biological agents, inadequate or excessive nutrient intakes, or impairs their optimal utilization, contributes to malnutrition.

An effective food control system improves the nutritional status of the population, directly and indirectly. It operates through: (1) ensuring that nutrient composition of foods is retained during the food chain i.e. production, storage, handling, processing, packaging, and preparation; (2) preventing and controlling biological and chemical contamination of foods; (3) promoting hygienic practices throughout the food industry by establishing appropriate codes and standards and training of food handling personnel; (4) reducing food losses caused by spoilage, contamination or improper storage or distribution; (5) promoting a safe and honestly presented food supply by requiring composition and nutrient information on food labels; and (6) protecting consumers against being offered foods that are injurious to health, are unfit for human consumption, or are nutritionally or economically debased. In addition to contributing in improvements of nutritional status, food control system encourages the orderly development of a nation's food industries, creates greater outlets for the farmers produce, stimulates increased foreign exchange earnings through export of foods that comply with acceptable standards, and avoids losses that occur when substandard foods are traded. All these effects help to create jobs, increase incomes, and ultimately improve nutritional status as consumers' diets become more varied and nutritious.

Thus, **strengthening food control systems** and **educating consumers** about appropriate food handling practices are both essential to proper nutrition. Governments, the food industry, consumers, and international agencies all have particularly important and interrelated roles to play.

Governments have a responsibility to ensure that a safe, nutritious, and varied food supply is available to enable their populations to choose a healthy diet. This requires, in addition to the food supply itself, comprehensive **legislation, regulations, and standards**, together with an organization for effective inspection and compliance monitoring, including laboratory analyses. Given the inevitable shortfall in resources for inspection and compliance monitoring, decisions have to be made on the order of priorities to protect public health and to ensure fair trade, such as microbiological hazards, chemical residues and quality standards. This will vary from country to country. **Publication of compliance and surveillance activities** gives the public confidence in the safety of the food supply, as it also does to countries importing food. An effective food control system will in many cases be a prerequisite for food exports to some markets; it is therefore important in economic as well as public health terms.

**Governments** also have a role in educating consumers and advising the food industry about a variety of topics, including food handling practices, minimizing food spoilage, and avoiding contamination. Both industry and consumers should be made aware of food laws, regulations and standards. Education programmes should especially be directed toward certain target groups, including the economically disadvantaged, the recently or rapidly urbanized, women as the primary household care givers, children, individuals with special nutrition needs, food handlers, farmers, industry supervisors, educators and health professionals. Governments also establish food and nutrition labelling regulations as well as guidelines for advertising to help consumers make better informed decisions.

Governments have further roles which include information gathering through general monitoring of the food supply for quality and safety, special surveys when problems are detected or suspected, and the gathering of epidemiological data on the nature and extent of foodborne diseases. Governments should bolster their understanding of food quality and safety by conducting research in public health and in food technology. It is a special responsibility of governments to see that food quality and safety programmes are integrated into other government-sponsored nutrition-related programmes, such as feeding programmes, nutrition education programmes, and other intervention programmes.

**The role of industry** in ensuring food quality and safety extends from agricultural production through food service. Good agricultural practices by primary producers include proper pre-harvest use of pesticides, fertilizers, veterinary drugs and post harvest control of storage, chemical use, handling practices, and transport. The food industry also has a role to play in developing alternative cost-effective technologies for food safety. The industry must also play a role in consumer education.

Consistently high quality standards are vitally important to the success of any food and beverage manufacturer in the competitive marketplace. Consumers buy products repeatedly only if they prefer them over competitive alternatives and have confidence in their wholesomeness. **Good manufacturing practices (GMPs)** are an important part of a total quality control system. They include product design using ingredients meeting established standards, compliance with codes of hygienic practice and the use of suitable technologies and distribution systems that ensure that the product reaches the consumer in satisfactory condition. While GMPs alone are not a guarantee of safety at the point of consumption, modern food handling and processing technology and quality assurance techniques are having a major impact on food safety. Good manufacturing practices may be more difficult to achieve in developing countries, although they are crucial for promoting food export.

**Consumers**, individually or through organizations, can do much to discourage food adulteration and fraudulent practices. A major influence by consumers on food quality and safety can be achieved through the exercise of discrimination in the marketplace. Consumers and consumer groups can be invaluable in connection with consumer education about improved sanitation and safe food handling, better nutrition, and improved general health. Community participation should be encouraged and used to the fullest extent.

**International organizations** have a role in assisting developing Member Nations in establishing or strengthening their national control systems and in developing suitable guidelines, educational and reference materials which can be adapted to local conditions of different countries. International organizations advise governments on food quality and safety, including the safe use of food additives and their permitted levels in various foods, and the recommended maximum levels of different contaminants in food. On a global basis, international organizations play an important role in the assessment of both the scope and magnitude of food contamination problems through the monitoring of selected contaminants in major food items, and occurrence of foodborne diseases.

In addition, international organizations have a unique role to play in developing standards and guidelines for food quality, safety and labelling, such as those standards developed by the **Codex Alimentarius Commission (Codex)**, a subsidiary body of FAO and WHO. These international standards protect the health of consumers while ensuring fair trade practices. Food standards are important in the international and national trade of foods. Standards and codes of practice are an integral part of national and international food security systems, ensuring the quality and safety of food.



## I. INTRODUCTION

The causes of nutritional problems are broad, and eliminating malnutrition and overnutrition is not merely a matter of increasing or altering food supplies. Rather, the causes of nutritional problems are likely to be complex and interdependent, and clearly extend to food quality and food safety<sup>(1)</sup>.

Access to safe, reliable and nutritious food supplies is a basic need for all people. Since the start of recorded history governments have had laws to protect food quality and prevent adulteration. Societies have also recognized that the fraudulent adulteration of food has negative social and economic consequences. More recently, concern has been expressed about contamination from environmental or industrial sources, or about the excessive use of chemicals in food production and processing.

In order to maintain a systematic approach to the protection of food against contamination, adulteration, or spoilage, countries have established official systems to control the quality and safety of the food supply with a view of assuring maximum consumer protection and promoting and facilitating trade both domestically and externally.

However, experience from countries with a comprehensive food control system has also shown that this alone can not prevent diseases which are transmitted through contaminated food. Considering that food is further processed/handled in the home or in food service establishments by professional food handlers, measures to protect consumers should also extend to the education of consumers in safe food handling practices. In view of this, the Joint FAO/WHO Expert Committee on Food Safety defined food safety as "all conditions necessary during the production, processing, storage, distribution, and preparation of food to ensure that it is safe, sound, wholesome, and fit for human consumption".

Food safety is a component of food quality. The latter refers to all aspects of production, processing, distribution, marketing and preparation that have an impact on the quality of food, including nutrient content, aesthetic properties, safety, and accurate labelling and advertising.

For the purpose of clarity, some other terms used in this paper are defined below:

Food Quality Control/Assurance includes all steps necessary to protect the quality and safety of foods in the chain from agricultural and fishery production and harvesting, through processing and storage, to the marketing and preparation of food for consumption. Strictly speaking, this term refers to voluntary efforts made by the food industry or trade to ensure the quality and safety of the food produced or marketed by them.

Food Control is a regulatory activity based on the implementation of legislation, regulations, and standards that include compliance measures to ensure food is safe and

offered for sale in an honest and fair manner to consumers. Food control also includes monitoring and surveillance programmes, for food hazards (e.g., microbial pathogens, chemical residues, mycotoxins, and radionuclides) that can provide vital information on the safety of national food supplies and serve as an indicator of environmental pollution problems. Food control is a mandatory activity enforced by national or local authorities to provide consumer protection and ensure that all foods domestically produced or imported and marketed conform to national requirements of quality and safety.

Food Contamination Monitoring consists of systems of repeated observation, measurement, and evaluation of substances or agents whose presence in, or on food in amounts exceeding safe established limits may constitute a health hazard. These systems are an important part of a food control programme.

Foodborne diseases. A disease, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food.

## **II. IMPORTANCE OF FOOD QUALITY AND SAFETY TO NUTRITION, HEALTH AND DEVELOPMENT**

An effective food control infrastructure should be able to ensure that the food does not contain unsafe levels of pathogenic organisms, chemicals (including naturally occurring toxins). In addition, it should ensure that the desirable characteristics, including nutrient quality of foods are retained, to the maximum extent feasible, during production, storage, handling, processing, packaging, and preparation. One objective of food control is to promote a safe and honestly presented food supply to protect consumers against being offered foods that are injurious to health or unfit for human consumption. Proper measures to control food quality and safety also help to reduce food losses caused by spoilage, improper storage or distribution and to promote an abundant and varied food supply, the foundation of a healthy diet. Another objective of the food control infrastructure is to protect consumers against the nutritional or economic debasement of foods during processing or preparation.

The problem of food control differs in rural and urban areas. In rural areas, where foods may be directly consumed by producers, chemical as well as microbiological contaminants can be unrecognized health hazards and render foods unfit for consumption. In urban areas (or in rural areas well served by sophisticated food distribution systems), processed foods are becoming more of an integral part of the food supply. These foods usually are subject to quality control and therefore when the food control system is effective, problems encountered with the food supply may be identified.

An effective food control infrastructure improves the nutritional status of the population, directly and indirectly. The direct ways include the promotion of hygienic practices throughout the food chain by standard-setting and the training of food handling

personnel as well as general public, the control of microbiological and chemical contamination of foods, and the requirements for composition and nutrient information on food labels. Indirectly, an effective food quality and safety infrastructure develops a nation's economy by encouraging the orderly development of agriculture and food industries. It also stimulates trade in foods both inside and outside the country, thus creating greater outlets for farmers' products. Increased foreign exchange earnings are also stimulated through export of foods that comply with acceptable standards, and losses resulting from the rejection of substandard foods are avoided. All these help to create jobs, increase incomes, and ultimately improve nutritional status as consumers' diets become more varied and nutritious.

## 2.1 Nutritional and health consequences of food contamination

During the last few decades, improvements in socioeconomic conditions, food supplies and the use of health services have led to improved nutritional status and increased life-expectancy for much of the world's population. However, despite advances in modern technology and attempts to provide safer food, foodborne diseases remain a major public health problem and an important cause of reduced economic productivity.

### 2.1.1 Biological contamination

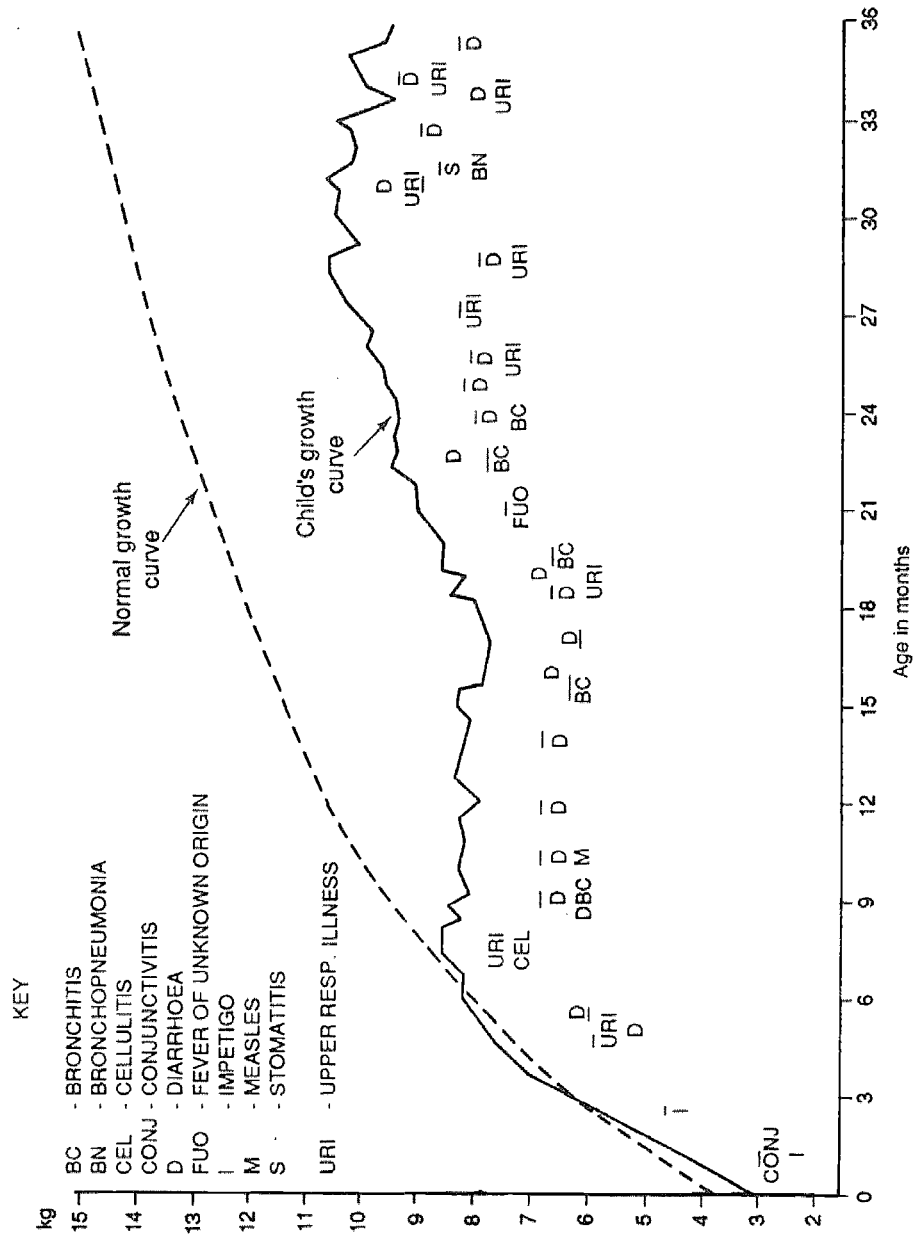
Available data indicate that foodborne diseases are increasing in many developing and industrialized countries. However, only a small proportion of cases come to the notice of health services and even fewer are investigated. As a result, it is believed that in industrialized countries only 10% of cases are reported, while in developing countries reported cases probably account for not more than 1% of the total <sup>(2)</sup>.

The overwhelming majority of acute foodborne diseases are caused by biological contaminants such as: bacteria such as pathogenic Escherichia coli, Shigella spp, Vibrio spp, Salmonella spp and Campylobacter jejuni; protozoa such as Entamoeba histolytica, Cryptosporidium and Giardia - and also enteric viruses<sup>(2)(3)</sup>.

In industrialized countries, with improvements in the general standard of living, development of basic sanitation, safe water supplies, effective vaccination programmes, food control infrastructure, and the increasing application of food technologies such as pasteurization, many foodborne diseases have been either eliminated or have considerably decreased in number. Nevertheless, many countries are experiencing a dramatic increase in several foodborne diseases, notably salmonellosis and campylobacteriosis.

A wide range of foodborne diseases prevail in developing countries. Examples are cholera, brucellosis, amoebiasis, shigellosis, salmonellosis, campylobacteriosis, helminthiasis, etc. Annually, an estimated 1 500 million episodes of diarrhoea occur in children under the age of five, and as a result over 3 million die. The majority of cases occur in developing countries and it is estimated that up to 70% are of foodborne origin<sup>(4)</sup>.

Figure 1 - Growth pattern of a child with frequent episodes of diarrhoea and other infections



Source: Mata L.J. Nutrition and infection. *Protein Advisory Group Bulletin*, 1971, 11: 18-21

Foodborne diseases cover all degrees of severity, from mild indispositions to life-threatening effects. Apart from the direct and acute health effects, certain foodborne pathogens, e.g. Toxoplasma gondii or Listeria monocytogenes can cause abortion or malformation of the foetus. In addition, foodborne diseases can lead to serious chronic diseases. In an outbreak of salmonellosis some 2 percent or more of the affected persons developed reactive arthritis as a consequence. Also, infections due to enterohaemorrhagic *E. coli* have been shown to cause serious disorders of the renal system, referred to as Haemolytic Uraemic Syndrome, affecting children in particular<sup>(5)</sup>.

However, one of the most drastic consequences of foodborne diseases is the effect on nutritional status. Diarrhoea experienced over an extended period of time can cause severe malnutrition in infants and children, particularly during the weaning age (Figure 1). It has been reported that of all illnesses, diarrhoea, often foodborne, has the greatest negative impact on the growth of infants. Contaminated weaning food has been recognized as one of the major causes of associated infections and malnutrition. It has been estimated that contamination of weaning food with pathogenic Escherichia coli is alone responsible for up to 25 % of all diarrhoeal diseases episodes<sup>(6)(7)</sup>.

Foodborne diseases are a significant health problem for the adult population as well. The elderly and immuno-suppressed individuals (cancer and AIDS patients) are particularly sensitive to the health effects of foodborne pathogens. Travellers especially are at risk. Of the millions of people who travel each year, WHO estimates that 20 to 50% suffer from foodborne diseases<sup>(8)(9)</sup>.

Pathogenic organisms may infiltrate into food at different stages of the food chain. They may contaminate the raw material during agriculture practice or may be introduced into the food by inappropriate processing or mishandling during storage and distribution. Mistakes made during the preparation of food for consumption (either in the food service sector or in the home) are responsible for a large number of foodborne disease. Common errors include: a) preparation of food too far in advance of consumption; b) prepared food left too long at a temperature permitting bacterial proliferation; c) inadequate heating; d) cross-contamination between cooked and raw food; and e) infected persons handling the food. Some raw foods are frequently contaminated, and consequently increase the risk of foodborne disease<sup>(10)</sup>.

### 2.1.2 Chemical contamination and food additives

#### Environmental chemicals

A number of chemical substances may occur in the food supply due to environmental contamination. Serious consequences have been reported when foods contaminated with heavy metals such as lead, cadmium, or mercury have been ingested over extended periods of time. In addition to its toxicity and accumulation in the body, lead has direct nutritional effects in that it interferes with vitamin D metabolism and calcium absorption. Similarly, cadmium may interfere with the metabolic role of certain minerals such as zinc. Food in lead

soldered cans may contain significant amounts of lead, and efforts to change to non-lead-soldered cans have led to significant decreases in the lead content of the diet in many industrialized countries. The situation is however different in most developing countries, where food may still be canned in lead-soldered containers<sup>(11)</sup>.

Methylmercury - the most toxic form of mercury - has been shown to have serious effects on the nervous system, which may be irreversible. Large predator fish ( e.g. tuna, swordfish ) are a major source of dietary mercury as they are at the top of the aquatic food chain. Methylmercury is concentrated as it moves up that chain. It has been demonstrated that the level of mercury in fish may be influenced by industrial pollution of the environment.

The Chernobyl accident provoked great concern over the health risks to people exposed to accidental radionuclide emissions. People living in the vicinity of the accident were exposed to high levels of radioactive contaminants in both food and water. In other parts of Europe, and elsewhere at some distances from the accident, the concern focused on contaminated foods (particularly cereals, meat and dairy products) as a source of exposure. However, in most countries, the estimated average dose acquired from eating foods contaminated from the Chernobyl accident only amounted to a very small fraction of the dose normally received from background radiation<sup>(12)</sup>.

Another family of environmental chemicals of public health interest are the chlorinated hydrocarbons. Polychlorinated biphenyls (PCBs) are used in a variety of industrial applications such as a heat exchange fluid in electrical transformers. PCBs have acute health effects and may also be carcinogenic. They are chemically very stable, soluble in fat and oil and therefore become persistent contaminants when introduced into the environment. Drastic restrictions in the production and use of PCBs have been introduced in many countries since the 1970's. Certain chlorinated hydrocarbon pesticides (DDT, BHC, etc.) are no longer permitted in some countries for the same reasons - toxicity and persistence in the environment.

Environmental chemicals are of special significance to those communities in developing countries (and some developed countries) whose basic diets consist primarily of a limited number of food items such as, for example, rice and fish. The contamination of these foods by toxic environmental chemicals may lead to serious health problems for these communities because of the continuing high dietary level exposure and the possible accumulation of toxic levels of those hazardous chemicals.

### Pesticide residues

Modern agriculture depends on agricultural chemicals including pesticides that reduce crop loss by eliminating pests. In many countries the emphasis is shifting toward integrated pest management in which pesticides are viewed as one tool in an effective management system - rather than as a simple cure for the problem of pest.

Overuse of pesticides and other agricultural chemicals can result in contamination of groundwater and the environment. Harmful human health effects are usually associated with direct exposure to large amounts of an agricultural chemical - as in chemical manufacturing accident, during unprotected crop application, or even unintentional contamination of food with pesticides (as when improperly stored pesticides were mistaken for flour and used in baking).

The acute effects of accidental pesticide contamination previously described must be distinguished from the much lower risks of chemical residues in food resulting from crop application and environmental persistence. In many, if not most countries, such risks are extremely low although not well quantified<sup>(13)</sup>.

### Veterinary drug residues

Veterinary drugs have been a key element in increasing animal productivity. They are important in the production of confined animals which are under more stress and are more at risk from communicable diseases. Where veterinary drugs are used under conditions of good agricultural and veterinary practice (including observation of proper withdrawal periods), residue levels will stay below the appropriate maximum residue levels recommended by the FAO/WHO Joint Expert Committee on Food Additives, which advises the Codex Alimentarius Commission. However, there are situations of potential concern. For example, antibacterial drugs given to animals in less than the normal therapeutic doses to promote weight gain, to prevent diseases, and to improve feed efficiency has given rise to concerns about potentially antibiotic-resistant organisms. However, there is no evidence to date that this has been a problem. Also, as a means of intensifying meat production, hormonal anabolic agents are used in some parts of the world for promoting growth. Under good agricultural and veterinary practice conditions, possible residues of the anabolic drugs in animal products have not been shown to present a risk to the consumer, as they are present in levels well below those produced naturally by the human organism.

### Mycotoxins

Mycotoxins, the toxic metabolites produced by certain microscopic fungi (moulds) on agricultural products may cause serious illnesses in man and animals<sup>(14)</sup>. Aflatoxin is the most well known and is among the most important of the mycotoxins from a public health point of view. It is produced by Aspergillus flavus and related species on a large number of food crops including cereals, nuts, oilseeds, legumes and certain dried fruits when these are handled and stored improperly. However, there are a number of well documented cases of acute human toxicosis from other mould toxins, such as those from the Fusarium moulds<sup>(15)</sup>. Epidemiological studies show a strong correlation between the high incidence of liver cancer in some African and South-East Asian countries (12-13 annually per 100 000) and exposure of the population to aflatoxin<sup>(16)</sup>. Chronic, low-level exposure to these compounds, particularly among nutritionally compromised individuals, could result in serious debilitating effects. Aflatoxin can also occur as toxic aflatoxin M1 in milk when dairy cows are fed

contaminated feed. This is a special problem as milk is a significant part of the diet of infants and often of the elderly. Besides environmental conditions and the type of food, post-harvest handling of food crops plays an important role in the growth of moulds and the production of the toxins<sup>(17)(18)</sup>. Compliance with good agricultural practices is of the utmost importance.

### Marine and plant toxins

Acute intoxication after consumption of fish or shellfish has been well known for centuries. In many areas of the world this type of intoxication is on the increase. For example, in the South Pacific region, the total number of reported intoxications due to marine biotoxins increased from just under 2 000 in 1984 (approximately the reported level for almost a decade) to almost 5 000 cases in 1987. A household survey in the Virgin Islands found the annual incidence of ciguatera to be 7.3 per 1 000 and another study suggested that the incidence could be as high as 30 per 1 000<sup>(19)</sup>. Ciguatera poisoning from ciguatoxin is the most common form of seafood intoxication. It occurs primarily in fish that feed on marine algae and the detritus of coral reefs. It is transmitted to larger predator fish including groupers and snappers who feed on the reef fish. It is of particular concern as it is heat-stable and is not destroyed by cooking. Paralytic shellfish poison may be accumulated by bivalve shellfish (clams, mussels) following a "red tide" (a marine bloom of algae producing the toxin). Histamine can be formed in scombroid fish which have not been promptly refrigerated after harvest and consumption of the contaminated fish may cause illness depending on the sensitivity of the individual. Finally, in many areas of the world, plant toxicants, such as certain poisonous mushrooms and cyanide-containing roots and tubers, present a potentially serious problem for food safety and concomitant impact on nutritional status.

### Food additives

Safely and legally used food additives are not contaminants. However, food additives used illegally constitute a form of contamination. Legally used food additives include a large and varied group of substances added to foods to accomplish an intended purpose (e.g. preservatives, colours), or which may be incorporated into foods through processing (enzymes, deforming agents, etc.). With increasing reliance on processed foods, especially in urban areas and in areas well served by transportation and distribution, food additives have been increasing in numbers and in volume. Food additives can preserve and enhance the nutritional value of foods. For example, preservatives delay spoilage caused by bacterial activity, fungus, and moulds, and antioxidants delay development of rancidity in fatty foods. Food consistency is improved and maintained through use of gelling agents, emulsifiers, and stabilizers. The addition of nutrients, such as vitamins and minerals to staples or other food substrates can correct a recognized dietary insufficiency in a given population or restore nutrients lost during processing or storage. All these actions contribute to a more stable, and ultimately more nutritious food supply.

Unfortunately, food additives can be misused to conceal inferiority or to make foods appear more valuable than they actually are. Further, some formerly used additives or



traditional methods of preservation, such as curing or smoking are now considered to be risk factors for certain diseases such as hypertension and cancer. However, there is no evidence that any of the food additives evaluated and used in accordance with the Codex Alimentarius recommendations have led to ill health. In many developing countries, the lack of effective regulatory control over the manufacturing, importation and use of food additives and the use of untested and potentially unsafe food additives are sources of concern for the local consumer. Cases are known where textile colours have been used in some food preparations. Accurate labelling and other regulatory controls, particularly use limits determined by safety assessments, must be established by food control authorities to prescribe safe conditions of use and to prevent deception or, in some cases, negative health consequences. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) provides safety evaluations of additives which are often used as a basis in the elaboration of recommended international standards by the Codex Alimentarius. JECFA evaluations are also used by many governments in the development of their national food additive legislation.

## 2.2 Economic and social consequences of food contamination

For countries with limited resources, the economic and social consequences of food contamination may be grave. Foodborne diseases in themselves cause loss of income, loss of work output, and increase medical care costs. For example, salmonellosis was estimated to have cost the United States about US\$ 1 000 million in 1987<sup>(20)</sup>. A considerable portion of food loss, worldwide, is due to contamination. Some 1 000 million tons of agricultural products are annually at risk of contamination with moulds and mycotoxins alone<sup>(21)</sup>.

Food contamination has a negative effect on trade in that exported foodstuffs may be rejected if the level of contaminant is above the limits permitted by the importing country. For example, during a three month period from January to March 1980, food imports valued at about US\$ 20 million were rejected by the US alone because of contamination with moulds and aflatoxins<sup>(19)</sup>. Additionally, a country's reputation for poor food quality control may result in a decrease in trade and may affect the tourism industry in that country.

Loss of credibility as a reliable supplier of safe and good quality foods has harsh economic and financial consequences for exporting countries. It is no secret that many developing countries have access to the very best raw food materials but that because of poor handling, harvesting and processing those materials at time of export may lose their quality characteristics and at times become even hazardous to health, a condition which jeopardizes their commercial potentials. Foods exported by countries with poor quality records are often subject to the most stringent examination by the importing countries, more so than products from countries with a reputation for reliability and credibility. As a consequence, the former countries suffer higher levels of rejections and, because of the risk element, attract prices far lower than they should. The financial loss to developing countries and their exporters is indeed important.

To illustrate the impact of food contamination/foodborne diseases on the economy, the example of Peru can be mentioned. It has been estimated that in addition to the tremendous health care costs, the epidemic of cholera has cost the country US\$ 700 million in lost revenue from food exports in 1991. During the first 60 days of the epidemic, the tourism industry lost about US\$ 70 million<sup>(22)</sup>.

### **III. STRENGTHENING FOOD QUALITY AND SAFETY PROGRAMMES**

Strengthening of food control programmes is essential to proper nutrition and protection of consumers. Governments, the food industry, and consumers have particularly important and interrelated roles to play in ensuring and improving environmental hygiene and the quality and safety of food and water and in educating consumers about appropriate handling practices to prevent spoilage and contamination.

#### **3.1 The role of government**

##### **3.1.1 Food legislation**

An adequate food law is the foundation of a government's food quality control system. Food laws should be designed to protect the health and economic interests of the consumer. Indirectly, food laws play a role in improving the nutritional status of the population. Food laws should clearly identify the responsibilities of the food industry, government regulators, and other concerned institutions. Governments should, however, provide laws that are sufficiently flexible to meet the needs arising from rapid changes in technology and in food trade. For practical and flexible administration, the basic food law should lay down general principles of food quality control. The regulations, based upon this law, should be sufficiently adaptable to meet the frequent changes which will invariably arise. While the law sets out broad principles, regulations will contain the detailed provisions. Formal mechanisms for citizen participation are recommended. Administration, supervision, and training will ensure that the intent of the law is consistently implemented<sup>(23)</sup>.

A very important function of government is to establish standards for food quality and safety. In general, standards protect the nutritional quality of the food supply by controlling the composition and description of foods passing into trade. Some standards may contain specific nutritional provisions, as appropriate for the country. For example, standards requiring the fortification of certain staple food products have been extremely important in alleviating specific, identified nutritional problems in a number of countries. For other standards, such as those for cereals and vegetable proteins, nutritional and dietary aspects have been central in their development. Establishment of codes of practice for food industries are essential for ensuring the quality and safety of foods.

Domestic and international trade in food crops and processed foods will only be possible if products meet appropriate standards of quality and safety. However, it should be

borne in mind that national standards, whose increased strictness cannot scientifically be justified, not only do not offer greater health protection, but can be used as non-tariff barriers to trade. On the other hand, there is increasing concern in many countries about the over consumption of certain nutrients, particularly fats, sodium, and sugars. Nutritional disadvantage may result from standards that prescribe minimum levels of these nutrients. Consideration should therefore be given to the inclusion of additional nutritional parameters in the development of new standards such as low fat, low salt, low sugar and high fibre.

Where feasible, processed and commercially marketed foods should bear labels that adequately indicate the identity, composition, and nutritional value of foods to the consumer. The use of the food label as a nutrition education tool should be a fundamental part of national nutrition policy implementation. Food labelling and nutrition education are inter-related - one cannot succeed without the other: food composition information is needed to apply nutrition education and dietary guidance; and nutrition education is needed to understand food composition information.

It is also important that the label bear storage instructions and method of use of processed foods. The nutritional qualities inherent in a food item are often lost due to improper storage and/or misuse of the food item.

The ready availability of the food label during the purchase, preparation, and even consumption of foods makes the label an ideal vehicle for conveying information about food composition, nutrition, and food safety. What information is to be conveyed in the space available, how that information is to be presented, and the limitations of the food label are all important policy issues. Nutrition information on the food label can play a pivotal role in national nutrition policy, not only in developed countries, but also in developing countries that are experiencing rapid urbanization, as populations are purchasing more of their food as processed, packaged food in a supermarket setting.

### 3.1.2 Compliance with the food law

Adequate food quality and safety legislation and implementing regulations alone are not enough; there must also be effective programmes to ensure compliance with the laws and regulations. It is important that food-related industries and businesses know that they and all competitors will be held to the same standards. It is also important that consumers can trust that their foods were prepared under sanitary conditions, that the products meet the expected quality standards, and that the information on the label is truthful and not misleading. Compliance is achieved in basically two ways: enforcement and voluntary programmes<sup>(24)</sup>.

Enforcement requires the even-handed application of penalties for violation of the laws and regulations. This requires careful documentation of inspection findings and public notification of actions taken, to serve as a deterrent to the industry and to assure consumers that the quality of their food supply is being guarded. It also requires that government

agencies direct their efforts at those problems that are of the greatest public and nutrition concern, and not merely at the easy or sensational issues. Careful risk assessment and risk management will help meet this goal. An evaluation of effectiveness is an integral part of any food safety programme<sup>(25)</sup>.

A more efficient approach to compliance is often through voluntary programmes, where the government provides education in the reasons and methods for compliance with laws and regulations. Industry, convinced of the benefits of compliance in boosting domestic and international trade and knowing how and why to achieve compliance, often can execute a large measure of self-policing, thus freeing government resources to concentrate on other public health and nutrition-related problems.

Nonetheless, flagrant violations of food laws must not go unpunished; otherwise, citizens will lose faith in their government's ability and will to protect them. A sequence of progressively stronger enforcement measures may be the most effective enforcement system. Enforcement should take into consideration factors such as intent and public health risk, and the system should be well-documented to ensure objectivity, fairness, and uniformity.

Although licensing of food establishments should not be viewed as the sole means of controlling either hygiene of food premises or food quality, it can be a valuable aid in applying food laws. Information such as the name and address of the firm, the ownership and identity of the responsible persons, and the types and volumes of food handled, can be very helpful to authorities in planning for inspections or sampling or in directing attention to the proper industry segments should a food safety problem arise. In addition the operator of the establishment should, as a condition of licensing, be required to prove its knowledge in safe food handling.

An effective compliance programme should provide for oversight during the production of foods, sampling of foods and for inspecting the premises where foods are prepared, packed, stored, or held for sale. Inspection should be often enough to have an effect. Inspection frequencies and priorities should be based on public health risk as determined by risk assessment, an increasingly important consideration as government resources for inspection become more constrained. During inspection, trained inspectors collect samples for routine or special analyses, detect unfitness of foods, and evaluate compliance with sanitary requirements and hygienic practices. Although industry has a responsibility to train their employees, a knowledgeable inspector can also provide, in certain circumstances, advice to food industry employees about the requirements of good manufacturing practices and explain compliance with all regulatory requirements. A food inspector can also investigate complaints from consumers and any other reports of possible violations of the food law. Food inspection protects rural and urban consumers from the health hazards of perishable foods, marketed through local distribution systems. Meat from diseased animals, milk mixed with contaminated water, and lack of refrigeration for dairy products in rural areas often pose serious health risks<sup>(26)</sup>.

Adequate laboratory facilities are essential to an effective food quality assurance infrastructure. Manufacturers, as well as governments, should maintain or have access to laboratory services. Frequently, problems and violations can be verified only through laboratory examination of food samples. Intelligent inspection with selective sampling, followed by accurate analysis and appropriate administrative or legal action provides the most complete approach to consumer protection.

Competent administration and management of the compliance programme is equally essential to its success. The economic and human resource situation in many developing countries imposes the rational and optimum use of available resources which in turn requires careful identification of priorities and a judicious planning of the necessary interventions.

### 3.1.3 Education of consumers, industry and specific target groups

An effective food control infrastructure must include effective education programmes. These programmes should cover food quality, safety, and nutrition in an integrated fashion, in so far as this is possible. Education can create a consumer demand for foods of higher quality and nutritional value, and can stimulate legislation to protect markets for these foods. Countries need appropriate education and extension programmes to protect the nutritional well-being of consumers in all settings, both rural and urban. Such programmes should be designed to assure that consumers have sufficient information on how to feed themselves adequately and safely and protect themselves against food-related problems. Countries also need appropriate education programmes aimed at the food industry to ensure that all segments of the industry are aware of the requirements and problems associated with the production of a safe, nutritious food supply. Such programmes are most effective when they are jointly supported, designed, developed, and implemented by government, the food industry, and consumers. Among both consumers and industry there are certain specific groups to whom the programmes should be targeted. The programmes should also be evaluated to determine how effective they have been in achieving their goals.

It is important that both consumers and industry understand basic principles in several specific topic areas of food safety and quality and how these factors impact nutritional status. One such important area is food handling practices, including preservation at the local level. Consumers should be provided information on the importance of proper handling of food in the home during storage and during and after preparation. The lesson that many problems of microbiological contamination can be eliminated or minimized by proper handling of foods is one of the more important messages that should be disseminated. Consumers should be taught the basic problems of food spoilage and how to recognize and avoid them. The consumer should also be knowledgeable of recognizing and rejecting food in the marketplace that has not been handled properly and may be subject to spoilage. Consumers should be given the opportunity to understand the basic problems with contamination, what are the most likely sources of contamination, and how contamination can be minimized. This could include instruction in recognizing contaminated water sources that should be avoided for taking fish or for use in food preparation. It could also involve simple lessons, such as

cooking foods in an appropriate way, washing or peeling fruits and vegetables to remove possible pesticide residues or surface microbiological contaminants. Consumers should also be given instruction in the purposes and requirements of food laws, regulations and standards and information on government activities to enforce these requirements. This kind of information increases consumer confidence in the quality of the food supply and alerts consumers to their rights and to the expectations that they should have from the food industry.

However, the government also has a role in providing the food industry with instruction in these same topics. For example, a general knowledge of food handling and preservation practices by all segments of the food industry can help ensure the nutritional quality of the food from the farm to the table. The government should make the food industry aware of food spoilage problems and measures that can be taken to reduce them. Industry should particularly be made aware of sources of potential contamination of foods during production, processing, and storage and how these potential pitfalls can be avoided. In this regard the government should ensure adequate provision of some basic utility needs such as uninterrupted electricity supply and potable water. These are non-behavioral factors availability of which would contribute to provision of safe food. Finally, the government should provide educational materials and instruction to all segments of the food industry on the requirements of the applicable food laws, regulations, and standards. It should also advise them on the appropriate Codes of Practice and encourage their use. An industry informed in the reasons behind these requirements will be more likely to voluntarily comply with them, and those responsible.

In those developing countries where governments have provided on-the-job training for food factory workers in the most simple procedures such as hand washing, personal hygiene, and product handling the results have proved most successful. In one country the demand for such training - for which industry pays - exceeds the government's resources to meet it.

As stated above, there are a number of specific target groups, within both the consumer and industry communities that should be the target of special educational efforts to improve food safety and ensure nutritional quality of foods. The specific target group being focused on may depend on the particular aspects of food quality and safety being covered. A few of these groups are discussed below.

In most countries, food quality safety and nutrition-related problems affect poor and socio-economically disadvantaged households, whose members are under- or uneducated. It must be kept in mind that much of the world's economically disadvantaged population lives in rural areas where many foods are consumed directly by those who grow, harvest, or collect them. National food control legislation and services as well as education and other extension programmes (e.g. primary health care services) are of significant value to these populations in reducing food losses, improving food handling practices and environmental hygiene, controlling food contamination, protecting nutritive values, and thus, improving the overall nutritional status, particularly in rural areas of the developing world.

The rapidly increasing rate of urbanization is one of the most striking demographic features of the last half of the twentieth century. Urbanization influences all aspects of food production and consumption. Because of rapid urbanization, food processing and food marketing must be particularly emphasized. It is estimated that 44% of the population of developing countries will live in towns and cities by the year 2000. A population shift of this magnitude demands increased agricultural productivity, improved transportation, processing, and marketing facilities, and a modern food control infrastructure to maintain the nutritional quality of the food and to ensure consumer confidence in their food supply.

The resulting socioeconomic conditions of rapid urbanization have a variable effect on nutrition status. Some effects are positive, such as improved dietary intakes resulting from increased availability and variety of foods. Other effects of urbanization on nutrition may be negative. The need for nutrition education, emphasizing food safety and food selection, is most pronounced where large changes, such as rural to urban migration, have occurred.

Providing individual care within the household is an important aspect of human behaviour. If people are to protect and improve their own nutritional status, they need basic information about nutrition and food safety. The knowledge, attitudes and practices of household care-providers largely determines the nutritional status of the household. Improved household food storage and preparation techniques and increased awareness of health risks all contribute to improved nutrition status. Nutrition and health education, as always, can be an effective intervention in helping to correct and improve nutrition problems. The long-term importance of such efforts is impossible to overestimate. At the household level it is usually the women who are the primary care-givers, and in the developing nations, often the household's entire well-being is directly dependent on the capacity of the women to acquire and utilize food. The responsibility for food safety commonly rests in the woman's domain. She has full charge of procuring or producing, storing, preparing, preserving, cooking, and serving foods. A substantial portion of transmission of foodborne disease occurs in the home so that education of those involved in domestic food preparation is particularly important<sup>(27)</sup>. Increasing educational opportunities in nutrition and food quality control for women, therefore, is fundamental<sup>(28)</sup>. Nonetheless, a variety of educational, motivational and supportive activities directed to all household members should be undertaken, particularly in countries where men and older children prepare food.

One of the most important target groups is children, particularly those of earlier school ages (i.e., 6 to 12 years of age). There are a number of reasons for this:

- School provides an effective, already existing forum for the dissemination of educational materials about food quality and safety and their importance to good nutrition.
- Habits formed early will often be carried throughout life. Thus, basic ideas of food quality and safety ingrained during these years will be useful and effective for years. On the other hand, if habits of improper food handling, etc. are started during these years, they will be extremely difficult to change in later life.

- Children can often influence the practices in the household. Lessons about food quality and safety learned in school will be brought home with a good likelihood that they will be put into practice<sup>(29)</sup>.

Food handlers play a vital role in preventing or controlling contamination. Food quality control and safety education is essential for the retail and institutional food service industries, because large outbreaks of foodborne illness are often traced to these settings. Attention should be given to transport and storage as factors such as inadequate refrigeration can encourage microbial growth and lead to illness. Yet food handlers are frequently poorly paid, with low motivation, and have little understanding of the risks of microbial or chemical contamination or how to avoid them. Further, food handlers may be on the job for only a few months. All these factors make the task of training more difficult. Public health and food control authorities in many countries as well as in some industries try to prevent food contamination by food handlers by means of medical examinations and laboratory tests. This is not cost effective and can lead to false sense of security. Financial and staff resources should be put to better use through other activities such as education and training and the use of Hazard Analysis Critical Control Point (HACCP) systems in food establishments<sup>(30)(31)(32)</sup>.

Particular attention should be given to the importance of time and temperature control, personal hygiene, cross-contamination, sources of contamination and the factors determining the survival and growth of pathogenic organisms in food. The need to report illness immediately to the supervisor must be stressed. The use of posters in work-rooms is considered to be an effective way of reminding food handlers of the various aspects of food safety<sup>(33)</sup>.

With increased urbanization, the consumption of prepared street foods is becoming more common. The preparation of these foods is often carried out under unhygienic conditions leading to an increased risk of foodborne illness. Street foods have been defined as "ready-to-eat foods and beverages prepared and/or sold by vendors especially in streets and other similar public places" <sup>(34)</sup>. The shape of this industry has come about during the recent past due to rapid urbanization and the convenience and variety of the food it offers. By providing affordable food at or near places of work, street food vendors are now a necessary part of modern, urban life. This non-formal industry feeds millions of people every day and employs millions of semi-skilled and unskilled workers. Little control measures are being applied in most countries to ensure that the foods are safe. Because of the socio-economic and nutritional significance of street foods, as well as their potential for health hazards, national authorities should take steps to recognize and assist this industry<sup>(35)</sup>. Education is a must if this important industry is to improve and demonstrate that the foods sold are safe and nutritious<sup>(36)</sup>.

Mass catering is that segment of food service concerned with feeding large numbers of people, usually within a short period of time or over extended periods. Because food is prepared in large quantities, large numbers of people will consume food from a particular production batch or central production facility, and there is usually some necessary time



delay between preparation and service. In some developing countries where there are no adequate refrigeration or storage facilities delays of up to two or more days sometimes occur between the preparation of components of a food item and the final preparation and service. This delay invariably is sufficient time for incipient spoilage to occur in some of the components. Mass catering serves many nonprofit and welfare segments, e.g., hospitals (where some consumers may be in a debilitated condition, thus increasing the potential hazard), prisons, and schools, but also extends to the upper end of the market to large functions and conventions and to the transportation segment, such as airlines. It has been well documented that the food service industry is responsible for more than half of the foodborne disease outbreaks of known cause, that most are bacterial in origin, and the causes are chiefly time-temperature abuse. The causes and controls are well understood, yet outbreaks continue because of a failure to implement controls at a practical level. Education of foodhandlers and application of proper quality assurance techniques such as the HACCP system could improve the situation. Therefore, educating mass caterers in the principles of food quality control and on their rôle in ensuring the nutritional status of the populations they serve should be a priority of governments<sup>(37)</sup>.

Another group with specific educational needs relative to food quality and safety are a country's farmers. Governmental education programmes in good agricultural practices by primary producers are of vital importance to assuring the nutritional quality of the food supply. Emphasis should be placed on sound management, including appropriate sanitation practices and biosecurity. These programmes should include instruction in pre-harvest safe use of pesticides and fertilizers, by adhering to label directions, and in good animal husbandry practices, including the safe use of veterinary medicines. There should also be instruction in post-harvest practices such as proper methods of storage and transport, including the safe use of agricultural chemicals during these periods. Many farmers are small businessmen, often under-educated, living in remote rural areas. These factors must be considered in designing programmes for this segment. Yet, the small farmers are a fundamental building block in establishing a safe, nutritious food supply and educational efforts aimed at them should pay significant dividends.

Another important segment that must understand the fundamentals of food quality and safety are supervisors in the food industry. Educational programmes aimed at these individuals are likely to be more effective because of the existence of a "multiplier" effect. Supervisors should understand the fundamental principles of good manufacturing practices and of quality control and ensure that their staff observe safe food-handling practices. Supervisors educated in the effects of food quality on nutrition and the importance of food safety to the nutritional status of the population should also pass this education on to the workers under their supervision. In this way educational programmes reach a much larger audience than would be possible if government were to attempt to bring direct educational efforts to all workers in the food industry.

A country's educators are a primary target segment for government education programmes in food quality and safety. By understanding the importance of these factors to

nutrition and public health, educators would then be able to integrate nutrition and food science, including instruction in proper food handling, avoidance of food spoilage and contamination, and the requirements of food laws and regulations, into the health and science curricula for the various age groups. Ideally, nutrition and food quality control should be taught in primary and secondary education curricula.

In countries where the rate of literacy is low, the onus is on the government to educate consumers by using pictorial posters, radio and town criers, as appropriate. Written educative materials are only useful to those who can read.

A country's health professionals and primary health care workers should be instructed in the importance of food safety and quality in maintaining good health and proper nutrition. Too often health professionals overlook food as a source of disease and public health problems because their primary focus is on communicable diseases or epidemics. Also, workers in the health care system in most countries clearly need more instruction in the intricate roles of the food supply in maintaining or improving nutritional status. These workers also often have contact with people at a point when they are seeking advice and are extremely susceptible to instruction. If they understand proper food handling and food safety and its role in maintaining nutritional status, they could pass this information on to their patients<sup>(38)(39)(40)(41)(42)</sup>.

There are increasing numbers of people with unique nutrition needs, and who also have particular concerns about food quality and safety. These include the growing elderly populations and immuno-compromised individuals. Not only are many elderly suffering from health conditions that compromise nutritional status, but also food intake by many elderly is low, making it especially important that they choose foods of high nutritional and safety quality in order to assure that nutrient needs are met. The elderly population is particularly sensitive to the health effects of certain foodborne pathogens e.g. Listeria monocytogenes. Also, special consideration should be given to the increasing number of individuals with compromised immune systems, whether through diseases such as AIDS or because of technologically advanced medical treatments such as chemotherapy. Epidemiological data show that immune compromised status makes them potentially more vulnerable to all infections including foodborne infections. Thus, they should have special instruction in food handling practices, as well as guidance about choosing safe foods. For example, cancer patients may be advised to consume thermally processed canned foods. Naturally, other vulnerable groups are pregnant women and infants and children. As mentioned before certain foodborne diseases are particularly dangerous for pregnant women and the foetus (e.g. toxoplasmosis). The effect of foodborne infections on the growth of infants and children has been well documented.

#### 3.1.4 Information gathering and research

Governments have a responsibility to gather information about the status and effects of food quality and safety programmes within the country. Only by gathering such information can it be documented that the programmes are achieving their desired effects.

Such information is important to give consumers confidence in the food supply and to support trade, particularly by giving potential export countries assurance that the goods they will receive are of acceptable quality. This information is equally important to document when programmes are not achieving the desired effects. An effective information gathering effort will pinpoint where the problems are occurring and will often even suggest what actions should be taken to correct the situation. The information gathered may be used to aid in assessment of nutritional status or indicate reasons for nutrition-related problems. Three different types of information that should be gathered are discussed below.

Monitoring involves the ongoing gathering of information about particular aspects of food quality and safety. For example, a programme of routine collection of selected food samples for microbiological assays could monitor the adequacy of food processing in the country. Programmes to systematically and routinely analyse for pesticide residues could monitor the proper use of pesticide chemicals, just as routine monitoring of environmental contaminants such as heavy metals document the appropriate overall conditions for food quality. An important component of this monitoring should be routine analyses of nutrient content of foods to provide assurance that the overall nutritional quality of the food supply is not being degraded by production or processing practices.

Epidemiological data on the nature, extent and cause of foodborne diseases are the second type of information that should be gathered by governments. These data will reflect the food quality and safety problems within the country. For example, a particular pattern of disease outbreaks may point to a specific breakdown in processing control that has compromised food safety. Although epidemiological data are difficult to collect, it is though indispensable for the management of food safety and quality programmes. Epidemiological data have led to resolution of serious problems and epidemiology should therefore be a critical component of an effective food quality control system.

Once a problem has been detected, or a potential problem is suspected, or even in some cases when new technologies or practices are being instituted, governments need to conduct information gathering through special surveys that are specifically targeted to the issue at hand. Such surveys look at a much more narrow range of variables or products than do the general monitoring. Therefore, considerable attention has to be paid to the sampling plan in designing a special survey.

Governments should conduct research, to the extent feasible, on specific problems of food quality and safety. However, government should not conduct research that is more properly carried out by the industry itself. Examples of the types of research that government might undertake are discussed below.

Food Technology. It might be appropriate for government to conduct research in specific food technology areas. These areas might include research on technological processes to utilize indigenous food stocks to improve the nutritional status of the population or to increase potential exports, thus indirectly improving the nutritional status. Other technological

areas of research might include specific technologies that could be used by the very small food processors who would not be able to develop the technologies on their own, but who could, by using the technology developed by the government, contribute significantly to the health, nutritional status, and economic well being of the population. An active research programme by the government also pays dividends in the overall food quality control programme by attracting scientists to work for the government and permitting the government authorities to understand and stay abreast with the latest developments in the field of food technology and the effects of food processing on nutrient quality.

Methodology (e.g., epidemiology). Also, government is the most logical location for research into methods for gathering information, particularly epidemiological information, that can be related back to food safety. Because of the difficulty of relating nutrition- and health-related problem to issues of food quality and safety, there is considerable research that could be done to develop new methodologies and survey techniques.

### 3.1.5 Collaboration with nutrition-related programmes

Within a government there are usually several food related programmes that cover food quality control regulation, food production assistance, feeding programmes directed at specific population segments, nutrition education efforts, and other intervention programmes. Often these programmes are carried out by different departments within the government. It is extremely important that there be close coordination and cooperation between the various programmes. Collaboration must be regarded as a consistent obligation, rather than a tangential activity.

The principles of sound food quality control must be integrated into the agricultural assistance programmes. Consistency among the various programmes lends credibility to the overall governmental effort and thereby increases consumer and industry confidence in the importance of the food quality and safety message, indirectly affecting the nutritional status of the population. It also increases confidence in potential export-receiving countries in the quality of food products to be expected, thus increasing trade, leading to improved economic and nutritional status.

Coordination with the feeding and intervention programmes is also important, because these programmes provide target audiences that are likely to be receptive to the food quality and safety educational messages of the government. The opportunity to use the existing organizational framework provided by an existing programme to further educational efforts should not be missed.

### 3.1.6 Other functions

Food security, although not a major focus of this paper, is an important responsibility of government that must always be kept in mind while establishing an effective food quality and safety system. Without a secure food supply, long-term improvement in nutritional status

is not possible<sup>(43)</sup>. A lack of food will lead to food price increase and the consumption of inferior quality, non-nutritious foods or even contaminated food. It also inevitably leads to increased fraudulent practices. Furthermore, food contamination leads to increased food losses, which in turn leads to a decrease in food security.

In many parts of the world, lack of basic sanitation and safe household water supplies, directly or indirectly, increase the risk of contamination of food. Provision of basic sanitation, safe water supplies as well as safe use of wastewater and excreta in agriculture and aquaculture are therefore important for preventing food contamination at source.

Providing food during emergency situations is another important responsibility of government. During these situations focus is often on only the quantity of food available to be provided. However, governments should also be aware of the quality of the food that is being supplied during the emergency and take steps to ensure that sub-standard foods are not "dumped" to populations who are particularly vulnerable. Also, governments should take into consideration the particular nutrition needs of the populations afflicted by the emergency situation and see that the foods being supplied address those needs to the extent possible. Also epidemics of foodborne diseases e.g. cholera, typhoid fever are often reported in emergency situations. Preparation of foods for great numbers of people in such situations requires specific knowledge and attention. To cope with such situations, governments require a crisis control plan, with well defined responsibilities and criteria.

Governments also have the opportunity to institute, coordinate, and encourage a variety of voluntary programmes for industry. For example, governments can provide the incentive and basic ground rules for industry programmes for providing food safety and nutrition education materials to consumers or for industry voluntarily providing more nutrition and safety-related information on food labels. Also, governments can provide the same kinds of support to industry voluntary programmes to teach food processors, handlers, etc. the basic requirements of quality control, good manufacturing practice, regulatory requirements, and other topics needed to achieve a nutritious food supply.

### 3.2. The role of the food industry

A country's food industry has a co-equal role with government in ensuring food quality and safety. Many international codes such as those produced by the Codex Alimentarius Commission and government regulations acknowledge that the food industry has the primary responsibility for producing safe food. The role of industry extends from primary agricultural production, through storage, transportation, processing, and distribution to food service. At each step along the way, the food industry must be aware of, and adhere to, good agricultural and manufacturing practices to ensure that the nutritional and hygienic quality of the food and the health and nutritional status of the population are not compromised.

### 3.2.1 Good agricultural practices by primary producers

Good agricultural practices by primary producers include proper pre-harvest use of pesticides, fertilizers, and veterinary drugs and post-harvest control of storage, chemical use, handling practices, and transport.

Application of pesticides by the agricultural producer must be in accordance with established application procedures, label instructions and use levels, including use only on crops that are approved as appropriate for the pesticide. The proper use of pesticides will lead to increased agricultural production and, thus, to improved nutritional status of the population. And, as stated above, there is no indication that pesticides residues occurring within established limits have caused any acute harm to human health. However, improper use constitutes a major danger specifically to the health of the agricultural workers and a threat generally to the health and nutritional status of the consumer.

Agricultural producers have a responsibility to use chemical fertilizers appropriately and responsibly. In addition to the threats to health that improper use may pose, a very real potential exists for damage to the environment. This in turn leads to long-term decreases in production, in the farm production and in related food production areas such as fisheries. Another important responsibility of the primary agricultural producers is the application of good animal husbandry practices. Such practices involve the appropriate use of veterinary drugs and the control of their residues. For this reason, the Codex Alimentarius Committee on Residues of Veterinary Drugs in Food is developing a code of good practice for use of veterinary drugs. Healthy animals mean increased production, leading to improved nutrition for the population<sup>(44)</sup>.

Post-harvest, agricultural producers have a role in ensuring food quality, including the maintenance of nutrient quality, and safety by practising proper handling, storage, and transport practices for foods. These include the appropriate use of post-harvest chemicals, such as pesticides, sprout inhibitors, ripening agents, within established tolerances and guidelines. Improper handling, storage, or transport practices also lead to unacceptable food losses, with the resultant impact on the nutritional status of the population. Additionally, improper post-harvest practices often result in mouldy produce, producing the mycotoxins mentioned earlier, with their impact on health and nutrition.

### 3.2.2 Quality assurance and control in food processing, distribution, service

Food processing, through the application of preservation techniques, increases the availability of foods for both rural and urban populations, minimizing the limiting effects of seasonal variations and promoting an abundant and varied diet. Food processing may enhance the aesthetic qualities of food, increasing the probability of consumption, thus contributing to nutritional status. Food processing can contribute significantly to food quality and safety and to supporting good nutrition if adherence to codes of good manufacturing practices is observed. Since in many countries these codes are, to some extent, essentially voluntary, it

is very important that members of the food industry, especially persons responsible for sanitation and quality control participate in their development. A code would involve a programme of inspection and quality control to detect and correct causes of contamination and quality degradation. Priority should be given to correction of practices or conditions which are hazardous to health or impact on the nutrient quality of the food.

In recent years, industry has developed a more focused approach to food quality and safety through programmes such as Hazard Analysis Critical Control Points (HACCP) systems. Essentially, HACCP is a series of actions that should be taken to assure the safety of processed and prepared foods. These actions include: (1) determine hazards and assess their severity and risks, (2) identify critical control points, (3) institute control measures and establish criteria to ensure control, (4) monitor critical control points, (5) take action whenever monitoring results indicate criteria are not met, and (6) verify that the system is functioning as planned. The HACCP system is applicable for animal production, food processing (including storage and transport), preparation in food service operations and in homes. Hazards that under the HACCP system would call for critical control points have been repeatedly documented as major contributing factors of outbreaks of foodborne disease. The HACCP system provides considerably more food safety assurance over that offered by traditional quality control based on finished product sampling and testing. Hazard analysis is based on objective data. HACCP is comprehensive because it systematically deals with ingredients, processes and subsequent use of products, in a step-by-step coverage of the operations. HACCP is a continuous, dynamic system and actions are taken to correct problems when detected. Government regulatory agencies should where applicable actively encourage the use of HACCP in all aspects of food production and study how to utilize the data generated from the system for regulatory purposes<sup>(45)(46)(47)</sup>.

Although, as discussed in the previous section, government has a role in educating workers in the food industry, the industry itself, in an effectively functioning food quality control system, must acknowledge its primary responsibility for the ongoing training of all food workers, from the highest level of management to temporary food servers. All segments of the industry act in concert to develop high standards for educational materials, identify audiences, develop and test educational materials, and evaluate them after use. Industry interacts with appropriate governmental bodies to ensure that the information is accurate and up-to-date and seek cooperation in reaching appropriate audiences with necessary materials. Industry efforts might include involvement with governmental and professional efforts to update and upgrade curricula on food quality and safety.

Key target groups for industry training efforts include supervisors and food handlers. Trained supervisors passing on the fundamentals of good manufacturing practices to their workers, and holding workers accountable for adhering to these principles, represent a most effective manner of extending the concepts of food quality and safety to all levels of the workplace. Training of food handlers throughout the food distribution chain is critical because most food contamination occurs as a result of mistakes during food handling. Industry education efforts might focus on the development of a national certification programme for various levels of food handlers and on gaining local acceptance of these codes.

The food industry has a major role to play in research related to developing foods that respond to the prevailing nutritional and food quality and safety problems within a country. For example, the industry has a role in researching nutrient deficiencies and ways to fortify foods. In countries where overnutrition is a predominant issue, the industry should develop technologies that lead to foods that are lower in fat and calories, yet retain their taste and appeal. Below are a couple of examples of technologies that have particular potential to contribute to health and good nutrition and for which the industry has a responsibility to develop and promote.

Food irradiation is one of the recent food preservation technologies which can be used to address many problems of food quality and safety <sup>(48)</sup> <sup>(49)</sup>. The potential for irradiation to reduce post-harvest losses, to meet quarantine restrictions, and to improve the safety and hygienic quality of foods (and, thus, reduce foodborne disease) has been increasingly recognized by many countries. At present, the most apparent health benefits from the use of food irradiation would be the treatment of poultry for destruction of Salmonella and other pathogenic bacteria, treatment of pork to inactivate Trichinella larvae, and the decontamination of spices and other food ingredients. For example, recent data have demonstrated that a proper radiation dose would render most common pathogenic microorganisms and parasites non-infective and that radiation processed food may be safely consumed without risk of infection. Very low dose irradiation is effective in controlling sprouting of root crops, such as potatoes, onions, and garlic, the most important cause of post-harvest loss. Low dose irradiation can reduce spoilage organisms or delay ripening, thus, extending the shelf life of many food products, such as fruits and vegetables, and thereby contributing to a stable, more nutritious food supply. Irradiation also offers special promise in contributing to the safety and nutrition of special diets required by the vulnerable elderly or by immune compromised populations. Regulations allowing the use of irradiation to ensure microbiological safety of foods already exist in several countries. The safety and effectiveness of irradiation has largely been established. However, consumers remain to be convinced that treated products are safe, wholesome, and nutritionally adequate and that irradiation sources can be safely used without harm to humans or the environment <sup>(50)</sup>.

A variety of biotechnological innovations have the potential to significantly increase the nutritional value of domestically produced food baskets, by improving nutrient profiles and by maintaining genetic diversity. For example, biotechnology is more controlled and precise than traditional breeding, in introducing desirable traits in plants and animals. Biotechnology also offers definite possibilities of contributing to improved food production. For example, poultry with introduced resistance to common poultry diseases may be commercially available in the next decade. The food industry must play a leading role in research to further develop the potential nutritional benefits of biotechnology <sup>(51)</sup>. With the use of biotechnology to develop new or improved foods, there needs to be a corresponding development of assessment procedures to ensure the safety of those foods. In recognition of this, FAO and WHO have initiated expert consultations and other discussions to address safety assessment concerns of new products.



Provision of information to the consumer from industry can take both direct and indirect forms. Information such as recommendations for use or preparation of a product is provided directly, often on the label or in advertising. Other direct contact by consumers with the industry occurs via requests for information about particular aspects of a product or as a result of complaints. Requests usually centre around ingredients or particular aspects of preparation and use. While this form of contact is with only a small proportion of end users, it is nevertheless an important avenue for consumer education with respect to food safety and nutrition. Indirect provision of quality, safety, and nutrition information occurs via industry or government/industry cooperative publications, in which companies often contribute written materials without reference to particular company products<sup>(52)</sup>.

Consumers are influenced by what they read and hear. Beneficial changes in dietary habits are attributable in part to media reports of developments in scientific knowledge about the relationships between diet and health. Both food labelling and advertising have enormous potential as educational tools to promote good nutrition practices by the public, by presenting to consumers information that links science with practical ways to apply that information in every day experience. Advertising and labelling must be adequate and truthful. The information provided should help consumers make wise dietary choices. It has been shown that labelling and advertising are effective in reaching, and communicating to, population groups that are not particularly responsive to governmental or general sources of information. Consumer awareness and ability to use nutrition information depends on a steady, consistent flow of truthful and pertinent information. The food industry has a special responsibility to use these powerful tools constructively.

The food industry has the opportunity to contribute to consumer education through special programmes. Examples of such programmes would be industry support for activities that involve physical exercise for a variety of age groups. Maintenance of good health and adequate nutritional status is enhanced by regular physical exercise. Also the food industry could support nutrition education activities directed towards particular segments of the population that may be at greater nutritional risk. An example of one such programme is the extensive long-term programme of the National Dairy Council in the United States, which has provided a complete range of educational materials, based on the best scientific information, to various age groups.

### 3.3. The role of consumers

Consumers have a right to safe food and a right to know what they are eating. Consumers, individually or through their organizations, can be powerful allies of government officials. They can do much to discourage food adulteration and fraudulent practices. Consumers have a responsibility to make sure that offenders of the food laws are reported. Therefore, consumers should be aware of their rights, privileges, and responsibilities under the food laws. They should be encouraged to advise officials whenever they encounter contaminated, adulterated, spoiled, or mislabelled foods. Further, they must know how and to whom to report these things. In addition, consumers have a role in demanding, from the

food industry, foods that not only comply with the food laws and regulations but are also of the highest quality possible. Such discrimination by consumers in the marketplace will help ensure the nutritional adequacy of the food supply, because the most effective incentive for the food industry to improve food quality and safety is consumer response in the form of an unwillingness to buy food from unhygienic premises and from those with a poor reputation for food safety.

Safe food practices in the home are the last line of defense against foodborne illness. The consumer must assume the ultimate responsibility for control of microbial and, to a limited extent, chemical contaminations during preparation and storage of food before consumption. Consumers, once given access to food quality and safety education programmes, must translate theory into practice in the home. The World Health Organization has developed 10 "Golden Rules for Safe Food Preparation". Consumers can protect their families by following these simple rules, thereby reducing the risk of foodborne disease significantly<sup>(33)</sup>.

Community participation is essential in community education programmes for improved sanitation, better nutrition, and improved general health. This is now recognized by many governments and international organizations. This principle is also becoming more evident in international aid programmes.

Consumer organizations have demonstrated their influence in the field of food safety and quality. A major role of consumers organizations should be to protect consumers through information and education on food safety and on their rights and their responsibilities relative to safe and nutritious food. Consumer organizations can accomplish this role through a variety of activities. Some test products and publish results to guide their members. Some do market surveys to inform members of best buys and help them avoid merchants who follow unethical practices, some handle consumer complaints. Many lobby for adequate laws and represent consumers on various bodies to ensure high standards of food safety and quality. All these activities lead to a safer, more nutritious food supply. However, one of the most important roles of consumer organization is collaboration with industries and governments in disseminating pertinent information of consumers.

#### 3.4. The role of international agencies

According to their mandate, international agencies have to assist their Member States in all the measures which are necessary to ensure food quality and safety from production to consumption of food.

Food standards are important in international and national trade in foods and for health protection of consumers. Such standards have been developed by a subsidiary body of FAO and WHO known as the Codex Alimentarius Commission which is often referred to simply as "Codex". The purpose of Codex is to develop international food standards and "codes of practice" aimed at protecting the health of the consumer while ensuring fair trade

practices. Government regulators, scientists, technical experts, consumer/industry representatives serve Codex in both official and advisory capacities. Codex develops standards and codes of practice dealing with basic principles, technical specifications, uniform labelling requirements, use of food additives, the presence of contaminants or residues of pesticides or veterinary drugs, sanitary requirements and good manufacturing practices for a wide variety of food products. Codex has developed more than 230 food commodity standards and established more than 40 guidelines and codes for food production and processing and approximately 2,400 maximum residue limits for pesticides. International standards often serve as recommended reference points for multilateral and bilateral trade agreements.

FAO and WHO are active in many other ways in support of food safety and food quality control for their member governments. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) provide independent scientific advice to the Codex Committees on Food Additives and Contaminants and on Pesticide Residues. JECFA and JMPR formulate general principles governing the use of additives and pesticides and evaluate the safety for the consumer of foods additives and pesticides and evaluate the safety for the consumer of foods additives, contaminants and pesticide residues. These are often used by Governments as a basis in the development of their national legislation on permitted levels of additives and contaminants in food. FAO and WHO also provide assistance to member countries in strengthening their food quality control and safety systems, both through specific development projects and through training and advisory activities. FAO and WHO further provide expert advice through consultations, when international problems in food safety are identified. An example was the Chernobyl nuclear reactor accident, where FAO and WHO in association with the International Atomic Energy Agency (IAEA), formulated recommended international guideline levels for radionuclide contamination of foods.

International agencies play an important role in the harmonization of food regulations worldwide, to eliminate technical barriers to trade and facilitate the movement of food between countries. This is particularly important for those developing countries which rely on their food exports for their foreign exchange earnings. The work of the Codex Alimentarius Commission aims specifically at achieving this objective. This work has been recently strengthened with the initiation in 1988 of the Uruguay Round of GATT negotiations. These negotiations and particularly the proposed "Decision on Sanitary and Phytosanitary Regulations and Barriers" require that sanitary and phytosanitary measures should not be applied in such a way as to create arbitrary, disguised or unjustifiable obstacles to international trade. It also provides for the harmonization of sanitary and phytosanitary measures on as wide a base as possible, with parties to the Decision, basing their measures on international standards, guidelines and recommendations whenever appropriate for them to do so.

International agencies have also a role to play in promoting and stressing the ethical aspects of the food trade. One tangible expression of this work is the "Codex Code of Ethics for International Trade in Food" which may be seen as a defense for those countries which lack an effective official food control system.

Food standards are important in international and national trade in foods. Too often, however, these standards focus solely on the safety and suitability of ingredients and fail to take into account the role such standards may play in promoting sound nutritional practices. For example, the level of fat in a food standard may have little impact on food safety or may have short-term economic implications to the producer, but may have a much greater long-term economic impact for the country in terms of the role it plays in increasing the prevalence of non-communicable disease and the associated health-care costs.

International agencies, play a major role in collection and dissemination of information in regard to food contaminants and foodborne diseases. The United Nations Environment Programme (UNEP)/FAO/WHO Food Contamination Monitoring and Assessment Programme (GEMS/FOOD), a component of the Global Environment Monitoring System (GEMS), established in 1976, collects information on the levels and trends of chemical contaminants in different foods and in total diet. Based on the collected data, the health impact of chemical contamination is assessed<sup>(11)</sup>.

In addition, international agencies have to assist their Member States in the education of the general public particularly the specific mentioned target groups as well as raising awareness among health workers on the relevant food quality and safety issues and their importance for improving the nutritional status. Human resource development is regarded as one the major contribution of international agencies to development and strengthening of national food quality and safety programmes.

#### **IV. POSSIBLE AVENUES OF ACTIONS**

Ensuring the quality and safety of the food supply is a complex task which requires the inputs and the cooperation of a number of actors including governments, industry, consumers, scientists and international organizations. The need to integrate the trade, health and supply aspects of food as recognized 55 years ago by the League of Nations, is still valid today.

International agencies have cooperated with member nations in the implementation of programmes to improve food self-sufficiency, establish effective food control systems, facilitate and regulate trade and improve the health status of the populations. As a result of these efforts, many of the basic requirements have been established for an international system to improve world food safety, trade and health with emphasis on action at the national and local levels. However, food losses, protectionist trade measures and inappropriate production practices still impact negatively on food security. Food trade is seriously impeded by non-tariff barriers based on safety, quality composition and labelling issues. The nutritional and health status of populations is still undermined by foodborne diseases, caused by microbial and chemical contaminants and inadequate nutritional quality of diets.

Increased awareness and commitment of governments and coordinated, effective use of existing programmes for food control and the education of general public by all concerned will yield positive results.

#### 4.1. Strengthening government capacity to promote food quality and safety

Governments should give the necessary attention and support on a continuing basis to the strengthening of their food control systems at national, state and local levels. This should include the updating of their food legislation and safety standards to meet changing consumer demands (e.g. for safety convenience and nutritional value), new production and preservation technologies (e.g. biotechnology, food irradiation), new food ingredients and emerging food safety concerns.

The strengthening effort should also include the inspection services through the expansion of their coverage to serve urban as well as rural areas, the increase of the technical capabilities of the inspectors to enable them to play an effective role in preventing potential health hazards and fraudulent practices associated with food. They should also be able to contribute to the education of the food handler in proper hygienic practices.

The establishment of adequate laboratory facilities capable of determining the quality and safety of various types of foods is also an important component of the food control system and should receive the necessary attention and support.

The management and organization of the entire food control system should be reviewed continually with a view of optimizing the use of the limited government resources and increasing the performance and efficiency of the system.

International assistance to developing countries in the development and strengthening of their food control infrastructure requires increased and continuing support.

#### 4.2. Developing human resources in food safety and food handling

There is probably no such thing as "too much" education related to food quality control. Particularly in institutional and retail food service, employee turnover is rapid and makes the education mission more difficult. Education of personnel working in the area of food control, as well as food handlers in proper food handling practices should be considered as priority actions.

#### 4.3. Consumer education and information

Open communication and public information policies will do much to facilitate consumer understanding of actual risks and options for eliminating or minimizing those risks. This means actively involving the public in policy development, providing programme information to the public in a timely manner, and addressing criticisms honestly and constructively. Also, managers, scientists and technicians with training in and acceptance of the concepts of risk communication -and with training on working with the media -can do much to improve communication with the public, decrease distrust of government and enhance public understanding of relative risks. In addition, healthy debate on communication

ethics can enhance public understanding. However, it must be recognized that the communication and education processes are dynamic and nonlinear. There will always be participants who seek to honestly inform or persuade the public that their perspective is the most valid; there will always be participants who seek to hide unfavourable information or "stonewall" in the mistaken belief that this will decrease public concern about an issue overdue for resolution in public policy forums; and there will always be participants who seek to quickly and dramatically manipulate public opinion using scare tactics or emotional arguments backed up with data that does not survive much scrutiny.

Use of mass media is only one of many mechanisms that are useful in educating the public. Educational efforts must be diverse, have audience-appropriate content, be pretested and evaluated and be continually reinforced in order to have potential usefulness in the goal of positively influencing consumer behaviour in the areas of food handling and nutritional choices.

Accessing the primary health care delivery systems requires much thought and planning. Approaches include developing information for pediatricians' offices, working with medical groups, professional dietetic groups and nursing associations to gain their endorsement of materials, providing materials to free clinics and other health-care settings, giving information to new mothers in obstetric hospital settings, etc. Such efforts will by their nature be long-term and require intensive work with professional health organizations that set the agenda for national meetings, decide on tentative priorities, etc. Much more work could be done in this area.

Groups examining the issue of consumer education on food inevitably agree on the importance of integrating food safety, quality and nutrition education into the school curricula. Success in this endeavour must be recognized as a long-term or even lifetime goal.

Tenaciously-held assumptions and "conventional wisdom" can be serious impediments to problem resolution. Those who "should" know about nutrition and food quality and safety often have never been fully educated in these areas, and consequently their professional opinion may be ill-informed and shaped by easily accessible mass media information rather than scientific data and critical reflection. For example, physicians who have taken to heart front-page coverage on poultry safety could conceivably take an extreme position and advise their patients to avoid poultry rather than advising them to follow the simple, basic food handling tips that will destroy pathogens and prevent disease. While contaminated food is the major cause of diarrhoeal diseases among infants and young children, education of mothers through primary health care workers is often overlooked in nutrition and infant feeding programmes. Primary health care workers and health professionals are, like many other citizens, caught up in fast-paced lifestyles that hamper their ability to keep up with the state of the art in areas such as food safety and nutrition, which they may regard as peripheral.

Over and over again, poverty, starvation and natural disasters remind the world community that very basic public health issues must be better addressed to improve the health

status of the world's citizens. For example, each time disease immunization of infants and children is allowed to decrease, illness rates go up. Food safety and nutrition are among these basic public health concerns. However, valid and critical public health concerns such as AIDS and cancer draw away public and scientific attention -and research and funding -from these basic public health needs. Ironically, in almost all cases, improving food safety and nutrition would have a positive effect on individuals' ability to deal with disease.

Several scientific links have been established between dietary patterns and specific diseases or health conditions. New initiatives in nutrition labelling and education have the potential to have a positive impact on public health by increasing public understanding of these connections and positively influencing public dietary patterns. However, the understanding and full support of the public health community must be garnered for these initiatives in order to have a long-lasting impact on public health.

#### 4.4 Further research needs

##### 4.4.1. Behavioral/motivational research

Much more research is needed to identify the variables that influence public behaviour in food handling and nutritional choices. Analysing these problems from a risk communication perspective could be helpful in identifying areas for research. However, it should also be recognized that research conducted even five years ago may not be entirely valid for long, for culture is not static. Certain basic emotional needs and drives are universal and may always be appealed to as motivational factors, but as historians know, turning points in history do occur that challenge accepted assumptions and affect the way people think, feel and consequently behave. Thus, ongoing research conducted in a way that allows meaningful comparison from year to year is one of the best ways to track changes in potential motivational factors.

Nevertheless, examining past educational campaigns that have had a positive impact on public behaviour -such as the campaign to improve dental hygiene practices and the campaign to increase automobile seat belt use -should provide ideas for further behavioral research.

The best way to evaluate educational effectiveness is to physically evaluate behaviour change. This is because some individuals may say they engage in a socially desirable manner (such as washing hands before cooking or decreasing fat and cholesterol intake) when they do not -perhaps because they wish they did or wish to be perceived as persons who engage in the behaviour. Such persons may well have a full awareness of the positive and even life-saving impact such behavioral changes could have, but have not crossed the line to actual behavioral change.

Where it is not possible to evaluate actual behaviour in an unbiased setting, it is desirable to determine "indicators" of behavioral change. This requires careful initial analysis

and the selection of behavioral criteria that can be linked with specific, simply worded, discrete educational messages and used over time as benchmarks for determining if behaviour has changed due to the education and, if so, how much. This is not to say that straightforward survey data is not useful, only that it has its limitations. Possible indicators of behavioral change -where actual observation is impossible -could include focus group interviews where open-ended questions about food preparation are asked before and after participants receive the educational message and have time to absorb it and apply it.

Other possible indicators might include surveys of those one step removed from the actual consumer or other individual being educated -such as consumer affairs officers at food companies, restaurant chains and grocery stores. Analysis of consumer hotline data banks can also provide useful information on education needs -by noting the topics of questions and the way in which questions are asked -and by noting that questions are no longer being asked about a specific topic that was a common query a year or two ago. This is one of the most valued uses of the data collected in USA by the Department of Agriculture's Tollfree Meat and Poultry Hotline.

It is important for those trying to determine whether educational materials have influenced behaviour to stay abreast with the state of the art in behavioral research; for in this area, as in any other scientific endeavour, new methodologies are constantly being developed and tested and traditional methodologies are becoming outmoded.

In the area of safe food handling, some believe a decrease in foodborne illness should be viewed as the true test of educational effectiveness. This led the USA. National Academy of Sciences in 1985 to recommend exactly such an epidemiological study, using a geographically contained area as the population for study.

Educators should closely examine how they define "hard to reach" groups and ensure they are also considering the vulnerability of the population at risk. For example, AIDS and cancer patients have much to gain by understanding and practising safe food handling and sensible nutrition practices; their behaviour can add or detract from their lifespan. Thus, the USA FD (Food and Drug Administration) development of an educational programme on safe food handling for AIDS patients, in conjunction with a well-known and progressive AIDS centre in the metropolitan Washington, D.C., area, might be of more impact than a programme directed at rural citizens who are hard to reach but who also have no atypical health problems.

#### 4.4.2 Low cost monitoring systems and practices

In the area of food quality control, there is a consistent need for ever better methodology. Several rapid tests have been developed that can screen for or detect chemical residue classes or compounds in food in a matter of hours; however, progress has not been as great in the microbiological arena.



On microbiological monitoring, there currently appears to be a discrepancy between what the public wishes to occur and what is scientifically appropriate or even feasible. For example, many consumers appear to believe that extensive microbiological monitoring of finished products is the best way to protect consumers from foodborne pathogens -apparently because they believe all problems can thus be detected. However, food control authorities have reached precisely the opposite conclusion, noting that in-process sampling can be of aid in ensuring a food production process is under control. In a HACCP system of food production, microbiological monitoring is simply one of the tools that may be used to verify the system is working -and therefore the product is acceptable. It is impossible to detect all problems at the end of the production line. It is more effective to have a preventive system that identifies problems early in a process, where the process can be corrected to avoid producing unacceptable products.

The HACCP approach presumes that food processors recognize their responsibility to control the process to ensure food quality. This means, by extension, that food processors bear the responsibility to conduct appropriate sampling and analysis to verify control, rather than waiting for regulatory authorities to conduct such sampling as a way of detecting problems or improving quality control.

Thus, there is a need for better and more effective microbiological tests -both for product and for environmental testing. However, microbiological monitoring for consumer protection may be more effective during a process, while microbiological monitoring of finished product may be more useful for programme analysis.

#### 4.4.3 Epidemiology of chemical contaminations

Tracing the health effects, both short- and long-term, resulting from the consequences of chemical contamination of foods is important because it can help us deal with such incidents in the future. Thus, research in this area perhaps would be better directed at analysing past contamination incidents, what were the long-term health effects, how were they manifested, how were they controlled, what measures were taken, and the success of those measures. For example, in the United States, contamination of the food supply from polychlorinated biphenyls in electrical transformers led to major regulatory changes and the development of "contamination response systems" to facilitate faster intergovernmental response to such problems. Contamination of feed grain with the pesticides heptachlor and chlordane ultimately led to the abolishment of approved uses of these compounds in the United States. Careful analysis of these and other contamination incidents worldwide could lead to useful recommendations for dealing with such contaminations.

#### 4.4.4 Chronic health impacts of food quality/safety problems

Much more research is needed in the area of the chronic effects of food contamination. For many chemicals the potential long term health effects are somewhat well known, through accidental contamination of food or toxicological studies in the laboratory on animals. However, additional epidemiological studies are needed to investigate the health effects in man upon long term exposure to low doses. Many chronic health effects are also being discovered in connection with foodborne diseases of biological origin. In view of this, additional research is required to show the magnitude of these problems as well as their significance for health.

#### 4.4.5 Economic impacts of food quality/safety problems

Research has been done in some countries in the areas of cost to industry, lost wages, hospitalization, and other health care costs as well as the direct consequences of food contamination on trade, food security and tourism. Such studies should be extended to include other countries, particularly the developing countries whose economy and development is sensitive to such losses.

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**CARING FOR THE SOCIO-ECONOMICALLY DEPRIVED  
AND NUTRITIONALLY VULNERABLE**

*Caring for the socio-economically deprived  
and nutritionally vulnerable  
Theme paper No. 3*

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## SUMMARY

Every year millions of children falter in their growth, fail to develop their intellectual potential, or die because of malnutrition. While the immediate causes of malnutrition may be inadequate dietary intake in relation to needs and disease, the underlying causes of malnutrition are more complex. In general, the underlying causes may be related to problems of household food security; access to health services, combined with an unhealthy environment; and care of nutritionally vulnerable household members, particularly women and children. Adequate food, health and care are all necessary for nutritional well-being.

Care refers to the provision in the household and community of time, attention, support and skills to meet the physical, mental and social needs of nutritionally vulnerable groups. Care can be provided within families, communities or by external institutions. Among the nutritionally vulnerable groups, attention is often focused on the growing child, but other vulnerable groups include mothers, refugees, the elderly, the disabled, the landless and the unemployed.

Caring capacity relates to the ability to use human, economic and organizational resources for the benefit of the household. It therefore involves issues of knowledge, time and control over resources. In the context of nutrition, it facilitates the optimal use of household food resources for child feeding, and of parental resources to protect from infection and care for the sick child or other vulnerable members of the society. More generally, it includes responding promptly to nutrition needs and nurturing physical, psychological and emotional well-being, which, in turn, will benefit nutrition and health.

The provision of adequate care for children has, above all, to do with parents, and particularly, the roles of and resources available to women as the major caregivers. In general, policies to improve care for children should relate most directly to strengthening the family as a social and economic unit. However, caring capacity exists not only at the family level, but also at the level of the community, and to a lesser extent, at the level of the State. In most communities, traditional institutions exist to support its members during time of stress, and state-based social security systems exist in many countries.

Specific caregiving for children includes breast-feeding, providing security and reducing child stress, providing shelter, clothing, feeding, bathing, supervision of toilet, preventing and treating illness, and showing affection, interaction and stimulation, playing and socializing and providing a safe environment for exploration. It also includes the use of resources outside the family, such as curative and preventive health clinics, prenatal care, traditional healers or members of the extended family network. Breast-feeding is a prime example of care, since it combines food security, caring and healthy environment in one action. The way in which these activities are performed is an important aspect of care: the motivation, skill, physical capacity, consistency, and the responsiveness of the caregiver to the child's needs, are all related to child survival, health and development.

The responsibility for providing care often falls disproportionately on women. Care of the mother, either by herself, her family, through social support in the community or the social service networks, will have direct effects on her ability to care for children. However, efforts to improve women's health and well-being should recognize the rights and needs of women to develop as individuals in their own right.

Common constraints to providing care, and how they may be addressed, include:

Poor physical and mental health. Physical health includes nutrition, medical care services, prenatal care and care for the girl child. Mental health needs of the woman include self-confidence, absence of depression, and reasonable levels of stress. Programmes can be designed which empower her to use her own skills, and to learn new ones that allow her to feel confident in a larger sphere. Access to publicly-provided health and related services is essential, including general health, pre-natal, obstetric and family planning services. Improved birth spacing and weaning practices will improve the health of women and children. Education on the value of family planning also needs to be targeted towards men.

Low levels of education, lack of support for traditional wisdom, and beliefs about care. The demand for care, or the perception of the importance of early and intense investment in the child, varies from culture to culture and between individuals, as will the understanding of the meaning of mothering, of fathering, and of care. Education and literacy are fundamental to achieving benefits from other policies. Adult education and literacy classes are important, as are carefully tailored education on child care, including communicating the importance of exclusive breast-feeding in the early months of life, increasing the energy density and quality of complementary foods, decreasing contamination and maintaining frequent feedings.

Lack of support from family or community. Such support can increase the care for children and women through a reduction of workload, economic assistance, knowledge, or emotional support. Many societies have traditional mother's helpers who provide assistance during childbirth and postpartum period, including advice and emotional support. Community groups can also provide support for children and women. Programmes can increase support by forming women's organizations, increasing the support provided by older siblings, or encouraging the father's support in child care. Social security systems for women can be expanded in those countries that can afford them.

Heavy workload in income generation and household production tasks. Often the very heavy workloads of women, particularly during the agricultural season, place a physical and emotional burden on them and consequently reduce their ability to provide care for themselves and their families. Technology and infrastructure can relieve demands on women's time and efforts. These include water collection and fuel gathering, access to health services, and technologies for improving hygiene and sanitation.

Household resources and the woman's control of resources. Increasing household income will enhance child nutrition to some degree, but the effects on children's nutritional status may be greater if the woman has some control over the household resources. Women's property and income rights can be strengthened through legislation and access to credit and household income, through both increased involvement in household decision-making and increased wage employment.

The elderly are rapidly becoming a substantial proportion of the population in both developed and developing countries. Proper nutrition plays an important role in preventing or postponing the development of chronic diseases in later life, and systems of care should encourage the elderly to follow sound nutritional practices. Food intake usually declines with age. This is usually associated with decreased needs due to lowered basal metabolic rates, reduced physical activity and a lowered lean body mass. Other factors such as apathy and depression can contribute to decreased appetite, as can the use of some medication and alcohol. Increasing poverty among the elderly also increases the risk of nutritional deficiencies among this group.

In some societies, the elderly can become socially isolated, and programmes to address this problem may be needed. Community-based care services for the elderly should be fully integrated into systems of primary health care. Programmes providing food commodities or prepared meals can help to ensure proper diets. The traditional family care structures found in all societies are generally supportive of the elderly; however, many of these structures weaken as countries become more urbanized.

Caring strategies also operate at national and international levels. When refugees cross international borders, international agencies are compelled to protect their welfare. At least 35 million people in the world today have either fled their country as refugees or have been displaced internally, usually by civil war. Refugees suffer from the same type of diseases as other vulnerable groups and often, more so, due to their increased destitution. Malnutrition, infectious diseases and mental/emotional illness are some of the more common consequences of being displaced.

Refugees need resources to help them to sustain their livelihoods as well as to meet their immediate needs. The resources they receive as assistance, including food, should be viewed as economic goods or support, and such "informal monetization" should be taken into account in the design of appropriate caring strategies. Where food rations are provided, allocation should be based on need rather than the immediately available resources of donors.

Strategies to care for the disabled, such as the blind, should aim to support livelihoods rather than increase their dependence on external assistance. The family and community organizations which help people to cope with their disabilities should be promoted along with jobs and skills training.

Actions to improve care by addressing the basic causes of malnutrition include:

Improving the technical/material means of production. Programmes to increase agricultural productivity, improve conditions of informal work, or mitigate problems of seasonality will indirectly improve the conditions of care by releasing time for caregiving.

Determining whether the social conditions of production influence the availability of care. Gender division of labour, which results in more equitable labour burdens for father and mother, or increased control of the means of production by the mother, may result in improved nutrition for children through greater availability of care. More broadly, the status of women, or a more equitable distribution of resources within a country may have positive effects on child nutrition through increased household food security, health services, or care.

Developing legislative and political initiatives to relieve constraints on care. Nutrition programmes can be tied to the Convention on the Rights of the Child, the World Summit for Children, and the Convention on the Elimination of All Forms of Discrimination against Women. Policies on maternity leave, breast-feeding breaks, and child care facilities at the workplace could be adopted. Legislation to insure women equal access to higher-level employment, to child support in cases of divorce, and to father recognition of children could be recommended.

Determining whether cultural/ideological factors are increasing the availability of care. Traditional beliefs which support child nutrition should be enhanced. However, many of the caregiving environments are undergoing rapid change through urbanization, migration, family disruption, and environmental degradation, and creative strategies are needed to reverse the negative impact of these trends on family support systems.

Including care in nutrition training programmes. Training and texts about infant and child feeding should include a recognition of the social nature of feeding, the process of child development, and the interaction between child characteristics and health and nutritional status. Medical personnel could be trained in the importance of behavioural aspects of health and in the relations between children's characteristics and care. Finally, training should also focus on the significance of the mother's health and mental well-being for nutrition.





## **I. INTRODUCTION**

Every year millions of children falter in their growth, fail to develop their intellectual potential, or die because of malnutrition. While the immediate causes of malnutrition may be inadequate dietary intake in relation to needs and disease, the underlying causes of malnutrition are more complex. Most are linked directly to poverty. In general, the underlying causes may be related to problems of household food security; access to health services, combined with an unhealthy environment; and availability of care for nutritionally vulnerable household members, particularly women and children. Adequate food, health and care are all necessary for nutritional well-being.

Care is the provision in the household and the community of time, attention and support to meet the physical, mental and social needs of the growing child and other household members. It leads to the optimal use of human, economic and organisational resources. Particularly in the context of child nutrition, care allows for the best use of household food resources for the feeding of children. It implies the effective use of resources to protect children from infection, to attend to a child during illness and to assist others who may be unable to care for themselves because of disability or old age. More generally, care includes nurturing full psychological and emotional well-being. These are goals in themselves and in turn they can benefit nutrition and health.

Vulnerability is determined not only by low income<sup>(1)</sup>, but also includes defenselessness, insecurity, and exposure to risk, shocks and stress. Vulnerability refers to exposure to contingencies and stress, and difficulty in coping with them. Factors such as weak asset base, incapacity to work, persecution and prejudice, natural disasters and civil wars can all cause populations to become nutritionally vulnerable. Some population groups have special preschool children, adolescent girls, pregnant and lactating women, and the elderly. Care of the nutritionally vulnerable, as well as provision of food and health, has to be assessed for different groups within the social and economic context of their lives.

The synergistic relationship between child malnutrition and care is being increasingly recognized. The role of care of children and women for child nutrition is clearly understood by many mothers, health care workers, community development practitioners and home economists, and its equal importance for nutrition as food and health is also being acknowledged. Care of women and children and other groups within the household and community determines the way in which food supplies are acquired, procured, delivered and allocated to these groups. Care behaviour also determines utilization of health services, water and sanitation systems, child care services, and a variety of family support networks which create a healthy environment for family members.

The primary providers of care for young children in all cultures are women, and therefore care of the child is inextricably linked with the situation of the household and women. A care-giver's knowledge about child care and her access to and control of resources determine, to a large extent, the care she can provide for the child. The lack of

resources, in the form of time, knowledge, and income, together with the subordination of women in many societies, constitutes a major cause of child malnutrition. In addition, mothers are themselves subject to nutritional stress, often combining pregnancy, lactation and frequent child bearing with heavy domestic and income earning work. Therefore, the care of children and hence their survival, growth and development, and of mothers (as the primary care-giver) strongly interact. The characteristics of the child also influence the care received. These interactions and their significance for child health and development vary with the age/developmental period of the child. Family circumstances and the responsibilities and attitudes of the father are also important determinants.

The term "care of children and women" includes not only care by a mother for her child, but also care of a woman, either by herself, by her family, through social support in the community, or by social networks such as health centres or work places. Care for a mother may have direct effects on her ability to provide responsive care for her children. The nutrition of women is more compromised than many recognize<sup>(2)</sup>, and their workloads are frequently excessive<sup>(3)</sup>.

For infants, examples of care include breast-feeding, diagnosing and treating illnesses, determining when a child is ready for supplementary feeding, stimulating language and other cognitive capacities, and providing emotional support. The timing and type of foods and the extra energy requirements of infection also have special nutritional implications. These have to be recognized through care. For children, care must be directly related to their developmental needs; as these change over time so will the nature of, and need for care. The pattern and quality of care should correspond to the biological and developmental stages through which an infant moves in the process of physical, psychological and social maturity; each stage has its vulnerable points. Compared to children under the age of five, those over-five are less vulnerable and may even become care-givers in their own right. However, they still remain vulnerable to infections and other health shocks. The growth spurt often combined with heavy work leads to high energy expenditure. Often, teenage girls become pregnant, then lactating, when their energy needs are very high. These special nutritional needs have to be met with adequate care.

The elderly have nutritional needs reflecting changes in their metabolism, patterns of activity and increasing susceptibility to diet-related chronic diseases. In some countries the family ties that support the elderly have weakened, and care for this vulnerable group is provided by the community or state. Disabled people also have special needs that have to be met through care. Other vulnerable groups, such as refugees and the internally displaced, care particularly when they lose support from family or community and the state or the international community becomes their care-giver.

## II. CARE FOR WOMEN

The experience of poverty is both shared and distributed within families. All suffer but some suffer more than others. A symptom of deprivation is the way children have to be

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neglected as parents struggle to secure future food supplies, income and health care for the family. A disproportionate amount of the struggle falls on women. For many of the groups discussed in this paper, women as mothers, daughters or wives will be the primary care givers as long as families remain intact. However, programmes which concentrate action on child welfare out of the context of the family may be treating symptoms rather than causes. Such programmes have to be considered in the context of women's essential production activities, although even more serious are development programmes which do not consider the problems of women and children at all, and damage the welfare of families by imposing excessive burdens on women. Even when families disintegrate, women will continue to have direct responsibility for the basic needs of others. Programmes to generate care must aim to maintain the family and community as a unit, encouraging fathers to contribute to care. Women often reach their peak vulnerability to nutritional stress as mothers during child-bearing, pregnancy and lactation. However, women can be nutritionally vulnerable at other times. In terms of the allocation of resources and functioning of markets, there are three key reasons why women in developing countries are at a greater disadvantage than men, therefore more vulnerable and subject to deprivation and nutritional stress<sup>(4)</sup>.

The first is the element of sex discrimination in access to resources or markets. This discrimination in markets acts against women in favour of men, and this continues no matter how much of the social sector budget is spent on women or how many special women's projects are set up.

Secondly, women face additional tasks in reproduction and family maintenance. Women experience the tax on physical energy and time that biological reproduction demands. They are also expected to care for children and sick adults, to cook for and clean the household. There are often additional tasks of collecting firewood and water. All of this must be carried out before income-earning work can be started. If women have to raise income and are entirely dependent on these efforts, as is the case for many households headed by women, then care for themselves and their children can suffer.

Thirdly, there is the question of allocation of resources, tasks and income within household economies. In many households in developing economies, especially in African countries, there are several lines of production within the household level, and men and women hold separate income generating activities. This also has an effect on incentives and response as women, involved in non-economic work, have restricted opportunities to take income-earning work. Economic distortions exist within these households as the terms of trade are biased against women. Outside observers add to this bias against women, partly by making unjustifiable division between 'production' and a number of other forms of work which are also vital for household subsistence, such as processing harvest produce for immediate consumption. These latter activities are given subordinate status as 'housework'.

These elements limit women's opportunities for social and economic independence. Attention to their needs through care will have benefits in terms of improving production and have a strong equity consideration. Many women are heads of household; women head about one third of the farms in Western Kenya, the range is 35-50 per cent in Zambia while

southern Africa is reputed to have the highest percentage of female headed households: 40-60 per cent in Lesotho and 35 per cent in Swaziland. In Botswana, studies during the 1970s reported 20-43 per cent of households were headed by women. Some of these households are supported from remittances by husbands working in the Republic of South Africa. In West Africa; the proportion of households headed by women is probably lower, although communities where males have migrated also show high figures. The degree of financial independence of such women is an open question, but characteristics of female-headed farms includes under-capitalization, below average farm size, fewer cash crops grown, low adoption of improved varieties of food crops and hiring out of labour to other farms. Women heads of household are also significantly older on average than other farming women<sup>(4)</sup>.

Women as workers face the double burden of high energy expenditure and low return to their effort. This combination may leave them trapped in a vicious circle of hard work and low income, unable to lead an independent existence. Seasonal problems of food shortages, high work levels and increased prevalence of infectious disease can be exacerbated for women. Disproportionate work burdens fall on women, especially during periods of peak labour demand.

Care for women requires the same elements as those proposed for other vulnerable and dependent groups; provision of time, attention, support and skills to meet their nutritional needs. Some of this care does come from husbands if women are married, and from extended family networks if they are unmarried or separated from their husbands. Technology which can reduce energy expenditure, credit and jobs for women, together with improved government social services such as creches, health care and family planning are all parts of care that will improve women's nutritional status. In particular government services are often available only to men: banking, agricultural credit and extension, should all include women. This will have production as well as welfare benefits.

### III. CARE AND THE YOUNG CHILD

#### 3.1 The Care Environment for Children

In understanding the role of care, two levels can be distinguished: the actual care given to a child, and the characteristics of the environment in which this care is given. The characteristics of this environment are (a) who is caring for the child i.e. the number and characteristics of care-givers; (b) where the care occurs e.g. at the mother's place of work, in the field, or in the home; and (c) how the family's economic and social resources support the child i.e. the family work and assets, wage rate, type of family, dependency ratio and so on. Not all children are raised in the family unit of father, mother (or mothers), and children. As many as 25 to 30 per cent of families in some areas are headed by women, without the support of men, and these households are often the most impoverished<sup>(5,6,7)</sup>. The way family income is used to support children is a vital part of the care environment.

Care plays a role in nutrition in different circumstances with several types of care-givers (mother or other), locations (home, institution, community, or workplace) and support

systems (father only, mother only, mother plus father, extended family). However, a much smaller number of care environments are likely, such as "Grandmother provides care in the child's home, mother works outside to support family, father also works" or "Mother provides care at workplace, and is sole source of support in the family". This typology allows a description of care-giving, and to identify how and with whom projects to reduce the likelihood that child malnutrition will occur.

The educational level of mothers alone, independent of household income, is positively related to better nutritional status of children and to lower infant mortality. The effects of maternal education on child health are mediated by better management of household resources. Maternal education is frequently associated with greater use of health care services, lower fertility rates and more child-centered care-giving behaviours. With increasing education, women have more power within the family to allocate resources for food and other items needed for their children's health and welfare.

Caring behaviours are difficult to investigate because the same action may have different consequences depending on the context. A distinction has been drawn between care that intends to return a child to a previously accepted state of health or development (compensatory care), and that which serves to enhance further development (enhancement care)<sup>(8)</sup>. Examples of compensatory care are taking an ill child to a health centre for treatment, or encouraging an anorexic child to eat. Enhancement care could include stimulating a child in play and language, encouraging a well-eating child to finish the last bite, or taking a child to the health centre for preventive care or vaccinations. Parents may not explicitly or even consciously be aware of enhancement goals, but the behaviour may reflect their goals for their children.

### 3.2 Influences of Care on Child Nutrition

Feeding behaviour may be as important as food availability for child nutrition<sup>(9)</sup>. Child care affects the child's dietary intake and therefore nutritional status in various ways: through prenatal nutrition and energy expenditure, breast-feeding and infant feeding behaviours, timing of feeding, meal frequency, amount of food per meal, energy density of the food, responsiveness of the care-giver to the child's hunger signs or persistence with child anorexia, and establishment of a secure emotional and loving attachment between child and care-giver.

Specific care-giving behaviours include breast-feeding; providing emotional security and reducing the child's stress; providing shelter, clothing, feeding, bathing, supervision of child's toilet; preventing and attending to illness; nurturing and showing affection, interaction and stimulation; playing and socializing; protecting from exposure to pathogens; and providing a relatively safe environment for exploration. A second set of behaviours include use of resources outside the family, including curative and preventative health clinics, prenatal care, traditional healers, or members of extended family network.

Breast-feeding is among the most elementary and consequential of care-giving activities. For the baby, breast-feeding combines access to food, protection against infection and the reception of loving care in a single activity. For the mother, breast-feeding means reinforcing the bond with her baby and, in cases where the baby receives no other fluid or food than breast milk, it helps to protect the mother from another pregnancy in the first six months after birth. Increasing the interval between births in turn protects the mother's health and nutritional status and that of other family members.

The next critical activity-complex is the weaning process, which takes place between six and 24 months. Infants are exposed to the greatest nutritional risks in the form of food contamination, reduced energy density, more infrequent feeding and a loss of maternal security during this time. An elder sibling who is not capable of properly caring for an infant may be given this responsibility which may cause malnutrition or even death. The hard nature of life in poor rural and urban locations may imply that little contact between mother and child takes place after weaning. The knowledge and motivation of the care-giver directly affects the nature of the response to the needs of children. In this context, the problems of care for adolescent girls often go unnoticed yet they also constitute a nutritionally vulnerable group in need of care.

The allocation of food within a home is an important issue directly related to the underlying causes of access to food and care. According to the customs of some societies, particular family members receive more food than others relative to their nutritional requirements. For example research indicates a sex bias favouring males in some countries.

A wide range of household and demographic factors are related to caring capacity and child malnutrition such as the nature of housing and water supply, birth order, the mother's age, age at weaning and the presence or absence of other siblings. Frequent births can deplete a woman's nutritional stores. If nutrient intakes of pregnant women are limited, the foetus' needs are met first. Furthermore, a large number of small children in the home can have negative effects on the children independent of other socio-economic factors.

I. There has been a debate over the relative significance of appropriate care-giving behaviours, amount and quality of time, and responsiveness to children's signals for psychological development. There is a wide range of caring behaviours that may lead to satisfactory growth and development of children. Aspects of care with negative consequences are those reflecting an absence of attendance to basic needs. The consensus appears to be that "quality of time" in child care rather than simple amount of time is associated with positive child outcomes, particularly for mental development, but also for growth. However, most of this research comes from industrialized countries. The way these behaviours are performed is a central aspect of that "quality": the motivation, skill, physical capacity, consistency, and, most important, the responsiveness of the care-giver to child cues are related to child survival, health, and development<sup>(10)</sup>. Studies have also linked "warm affect" (self-reported happiness, observations of smiling, positive behaviour with children) with nutritional outcomes<sup>(11,12)</sup>.

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Research linking caring practices with child survival, growth, and development are of three kinds: studies that cover two groups of children differing in nutritional status, but with similar socio-economic levels; studies with children who fail to thrive; and experimental studies in which care-givers are taught different caring behaviours and the effects of this behaviour change on child nutrition and/or development are evaluated. The importance of these behaviours varies by developmental period. For example, frequent holding of an infant is important for physical and psychological development, but as a toddler, a child who is frequently held is often more poorly nourished, or shows lower levels of verbal development than more active children.

Studies comparing well and poorly nourished children have found specific caring practices associated with better nutritional status in children despite poorer environments. Examples of these caring behaviours are frequent physical contact, a consistent responsive reaction to the child's needs, and showing affection to the child<sup>(11,12)</sup>. Recent studies from several countries (Mexico, Bangladesh, Nicaragua, Colombia, USA, Great Britain, Jamaica) have reported significant associations among one and two year old children between the care-giver's active role in child feeding and the child's food ingestion or nutritional status. Active feeding includes offering a child a second helping, holding a feeding utensil (if available) rather than asking the child to self-feed, and offering praise for eating. These feeding behaviours could be considered enhancement care, since studies show that the behaviours increase the amount of food ingested and tend to be associated with better nutritional status.

Other studies from Peru and Nicaragua have reported feeding behaviours that seem to be compensatory, in that care-givers increased efforts at feeding only in response to child refusal. When children are healthy, maternal encouragement to eat is minimal but when infants were ill with diarrhoea and refused food, mothers were more active in care-giving than when the child was not ill<sup>(13,14)</sup>.

The importance of separating the compensatory and the enhancement aspects of care is illustrated by these findings. Some mothers and families may have developed an investment strategy for their children in which they want to enhance each child's development. Others are concerned with the maintenance of health, children, or a return of unhealthy children to a particular level of functioning.

The care environment could affect feeding behaviours. Orphanage children in Ghana were better nourished than village children because the workers had more time for feeding than the mothers, fed more actively, and offered second helpings<sup>(15)</sup>. Generally, studies indicate that a family without adequate economic support, or with an inadequate care-giver will be at greater risk of having a malnourished child.

Failure-to-thrive studies have examined factors in the mother/child interaction that might explain causes of growth failure of children in industrialized countries with no medical abnormality. These problems are associated with the child's difficulty in achieving homeostasis, and disorders of attachment with the mother. Both characteristics of the child and of the mother/family are responsible for these cases. Characteristics of some mothers



contact, and little physical intimacy. Maternal stress, a bad experience from her own rearing process, or lack of family support can reduce her responsiveness to her child.

Intervention studies have attempted to increase children's nutritional or developmental status through teaching new caring behaviours to care-givers. Usually, an experimental group received instruction in stimulating and playing with their children, whereas the control group did not. All children in these studies were biologically at risk, either through prematurity or malnutrition.

Two conclusions emerged from these studies: first, positive effects of teaching care-givers new care-giving behaviours were seen for biological outcome measures (activity level, growth and developmental quotient) in every case, even though the treatment had not included food supplements. Second, in those studies which actually measured parental behaviour, few differences between experimental and control groups were seen in these behaviours<sup>(16)</sup>.

The inconsistencies in these studies lead one to question the mechanism through which home teaching affected the child outcomes. There is some speculation that the parents perceived their children as special, and channelled more food to them. It is possible that the parents' behaviour and beliefs changed, but that amount of change was not observed with the methods used. A third explanation is that increased active tactile stimulation (e.g. touch or handling) might have direct effects on the child's growth hormones<sup>(17)</sup> through effects on ornithine decarboxylase, one of the prime controllers of growth.

### 3.3 Age and Development Changes

The developmental stage of the child is important in the assessment of care as changes occur with the developing capabilities of the child. These changes are of two kinds: changes in the child's psychological and biological processes, and changes in the environment provided to the child. During the first five years of a child's life, the conditions that influence growth and development vary tremendously. The relative importance of the mother's time in care-giving and the nutritional benefit of environmental resources also varies with the child's age.

Four stages of development relevant to nutrition can be roughly defined for the young child: the prenatal period, infancy, toddlerhood, and the preschool period. The risks and responsibilities of care-giving differ for each period. The care environment also differs, with the first two more related to the mother, and the second two involving the wider social context in which care occurs.

The prenatal period sets the trajectory for the child, although later events determine whether that trajectory is kept. Influences during gestation include the mother's dietary intake, energy expenditure, and emotional state. Recent evidence suggests that the mother's pre-pregnancy nutritional status is established during her childhood.

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The connections among previous pregnancies, pre-pregnancy weight, weight gain during pregnancy, and the child's birth weight are well known. There is much less information about the effects of the family's care for the pregnant woman such as their attempts to reduce her workload or increase her dietary intake. Too often women have no special care during pregnancy. The factors that account for the lack of special care for the pregnant woman are probably a combination of economic factors, the family's understanding of her unique needs, and the support she receives from them. Both families and the women themselves need to be made aware of prenatal requirements.

During the first months of life, the major determinants of nutritional status are characteristics of the mother, such as pre-pregnancy weight and pregnancy weight gain<sup>(18)</sup> and the establishment of breast-feeding. Prenatal food supplementation may influence birth weight if the mother is undernourished. Infants are protected from maternal undernutrition up to a point, since the mother's body reserves seem to be preferentially used to support the child, certainly in terms of calories, but not micronutrients.

Although preconceptual and prenatal nutrition give a permanent impact on growth, breast-feeding also has a strong implication for child growth. The consequences for children of failing to establish exclusive breast-feeding are long-lasting for children in impoverished circumstances. Mother-infant contact in the first hour of life may have positive consequences for breast-feeding and maternal care, but only if the maternal-infant bond is at risk. Physical care and the parent's responsiveness to the child's distress are important aspects of care-giving during this period, as well as beginning of affective relations<sup>(19)</sup>.

During the first six months of life, the child's behaviour gradually shifts from reflexive, obligatory control to a voluntary or deliberate response system. With the acquisition and refinement of voluntary behaviour, behavioural development is increasingly attached to social relationships<sup>(20)</sup>. During the first year, complementary feeding usually begins, a process that depends on social support and may form the basis for many social interactions.

In most cultures, mothers devote considerable time to the infant, particularly in the first six to nine months of the child's life. Therefore, during the first year of the child's life, the loss of the mother's time with her child without an adequate alternate can be difficult. The connection between exclusive breast-feeding and health and nutrition of infants is well established. However, recent work has suggested that not only the fact of breast-feeding, but the way it is done will have significant effects on the child's growth. For example it has been reported that mothers who allowed a child to terminate the breast-feeding period, and who were sitting or lying down during breast-feeding had better nourished children than others<sup>(8)</sup>. These associations are not casual, but they raise the possibility that changing some of the social aspects of breast-feeding might influence child nutrition.

The risk of mortality is the greatest in the first year of the child's life. The second and third years are the period of greatest relative weight deficit. Growth faltering however,

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most often begins during the complementary feeding period (roughly) from six months to eighteen months of age. Among children who are undernourished, the most common pattern is for anthropometric status of children to drop between six and twelve months after birth. Rates for malnutrition and infection peak in the second year (12 to 23 months)<sup>(21)</sup>, and the proportion of children dying matches or exceeds the total dying in the following three years<sup>(22)</sup>.

The decline in growth rate and health can be linked to an increase in diarrhoea as the child begins to be mobile, becomes infected more easily, and suffers anorexia associated with diarrhoea. Supplementary foods may be low in energy density and contaminated. In some cultures intensive, warm, and solicitous mother-child contact continues to the end of the first year, however is altered dramatically during the second year of the child's life by abrupt weaning or separation, resulting in misery, depression, and failure of appetite in the child. This type of rejection is not permanent, but is linked to the particular period of child-rearing. It may be intensified if the child is a girl.

These emerging behaviours of the child require different types of care behaviour. Cleanliness of the environment, encouragement of eating, and vigilance for the child's safety become significant. Skills, knowledge, and resources are needed to prepare high density foods free from contamination. During this period, the abilities of the alternate care-giver to protect the child from infection, and to actively feed the child, seem to be particularly important<sup>(20)</sup>. The child's linguistic abilities are unlikely to be sufficient to ask for food clearly until 24 months. For example, children's cues that they are hungry are much more obvious in the first six months of life, and after they are able to use language to articulate their needs, than during the high-risk period of nine to 18 months. In the interim, the parent/care-giver must be particularly responsive to child cues of hunger and food preference in order to maximize opportunities for feeding since the child's skill level for obtaining food is low.

Beyond the age of 36 months, the change in the growth rate of the child does not appear to be influenced substantially by dietary intake until the child reaches puberty<sup>(23)</sup>, although continued good nutrition is necessary to preserve the trajectory and appears to be associated with normal cognitive development.

The caring requirements of the child who has reached 36 months differ from those of younger children. Risk of diarrhoea is less, and the child is more capable of self-care. Further, in many societies, children at age three or four are not really "cared for"; they are initiated into the culture of children, and may even become fledgling care-givers themselves to younger siblings. In addition, they may have developed skills to obtain food for themselves, and the wisdom to protect themselves a little from pathogens in the environment. However, these children continue to need positive affective interactions and cognitive stimulation for optimal psycho-social and mental development.

### 3.4 Caring as a Health and Hygiene Behaviour

Child care-giving affects the child's nutritional status through protection of the child from pathogens, a result of the care-giver's cleanliness and sanitation (e.g. washing hands with soap before a meal and after cleaning away child's faeces), using of health care services for routine checks (e.g. growth monitoring), and nursing care for the child during episodes of illness.

Introduction of safe-water and sanitation systems will interact with care behaviours and beliefs. In this context, education for girls is especially important; education of the mother is frequently associated with good hygiene behaviour, increasing the likelihood that the mother can make optimal use of water and sanitation systems<sup>(24)</sup>.

Although in the past much of the development of health services has been in curative care, the establishment of hospitals, and the construction of clinics, it is now recognized that much health care occurs in the home, and that a successful health programme must deal with the care-giver's behaviours and beliefs surrounding disease and health; the "household production of health" is now an accepted development concept.

When a child is ill, the mother usually takes on a number of roles. She must diagnose the illness, initiate a treatment at home (usually), and provide additional emotional support for the child. If the home treatment does not work, most mothers begin a series of "health seeking behaviours", turning first to traditional healers, residents of the same community. If that does not work, other resources are the local pharmacy, the health post, and only as a last resort, the hospital. Thus much of the treatment of ill children depends on the care environment in the home.

Given the range of activities required to care for the child with diarrhoea, the mother must spend more time with the child. A mother often judges the severity of the diarrhoea according to how much the episode interfered with her everyday life. The more demanding the child, the greater the interference. Unfortunately, if a child becomes ill, although listless and undemanding, the mother often perceives the child as less sick.

It is important to understand the relation between traditional wisdom and treatment for an illness such as diarrhoea. In some areas, advances in medical science have resulted in greater knowledge about the appropriate treatment of diarrhoea than existed traditionally. The use of ORT, or the home made sugar-salt solution, can reduce the likelihood of dehydration, but numerous studies have shown that mothers are slow to adopt this technique, related in part to the failure of the educational messages to build on the mother's existing treatments of diarrhoea. Supplementary feeding of children during the convalescent stage, and continued breast-feeding are other recommendations that are not always adopted. Advances in medical knowledge can also serve to correct previous advice, as in the case of avoiding the use of antibiotics for diarrhoeal disease.

A health care system that could be considered "caring" would take into account constraints to care, such as women's workload, by reducing wait times, and constraints to information, by building on traditional concepts where possible. The women themselves would need to receive support from health care workers, and to see how to combine increased care with household workload.

### 3.5 Influences of Child on Caring

Although there has been a recognition for many years that some characteristics of the child will influence caring behaviours, this idea has not received much attention by nutritionists. There are several mechanisms for this effect, which may operate in different directions. One is through appetite: a child who is hungrier may demand more food, and finish more of the food offered to him/her. A second is through energy expenditure or temperament: a child who is more active and explores more might increase his/her ability to evoke care-giving, or require less care-giving.

Marginalization of the child within the family, of the mother within the family, or of the family within the community may influence caring capacity and nutritional status. One of the major reasons for marginalization is sex. Preference for sons has been found in many parts of the world, particularly in the Middle East and South Asia. Because of this, girls have higher rates of morbidity, mortality, less food allocation, are less likely to be provided with medical care, and to receive schooling in many parts of the world. The result in many countries is lack of access to resources by the girl child, resulting in long term negative consequences for the following generation.

There is some evidence that supplementary feedings of girls may have greater benefit for their cognitive growth than for boys. A review of the effects of malnutrition on mental development has found that when differences by sex were reported, males were favoured at birth, and females in preschool and school aged years<sup>(25)</sup>. More substantial effects of nutritional supplementation on the cognitive development of girls than boys has been found<sup>(26)</sup>.

Although sex is the most common reason for marginalization, children may be discriminated against for other reasons, such as being unwanted, high birth order, sickness, physical or mental disabilities, parentage, or other idiosyncratic reasons whose value is culturally mediated, such as twins. Child fostering has also been found to be associated with poorer nutrition<sup>(27)</sup>.

## **IV. FACTORS INFLUENCING THE AVAILABILITY OF CARE FOR WOMEN AND CHILDREN**

Six factors influence the provision or availability of care for women and children: (a) maternal physical health; (b) mother's mental health and self-confidence; (c) education and beliefs of mother and family; (d) social support, including support from the father, kin

and community; (e) workload and time availability of the mother, and; (f) the availability and control of resources. This list is not exhaustive, but represents key variables that may influence the provision of care.

#### 4.1 Physical Health of Mothers/Care-givers

Improved physical health and nutrition of the mother or other care-giver is generally associated with improved caring capacity. Also, effects of childhood protein energy malnutrition on physical work are well established for men in strenuous activities, and are probably similar for women. The effects of current PEM on productivity are less clear. A mother with increased energy expenditure associated with higher dietary intake may be more involved in optional activities such as enhancement care for children, or parent-child interaction, than a woman with lower dietary intake. In urban Nicaragua, mothers with a history of anaemia interacted significantly less often with their children during the observation period than those without this history. Anaemia and current PEM for women may reduce responsive, enhancing interactions with children.

The current increase in the number of mothers who have AIDS is raising a new spectre for families and children. The effects of HIV infection on care-giving during the life of the individual, and the effects of the death of a mother on a child are dramatic examples of the significance of caring practices for child welfare. In addition to the mother, the health and nutritional status of other care-givers, usually the adolescent girls and elderly women, can also influence the availability and quality of care.

#### 4.2 Mental Health, Stress and Self Confidence

Few studies have examined self-esteem systematically. Many evaluations of income-generating projects for women mentioned anecdotally that women's self confidence seemed to have improved. Breast-feeding may increase self confidence because the woman understands that she can meet the needs of her child without relying on technological consumer products such as formula and bottle. Self confidence has also been linked with care. Mothers with more self confidence were more willing to try to feed anorexic children. Given the known effects of maternal depression on care-giving in developed countries, and its prevalence in developing countries, depression could be a factor in some cases of infant and preschool-age malnutrition.

The effects of the stresses of war on children are well known: severe negative effects on children have been shown from war zones in Cambodia, Mozambique, Nicaragua, the Middle East, and the inner city of Chicago. Tragically, children are sometimes the intended victims of war, as occurred in Cambodia. Children are wounded psychologically and socially when soldiers are killed, since each man is a father, brother or uncle to some child. They are wounded when "collateral damage" occurs (i.e. a civilian is accidentally killed) since each one is a relative of a child. Children are wounded when they experience the horror of war firsthand, and by the social disruption that occurs in the process of war. Disruption can lead to migration to avoid the conflict, and increased poverty as people are separated from

their homes. Malnutrition results from food shortages, absence of care-givers or care-givers' inability to handle the difficult circumstances, and the breakdown of social patterns. Like so many other risk factors, the war disproportionately affects the poor.

#### 4.3 Education and Beliefs

Associations between increased maternal education and child survival, growth, and development are consistent and strong. They have been reported in 14 countries and three world regions using the World Fertility Survey data. Education for women has increasingly been seen as a critical entry point for public health interventions.

More educated mothers make better use of health services, provide better child care including feeding, have more hygienic household practices and personal habits, have increased knowledge of appropriate child rearing, have a higher status in the family, are more assertive, and are more ready to change their beliefs about how, and how much they should invest in each child<sup>(27)</sup>. Parental investment strategies refer to parents' choices about using their resources for their children's development, and their implicit goals for their children. Traditional, rural parents tend to invest in a child's survival, and strive for the maximum number of children possible. Children provide labour and old age security. Urban educated parents are less likely to have need for children's labour, or for support in their old age. They tend to have fewer children, and invest more in each child.

Belief patterns themselves may have a substantial effect on feeding behaviours. Many parents did not believe that food for children was associated with their health. In addition attitudes towards food such as calling children to meals, trying to make foods which children like, purchasing small treats, and using medical care are all more highly associated with better nutritional status of their children than the mother's socioeconomic status. Also, the more often the mother encouraged the child to eat, the better the child's nutritional status, reflecting an important attitudinal dimension, i.e. the amount that parents perceive that they should push their children not only in feeding, but also in learning.

#### 4.4 Social Support

Social support refers to the help of the community and family, and includes actual assistance, emotional and knowledge. Actual assistance can reduce workloads and increase the amount or quality of care-giving available. For example, in Lesotho, the greater the number of able-bodied women living together in a household, the less time each woman spent on household work and the more time on social activities<sup>(28)</sup>. Community support can be critical for solving problems of alternate child care, credit, or agricultural productivity, through the information of work groups, cooperatives, or informal sharing of tasks.

Support from other family members in child care may influence the quality and amount of care provided, both directly through freeing the mother's time, and indirectly through influences on the mother such as reducing her stress. Whether freed time would actually be spent on child care may depend on cultural beliefs about child care. If child care

is seen as primarily physical care, designed to enhance survival, a mother with more free time might spend it on activities other than enhancement care for her children.

Fathers are often not included in discussions of care, but they can substantially improve the welfare of their children. This can occur through a number of different avenues, such as contributing a higher proportion of their income to their children's welfare, performing more care-giving, or valuing and providing support to the mother for her care-giving. The commitment of the father to the welfare of his children has been shown to be a significant factor in children's nutritional status in Latin America. This effect is much less in West Africa, where providing for the children's food is largely the mother's responsibility.

It is important to understand local conceptions of fathering roles and responsibilities. There are significant cultural differences in the role fathers play in their children's upbringing, ranging from "finding a good mother" to becoming highly involved child rearing. Men's sense of responsibility for fathering also appears to be enhanced by having increased experiences of care-giving<sup>(29)</sup>.

#### 4.5 Mother's Time, Work and Income Generation

Workload of the mother influences the caring capacity of the family. It is generally understood that poor Third World women's time is full with home production, agriculture, and income-earning; if additional time is to be spent on care-giving, time must be subtracted from another activity<sup>(3)</sup>. Women on average work more hours in home and economic production than the men in their families<sup>(30)</sup>. Inadequate food security in a household can result in a second time cost as family members including the mother or alternate care-givers, spend more time attempting to obtain sufficient food. It is important to recognize that the fewer the family resources, the higher the time cost for food preparation, the more difficult the attainment of proper hygiene, and the greater the need for good child care.

There has been much concern about the effects of women's income earning activities for the welfare of their children, since these activities may reduce time in child rearing. However, this discussion must be placed in context. For most poor women, income generation is not a matter of choice, but of survival for her and her children. Therefore, to debate whether or not women should work for earnings misses the key issue, which is how to enhance the well-being of the income-earning mother and her family.

A review of 25 studies from 16 developing countries found no conclusive evidence linking maternal employment with poorer nutritional status of children<sup>(31)</sup>. Negative effects of mother's work on child nutritional status are presumed to occur through the lack of care-giving (including breast-feeding) an income-earning mother can provide, and positive effects are presumed to occur through increased income or control of income by the mother. Effects appeared to depend on the type of income-earning, the availability of adequate alternate child care, and the age of the child. When mothers earned a reasonable wage for their work, when there was an adult care-giver, and children were between one and three years of age, the effects of income-earning were found to be positive. The reason for the effect of the



child's age is that after infancy, mothers' child care time is less essential, since child care tends to be performed by other family members. On the other hand, the additional income under the control of the mother might have particular benefits for the 1 to 3 year old child.

Women's income-earning has been associated with earlier bottle feeding and shorter exclusive breast-feeding in Thailand, Indonesia, and Colombia, but not in Kenya<sup>(32)</sup>. However, there were many women in all of these countries who began bottle-feeding very early and were not income-earning. The authors conclude that there are factors influencing the failure to breast-feed other than income-earning.

#### 4.6 Availability and Control of Resources

The low status of women in many cultures means that often they do not have much control over the resources within the family, nor do they have much decision-making power in the household. They may have responsibility for child rearing without control over the resources needed to carry out the responsibility. Control of resources may be greater if the woman earns the income<sup>(33)</sup>, although this is not always the case<sup>(30)</sup>. Women who earn an income have more household decision-making power than those who do not work. Income in the control of women is more likely to be allocated for the immediate benefit of children, such as the purchase of food, than is income earned by men.

It is important to recognize that increasing women's control of income is not sufficient to ensure good nutrition for mother or child. Without adequate resources, no amount of care-giving or resource control is sufficient. Some projects that have increased the workload of the mother, without increasing the amount of income under her control, have shown only limited or no effects on children's nutritional status<sup>(34)</sup>.

## V. THE ROLE OF CHILD CARE IN NUTRITION PROGRAMMES

### 5.1 Breast-feeding Protection, Promotion and Support

The most suitable food for all infants is breast milk. It is the major source of food for the over 140 million infants born each year who constitute nearly 3 % of the world's population.<sup>1</sup>

Scientific evidence and research have demonstrated that superiority of breast-feeding for child survival, health and nutrition, maternal health, and child spacing. National and international authorities recognized that breast-feeding, specifically exclusive breast-feeding for the first 4 to 6 months and continuing thereafter with appropriate complimentary foods

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<sup>1</sup> Figures were taken from Wellstart Paper "Breastfeeding: A Natural Resource for Food Security", 1992, Wellstart - Expanded Promotion of Breastfeeding, Washington D.C.

constitutes optimal infant feeding practices. Breastmilk provides optimal nutrition and promotes child's growth and development. It represents advantages for the infant and mother. Breast-feeding provides protection against diarrhoea and infectious diseases. It benefits women's health, lowers the risk of ovarian and breast cancers and offers psychological benefits by the emotional bonding created between the breast-fed infant and mother. Breast-feeding contributes significantly to child spacing and reduces fertility rates. When breast-feeding is complimented by timely introduction of other family planning methods, fertility is further reduced, allowing continued partial breast-feeding and time for replenishment of maternal mineral energy stores prior to the next pregnancy. Recent scientific literature shows that breast-feeding is a single programme intervention that can save more infant lives and prevent more morbidity than any other intervention strategy. Breast-feeding currently saves 6 million infant lives per year from diarrhoea. A study in Brazil shows that infant mortality from diarrhoeal diseases of those who are exclusively breast-fed was one-third to one-fourth the risk of infants who are only partially breast-fed, and one-eleventh to one-sixteenth the risk of those who were not breast-fed at all.

The major cause for concern among leading advocates of breast-feeding today is not so much existing prevalence rates as the fact that, in many countries, only a small percentage of the infants are exclusively breast-fed for the first 4 to 6 months of life. Results from 1986 to 1989 Demographic and Health Surveys and the World Health Organization data bank show that the percentage of mothers that initiate breast-feeding is high in all regions studied: 98% in Africa, 96% in Asia, and 90% in South America, but exclusive breast-feeding in most countries is rare and goes on for a very short time. Even among the countries with the greatest duration of breast-feeding, exclusive breast-feeding rarely exceeds one month. Yet, for the human infants nothing but breastmilk is required for the first 4 to 6 months of life - neither substitutes nor supplements, not even water.

Ideally promotion of breast-feeding should include training for health care workers in the physical and psychological processes of breast-feeding, changes in hospital practices regarding birth and rooming-in, elimination of the provision of free or low-cost supplies of breast milk substitutes to maternity services, spouse and community support for breast-feeding after birth, and special consideration in the work place for working mothers. Few programmes contain all of these elements.

The breast-feeding promotion effort in Kenya was supported by the Ministry of Health and NGOs such as the Breast-feeding Information Group. In response to declining levels of breast-feeding, and the controversy over the role of infant formula companies in that decline, a study was commissioned in 1982 to determine levels of knowledge and practice among health workers. The results suggested a lack of knowledge, maternity ward practices which inhibited the initiation of breast-feeding, and questionable advice from the health workers. In response, the Ministry of Health and NGOs initiated a multifaceted approach to improving breast-feeding, informing senior health officials, producing a code of marketing, and training and motivating health workers. The mechanisms were a series of training sessions for health practitioners at all levels, a directive to change hospital practices from the Minister of Health, and a national code for marketing of breast milk substitutes.

The evaluation showed that hospital personnel gained a knowledge of the management of lactation, their own responsibility in encouraging breast-feeding, and the dangers of bottle feeding. By seeing the importance of early and constant mother-infant contact, hospital personnel avoided bottles. On the other hand, the health workers were less likely to agree with the directives to avoid pre-lacteal feeds and early supplementation. A major focus of the project was to improve the care to the child through improving hospital practices surrounding birth.

The political and legislative aspects of the Kenya project were evident. The Ministry of Health provided visible support through directives to change hospital practices, training, and the development of a breast milk substitute policy which effectively stopped the practice of providing mothers with free formula samples and a bottle when leaving the hospital. It was a remarkable change in a relatively short period. However, in-depth studies in 14 countries (including Kenya) on actions they had taken to give effect to the International Code of Marketing of Breast-milk Substitutes demonstrated that legislative action alone was insufficient in effecting improvement in breast-feeding practices and patterns. The conclusions of these studies confirm that obstacles to successful programmes include: the absence of a national focal point; lack of knowledge of national legislative or regulatory action by the public, the health sector and local industry representatives; insufficient financial resources for monitoring and evaluation; lack of an explicit national strategy for programme development that includes public and health worker education and training; as well as incomplete legislative, regulatory or other action giving effect to the principles and aim of the International Code.

Improvements in the health and nutrition of infants were effected in Brazil through a multisectoral approach involving public education through the media, reorientation and training of health workers, enactment of a national legislation and regulations on the marketing of breast-milk substitutes, and national support from international agencies and non-governmental organizations. Over a period of several years during the 1980s, with the full political support of the government, the prevalence and duration of breast-feeding was significantly increased. A study among infant 0-2 months of age showed a 46 % reduction of diarrhoeal deaths and a 23 % reduction of respiratory disease deaths attributable to the improved patterns of breast-feeding.

## 5.2 Growth Monitoring and Promotion (GMP) and Supplementary Feeding

Growth monitoring continues to be a key strategy in nutrition education programmes, and has proved to be effective in a number of projects. Some programmes have not been particularly effective due to three problems: the accuracy of the assessment, the time requirements of the mother (or primary care-giver) in bringing the child to a centre, and the need for follow-up. When follow-up attention does exist, it is usually attempted by harried workers who are trying to expedite the weighing itself.

For example, in the Tamil Nadu project, a "food as medicine" approach was instituted for children who showed inadequate weight gain in two successive months<sup>(35)</sup>. Mothers were given supplementary food targeted specifically to the undernourished child until the weight gain returned to normal. The project reduced the incidence of malnutrition, perhaps in part because the parents were made to feel that the child was special.

The effects of care on nutrition were considered in this successful project. In the Tamil Nadu programme, an effort was made to reach families even if the care-giver was not able to attend the weighing centre. The community workers lived in the villages, children were weighed in their homes if they were not brought in for evaluation; and visited in their homes if they were targeted for supplementary feeding.

The effects of the child on care were illustrated in Tamil Nadu in part by targeting the children most at risk; GMP programmes should target children during infancy through 36 months in order to identify the beginnings of growth faltering and quickly bring them back to an adequate nutritional level.

Constraints to care are often an issue since growth monitoring and supplementary feeding require additional care from the family of a targeted child. Someone needs to bring the child to a location during the day for weighing regularly, and have the time and energy to put recommendations into practice. Mothers might have to sacrifice time spent in agricultural production which has long-term implications for the family's food availability. Yet these families are often the ones with the fewest care resources and the highest workload for the mother.

In Tamil Nadu, women's working groups were established in each community to provide encouragement and support to other families in need, and at times to prepare the supplementary food for the child. Many successful nutrition programmes seem to involve community participation and community support. In Iringa, Tanzania, mothers identified a need for help with increasing feeding frequency, given their workloads<sup>(36)</sup>. Therefore, part of the programme involved establishing a system of child care centres run by community members to feed children whose mothers were employed. Finally, women's workload was decreased by encouraging fathers to take on some of the tasks normally performed by the women, such as hauling fuel and water. A locally made videotape called "Share the Burden" depicted men helping their wives, and showed the last hold-out finally assisting his wife.

### 5.3 Nutrition Education

Nutrition education programmes frequently recommend new infant feeding practices, focused on food, but the recommendations imply changes in feeding (a care-giving behaviour). For example, an infant feeding chart for a programme in Kenya recommends increasing density of weaning food, providing suitable snacks and breast-feeding, and giving smaller, more frequent meals. Another example is one of the messages in the UNICEF Facts for Life: to increase the frequency of feeding for young children. In both cases, not only food, but also feeding behaviours and beliefs must change. If a child is to have more

frequent meals, or denser weaning foods, someone has to increase care-giving time and effort in order to make these changes occur.

Nutrition education is moving away from the medical model, in which directives are given, to a more participatory approach. Early nutrition education projects tended to show little effect on behaviours or nutritional status, despite extensive use of mass media. However, adapting the messages to the local context, and using participatory methods has increased the likelihood of behaviour change considerably, as seen in successful nutrition education projects in Indonesia and the Dominican Republic (ANEP).

The Government of Tanzania (1988) Iringa project, supported by UNICEF and WHO in four years reduced the incidence of severe and moderate malnutrition in 168 villages, compared to villages outside the programme through a combination of improvements in health care, water and sanitation, agricultural development, and child care and development. One of the interventions was the establishment of community-level day care centres to provide frequent and regular feeding of children. Mothers were encouraged to use existing foods to meet the children's nutrient needs. Because the project operated through community participation, it was possible to develop culturally acceptable child caretaker organizations. This project is an excellent example of the incorporation of a within-household perspective into a larger effort.

#### 5.4 Early Child Development Programmes

Community-based early stimulation programmes for children from impoverished environments, using para-professionals, can result in significant changes in children's cognitive development, particularly if the programmes are begun when the child is under three and when the mother or primary care-giver is involved. These programmes provide enhancement care in terms of nutritional supplementation if necessary, and cognitive and psycho-social stimulation. Teachers may be local volunteers or parents who receive training in early childhood education, therefore increasing the human resources in the community. Coverage in some countries has reached 25%, and there is evidence that children in these programmes have shown cognitive gains compared to children not enrolled<sup>(37)</sup>.

Community based programmes that are developed by groups of mothers, staffed by one or more mothers under the guidance of a visiting supervisor, and provide care in the home of one of the mothers, are good examples of care programmes. For example, the Rural Income Generation and Credit programme in Nepal supported by UNICEF initially began as an income generation project, but a child care component was strengthened when it became clear that women's workloads were extremely high, and there was a lack of time for care. In each village, groups of five to six mothers were organized to take turns caring for their one to three year old children during the day, while the others were freed for agricultural work. Care took place in the home of the mother who was in charge for the day.

### 5.5 Income Generation and Credit Programmes

Recently, several programmes to develop income-generation and credit for women have been developed as a means of increasing the nutritional well-being of children and mothers. The rationale for this approach is the frequently reported finding that when mothers have control of income, they are more likely to spend it on food for children than when other family members control the income. Two projects will be described: the Grameen Bank in Bangladesh, intended to increase income generation through providing credit, and second, within the Export Processing Zone (EPZ) in Mauritius, a response to women's work.

One of the most studied and successful credit systems has been the Grameen Bank in Bangladesh. Started as a small scale bank in 1976, it has grown to be a bank owned primarily by the poor that lends to the poorest women. Loans tend to be small (under US\$ 100) and the repayment rates are excellent (98%). The bank had extended to 400 000 borrowers and 400 branches by 1988. Evaluations have shown that the recipients of the loans are indeed among the poorest families and the recipients have increased their per capita incomes, intake of foods, and value of non-land assets, income, and consumption. Relationships between spouses tend to be good.

The success of the Grameen Bank model is partly due to the system of social support, and the requirements for getting a loan. In order to receive a loan, a woman must join with a group of four other women of her own choosing, and these groups are federated into centres. The group is formed over time, and the process involves development of understanding and mutual confidence building. Its strategy for ensuring that only the poor apply is to require loans be given to groups of women. When a woman is finally approved, it is a great moment of achievement because she knows that she earned it by herself.

The most salient aspect of this programme is the effect of receiving credit on the availability of care. Specifically, women's self confidence improves; they have much more social support from their group and the members of the Bank; and they have resources under their own control, perhaps for the first time. Although their workload may increase, they may also reduce the amount of time spent achieving household food security since they now have a more secure source of income.

A more common situation for women is employment in the new Export Processing Zones, which rely on a ready supply of cheap, docile labour, primarily supplied by women. These EPZs appear to provide employment for women and to increase family incomes, which should have positive effects for both women and children. The EPZ of Mauritius provides an example of the positive and negative effects on the health and nutritional status of women and children, and of a UNICEF/Government of Mauritius effort to resolve the situation. More than any other factor, a lack of availability of caring was responsible for the poor nutritional situation of women and children. Despite the higher incomes, the health and nutritional status of women and children has deteriorated since 1983.

The increases in income have brought about mixed effects on the existing situation of care. Traditionally, child care occurred in the home by the mother and siblings, and women had kitchen gardens that supplied a large percent of the family's green vegetables. Now families have become less stable and a higher incidence of juvenile delinquency has been reported. The kitchen gardens have also disappeared. Care for children has deteriorated considerably since traditional family forms are no longer available.

The programme which was instituted by the Government of Mauritius and UNICEF had a number of components. The health component involved making community health workers available after work. The nutrition component had three parts: a mobile canteen that provided good cheap food; second, nutrition education materials to inform women about the need for balanced meals, and third, unemployed women were assisted to sell half-prepared food to women as they left work. Child care was provided in affordable centres near the EPZ and informal day care in the home settings. The home centres were staffed by mothers or other women who did not join the labour force.

The caring behaviours which were instituted were child care, provided by previously unemployed mothers, and food preparation, also supplied as an income-generating activity by unemployed women. Therefore, these behaviours replaced the activities of the employed mothers. The programme, therefore, addressed the key constraints through providing alternatives for both care-giving and food preparation, and more available health care. Increasing the assistance of fathers might have been another aspect of the programme.

Of paramount importance was the political/legal area. The project worked to improve labour legislation regulating breast-feeding breaks and maternity leave, as well as child labour laws. The project included teaching women their rights, working on the implementation of the Child Rights Convention, and a review of child protection laws. It addressed the various issues presented by women's employment in the EPZ very well and is a model for careful planning and implementation.

#### 5.6 Technology Devices for Workload Reduction

A number of technological innovations have been introduced to reduce the time women spend in household production tasks. Examples are closer water supply, improved stoves and cooking facilities, transport systems that men are willing to share, and grinding or food processing mechanisms. The assumption behind the introduction of these labour saving devices is that women will reinvest time released from domestic chores in growing more food or in income-generation. As women have more cash, there is a reduction in malnutrition.

An analysis of a number of technology interventions indicated that some, but not all, actually decreased the time women spent in the activity<sup>(30)</sup>. In some water projects, more convenient access to water resulted in more water use, rather than a savings of time, and were not translated into agricultural yields. Improved stoves reduced both cooking time and the need to gather fuel in Sri Lanka. In Peru, women who had to spend less time gathering

fuel increased the time spent in cooking. Those food processing techniques which were not mechanized did not lead to much time savings, and were therefore rejected<sup>(38)</sup>. Many led to substantial time and energy savings for women, although a problem with the mechanized devices was that some required investments and credit that were beyond the economic resources of the women. In a number of instances, women were more interested in energy savings than in time savings.

Given that these technologies do, in many cases, release women for other activities, the crucial question is what activities replace them. There is no consistent pattern of increased agricultural productivity. Agricultural productivity depends on other constraints, such as the available land, labour, and the woman's control of the income from the agricultural productivity. In some cases, since women had sacrificed some of their home production tasks for agriculture, with the released time they were able to invest more in home production. Women have more time for leisure, rest, literacy and nutrition education. Women may also replace time with higher quality nutrition, more hot meals, and more home prepared meals.

Increased rest and leisure for women are clearly of value for them, as well as their families. Whether released time was used in more compensatory (physical) or enhancement (socio-emotional or stimulation) child care is unclear. It is difficult to determine time spent in child care. It tends to be concurrent with other activities; and many aspects of child care, such as teaching, conversing, or holding a child, may be considered by the woman as leisure, not child care. Women in rural Guatemala report doing child care all day long even when they have a full day of income-earning activities. More importantly, women are unlikely to use released time for child care, particularly enhancement child care, unless they have prioritized it as an important activity compared to other competing demands of income generation, food preparation, cleaning, or rest.

### 5.7 Legislation for Rights for Women and Children

One of the basic causes of absence of care for nutrition is the absence of political will, and legislation, to protect the rights of women and children. Theoretically, legislation ensuring maternity leave for working women and breast-feeding breaks for working women would increase the amount of care for mothers and children during the critical first year. The International Labour Organization's (ILO) Maternity Protection Convention of 1919 provided for a maternity leave of 12 weeks, free medical care, and two half-hour nursing breaks for women employed in industry and commerce. This convention, even with national legislation, has had little effect. Few women actually receive the maternity and breast-feeding benefits, and most working women are ineligible for these benefits because they work in subsistence agriculture, in the informal sector, or as domestics. Unions do not make maternity and breast-feeding leaves a priority for fear that married women will be discriminated against in the labour market, or that women will be laid off before they are eligible for maternity leave.



It is theoretically possible for maternity and breast-feeding support to be provided by an industry or company, but this is rare. Some companies in industrialized countries provide maternity benefits and flexible work time, but none provided breast-feeding breaks. The Self Employed Women's Association (SEWA), a trade union of over 5,000 poor women workers in Ahmedabad, India, provides prenatal care and nutritional supplements and cash for members immediately post partum. They have tried to provide child care close to the market place, for which SEWA members pay only a nominal amount, the remainder being paid by the SEWA Trust. This model is being replicated elsewhere in India.

Other legislation that might change the availability of care include child support enforcement, marriage age legislation, and divorce legislation. In each case, however, the limitations of legislation for creating real change without political will and government funds must be acknowledged.

### 5.8 Conclusions of Programme Analysis

Different programmes designed to improve nutritional status of women and children have been described, both as typical models and as specific examples of programmes. The following points can be made:

- Project feasibility studies need to consider existing patterns of care that might be built upon to strengthen the project;
- Programmes should not increase the burdens on women; rather, return some resources to them, and to focus on their needs;
- Because of some discrimination against girls in many societies, a special focus on girls' needs is important;
- Some constraints to care seemed to be well recognized, particularly workload, self confidence and beliefs/education. However, few programmes specifically examine effects of the mother's health, social support system, or control of resources;
- There is a much stronger focus on physical care than on psycho-social aspects of care, even though these dimensions are very important.

The tendency to focus only on the physical aspects of care is based on the medical model, and is reinforced by the development agencies. However, the current definition of health adopted by the World Health Organization includes overall health, both mental and physical. It is difficult to focus on the social and psychological aspects of a programme. First, measurement of impact may be difficult, since these behaviours are much harder to quantify than, for example, nutritional status. Second, many of the limits to care are deeply embedded in the lack of social justice of society, and are difficult to change without substantial social change as well as investment. Problems of family violence, for example,

may have a profound negative impact on child nutrition, but the treatment of the problem requires resources not normally in the repertoire of nutrition educators. Third, these issues are more difficult to discuss and the open admission of them may be culturally unacceptable.

On the other hand, the resources that can be mustered to cope with these problems may already exist in the communities. For example, many communities have identified "natural counsellors" or unofficial advisers who are consulted on health, nutritional, or psychological problems. These people might prove to be excellent as counsellors for growth monitoring and promotion programmes, and support personnel for other programmes. A local person may not need to use the same listening strategies as a stranger because the circumstances of each family would be known. The traditional wisdom of the communities can be used extensively.

## **VI. OTHER VULNERABLE GROUPS**

Care is also an important factor for other vulnerable members of society. These members include the elderly, refugees and the displaced, as well as the disabled. Providing adequate care for these groups will often require strengthening the caring capacity at the household, community, national and international levels.

### **6.1 The Elderly**

The elderly are rapidly becoming a substantial proportion of the population in both developed and developing countries. Increased life-expectancy and reduced fertility world-wide are combining to alter significantly the population age structure. By the year 2000, it is expected that about 10 per cent of the world's population (or about 700 million) will be over 65 years of age. Society will face new challenges in the provision of care for the elderly as both their numbers and proportion of the population increase. In addition, these increases are prompting a transition within societies as the traditional family networks and care structures break down. These support structures are coming under increasing strain in many countries as countries become more urbanized; nuclear families are rapidly emerging, and single member households are also increasing. Also, with diminishing family size following fertility control programmes, kinship linkages between generations are becoming attenuated, with parents and grandparents having too few children to fall back upon. As a consequence, many elderly people find themselves isolated, and dependent on state-based social security systems.

Industrialized societies have, by and large, accepted the position that support of the elderly is a "collective responsibility", and have largely opted for a system whereby money and services flow from the young to the elderly, not through respective families but through such services as taxation, pensions, and community social and welfare services. "Pensions", "old-age homes", "day-care centres", "home help", "meals on wheels", "retirement clubs", etc. are some of the institutional devices being widely adopted. But unlike in industrialized

societies, the elderly in many non-industrialized societies have traditionally enjoyed a dominant decision-making role in extended families<sup>(39)</sup>.

The policy of encouraging families to care for their elderly, in consonance with cultural traditions, has tremendous advantages. It would impose far less burden on the national resources. It would also provide emotional satisfaction to the elderly and could prove far more conducive to the maintenance of their health, nutritional status, productivity and dignity. A good proportion of the elderly between 60 to 70 years can continue to function as a valuable component of national human resources if they receive appropriate preventive and timely health care.

Proper nutrition plays an important role in preventing or postponing the development of chronic diseases, and systems of care should encourage the elderly to follow sound nutritional practices. With age, the body's capacity to adapt is diminishing even as challenges to health posed by a changing social and physical environment, as well as changes in diet, are increasing. Among the most common chronic diseases the elderly often suffer are those which are directly linked to a combination of inappropriate diet and unhealthy lifestyles, such as atherosclerosis, cardiovascular and cerebrovascular diseases, cancer, diabetes and osteoporosis. Inadequate intake of some vitamins and minerals are also particularly liable to occur among the elderly as they adopt more limited diets, and cause specific nutritional diseases or disorders among the elderly.

Food intake usually declines with age, associated with decreased needs due to a lowered basal metabolic rate, reduced physical activity and a lowered lean body mass. Other factors such as apathy and depression can contribute to decreased appetite, as can the use of some medication and alcohol. Increasing poverty among the elderly also increases the risk of nutritional deficiencies among this group. Decreased energy intake is closely associated with a lower intake of essential micronutrients. Age-related physiological changes such as a progressive decline in the functioning of bodily organs that influence the absorption, transport, metabolism and/or excretion of nutrients, can affect both nutritional needs and nutritional status.

## 6.2 Refugees and the Displaced

The number of refugees dependent on international assistance is increasing rapidly; of the world's 17 million international refugees, approximately 13 million are living in camps in remote areas of Africa, the Middle East and Southwest Asia. In addition, up to 20 million internally displaced persons are dependent on some kind of international food aid for their survival. When refugees cross international borders, international agencies are compelled to protect their welfare. In this way, caring strategies are needed at national and international levels as well as at the household and community levels. But the resources available for refugees and displaced persons, at national and international levels, are grossly inadequate.

*Caring for the socio-economically deprived  
and nutritionally vulnerable  
Theme paper No. 3*

Acute undernutrition prevalence rates have been elevated in many displaced and refugee populations over the last 12 years, ranging as high as 50 percent in eastern Sudan in 1985. Undernutrition rates have decreased rapidly in situations where effective emergency relief operations have been mounted promptly, such as in Thailand (1979) and Pakistan (1980); however, in other emergencies such as in Somalia (1980) and Sudan (1985), undernutrition rates have remained high (greater than 20 per cent) for 6 to 8 months. Of some concern is the observation that acute undernutrition rates among Somali refugees in Ethiopia (1988-89) actually increased for six months after a relief programme was launched.

Refugees suffer from the same type of diseases as other vulnerable groups, but often, more so due to their increased destitution. Surveys of refugee populations have demonstrated wide variation in both early nutritional status and in the rate of improvement that has resulted from international food assistance. Malnutrition, infectious diseases and mental/emotional illness are some of the more common consequences of being displaced. The synergism between high malnutrition prevalence and increased incidence of communicable diseases explains much of the excess mortality seen in refugee and displaced populations. Most of the deaths in migrating populations are thought to be due to the health shocks caused by these population movements and aggregations rather than outright starvation through lack of food.

The importance of micronutrient deficiencies in refugee and displaced populations has only recently been extensively documented. In addition to deficiencies of vitamin A and iron, conditions that have been widely recognized in developing countries, high incidence of scurvy and pellagra have also been reported in refugee populations during the past decade. The international community has still not developed an adequate strategy to prevent scurvy in camps in the Horn of Africa, as demonstrated by an outbreak that took place among adult males in a camp in eastern Sudan during 1991. Scurvy has been closely related to the duration of stay of refugees in remote African camps where food rations have been confined to two or three items. The vitamin C content of these rations has been far below international recommended daily allowances. The lack of variety in basic relief rations is a significant risk factor for pellagra and other micronutrient deficiency syndromes. The inclusion of groundnut or fortified cereals in daily rations increases the total intake of available niacin and will prevent the development of pellagra.

The adequacy of the international response to refugee emergencies has been inconsistent, and often based more on political considerations than real needs. When logistical problems combine with a weak political interest among donors, as in the Horn of Africa, the nutrition problems are greater. A major problem is the lack of technical input into relief programme planning, implementation and evaluation. International relief organizations have tended to use a model of decision-making that focuses on the process of delivering food rather than the outcome of preventing mortality and morbidity among refugees. Where health information systems exist, they have generally neglected to systematically monitor ration quantity and composition at the household level.

Refugees, like other vulnerable groups, should not be seen as helpless and totally or permanently dependent. They need resources to help them cope better with deprivation.

Obviously it needs to reach them, in the right form at the right time. Their needs are to sustain their livelihoods as well as to meet their immediate needs. Relief to meet their nutritional needs, if properly targeted, implemented and monitored can lead to long term improvement in the level of their livelihoods. Dietary diversification can be promoted by actively supporting vegetable cultivation, small animal raising and fish farming in refugee camps and settlements as a routine component of all refugee assistance programmes. The resources they receive as assistance, including food, should be viewed as economic goods or support, and such "informal monetization" should be taken into account in the design of appropriate caring strategies. Therefore, constraints should not be placed on the practice by refugees of bartering ration items for local foods in markets. Where food rations are provided, allocations should be based on need rather than the immediately available resources of donors.

### 6.3 The Disabled

Caring strategies for the disabled, such as the blind, should also aim to support their capacity to earn a livelihood rather than increase their dependence on external assistance. They should also strengthen and support at the household and community levels the organisations which help the disabled cope. Jobs and skills training may be more effective than nutrition education or food distribution.

## VII. CARE BY COMMUNITIES AND SOCIAL SYSTEMS

### 7.1 Community Organization

The importance of care by individuals and households in determining nutritional well-being have been highlighted. However, communities also have important influences on nutrition. Nutritional status is an outcome of a complex web of social, economic, demographic and environmental factors. Societies have a basic instinct for survival and one of the essential elements of this survival is adequate nutrition. Many communities, especially in developing countries, have to cope with a very harsh physical and economic environment. Their capacity to operate within that environment depends in part on natural resources which may be totally inadequate. For example, for historical reasons a village may have been established on highly eroded or exhausted land which is unsuitable for agriculture, highly eroded or exhausted, or located in areas infested with disease agents or vectors. The community's survival depends on its ability to overcome those constraints through its own resources or through the help of the government or other external resources.

The economic environment may be equally challenging. For instance, isolated villages may have difficulty competing with villages located in areas which are more accessible to a market. They may have to accept low prices for some of their primary produce.

A community's ability to cope with such challenges depends on its own structure and organization, the abilities of its leaders, their willingness to cooperate with each other and

to serve the interests of the community as a whole. Usually an informal or formal village government, a council or other organization exists. The adequacy of this structure and the encouragement and support given by the nearest outpost of the local government have an important bearing on the community's capacity to cope with its environment and internal problems.

Social organization and leadership capacity can also have an important bearing on the nutritional status of the community. For instance, active leaders may organize communal activity needed to maintain village roads and bridges. Farmers' groups can facilitate commercial contact with the outside world to allow the marketing of their products and the access to government services.

If there is sufficient nutritional, health or social awareness, the village committee or informal groups, especially women's organizations within the community, can sometimes identify poorly nourished individuals, families with problems, displaced persons, landless or other underprivileged households. In well-organized communities, a local organization takes care of these problems. If there is no existing community organization of this type, the nutritional status of community members, along with other measures of quality of life, is likely to be markedly worse.

## 7.2 Social Security Systems

In addition to the types of care given by communities, there are mechanisms for providing care in a more systematic manner. For example, governments or non-governmental organizations provide care through social security systems. Generally, these are organized at the national or local government level and they are more common in urban areas.

The provision of care in the form of a socially organized response to nutritional need is in transition. As communities modernize and populations relocate to urban areas, traditional caring structures within families and communities weaken. This is especially true of the extended family system and this can lead to the creation of groups of people who lack care unless governments or other institutions step in to assist them. In many countries voluntary organizations work to fill the gaps in the provision of care. The state provides social security to maintain minimum income levels in several developed countries.

The forms of social security vary in their relationship to nutrition in developed and developing countries. Several developing countries subsidize consumer food prices especially for urban populations which helps increase the calorie intake by the poor. In some countries, feeding programmes have been instituted for mothers, infants and schoolchildren. There are some forms of social security (for instance, medical insurance, disability insurance, unemployment payments) in some developing countries, but these are scarce and limited to the formal employment sector. Most developing countries do not have the resources to institute a formal social security system until they reach middle income levels. In both developed and developing countries, the elderly tend to be socially isolated. In some countries, programmes such as food commodity and meal distribution provide care to these

vulnerable groups. In similar ways, programmes for other groups such as the disabled may also be regarded as forms of care. Moreover, when refugees cross international borders, international agencies have an obligation to protect their welfare and the resources they provide in the form of food and other goods become part of a caring strategy.

## VIII. IMPLICATIONS FOR POLICIES, STRATEGIES AND PROGRAMMES

Policies to improve care for vulnerable individuals, such as infants, young children and mothers, should attempt directly to strengthen the capacity of the family as a social and economic unit to provide care. Care is also an important component for the health and nutritional well-being of other vulnerable members of society, including the elderly, the disabled, refugees and the displaced. Providing adequate care for these people will often require strengthening the capabilities at the community, national and international levels.

Before initiating actions, a careful analysis of the existing patterns of child care should be carried out. Traditional forms of child care can be built upon for programming, or at least not undermined. Conditions under which children are cared for, and by whom, influence programme options. Families that appear to provide adequate levels of care, but do so at great effort, are potentially at risk, and should be targeted for assistance.

### 8.1 Care of the Young Child

The first type of care required is for the infant and focuses on breast-feeding. This is the basis of a dynamic relationship between mother and infant, having psychological and social dimensions as well as the physical one - that of supplying breast milk. It is important to ensure that breast-feeding is soundly and adequately established from the beginning; that colostrum is utilized in the first days of life, not discarded and that infants are solely breast-fed for four to six months. This entails proper advice, encouragement and preparation of the mother during prenatal care and after the baby is born. As more deliveries take place in maternity units or hospitals in developing countries, it is crucial to ensure that appropriate facilities exist and practices are followed which encourage breast-feeding. For instance, the infants should be in the same room and bed with the mother.

The realization that negative influences often affect maternity services, including the unnecessary use of breast-milk substitutes, has led to the development of ten criteria for "baby-friendly hospitals". Programmes are now being extended around the world to develop baby-friendly hospital approaches and training programmes. Practically all countries are in need of swift and determined action along these lines to prevent further undermining of breast-feeding as urbanization advances. National programmes for breast-feeding protection and promotion need to be drawn up and implemented. Criteria for the assessment of the status of breast-feeding in individual countries have also been drawn up and need to be used in monitoring those programmes. In addition, individual counselling and encouragement of mothers concerning the advantages of breast-feeding needs to be intensified in all health

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facilities. Countries with low rates of breast-feeding should aim to reverse this trend, especially in urban areas.

After four to six months of life, the weaning process begins, with the gradual introduction of supplementary foods suitably prepared for the infant's digestive capacity, in accordance with local food availability and cultural traditions. While many countries have national guidelines for infant feeding, others do not. Sometimes the guidelines which exist were drawn up in the years before there was full awareness of the importance of frequent feeding (four to six times daily) and of adequate energy density in infant foods. The importance of using a sufficiently concentrated cereal porridge (traditional mixtures are too dilute) and adding some vegetable oil may need to be stressed more, as well as the better use of foods such as pulses, green leafy and yellow vegetables, etc. which are rich in protein and micronutrients. Use of fermented or malted cereals during the weaning period is also advantageous and should be promoted if it has already been tested in the country, or research should be carried out if it has not yet been studied.

Clearly, such dietary guidelines for infants and young children should be adapted to local food availability and customs. Often there is a need to adapt a national guideline to different ecological zones and dietary patterns in a country. Much emphasis is also needed on the importance of continuing close care and nurturing by the mother or other care-giver, particularly during episodes of infection, and during the second year of life in general when the young child is more often in the hands of a grandparent or an older sibling.

In planning programmes, social and emotional aspects of feeding of infants and young children should be included. Therefore, a child development component involving the important role of touch, social stimulation and emotional support in children's adequate growth, particularly with high-risk children, should be included in nutrition programmes, such as growth monitoring and promotion, nutrition rehabilitation centres and breast-feeding promotion. The term "infant feeding" should include both physical aspects of food and behavioural aspects of the feeding situation. The consequences of programme initiatives on care-givers should be examined; what behaviours are required of them, and which existing activities and beliefs need to be replaced by the new activities.

Programmes and policies should include an awareness that characteristics of the child may play a major role in nutrition. In some parts of the world, girl children receive smaller portions of the family food, shorter duration of breast-feeding, or less access to medical care. Children who are later born, who have special needs, or have some other culturally defined stigma may receive less adequate care.

Child care needs vary by developmental period. Constraints to care should be identified, including the factors identified in Section IV. It is essential to determine local understanding of the meaning of mothering and of care. What mothers consider to be critical aspects of childbearing should be determined. The demand for care might be increased by changing family perceptions of the importance of caring, feeding, breast-feeding and



stimulation. The education of girls who will be future mothers needs to be a priority for nutrition programmes.

## 8.2 Care at the Household Level

In many households, the principal providers of care are women. Therefore, the capacity to provide care at the household level largely depends on the health of the mother, her education, her time and energy, the control she has over the resources of the household and her ability to use them effectively. Thus, in order to ensure appropriate care at the household level, several types of action are needed. First, it is necessary to promote the mother's physical and mental health by providing access to health and related services, including general health, prenatal, obstetric and family planning services. Dietary guidelines for mothers during pregnancy and lactation are also needed and should be widely disseminated. Encouraging parents to space pregnancies over adequate time periods can benefit both mothers and children. Too close spacing may result in low birth weight, and an inadequate capacity for care of the new-born and other young children. The mother herself may be nutritionally depleted from too frequent births and over-burdened by too many tasks, including demands for child care. It is important that education on the value of family planning be targeted towards men as well. Also, the benefits of breast-feeding in contributing to longer birth intervals can be stressed in this context.

Action needs to be taken to increase maternal education and literacy as education and beliefs influence the skills and knowledge needed for successful child care practices. Education which is carefully tailored to child care is especially important and this should include the importance of exclusive breast-feeding in the early months of life, increasing the energy density and quality of complementary foods, ensuring appropriate weaning practices, decreasing food contamination and maintaining frequent feeding. Maternal education can also affect parental decisions regarding expenditures of time, resources, etc. In addition, improved literacy and increased education of the father should be encouraged as his beliefs and commitment to the welfare of his children have significant effects on their nutritional well-being.

The mental health and self confidence of the mother must also be a focus of programmes. Mental health needs of the woman include self confidence, absence of depression, and stress below harmful levels. Programmes can be designed that empower her to use her own skills, and to learn new ones that allow her to feel confident in a larger sphere.

Social support from family or community can increase the care for a child through assistance in tasks, economic assistance, information, or emotional support. Many societies have traditional mother helpers, who provide assistance during childbirth and the postpartum period, including advice and emotional support. This form of support is provided by fathers in most cultures. Programmes have been able to increase support by forming women's organisations, increasing the support provided by fathers or older siblings.

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Programmes to increase agricultural productivity, improve conditions of informal work, or mitigate problems of seasonality may indirectly improve care by releasing time for care-giving. Nutrition projects could work with women's income and credit projects to increase the returns on her work per hour, and therefore free her time for child care. Appropriate technology projects that reduce time in fuel and water collection, food preparation, or food processing time may also improve child nutrition.

The social conditions of production influence the availability of care. Sex division of labour, which results in more equitable labour burdens for father and mother, or increased control of the means of production by the mother, may result in improved nutrition for children through greater availability of care. More broadly, the status of women, or a more equitable distribution of resources within a country may have positive effects on child nutrition through increased household food security, health services, or care.

Household resources and the woman's control of resources should be increased. Increasing household income enhances child nutrition to some degree, but improvements in child nutritional status are greater if the woman has some control over the household resources. Income generation projects for women can improve the ability of the mother to combine household food security measures with provision of adequate care. Projects to develop men's productivity should not undermine women's control of income.

Whether cultural/ideological factors are increasing the availability of care should be determined. Traditional beliefs which support child nutrition should be enhanced. However, many of the care-giving environments are undergoing rapid change through urbanisation, migration, family disruption, and environmental degradation, and creative strategies are needed to reverse the negative impact of these trends on family support systems.

Care should be included in nutrition training programmes. Training and texts about infant and child feeding should include a recognition of the social nature of feeding, the process of child development, and the interaction between child characteristics and health and nutritional status. Medical personnel could be trained in the importance of behavioural aspects of health and in the relations between children's characteristics and care. Finally, training should also focus on the significance of the mother's health and mental well-being for nutrition.

Weaning of infants and the introduction of first foods is a crucial period and a large number of actions are possible to prevent malnutrition. Low cost, commercially processed foods can be produced for infants and young children. Village-based food processing projects including those that reduce food contamination, and the subsidizing of nutrient dense foods all have a role to play<sup>(40)</sup>. Health initiatives in the form of primary health care facilities, encouragement of breast-feeding, prevention and treatment of diarrhoea and development of safe water supplies all have positive effects on care.

Care strategies for other vulnerable groups - refugees, elderly, the disabled - should aim to reduce dependency, strengthen the livelihoods of these groups and enhance their

talents. Resources should reflect a response to their needs and proper targeting will be beneficial to all the partners.

Including care of vulnerable groups in the development of nutrition projects is not a completely new idea. However, this perspective engenders recommendations that extend those derived from an analysis of recent successful nutrition projects. It does not replace other approaches, but rather complements them.

### 8.3 Social Security Systems and Care at the Community Level

Legislative and political initiatives to relieve constraints on care should be developed. Nutrition programs can be tied to the Convention on the Rights of the Child, the World Summit for Children, and the Convention against Discrimination against Women. Policies on maternity leave, breast-feeding breaks, and child care facilities at the workplace could be adopted, although these should not cause negative effects on women's employment. Legislation to ensure that women have equal access to higher-level employment, to child support in case of divorce, and to father recognition of children could be recommended.

In many communities, traditional support systems, such as the extended family, have strong benefits in providing support for people during times of stress. These social supports from family or community can increase the care for both women and children through a reduction of work-load, economic assistance, increased knowledge or emotional support. Community support is also critical for solving problems of child care or work burden through the formation of child care centres, work groups, cooperatives or informal networks for sharing tasks. However, this form of support is being eroded by urbanization and rapid social change. Therefore, action needs to be taken to enhance the promotion of women's organizations, to assist older siblings who are responsible for young children, and to encourage the father's participation in child care, through media and support groups.

Care at the community level is another important component of the strategy to improve nutrition. In traditional societies, especially in rural areas, much depends on the capacity of the village administration to identify nutritional problems and generate appropriate action. Although effective action may take place, for example, through proper organization of agricultural, social and income-earning activities in the village, even when awareness or analysis of the nutritional issues is lacking, strengthened village structures can play a very useful role in assessing nutritional problems and generating appropriate responses. Government structures at the village level may need to be strengthened through democratization, decentralization of responsibilities and training programmes for community leaders to provide the necessary analytic and management skills. Development of the local human resources and of specific nutrition-oriented action in each community should be well-defined components of district development plans.

It is recognized that there is low coverage of communities by formal health services. The essence of the primary health care concept is that communities participate in and organize the essential elements of their own health care, with support of the nearest health

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centre. Since the Alma Ata Conference this process has been extended to reach a substantial number of communities in most countries although more need to be reached. Very often this is carried out through the creation of a village health committee and the training of community health workers. The extent of community awareness of health issues and their capacity to develop a health programme at the community level is another important determinant of nutritional status, since all aspects of health care impinge on nutrition. The existence of such grassroots activities is an important determining factor of young child and maternal nutrition.

In the urban environment, this type of community organisation and action may be more difficult than in rural areas because of the breakdown of traditional structures and values and the fragmentation of society. Problems of both overnutrition and undernutrition may be present and addressing them will require different organizational approaches. It is important, therefore, to include nutritional considerations in the urban planning and local government processes.

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**PREVENTING AND MANAGING INFECTIOUS DISEASES**



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## SUMMARY

The interaction between nutrition and infection, often called the "malnutrition-infection complex" (MIC), remains the most prevalent public health problem in the world today. Of the 13 million infants and children who die each year in developing countries, most deaths are due to infection and/or parasitic diseases, and many, if not most, of the children die malnourished. The relationship between malnutrition and infection accounts for much of the high morbidity and mortality under circumstances of high exposure to infectious diseases and inadequate diet characterizing many poor communities.

This malnutrition-infection complex refers to a situation in which nutritional status influences the outcome of exposure to infection at the same time as infection contributes to a deterioration in nutritional status. Inadequate dietary intake leads to low nutritional reserves, which are manifested as weight loss or failure of growth in children. Depleted nutritional reserves are associated with a lowering of immunity. Control of infectious diseases and dietary/nutrition interventions are of major importance in breaking the cycle of malnutrition and infection.

In protein-energy malnutrition and vitamin A deficiencies, there may be progressive damage to mucosa, lowering resistance to colonization and invasion by pathogens. Lowered immunity and mucosal damage are the major mechanisms by which defences are compromised. Under these circumstances, the incidence, severity, and duration of diseases may be increased. The diseases themselves exacerbate loss of nutrients, both by the physical loss from the intestine and by the host's metabolic response. These factors worsen malnutrition, leading to further damage to defence mechanisms. At the same time, many diseases are associated with a loss of appetite and other possible disabilities, further lowering the dietary intake.

Infections and parasitic diseases also have an impact on adult physical performance, work capacity and consequently on food security and nutritional status. This is well documented for malaria, onchocerciasis, schistosomiasis and various intestinal parasites. However, there are few infections with the potential for as profound an effect on food production capacities and nutritional status as HIV (human immunodeficiency virus) which causes AIDS. In households and severely affected communities, AIDS is likely to have a significant impact on the ability of people to produce, market, procure and prepare food.

Both the traditional and the modern health sector, through primary health care, have a role to play in controlling infectious disease. Immunization, early recognition and intervention in growth faltering, breast-feeding promotion, emphasis on adequate dietary intake, especially during infancy, as well as family planning, are public health measures that contribute to preventing infections. Controlling infectious diseases also involves improving the health environment.

Dietary management during illness seeks to modify the course and outcome of infection by the improvement of food intake during disease and recovery, particularly in young children. This includes: continuation of breast-feeding during infections; use of rehydration therapy in treatment of acute diarrhoea; maintenance of diet during persistent diarrhoea; administration of vitamin A in the management of measles, acute diarrhoea and respiratory infections; administration of iron during the treatment of malaria and parasite control where intestinal parasite infestation is prevalent.

The prevention and control of malnutrition/infection requires substantial inputs from other sectors, in addition to health. Improvements relating to food safety, housing, water supply and sanitation are important steps towards preventing infection. Primary education has an important role to play by stressing rudimentary nutrition principles and health. At the same time, nutrition and health improvements are unlikely to be sustained if socio-economic status does not improve concurrently.

## I. INTRODUCTION

Given the impact that infection has on nutritional status, it is essential that comprehensive policies and programmes aimed at preventing malnutrition include careful consideration of preventing and managing a wide range of infections. The interaction between nutrition and infection has been described as the malnutrition-infection complex (MIC), meaning a situation where nutritional status influences the outcome of exposure to infection at the same time as infection contributes to a deterioration in nutritional status <sup>(1)</sup>. MIC accounts for the severity of many infections and the high mortality rates associated with diarrhoea and respiratory infections, especially measles. It also contributes to increased incidence of growth faltering, protein-energy malnutrition, low birth weight and micronutrient deficiencies, especially of vitamin A and iron.

Once a potential host has been exposed to infection, the risk of actually developing disease is influenced by the state of the body's several defence mechanisms (immunity) that serve to bar entry to infectious agents, or pathogens. Numerous variables influence host immunity; among the most important are previous exposure to disease, genetic predisposition, prior immunization and health and nutritional status. Once defence mechanisms have been overwhelmed, infection's severity and duration are in turn influenced by the host's ability to repair tissues and eliminate pathogens.

Infection/nutrition interaction takes its most serious toll among the poorest population groups among which the spread of infections is intensified by food contamination, unsafe water supplies, inadequate sewage disposal and general sanitation, crowded or otherwise poor housing, and other unfavourable environmental conditions. The poor are also at a particularly serious disadvantage where infection is concerned because of their frequently limited access to health care, inability to pay for needed medications and services, and limited time either to care adequately for family members during periods of acute illness or to promote their nutritional recovery during convalescence. While MIC most commonly affects children, it is also a significant factor where adult morbidity is concerned.

This paper suggests a conceptual framework for developing policies and strategies for preventing and managing infection that focus on different parts of the malnutrition-infection cycle. Breaking the cycle requires specific actions, for example immunization against infections that contribute to deteriorating nutritional status, and attention to specific nutritional management issues, for example vitamin A supplementation for children with measles and the dietary management of diarrhoea. Such fundamental measures as improvement of the sanitary environment of communities and households, education (particularly basic knowledge about nutrition and safe food practices), and poverty alleviation also have a critical role to play in effective infection control.

The basic MIC model is shown in Figure 1. The starting point is the presence of an environmental pathogen which, in order to cause illness, has to invade a host. In some cases this may be relatively easy, for example when food is contaminated by a diarrhoea-causing bacterial agent. In others the presence of a vector may be required, for example a mosquito to inject malaria parasites into the blood.

In general terms, there are three main outcomes of the interaction between pathogen and host immunity. First, subjects whose immune systems are functioning well are frequently able to clear pathogens from their bodies at an early stage when infection is moderate. If effective treatment is provided at the onset of an illness, recovery can be rapid and nutritional status never really threatened. For example, early malaria diagnosis can lead to direct clinical improvement even as it helps to maintain healthy nutritional status, while vigorous applications of appropriate rehydration regimes will help to speed recovery from dehydration due to acute diarrhoea. A second scenario: infection is so severe that subjects develop possible fatal, clinical illnesses due to a pathogen's virulence. A third and frequently encountered scenario: pathogen clearance and tissue repair are delayed, which results in prolonged, often severe illness usually associated with deteriorating nutritional status.

Several factors contribute to deteriorating nutritional status in case of severe and prolonged infection, including decreased food intake, inefficient nutrient absorption, losses of body nutrient stores and increased nutritional requirements. People who are sick frequently lose appetite and are thus unlikely to maintain their dietary intake unless encouraged to do so. The range of possible outcomes is quite broad, from weight loss and vitamin and mineral deficiencies among children with persistent diarrhoea, to reduced birth weight in infants born of mothers infected with malaria during pregnancy. Malnutrition has such a profound effect on host defence mechanisms that the next exposure to a pathogen can mean less resistance than before to tissue invasion and more severe and prolonged illness <sup>(2)</sup>, which is an indication that MIC's vicious cycle is firmly established. The nutrition and infection cycle, presented in Figures 1 and 2, focuses on the biological interactions between environment, pathogen and host. The model assumes illness to be the outcome of the interaction between host and pathogen present in the environment, although the situation is in fact considerably more complex.

## **II. EFFECT OF INFECTIONS ON NUTRITIONAL STATUS AND ON FOOD SECURITY**

Food production and food security are influenced, among others, by many factors <sup>(3)</sup>, such as climate, geography, rainfall patterns and available technology, and conditions affecting the sale and purchase of food that include market prices and the general state of the economy. Emphasis in recent decades on the effect of infections on nutritional status, especially among children, has, to a degree, eclipsed consideration of the impact that infections have on food production by adults, although a number of classic historical accounts deal with this question in some detail. For example, the severe famines in Bihar and other states in India in the early and middle nineteenth century were closely linked to serious malaria epidemics which caused considerably greater devastation among populations than had been previously the case <sup>(4)</sup>. The inability of entire families to tend their fields, and the link between infection and food production, are well documented in such cases.

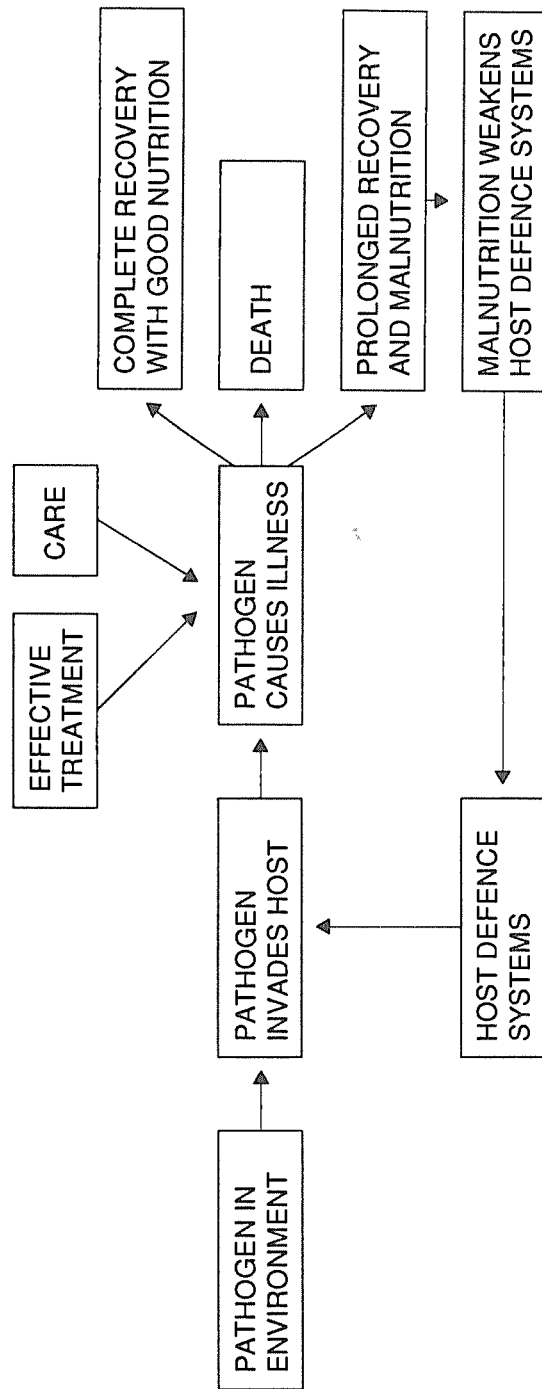


Figure 1. A simplified model of the Malnutrition-Infection Cycle

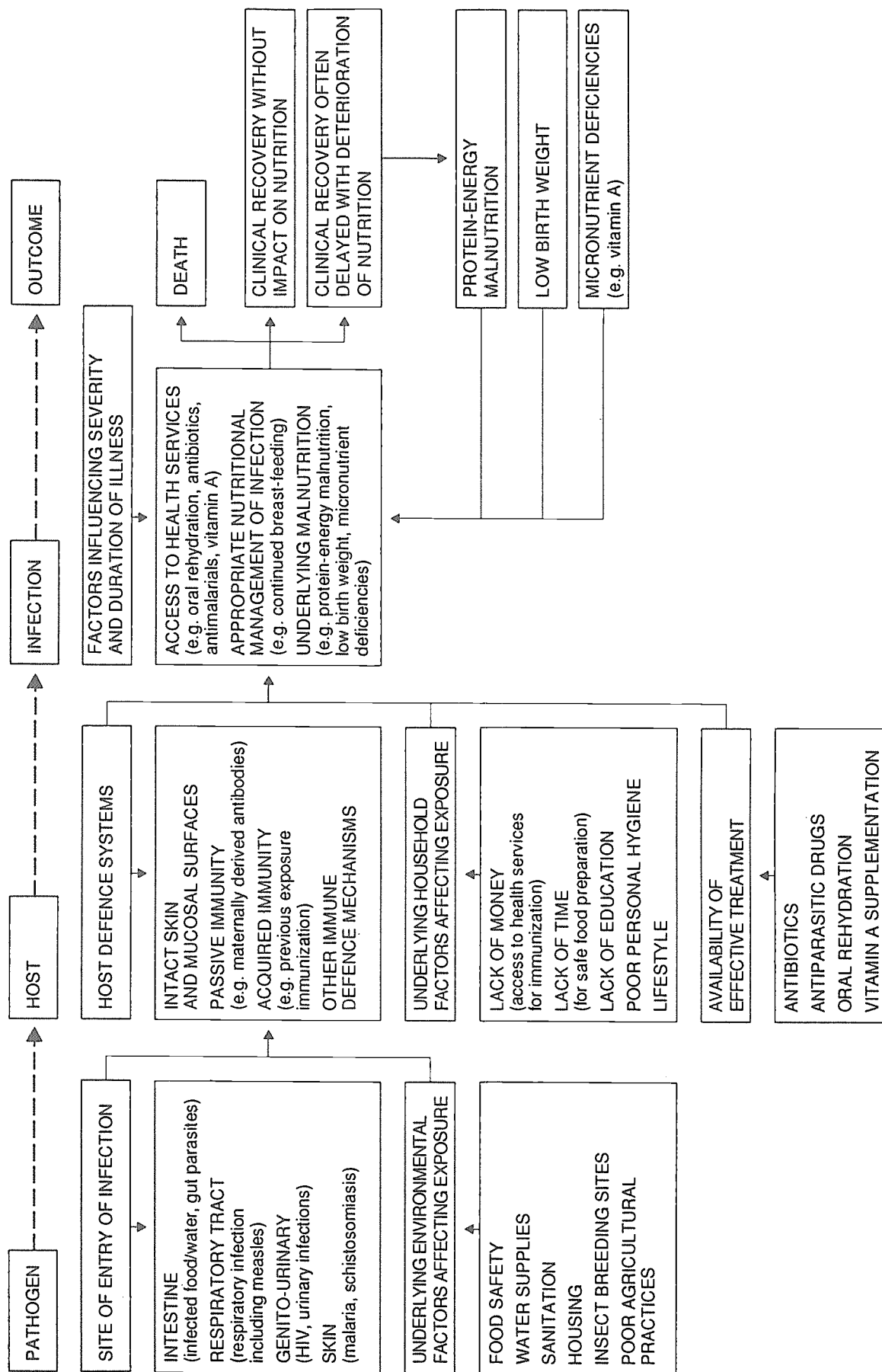


Figure 2. Variables which influence the Malnutrition-Infection Cycle

The impact of the parasitic disease that causes river blindness (onchocerciasis) on people's ability to produce food is sometimes so severe that whole communities are forced to migrate out of areas of high endemicity. The effect on food production is dramatic, given the negative impact that heavy loads of infection with schistosomiasis, in both its bladder and intestinal forms, have on capacity for physical work. Productivity is also reduced among groups affected by multiple intestinal parasites such as amoebiasis, hookworm, *Trichuris*, *Ascaris* or *Strongyloides*, especially in subjects whose nutritional status is already poor and who suffer from heavy worm loads.

Because urban households are largely dependent on food produced by others, any infection that decreases earning ability among urban populations can have a negative impact on both the quantity and quality of food consumed. For example, the consequences for the nutritional status of other members of a household, particularly children, could be quite serious in the case of the head, a farmer, who has tuberculosis and is obliged to cease work to seek health care.

Few infections have the potential for as profound an effect on food production capacities or on nutritional status as human immunodeficiency virus (HIV), which causes acquired immunodeficiency syndrome (AIDS). HIV's likely impact on food production is still not clear in view of its relatively recent onset in epidemic proportions. However, present morbidity and mortality rates show that, in many countries, AIDS is likely to have a significant impact on the ability of people to produce, transport, sell and buy food. Particular patterns affecting nutrition will be determined by the prevalence of HIV in given communities and the efficacy of community-based coping strategies. In rural areas where women play an active role in agricultural production and up to 20 percent of women attending antenatal clinics are HIV-positive, a significant negative impact on the number of adults in the work force is inevitable.

A decrease in food production is all but certain in view of the high numbers of deaths already occurring in some agrarian communities among household heads and their spouses as a result of HIV. This outcome may be mitigated to a degree in individual circumstances by increased agricultural productivity among children. In any event, careful assessment of the nutritional impact of AIDS on non-infected household members is required. Problems related to food production are likely to be all that much greater in societies where death of a household head results in the loss of land rights.

The highest prevalence of HIV infection globally is in countries of central Africa where, fortunately, strong social coping mechanisms such as the extended family are firmly in place. WHO and FAO have assessed the potential socio-economic impact of AIDS in Africa, specifically as to the impact of AIDS-related mortality on the labour supply in farm households and its implications for food and non-food production <sup>(5)</sup>. Most of the ten most seriously affected countries in Africa, seven of which are in the east and central regions, are heavily dependent on agricultural exports as a source of foreign exchange needed to pay for the imported raw materials and equipment that are essential for development purposes. In



rural districts HIV-infection levels have been estimated to exceed 30 percent for some age groups. Conservative estimates suggest that AIDS-related mortality could reduce the adult labour force by as much as one quarter by the year 2010. In addition to the direct impact on farms, the serious indirect socio-economic consequences include disappearance of traditional family welfare structures, loss of a trained workforce and reduced family income. The number of orphans is rapidly increasing in all severely affected countries, with the result that traditional coping strategies may soon be overwhelmed. The challenge is particularly daunting in urban areas where support systems are weakest.

### III. TYPES OF MALNUTRITION THAT INFLUENCE INFECTION

It is customary to distinguish among nutritional deficiencies in assessing their impact on immunity. Many reviews concentrate on the effect on immunity of growth faltering, low birth weight, protein-energy malnutrition (PEM) and deficiencies of iron, vitamin A and zinc. In fact, most malnourished individuals suffer simultaneously from a range of nutritional deficiencies <sup>(6)</sup>.

#### 3.1 Protein-energy malnutrition

There is a higher prevalence of infection among underweight children. In addition, evidence increasingly suggests that even minor degrees of growth faltering are associated with increased risk of infection. The impact of low birth weight on morbidity resulting from infection in early infancy is well documented. In many communities infants weighing less than 2.5 kg at birth are at considerably greater risk of infection than are heavier babies. Babies with low birth weight due to intrauterine growth retardation resulting from inadequate maternal intake of energy, protein, and such micronutrients as iron, zinc and folic acid, are at high risk of infection. Integrated approaches to reducing the prevalence of low birth weight have about equal benefit in terms of reducing infection rates.

#### 3.2 Vitamin A deficiency

There is considerable evidence suggesting that clinical, and possibly subclinical, vitamin A deficiency may be associated with increased risk of mortality from infection <sup>(7)</sup>. The evidence for increased infection prevalence is less conclusive, primarily because emphasis has so far been on assessing the impact of vitamin A on mortality. Nevertheless, according to some studies, providing children with vitamin A supplements in vitamin-deficient areas has decreased the severity of diarrhoeal disease and lowered hospitalization rates. Prevention and control programmes have thus far mainly used periodic high-dose supplements of vitamin A in convenient capsule form. However, regular delivery of low-dose supplements - equivalent to those that would be provided naturally by food - has also had a significant positive impact on mortality.

The sustainability of such intervention programmes requires careful assessment. At present most involve supplementation with high-dose capsules (200 000 IU) at 4-6 month intervals. Special programmes target children through mother and child health clinics, school child-health programmes and community groups. Coverage among high-risk populations is often far from complete and, in any case, insufficient to meet the needs of the most vulnerable groups. Indeed, individuals who are at greatest risk of vitamin A deficiency are frequently among those least likely to receive a capsule due to their low socio-economic status and poor access to and use of health services. The long-term solution to protecting micronutrient status is to improve the diets of populations who are at risk. Production and distribution of micronutrient-rich fortified foods, jointly with nutrition education, are likewise important elements of an effective strategy.

It is not unusual for micronutrients to be readily available but not included in a diet for cultural reasons. Thus, nutrition education, particularly for mothers of young children, could be an important means of improving vitamin A intake. Appropriate technology for preserving such vitamin A-rich foods as mangoes, which are seasonally available, could be relevant in some environments. The importance of breast-feeding as part of a strategy for maintaining vitamin A status cannot be over-emphasized, particularly for children who are susceptible to infections like diarrhoeal diseases.

### 3.3 Iron deficiency

The causes of the most common nutritional deficiency are generally well known<sup>(8)</sup>; infants, young children, pregnant and lactating women are all at high risk. Low iron stores are associated with low birth weight and prematurity, which in turn are associated with an increased risk of infection. Iron deficiency influences the immune system and therefore the body's resistance to infection. The high mortality associated with severe anaemia in pregnant women in certain communities has been attributed in part to the influence iron deficiency has on the rate of sepsis among such women. Iron-deficient young children and infants provided iron supplements have been shown to experience fewer episodes of respiratory infection. In contrast, iron-deficient plantation workers were seen to have a greater prevalence of respiratory illness and diarrhoea.

Excessive iron can also be harmful since it stimulates the release of active chemicals known as free radicals, which can damage body tissues. In addition, studies show that the administration of large doses of iron by injection was followed by increased prevalence of malaria in endemic areas, while mortality rates increased among severely malnourished children who were given high oral doses of iron.

The growing consensus is that both excessively low and high levels of iron present disadvantages in terms of their impact on morbidity. Thus, it is advantageous to improve the iron status of women during antenatal care, even in areas of high malaria prevalence and where respiratory and urinary-tract infections are common. Timely treatment of such

infections is important for improving the health of women and protecting them during pregnancy. It is also appropriate to improve the iron status of young children. Ways to improve iron status - including by modifying diet, increasing nutrient bio-availability, supplementation and food fortification - are discussed in a separate paper.

### 3.4 Zinc deficiency

Zinc is an essential nutrient in humans and is known to be critical for many biochemical pathways in metabolism. A deficiency of this micronutrient can seriously impair the body's immunological function, and may also lead to tissue abnormalities such as thinning of the intestinal lining. The severity of persistent diarrhoea decreases in children who receive zinc supplements <sup>(9)</sup>. A number of studies have also demonstrated the importance of improving the zinc status of elderly subjects in an effort to reduce morbidity from infections such as pneumonia. The overall effort to prevent and manage infection should include strategies for improving dietary zinc intake, including a careful assessment of the agro-ecological, social and economic environment.

## IV. INFECTIONS THAT CONTRIBUTE TO MALNUTRITION

Malnutrition has been shown to be the root cause of much child mortality in the world - as high as 50 percent according to the Institute of Nutrition of Central America and Panama (INCAP). Prospective studies of growth and morbidity, particularly among young children, have in turn identified certain infections that have a particularly negative impact on growth. Among the most prevalent of these are persistent diarrhoea, respiratory infections (especially pertussis and measles), malaria and, more recently, HIV infection. The impact of any infection on nutritional status varies according to its intensity, availability of food and time for feeding, cultural beliefs, and access to and use of health facilities. Thus, whereas diarrhoea and malaria were seen to have a marked negative effect on weight gain in a relatively underprivileged community in rural Gambia, these same infections had much less impact on nutrition in a better-off community.

### 4.1 Diarrhoea

Diarrhoea, especially the chronic recurrent variety, is the classic example of MIC given its universality and extreme commonness. In general, the nutritional status of exclusively breast-fed infants is not compromised as a result of diarrhoea, and breast-milk intakes usually remain satisfactory. In contrast, children's intake of solid food can be reduced because of the child's limited capacity to consume adequate amounts of bulky, less energy-dense foods. Diarrhoea, which is frequently a result of contaminated weaning food and water, is common during the second year of life when breast-milk is either no longer part of the infant's diet or is consumed in lesser amounts. Infants who are fed on breast-milk substitutes, including infant formula, are at particular risk of developing diarrhoea both because of the ease with which feeding bottles become contaminated and the absence of breast-milk's anti-infective properties.

The majority of diarrhoea episodes among children consist of relatively short episodes of watery stools lasting a few days only. It is estimated that 80 percent of cases are acute watery diarrhoea, 10 percent acute dysentery, and 10 percent persistent diarrhoea. During such episodes, children's dietary intake may be sustained by frequent feeding while rehydration is maintained<sup>(10,11)</sup>. Indeed, the enthusiasm with which oral rehydration therapy has been promoted over the last decade has reduced deaths due to dehydration in many communities. Acute diarrhoea does not appear to have a permanent effect on growth unless diet is inadequate. However, even when oral rehydration therapy is used, there is still some temporary weight loss. It seems that normal weight recovery is achieved in an optimal time only if food intake is increased during the recovery phase. Moreover, the longer diarrhoea lasts, the greater the loss of potassium and sodium. Good sources of potassium include bananas, tubers, root vegetables (for example, carrots) and molasses. These foods should be given greater prominence not only in the post-acute-diarrhoea recovery diet and in therapy during the acute phase, but also in managing chronic recurrent diarrhoea.

The persistent diarrhoea syndrome, i.e. diarrhoea lasting more than 14 days, and dysentery are associated with weight loss and micronutrient deficiency. The causes of chronic or recurrent diarrhoea are not as evident as those of acute diarrhoea. Amoebiasis and *Giardia* are particularly important in this connection. Acute watery diarrhoea is usually not complicated by major problems of food absorption, whereas persistent diarrhoea is often associated with a reduced absorption from 90 percent to 70 percent of both macro- and micronutrients. Endogenous loss of body nutrient stores, including protein and micronutrients, often occurs in cases of dysenteric illness.

During persistent diarrhoea and dysentery, severe growth faltering and development of frank clinical deficiency syndromes of protein-energy malnutrition may occur. Frequent feeding of locally appropriate mixes of cereals and legumes is beneficial. Also, various solid foods such as the chicken and rice diets that are fed in many communities appear to be beneficial. It is important that national programmes responsible for diarrhoeal disease prevention and control develop guidelines for nutritional management of acute and persistent diarrhoea. Prevention of diarrhoeal disease should be a key part of any programme aimed at improving nutrition, including monitoring and evaluation of government strategies to promote universal breast-feeding and preparation of pathogen-free weaning foods. This approach includes promotion of a full range of food safety practices covering all steps from food preparation to actual consumption. The antimicrobial characteristics of fermented food can be promoted in certain cultures. The use of amylase-rich cereals to reduce food viscosity may be routine practice. Supplementation with micronutrients (e.g. zinc and vitamin A) is necessary to deal with certain persistent diarrhoeal syndromes.

#### 4.2 Measles

Measles can precipitate malnutrition in situations where food intake is reduced due to dehydration, fever and painful mouth lesions. Measles frequently precipitates vitamin A deficiency, and when the two occur together the risk of blindness increases. Pneumonia and persistent diarrhoea frequently complicate measles, and often cause growth faltering and micronutrient deficiency.

Preventing measles by vaccination is one of the most important technical approaches to protecting the nutrition of young children. Despite intensive efforts, measles vaccine coverage is still far from universal. Many children between six and nine months of age, which is when measles vaccines are usually given in developing countries, are unprotected by maternal antibodies derived through breast-feeding. Thus, new approaches using vaccines and appropriate dose regimes to be given at an earlier age are required. While awaiting the development of such regimes, providing existing measles vaccines remains an important nutrition intervention. Vaccination against measles is a high priority in refugee nutrition programmes in view of the particular health problems this group faces. The immune response to measles vaccine is satisfactory, even in the presence of severe protein-energy malnutrition. Systemic measles infection reduces vitamin A levels to a point where mortality can be as much as 10 percent. It is thus recommended that vitamin A supplements be given to all children with measles where the case fatality rate is greater than 1 percent <sup>(12)</sup>.

#### 4.3 Malaria

The impact of malaria on nutrition varies according to age, immunological status and the intensity of infection. For example, it can affect birth weight and cause folate deficiency among young children and adolescents. Malaria is a common cause of premature labour and delivery, and consequently contributes to low birth weight. Malaria has been found to be by far the most common cause of severe anaemia among mothers, particularly in Africa. Pregnant women who are primiparas are especially susceptible to malaria.

Treating malaria rapidly prevents weight loss and anaemia. Malaria is not yet vaccine-preventable and prevention by chemoprophylaxis is increasingly ineffective as the parasite develops resistance to different drugs. Environmental approaches that emphasize using impregnated bed-nets and stopping mosquitos from breeding are currently the most effective community-based prevention and control strategies.

#### 4.4 Respiratory infections

Respiratory infections are associated with growth faltering as a result of anorexia, breathlessness, fever, pain, vomiting (especially in cases of pertussis) and associated diarrhoea. Thus programmes successfully combating acute respiratory infection are likely to have a positive impact on nutritional status. In this context greater attention is being given to making widely available such low-cost antibiotics as co-trimoxazole. Certain vaccines, for example the pneumococcal variety, decrease the prevalence of respiratory infection to such an extent that nutritional status is improved.

Vitamin A supplementation is beneficial in managing measles-associated acute respiratory infections but the benefits of vitamin A on other respiratory infections is not known. Pulmonary tuberculosis, which is especially prevalent in subjects with AIDS, has devastating effects on nutritional status. Prophylaxis with isoniazid is being considered in

some countries for use in HIV-positive subjects. Pneumocystic infection of the lungs may also occur in HIV-positive subjects with consequent negative nutritional impact. In communities where such drugs are available, suitable prophylaxis may help to prevent infections that are associated with weight loss.

#### 4.5 Intestinal parasites

Intestinal parasites such as *Schistosoma*, *Giardia lamblia*, *Ascaris lumbricoides* (roundworm), hookworm, *Trichuris trichiura* (whipworm) and *Strongyloides stercoralis* are all associated with malnutrition<sup>(13)</sup>. People who live in communities with a high level of parasitic infections are often short of food and are therefore undernourished. There is nevertheless increasing evidence of the nutritional benefits of de-worming in these environments, particularly among school-age children.

*Ascaris* infection is associated with growth faltering and a deficiency of vitamin A and zinc. Studies show that using selective treatment for parasites such as pyrantel, piperazine or albendazole has improved nutrition. *Trichuris* is associated with stunting and, in some communities, with frank clinical protein-energy malnutrition, although it has been underestimated as an enteropathogen in the past. Recent studies have demonstrated the important impact of this parasite on protein and blood loss from the intestine, in addition to its effect on linear growth.

*Giardia lamblia* is a common protozoal parasite, which is so widespread that it could have an impact on nutritional status. During early childhood, before active immunity has been established, *Giardia* can cause growth faltering. In severe cases it can produce marked weight loss, nutrient malabsorption, and deficiencies of vitamin A and folic acid. Once established in the intestine, *Giardia* contributes to growth faltering in cases of severe protein-energy malnutrition and AIDS.

Hookworm, which enters the body through the skin, is well known as a cause of iron and protein deficiency, particularly among older children and adults who are continually exposed to high rates of infection as a result of walking and working in fields that are contaminated by parasite-infected faeces. Hookworm can also contribute significantly to nutritional anaemia among pregnant women.

Since few affected populations suffer from single infections from individual parasites - multi-parasitic infection is the rule - drugs having a broad anti-parasitic effect are preferred. Thus regular treatment with mebendazole and, more recently albendazole, which has widespread efficacy against *Ascaris*, *Trichuris*, hookworm and *Giardia*, are associated with improved linear growth, iron status and cognitive function in schoolchildren.

*Schistosoma* infection is still widespread in many communities. *Schistosoma haematobium* is associated with thinness, and with anaemia as a result of blood loss in the

urine, while *Schistosoma mansoni* is associated with poor growth and anaemia. Elimination of these parasites is linked to improved appetite and rates of weight gain in children and young adults. The reduced price and increased availability of the drug praziquantel is an important factor in managing these infections and thereby improving nutrition.

Parasite-control strategies require a combination of environmental protection, for example control of irrigation channels and lakes, vaccines and chemotherapy, and promotion of behavioural change, particularly a sustained emphasis on improved personal hygiene and sanitary conditions. Effective parasite control regimes include using schools as chemotherapy-distribution centres and promoting hygiene and behavioural change through educational curricula.

#### 4.6 HIV infection

The severe nutritional problems associated with HIV infection were first described more than a decade ago in accounts of the "slim disease". The full nutritional impact of clinical AIDS includes poor dietary intake, nutrient malabsorption, increased nutritional requirements and excessive losses of body nutrient stores occurring as a result of secondary infections of the skin, lungs, intestine and bloodstream.

Roughly one-third of the babies born worldwide to HIV-infected mothers become infected themselves. Much of this mother-to-infant transmission occurs during pregnancy and delivery, although recent data confirm that some of it occurs through breast-feeding. Fortunately, the vast majority of babies breast-fed by HIV-infected mothers do not become infected through breast-feeding. All available data on HIV transmission and breast-feeding were reviewed at a technical consultation jointly convened by WHO and UNICEF in April-May 1992. The consultation concluded that where infectious disease and malnutrition are the main causes of infant deaths and the infant mortality rate is high, the usual advice to mothers should be that they breast-feed their babies. On the other hand, in settings where this is not the case the usual medical advice to pregnant women known to be infected with HIV should be to use a safe feeding alternative for their baby rather than to breast-feed<sup>(14)</sup>.

There is considerable variation in the health outcome of children who develop AIDS. In general it appears that the poorer the environment the greater the chance of children developing secondary infections and dying. An additional problem is the steady stream of infections that impairs a child's immune system to the point that susceptibility to infections and development of full-blown AIDS with associated malnutrition greatly increases. Emphasis on prevention and early management of infection is seen as a vital strategy for preventing the development of AIDS-related nutrition problems.

Much of the weight loss and other nutritional deficiencies related to HIV in adults are the result of poor food intake and nutrient malabsorption. The despair and anxiety associated with HIV may also have a negative impact on appetite. Counselling, and care and compassion for those concerned are seen as a valid approach to protecting nutritional

status, which is particularly important for wage-earners whose ability to work also has significant repercussions for the nutritional status of other family members. HIV control strategies concentrate on preventing the disease's spread through sexual and non-sexual routes. Improving the nutrition status of groups at risk is likely to assist in maintaining the lining of the genital tract, and thereby help to limit HIV's access through genital ulceration.

## **V. COMMUNITY-BASED APPROACHES TO PROMOTING NUTRITIONAL WELL-BEING**

Access to effective treatment is critical to influencing the outcome of infection. Ensuring this access has implications for both governmental and non-governmental structures and the non-formal sectors which are responsible for making effective treatment available at an affordable price. It is clear that treatment in health centres, clinics or hospitals, while important, is insufficient to meet real needs. Traditional practitioners have provided health care in virtually all societies over the ages. In some instances the effectiveness of traditional remedies, such as cereal-based oral rehydration for diarrhoea and quinine preparations for malaria, is well established. In others, for example where some leaves and roots and miscellaneous medications are concerned, the potential utility in managing infection has not been scientifically evaluated. In the absence of community-based primary health care systems and health education that emphasizes what the individual can do to attain and maintain health, it is unlikely that all those who require treatment will receive it. Less likely still is that the poor could afford to leave their food-producing, income-generating and other essential domestic activities, or that they could pay for treatment, even if it were available.

There is general agreement that a combination of community-based health care, adequate local facilities and means of transport from secondary health care to main health centres or hospitals are among the critical elements for attaining and maintaining health. The Iringa Nutrition Programme in the United Republic of Tanzania, which was part of the Joint WHO/UNICEF Nutrition Support Programme (1984-1989) <sup>(9)</sup> is an example of a community intervention programme that has succeeded in reducing the prevalence of severe illness and mortality from infectious disease while improving nutrition. The Iringa experience highlights the importance of community-based activities, in this case growth monitoring, early treatment for malaria and diarrhoea, and a range of measures, especially related to agriculture and preventive health services, aimed at promoting community development. Reduced mortality was considered to be a combined result of community involvement and the provision and utilization of preventive services and immunization, early recognition and intervention in respect of growth faltering, breast-feeding promotion, and emphasis on adequate dietary intake, especially during infancy and early childhood.

Family planning is not usually considered a public health intervention that contributes to preventing infection, despite the profound impact on child infection and nutritional status



that reducing the number of children and increasing the length of birth interval can have. Birth-spacing is associated with higher birth weights, lower prevalence of growth faltering during infancy and early childhood, decreased prevalence of infection and increased ability of mothers to care properly for their children.

Death due to infection has been largely eliminated in affluent countries as a result of improvements in housing, water supplies and sanitation, which have served to reduce the spread of pathogens by aerosol, water and food. Elimination of insect breeding sites has reduced malaria transmission and thus had a positive impact on nutritional status in many tropical areas. The use of impregnated bed-nets as an environmental means for self-protection has also been successful.

Environmental factors are an important contribution to MIC, particularly where diarrhoeal diseases are concerned as a result of contaminated food, unsafe water and lack of sanitation, and respiratory infections where overcrowding is associated with the aerosol-transmission of large numbers of pathogens from, for example, one coughing family member to another. Changes in personal behaviour, especially relating to hygiene and use of health services, are critical to reducing infection's impact, even as basic education is essential to facilitating behavioural change. The uneducated are less likely than the educated to contribute to environmental change, to improve personal hygiene in relation to food preparation and excreta disposal, to make use of preventive and curative health services, and to promote sound nutritional practices during illness. If their effect is to be optimal, therefore, programmes seeking to protect against infection should include an element of basic education.

The subject of care merits considerable reflection. Weakness, pain, or breathlessness may hamper food preparation or consumption by sick persons who are in need of care if they are to maintain their nutritional status during convalescence and recover any resultant nutrient losses. Many conditions contribute to insufficient care during illness, for example families that are under stress due to too many children born too close together; mothers who are weakened by poor diet and hard physical labour; and care-givers, usually women, who have to be away from home on important farming or income-generating activities. Time and patience during child feeding are essential ingredients for ensuring optimal infant growth and development, yet living in stressful conditions puts an enormous strain on maternal/child bonding and feeding patterns. For mothers engaged in paid employment, inadequate leave time and absence of infant and child care facilities are among the major difficulties faced in caring for children.

Maternal household responsibilities also merit careful consideration. Women are frequently the busiest members of the family and therefore reducing their heavy physical burdens has a potentially positive impact not only on their own nutritional status, but on that of other family members as well. Care has traditionally been seen as an emotional response, and emphasis has been on establishing caring relationships between individuals, for example mothers and their children. In the nutritional context, however, the concept is broadened

in recognition of the importance of care as an element of human behaviour on which social, economic and environmental influences have a profound effect. Care, including such psychological aspects of family life as harmony, respect and love, is particularly difficult to sustain under harsh circumstances, yet all are important elements in preventing and managing infection.

The increased susceptibility to infections among people with AIDS causes great stress among family and community units that are attempting to sustain the emotional and physical integrity of persons who may be severely sick for long periods before they die. It should not be assumed that such individuals are unable to contribute to the productivity and emotional support of their families, given the substantial differences in the health outcome of persons with AIDS. Those in circumstances where infections can be avoided, or managed at an early stage with effective drugs, are likely to survive for many years as productive social and economic beings. Those in more hostile environments, who have fewer resources at their disposal, are likely to experience considerably greater problems. The ability of parents and children to survive as family units that include widows, widowers and orphans depends increasingly on their ability to attract resources of many different types, from community health services to various forms of social welfare.

## **VI. STRATEGIES FOR PREVENTING AND MANAGING INFECTION**

Environmental improvements relating to food safety, housing, water supply and sanitation are important steps towards preventing infection. Such actions may well occur independently of improved socio-economic status, but nutrition and health benefits are unlikely to be sustained if socio-economic status does not improve concurrently. Primary education has an important role to play in improving nutritional status by stressing rudimentary nutrition principles that include dietary diversification and basic food-safety practices that minimize risk of food contamination.

A number of core concepts for food and water safety are outlined in Figure 2. Through the mass-media and other promotional efforts, the same types of educational components can be aimed at women who are most frequently responsible for preparing food for infants and children, and at public and semi-public sites, including street vendors, small neighbourhood food-service establishments, and food services in the workplace. Meanwhile primary health care activities known to have a positive impact on nutritional status, for example immunization, should also be promoted.

Action should be taken at different levels of the health system:

Health centre: Growth monitoring, control of infections, review of a child's diet and any socio-economic problems a family may be facing.

Community level: Community-based growth monitoring and related anti-infection measures are being implemented in many countries. About half of the countries in Africa, and no doubt more in other regions, have community-based growth-monitoring programmes as part of their health-for-all policies.

District level: Efforts should be made to increase service integration, for example those related to epidemiology, maternal and child health and nutrition, and health education and general health. Often resources in developing countries do not permit all members of a community to be reached. In such cases it may be more effective to concentrate on a limited area where, with a combination of measures, there is real chance for improvement. An optimal approach might be to concentrate all interventions in communities having large-scale problems. For example, it may be preferable, if transportation is limited, to cover a whole area with measles and BCG vaccination only, which would require only one visit to a health centre and would consequently be much easier to achieve than vaccinations requiring three visits. In addition, some vaccinations, e.g. measles and BCG, have a more dramatic impact on health and nutritional status than others, e.g. diphtheria and polio.

National level: Problems with service integration are frequent. For example, the control of diarrhoeal diseases is typically the responsibility of "epidemiological services", and only occasionally under maternal and child health (MCH) services where it might have more chance of being implemented through local integrated MCH and general health services. Another problem that arises is that services related to nutrition and diarrhoeal diseases are often marginal to MCH or completely independent of it. Such verticalization may be detrimental to service delivery at peripheral levels, and thus one approach may be to include nutrition modules in MCH and diarrhoeal diseases control, and diarrhoeal diseases control modules in nutrition and MCH training.

Specific interventions frequently provide clear, even dramatic, results, such as the impact effective measles programmes can have on improving infants' nutritional status. At the same time, however, the impact of infection control on nutrition tends to vary considerably between communities and it is essential to consider associated interventions that will optimize the impact of infection control as part of a strategy for improving nutrition.

Key interventions to minimize the incidence or consequences of infection include:

- Promoting exclusive breast-feeding for the first 4-6 months of life.
- Promoting immunization, especially against measles and pertussis.
- Preventing exposure of young children to other children or adults with respiratory infections, especially tuberculosis.
- Avoiding mosquitoes by eliminating breeding sites and using impregnated bed-nets.
- Promoting consumption of vitamin A, iron and zinc, and reducing PEM.

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- Promoting health and appropriate diet during pregnancy and reducing the prevalence of infants with low birth weight.
- Promoting birth-spacing.
- Promoting improved water supplies, sanitation and personal hygiene.
- Improving housing.
- Promoting food safety through appropriate food storage and preparation techniques.
- Preventing the spread of AIDS.

Key interventions for managing infections and preventing deterioration in nutritional status include:

- Promoting breast-feeding.
- Ensuring availability and use of antibiotics and anti-parasitic drugs.
- Promoting locally appropriate mixes for the dietary management of infection, especially diarrhoeal diseases.
- Encouraging appropriate feeding during illness and convalescence.
- Providing vitamin A supplements for children with measles.
- Promoting employment policies and working conditions that enable parents to look after their children, especially during periods of illness.
- Demonstrating appropriate interventions that will reduce body temperature.

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**PROMOTING APPROPRIATE DIETS AND HEALTHY  
LIFESTYLES**

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## SUMMARY

Promoting better eating habits and positive health behaviour is one of the most challenging tasks in the overall effort to improve nutrition. Nutritional problems broadly fall into two categories: those due to insufficient intake relative to needs and infections, and those due to an excessive or unbalanced intake of food or particular dietary components. In both instances, improvements in nutritional well-being will depend on people having access to a variety of safe and affordable foods, understanding what constitutes an appropriate diet and knowing how to best meet their nutritional needs from available resources. Strategies to promote healthy diets, in addition to education, should include motivating people and creating opportunities for them to change their behaviour, taking into account economic factors, individual preferences, lifestyles and time constraints.

In terms of nutrition and its relation to health, the first concern of national authorities must be securing for all sectors of the population adequate supplies of good quality and safe food in order to prevent deficiencies of macro- and micronutrients. This is the highest nutritional priority in most developing countries, where nutritional deficiencies such as protein-energy malnutrition, anaemia, iodine deficiency disorders, and deficiencies of vitamin A and other micronutrients are among the most pressing public health and social problems. Some of these same deficiencies are also found among vulnerable groups in developed countries.

However, excessive and unbalanced intakes of food or certain dietary components, in association with changes in lifestyle, are related to a range of chronic non-communicable diseases such as coronary heart disease, cerebrovascular disease, various cancers, diabetes, dental caries, and osteoporosis. These are now among the main causes of morbidity and mortality in most developed countries, and they are emerging as significant public health problems in many developing countries. Modifications in diet and life-styles can be expected to reduce the incidence of these diseases. The functional and financial burden of these emerging diet-related diseases on the individual, on health services and on social security systems are considerable, and must be addressed.

Numerous economic, social, cultural and educational factors are inexorably linked to people's diets and lifestyles. Poverty and social inequity are the major underlying causes of many of these problems, but others are due to unhealthy habits, ironically in pursuit of a better or more comfortable life. Although



education and information play an important role, the way people eat and live is not always a matter of choice for vast segments of the world's population. An overall objective should be to improve the social, cultural, environmental and economic conditions that influence people's behaviour in relation to diet and other aspects of their lifestyle.

Current scientific evidence of the relationship between diet and health indicates that diets most clearly associated with a reduced risk of chronic diseases, including heart disease and some forms of cancer, are those that are moderate in energy, low in fat (especially saturated fat and cholesterol), contain adequate amounts of complex carbohydrates and dietary fibre, are moderate in salt content, and contain adequate amounts of essential vitamins and minerals. Diets rich in plant foods, including fruits, vegetables, legumes, and whole grain cereals, are associated with a lower incidence of coronary heart diseases and some cancers. Specifically, diets rich in green and yellow vegetables, citrus fruits, and low in salt-pickled, smoked and salt-preserved foods, are related to a lower risk of cancer, including cancer of the colon, stomach, lung and oesophagus.

When the general policy objectives to improve nutrition have been determined, strategies and actions to reach them include:

- nutrition education and dietary guidance for the general public;
- training of professionals in health care, agriculture extension, and related services;
- development of food-service guidelines;
- involvement of consumer groups and the food industry;
- ensuring food quality and safety;
- monitoring and evaluating national food and nutrition situations; and
- encouraging the availability of the variety of foods needed to meet consumer demand.

To encourage and promote overall health, official nutrition goals and dietary recommendations have been issued by government agencies in different countries and by various national and international panels of experts. Traditionally, recommended dietary allowances have focused on adequate and safe intakes to avoid deficiencies and to ensure that energy is adequate for the needs of nearly all adults, and for the growth development and activity of children. More recently, however, dietary recommendations and guidelines reflect growing concern about diet-related non-communicable diseases, and recommendations now frequently include recommendations for intake of those dietary components that are associated with risk of these diseases. These guidelines provide advice, appropriate for the populations concerned, on selecting a balanced diet that promotes health. Appropriate advice on food

purchasing and preparation should be provided. The basic guidelines adopted in many developed countries are quite similar and they include the following principles:

- adjust energy intake to energy expenditure to maintain desirable body weight;
- avoid excessive fat intake and, especially, intake of saturated fat and cholesterol;
- increase intake of complex carbohydrates and dietary fibre and limit sugar intake to moderate levels;
- limit salt intake to a moderate level;
- limit alcohol intake.

In addition to qualitative dietary guidelines, quantitative nutrient goals have been proposed in some countries. The WHO Study Group (1990) has recommended population nutrient goals which provide upper and lower limits within which average intakes should fall for good health and nutrition. The group envisaged that the population nutrient goals would be useful as general planning tools to evaluate the adequacy of a given food supply and the effectiveness of social communication efforts.

The use and interpretation of food labelling plays an important role in education and information strategies for promoting healthy diets. The recommendations of the FAO/WHO Codex Alimentarius Commission, and legislation that has been approved in several countries on this basis, are designed to provide this basic information to consumers, while ensuring that foods are presented honestly by food manufacturers and vendors. Information provided on food labels needs to be supported by coexisting nutrition education programmes.

Evidence from a number of countries indicates that well-executed nutrition communication campaigns can change knowledge and attitudes and alter behaviour, resulting in improvements in nutritional status. Taken as a whole, the evidence from comparisons among and within developed countries supports the view that many chronic diseases can be prevented, or their onset at least considerable postponed, through changes in lifestyle and diet.

Many sectors play a major role in the promotion of healthy diets and lifestyles. The public sector, including health professionals, can work to educate the general public about diet, health and importance of physical exercise. The food industry plays an essential role by responding to consumer demand to produce and market the variety of foods that contribute to a healthy diet. Formal and non-formal education play a central role. Incorporating nutrition into education in general, within the context of local culture, is recommended. In addition to

school systems, the health and agriculture sectors, public information channels, worker organizations and in education and promotion of nutrition and healthy lifestyles.

The mass media can make major contributions, and should work along side government and technical experts from the early planning stages of campaigns to promote nutrition and health. The private and commercial sector can cooperate by promoting scientifically sound information and advertising. The influences of consumer groups and community leaders on private sector and government actions sensitive to public opinion, are also important.

All recommendations to encourage and sustain appropriate diets and healthy lifestyles should be culturally acceptable and economically feasible. The quality of traditional foods should be emphasized, when appropriate. Promotion of dietary guidelines should be widely promoted through government, health services, schools, feeding programmes, the mass media, food industry, advertising and by consumer and community groups.

## I. INTRODUCTION

Nutritional disorders can be of a relatively fast and acute onset, as occurs when people are forced to migrate towards areas where there is not enough food, or when sudden disasters destroy food supplies. There are also chronic nutritional problems that may be prevented or reduced with an adequate diet, which fall into two broad categories: those due to insufficient intake of good quality and safe foods, and those due to an excessive or unbalanced intake of foods or certain dietary components.

Several lifestyle factors, including those affecting food choices, may have a positive or negative impact on nutritional well-being. These include customary, occupational and leisure-time physical activity; habits such as smoking and alcohol consumption; behavioural changes brought about by urbanization and migration; environmental conditions such as housing and sanitation, and occupational hazards; and hygienic conditions associated with food handling and consumption.

In terms of nutrition and its relation to health, the first concern for all national authorities must be securing adequate supplies of good quality and safe food and to make it available to all sectors of the population in order to prevent deficiencies of macro- and micronutrients. This is the highest nutritional priority in most developing countries, where nutritional deficiencies such as protein-energy malnutrition, anaemia, iodine deficiency disorders, and deficiencies of vitamin A and other micronutrients are among the most pressing public health and social problems<sup>(1,2)</sup>. Some of these same deficiencies are also found among vulnerable groups in developed countries.

On the other hand, dietary patterns including excessive and unbalanced intakes of food or certain dietary components, often associated with changes in lifestyle, are related to a range of chronic non-communicable diseases such as coronary heart disease, cerebrovascular disease, various cancers, diabetes, dental caries, and osteoporosis. These are now among the main causes of morbidity and mortality in most developed countries, and they are emerging as significant public health problems in many developing countries. Dietary patterns are important factors contributing to several major chronic non-communicable diseases and modifications in diet and lifestyles can be expected to reduce the incidence of those diseases.

The world is full of contrasts: many millions of people are undernourished while countless others are obese; cardiovascular diseases are decreasing in some regions even as they increase at an alarming pace in others; globally, life expectancy is increasing, but median age at death remains appallingly low in many countries; growing old implies becoming physically and socially disabled in some societies, while the elderly remain active and productive in other societies. Table 1 illustrates some of these situations. These contrasts exist not only between, but also within, countries, and even within families. In addition, there is a constantly growing number of countries where protein-energy malnutrition remains among the most important causes of child morbidity and mortality, even as cardiovascular and other chronic diet-related non-communicable diseases are rapidly increasing among adults.

**Table 1 - Selected characteristics of nutrition-related problems in different regions of the world**

	US and Canada	Western Europe	Latin America	Africa	South Asia
Malnutrition (deficiency), per 100 children	4	0.2	16	26	47
Obesity, per 1 000 adults	130	64	10-39	3	3
Trends in CV diseases, last decade	-	-	++	0	+
Life expectancy, years	75	73	65	50	59
Anaemia, % women 15-40 years	8	12	17	44	58

Source: WHO <sup>(3-8)</sup>

- = Decrease      0 = No change      + = Increase      ++ = Marked increase

Numerous economic, social, cultural and educational factors affect these contrasts, and they are inexorably linked to people's diets and lifestyles. Poverty and social inequity are the major underlying causes of many of these problems, but others are due to unhealthy habits, ironically in pursuit of a better or more comfortable life. Although education and information play an important role, the way people eat and live and their lifestyle and dietary patterns are not a matter of choice for vast segments of the world's population. Therefore, promotion of appropriate diets and healthy lifestyles involves more than education. In addition to transmitting knowledge, there is a need to develop a willingness to improve, provide an opportunity to do so, and permit access to the necessary means. Thus, the ultimate objective should be to improve the social, cultural, environmental and economic conditions that influence people's behaviour in relation to diet and other aspects of their lifestyle.

Combating nutritional deficiency diseases, particularly in developing countries, requires a range of strategies that have evolved over the past 50 years. However, health problems associated with changing lifestyles and diets, including excessive and unbalanced dietary intakes, have only recently received attention, and action to reverse the trend has

been taken by only some countries. An analysis of the current situation and trends in diet- and lifestyle-related problems is of great importance for all countries in order to arrive at practical recommendations and strategies that will improve the health and nutrition of their citizens.

## II. OVERVIEW OF THE CURRENT SITUATION

### 2.1 Changing trends in diet-related diseases

#### Dietary deficiencies

The most serious health and welfare problems facing developing countries over the last 50 years have been the combined impact of widespread undernutrition and infectious diseases. Protein-energy malnutrition has been a particularly significant public health problem in these same countries because of its high prevalence; its relationship to child morbidity, mortality, and impaired physical and cognitive growth; and its implications for social and economic development. Based on a recent analysis of global data, most undernourished persons, on the basis of the estimated 192 million children actually suffering from protein-energy malnutrition, live in developing countries in the following global distribution: Asia 82%, Africa 12%, the Americas 3%, and the Near East 3% <sup>(2)</sup>. According to recent FAO estimates based on dietary energy supply, over 780 million persons in developing regions are considered to be chronically dietary energy deficient<sup>(9)</sup>. This translates, within regions, to 33% of the total population (or 168 million people) in Africa, 13% (59 million people) in Latin America, 19% (528 million people) in Asia, and 12% (31 million people) in the Near East. In industrialized countries, protein-energy malnutrition is found mainly among young children in the lower socio-economic groups, the elderly who live alone, adults addicted to alcohol and drugs, and persons with emaciating diseases.

An analysis of long-term trends shows a gradual reduction in the *proportion* of undernourished children where countries have not been affected by such natural and man-made disasters such as drought, desertification, war, forced migration, and economic crisis<sup>(10)</sup>. However, the absolute *number* of undernourished individuals has not decreased due to population growth in many of the countries where malnutrition is most prevalent.

The consequences of undernutrition include a high rate of infant and child mortality, decreased resistance to infectious diseases, growth retardation, impaired cognitive and social performance, increased morbidity among the elderly, and reduced physical activity and work capacity among both children and adults<sup>(11-14)</sup>. One of the first steps to be taken in promoting healthy lifestyles is therefore to control undernutrition, and this starts with improving and protecting the nutritional status of infants and young children.

Micronutrient deficiencies affect large numbers of people the world over. For example, 2 150 million people are anaemic or iron deficient. The most seriously affected groups, in approximate descending order, are pregnant women, preschool-age children, low-

birth-weight infants, other women, the elderly, school-age children, and adult men. In developing countries, prevalence rates in pregnant women are commonly in the range of 40% to 60%; among other women, 20% to 40%; and in school-age children and adult men, around 20%<sup>(3,15)</sup>. In addition, large numbers of people, mainly in developing countries, suffer from deficiencies of iodine (at least 200 million), vitamin A (40 million) or from other vitamins and minerals. These specific nutrient deficiencies, together with protein-energy malnutrition, interfere drastically with individual and societal well-being. Action to combat them should be part of comprehensive and integrated national health, agricultural and educational policies to improve food and nutrition. The long-term solution for most affected populations is for increased dietary intakes of micronutrients, and, in the case of iodine, for example the consumption of iodized salt.

### Diet-related non-communicable diseases

Despite the continuing considerable impact of undernutrition and various infectious diseases on morbidity and life expectancy in many developing countries, these problems are gradually being overcome in a number of countries. Consequently, life expectancy has increased in every region of the world over the last 30 years, and still further improvements, especially in Africa and Asia, are expected in the years to come.

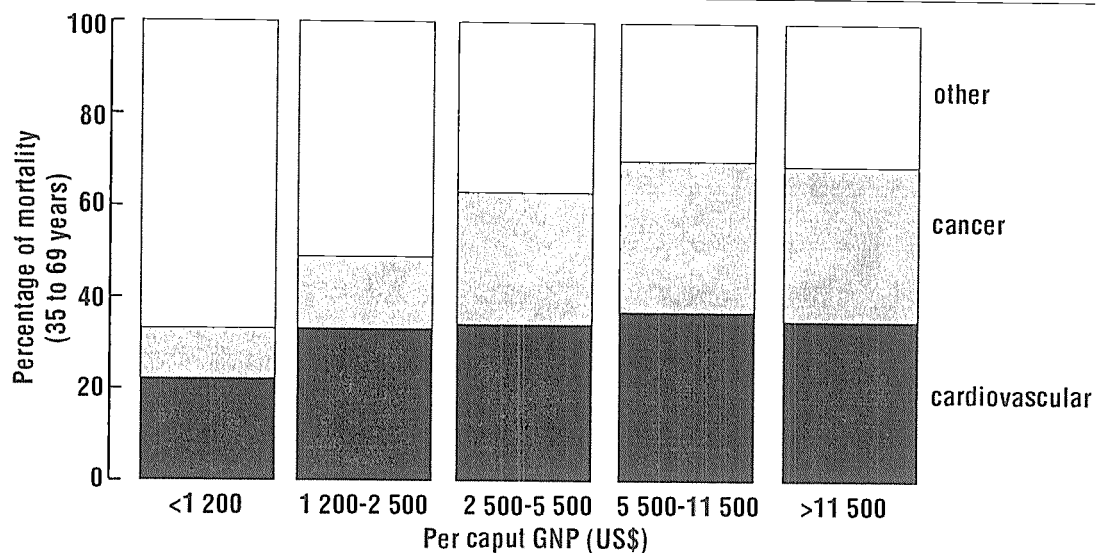
In 1980-85 life expectancy was 72.8 years in developed countries and 59.4 years in developing countries. By the period 2020-2025, life expectancy is anticipated to be 79.0 years and 71.6 years, respectively<sup>(16)</sup>. As a consequence, the proportion of elderly people in all population groups will increase. By the year 2025, up to 27% of the population in Europe will be persons over 60 years of age, 14% in Asia, 13% in Latin America, and 7% in Africa. Thus, with the ageing of populations in both developed and developing countries, the number of people with obesity and diet-related chronic non-communicable diseases, including various cancers, cardiovascular disease, diabetes, chronic rheumatic diseases, and osteoporosis, is expected to continue to increase.

Modest increases in prosperity in populations in countries with low gross national products (GNP) appear to be associated with the most marked increases in the proportion of chronic diseases (Figure 1). Among other factors, as GNP rises, the proportion of calories derived from vegetable foods and complex carbohydrates progressively decreases. While the proportion derived from animal products, particularly animal fat, and simple carbohydrates tends to increase (Figure 2).

The estimated distribution of causes of death in developing and developed countries is shown in Figure 3. Around 1980, cardiovascular and cancer deaths together accounted for only 22% of total deaths in developing countries and 67% in developed countries<sup>(17)</sup>. In the future the proportion of deaths due to cardiovascular diseases and cancers is likely to increase considerably in developing countries.

Coronary heart disease (CHD) rates have been declining during the past 10-25 years in most developed countries (Figure 4). In almost all countries with major falls or rises in CHD mortality, there have been, respectively, corresponding decreases or increases in

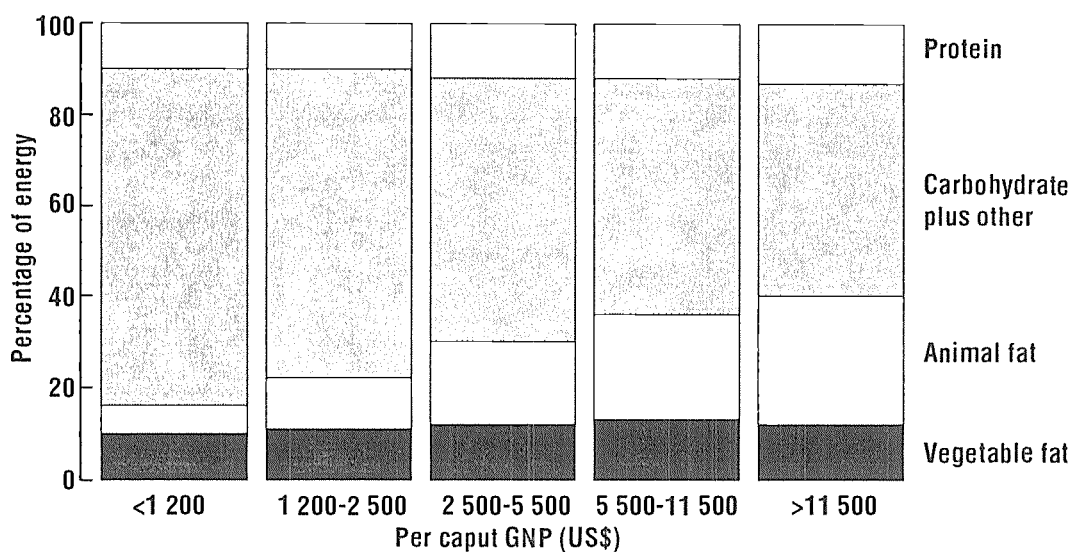
Figure 1. Proportion of deaths from cardiovascular diseases, cancer, and other diseases, for both sexes aged 35–69, in relation to per caput gross national product\*



Source: WHO<sup>20</sup>

\* This diagram is based on an analysis of cause-specific mortality rates for the ages 35–69 years, from the WHO international mortality data base, adjusted to the world population, standard-age distribution. Fifty-two countries satisfied selection criteria for this analysis: information was available on national mortality by age group and on per capita gross national product (GNP), and the population numbered more than one million. Countries were divided into five groups according to GNP. Information on GNP was obtained from The World Bank.

Figure 2. Components of diet in relation to per caput gross national product\*

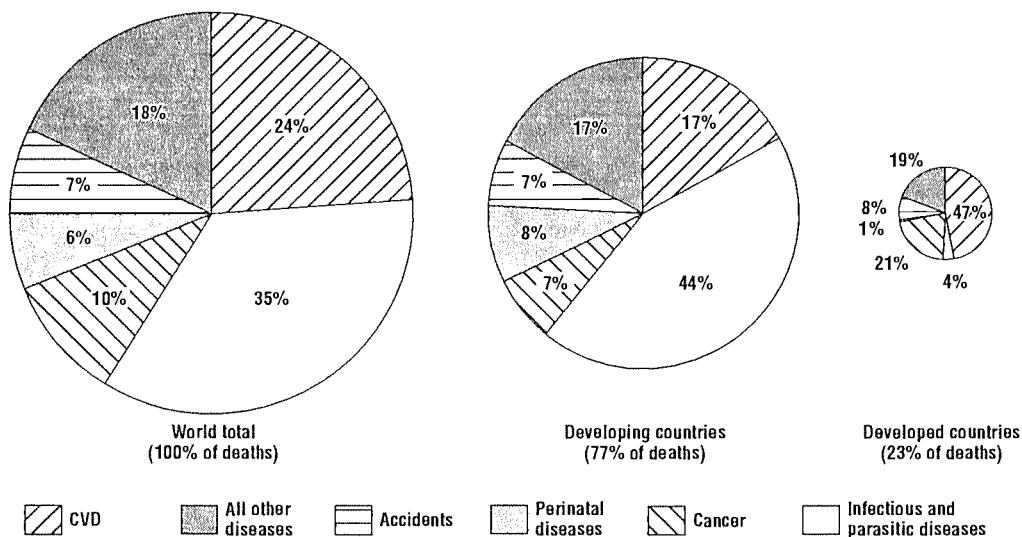


Source: WHO<sup>20</sup>

\* This diagram is based on an analysis of diet components, GNP, and mortality rates. Fifty-two countries satisfied selection criteria for this analysis: information was available on per capita gross national product (GNP) and on energy and fat consumption, and the population numbered more than one million. Information on diet components was obtained from FAO, and on GNP from The World Bank.



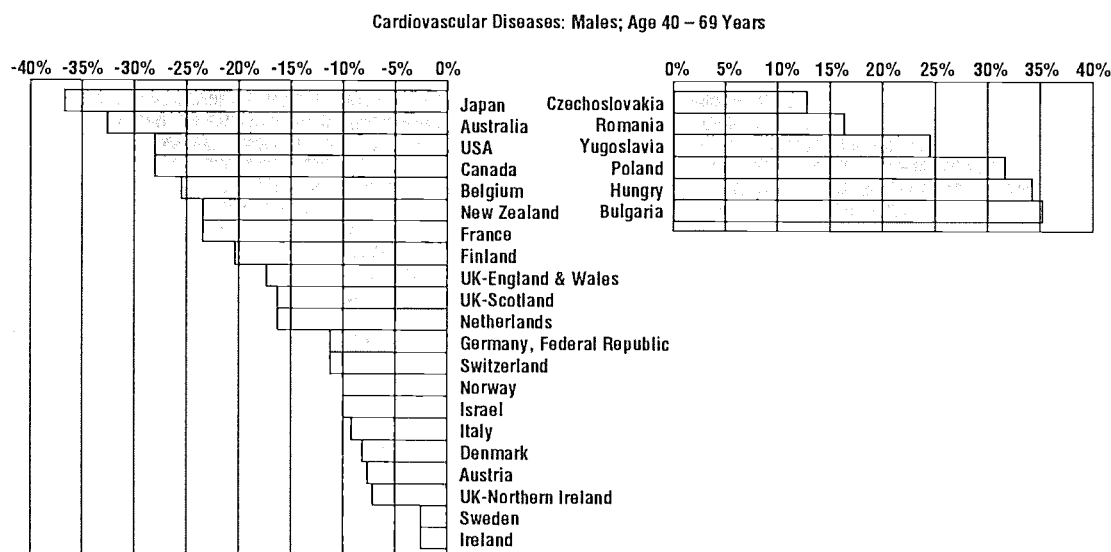
Figure 3. Estimated distribution of causes of death 1990<sup>1</sup>



Source: WHO.

<sup>1</sup> These estimates are based on total number of deaths estimated by the UN Population Division, number of deaths by cause among children aged less than 5 years estimated by WHO programmes for developing countries, cause of death data reported by the developed countries for the World Health Statistics Annual and on the assumption that the overall mortality pattern for the developing countries has not changed since 1985.

Figure 4. Percentage changes in age-standardized death rates (1970/3 - 1980/3)



Source: Reprinted from Bøthig 21.

animal-fat consumption, with reciprocal changes in the consumption of vegetable fats<sup>(18)</sup>. For example, in the United States mortality from ischaemic heart disease in men aged 30-69 years decreased by 49% between 1970 and 1985. It was estimated that a reduction in average blood cholesterol levels, which are directly linked to decreased intakes of saturated fat, accounted for 30% of this decline<sup>(19)</sup>. Taken as a whole, the evidence from comparisons among and within developed countries supports the view that many chronic diseases can be prevented, or their onset at least considerably postponed, through changes in lifestyle and diet<sup>(20)</sup>.

## 2.2 Dietary patterns and lifestyle factors affecting health

### Dietary patterns

Dietary patterns are important factors contributing to health. Modifications in diet can be expected to reduce the risk of disease and, in some cases, prevent it. Diets that are inadequate in energy and certain nutrients can lead to serious deficiency diseases and even death. Although concern about dietary deficiency remains a priority in many parts of the world, the focus in the present context is on dietary patterns reflecting excessive or unbalanced intakes and diet-related non-communicable diseases, both of which are of growing global public health importance.

Current scientific evidence of the relationship between diet and health indicates that diets most clearly associated with a reduced risk of chronic disease, including heart disease and some forms of cancer, are those that are moderate in energy, low in fat (especially saturated fat and cholesterol), contain adequate amounts of complex carbohydrates and dietary fibre, are moderate in their salt content, and contain adequate vitamins and minerals. Diets rich in plant foods, including fruits, vegetables, legumes, and whole-grain cereals, are associated with a lower incidence of coronary heart disease and some cancers. Specifically, diets rich in green and yellow vegetables, citrus fruits, and low in salt-pickled, smoked and salt-preserved foods, are related to a lower risk of specific cancers, including cancer of the colon, stomach, lung and oesophagus (Table 2).

As regards diet-health relationships concerning various specific nutrients and dietary components, a number of conclusions have been drawn. There is clear evidence that the total amounts and types of fat and other lipids in the diet influence the risk of atherosclerotic cardiovascular disease, and that saturated fat and cholesterol are strongly linked to increased health risk from these conditions. Excessive energy intake contributes to obesity and diabetes. Excessive alcohol consumption is associated with an increase in coronary heart disease, hypertension, stroke and osteoporosis. In addition, the frequency of sugar consumption is strongly related to incidence of dental caries.

However, diet-health relationships are not always obvious. This is partly due to an incomplete understanding of the factors contributing to chronic diet-related diseases, the role of diet in relation to other factors, and the influence of specific components within a total

**Table 2 - Associations between selected dietary components, body weight and cancer**

Site of Cancer	Fat	Body Weight	Fibre	Fruits and Vegetables	Alcohol	Smoked, Salted, and Pickled Foods
Lung				-		
Breast	+	+			+/-	
Colon	++		-	-		
Prostate	++					
Bladder				-		
Rectum	+			-	+	
Endometrium		++				
Oral cavity				-	+ *	
Stomach				-		++
Cervix				-		
Oesophagus				-	++ *	+

Source: WHO <sup>(20)</sup>.

- + = Positive association; increased intake with increased cancer.
- = Negative association; increased intake with decreased cancer.
- \* = Synergistic with smoking.

diet. For example, although there is clear evidence that demonstrates that an increase in serum cholesterol is related to saturated fat intake, not all saturated fatty acids have the same effect on serum cholesterol. In addition, in some cases it is the consumption of the foods containing the dietary components, and not the components themselves, that is related to better health. For example it is fibre-rich foods, and not fibre *per se*, that may protect against some diseases. Nevertheless, several recent reviews of the scientific evidence for specific diet-health relationships have reached conclusions similar to those mentioned earlier, which provide a basis for sound dietary guidance.

### Physical activity

Regular physical activity, whether related to an occupation or part of leisure-time activities, is an important component of healthy lifestyles. Regular exercise stimulates cardiovascular and respiratory functions; increases blood supply to the heart muscle;

regulates energy balance; helps to maintain bone mineralization, muscle strength and joint flexibility; stimulates the secretion of growth factors in children; improves psychomotor development; and favourably influences mood and serves to relieve anxiety<sup>(22-25)</sup>. In contrast, physical inactivity and a sedentary lifestyle may have several adverse consequences for health, including overweight, unfavourable blood-lipid concentrations, and impaired glucose tolerance and insulin metabolism.

A sedentary lifestyle can be particularly damaging to the health of the elderly, and may reinforce age-related limitations and handicaps that further reduce physical activity among this group. This can lead to conditions such as varicose veins, blood stasis and clotting, increase in bone brittleness, and painful, rigid joints.

### Alcohol

As alcohol consumption rises within a population, so does the frequency of associated health problems. Excessive alcohol consumption is linked to an increased risk of hypertension, coronary heart disease, stroke, liver cirrhosis, fetal alcohol syndrome, metabolic brain damage, and various forms of cancer<sup>(26,27)</sup>. The social consequences of excessive alcohol consumption and related problems of alcohol dependency are serious for all concerned - the immediate victims, of course, but also their families and society as a whole. There is, however, some evidence that the consumption of small amounts of alcohol is associated with a reduced risk of ischaemic heart disease.

Alcohol consumption and alcohol-related problems have increased considerably in recent decades in most countries. Total world consumption of beer, wine and spirits in terms of 100% alcohol increased from 74 million hectolitres in 1965 to 110 million in 1980<sup>(28)</sup>. Table 3 shows that, while there was little change in the per capita alcohol consumption in developing countries, there was an increase of between 25 and 90% in developed countries. However, the proportion of people consuming alcohol, and the average consumption in many developing countries, is as high as in developed countries.

The health and economic consequences of alcohol consumption have also worsened. Fifty percent of all road fatalities in Africa are attributable to alcohol abuse. Liver cirrhosis is a growing cause of death in many industrialized countries. In most European countries alcohol abuse accounts for approximately half of all days spent in general hospitals and a similar proportion of sick-leave absence from work.

### Tobacco use

About 3 million deaths worldwide are attributable to smoking every year<sup>(30)</sup>. Two million one hundred thousand people died in developed countries alone in 1990, and almost half of these were between 35-64 years of age. In fact, smoking is related to the leading causes of premature death in adults in developed countries, and is fast becoming a major problem in developing countries as well<sup>(31)</sup>.

**Table 3 - Per capita consumption of beer, wine and spirits, as litres of 100% alcohol**

Region or country	Year 1965	Year 1980
Asia, except Japan	0.1	0.2
Africa	1.0	0.7
Latin America and the Caribbean	2.4	2.4
Japan	2.1	4.0
USSR	4.4	5.6
USA and Canada	4.7	8.1
Australia and New Zealand	6.4	10.6
Europe, except USSR	8.7	10.9

Source: WHO <sup>(29)</sup>.

Smokers are sick more often than non-smokers, and they lose 33% to 45% more work days<sup>(32)</sup>. In countries with long-established patterns of tobacco use, smoking is responsible for about 90% of all cases of lung cancer, 80% of chronic bronchitis and emphysema, and 20-25% deaths from ischaemic heart disease and stroke<sup>(33)</sup>. It has been estimated that more than 600 000 new cases of lung cancer occur worldwide every year, most of them due to smoking, and that the annual increase in incidence is about 0.5%<sup>(34)</sup>.

Smoking also contributes significantly to mortality from cancer of the lip, oral cavity, pharynx, larynx, oesophagus, pancreas and bladder, and is responsible for more frequent respiratory ailments in children in households where others smoke tobacco. In Southeast Asia, tobacco chewing is a major cause of deaths due to oral cancer.<sup>(35)</sup>

Between 1970 and 1985, cigarette smoking fell by 6-9% in countries like Australia, Canada, New Zealand and the USA, and by 25% in the United Kingdom, probably due to a combination of increased public awareness and educational campaigns. The decrease was greater among men than women<sup>(36)</sup>, which is reflected in men's declining mortality rate from lung cancer. In contrast, during the same period adult cigarette consumption increased by 22% in Asia, 24% in Latin America and 42% in Africa<sup>(36)</sup>. Similar increments have occurred in many European countries, especially among young people aged 15-24 years<sup>(37)</sup>, and in several countries the number of female smokers has reached or surpassed that of males.

### 2.3 Factors affecting dietary patterns and lifestyles

#### Social, economic and cultural factors

Dietary and lifestyle patterns are affected by social, cultural and economic factors. Individual dietary patterns and lifestyles are largely determined by the culture in which people are raised and the society in which they live. A person's sex, age, and economic and social status influence issues related to intra-household food distribution and other priorities; whether or not people work outside the home and type of occupation; their opportunities to study, social interaction, mobility, marriage; the practice of sports and other leisure activities. Society's attitudes towards unhealthy behaviour, like smoking and alcohol consumption, are also important. Culture is a strong behavioural determinant, for example, religious or personal beliefs related to diet, including preference for or avoidance of certain foods during illness or pregnancy, or the use of foods as a sign of hospitality or status.

It is not easy to modify the eating habits of a population, and some customs, especially those of a religious nature, may never change. Yet it is still frequently possible to overcome cultural barriers. For example, changes in dietary habits have occurred along with the development of agriculture and improved food supply. The industrial revolution radically modified many occupations. The rapid social and economic changes that have occurred during the twentieth century, including urbanization, increased mobility and improved communications, have all contributed to changes in dietary habits. These examples suggest that many of the "cultural" determinants of diet are finally just as much the result of need, opportunity and convenience. This is illustrated by society's acceptance of processed cereals and refined sugar, the increased use of easy- and quick-to-prepare foods, and the growing consumption of processed and semi-processed foods in urban centres everywhere.

Generally speaking, deviations from traditional dietary patterns tend to be accompanied by economic development. Given that the world's population continues to grow exponentially, and this in tandem with increasing urbanization and industrialization, the ways in which foods are produced, stored, processed and marketed have had to be adapted to ensure a steady and adequate food supply. Preserving seasonal surpluses to provide food during cold or lean seasons is critical to maintaining healthy nutrition throughout the year.

Age and sex are important factors influencing child-rearing practices, child and adolescent labour, when young people assume rights and responsibilities in society, and the lifestyle of older people who gradually become less productive, less self-sufficient, or unable to care for themselves.

Social and economic conditions provide the context of opportunities that determine whether and how people are permitted to act. In many societies people of certain lineage, race, religion or social standing are barred from, allowed to participate in, or forced to engage in given activities. In the last three or four decades, advances in education,

communications and trans-cultural contacts, as well as political and economic factors, have produced important social changes with profound effects in some cultures. A major outcome has been greater individual freedom.

### Influence of urbanization on diet and lifestyle

The rapid urban growth now taking place constitutes one of the most radical and rapid social transformations in history. If current urbanization trends continue, by the year 2000 about 45% of the population in developing countries will be living in urban areas, up from 17% in 1950 (Table 4). In absolute terms, this means an increase from about 285 to over 2 250 million people. By then, urban dwellers will outnumber rural dwellers three to one in Latin America<sup>(38)</sup>. In Africa, where most cities were small towns only three decades ago, there will be over 75 cities of more than one million inhabitants. Rural populations will still form the majority in the large Asian countries of China, India and Indonesia, but their urban population is nevertheless growing very rapidly. Thus, by the year 2000 nearly one-third of India's 900 million population will be living in urban areas and of these nearly 100 million will be slum dwellers, while in Asia overall urban population will constitute 35% of the total population<sup>(39)</sup>.

Urban expansion is also affecting the more-developed regions. It is estimated that, between 1950 and the year 2000, rural population will have decreased by about 15 percent, while the number of people in urban areas will more than double. In relative terms, urban population will increase in this half a century from slightly more than 50% to 75%. In many cases, rapid urbanization combined with rapid population increase has led to densely populated cities. The increase in urban population has often far outstripped the development of adequate health-related infrastructure, including basic sanitation, and thus led to increased contamination of both food and water supplies.

On the other hand, cities provide many services that are difficult to obtain or are non-existent in rural areas. These services have a direct impact on human well-being, for example better access to health services, wider availability and variety of foods, better schooling, and more education and information opportunities for promoting healthy lifestyles. Nevertheless, the same city can provide an array of health environments for different groups. The inhabitants of large cities in industrialized countries in general, and urban elites in developing countries, both benefit from improved health facilities, and access to good quality foods and an active healthy lifestyle. But a significant proportion of urban dwellers, especially in developing countries, are poor, and their numbers are growing due to a combination of natural increase and migration from rural areas in search of employment and other opportunities that the urban economy is frequently unable to provide. The result is migrant populations that suffer from a double bind: they rarely have access to urban services and amenities even as they forsake the traditional social support system enjoyed in the countryside.

**Table 4 - Urban population in more-developed regions and less-developed regions in the years 1950, 1985 and projections for 2000**

	Urban Population (Rural)			Urban Population		
	1950	1985	2000	1950	1985	2000
	- millions -			- percent -		
More-developed regions *	448 (384)	841 (334)	946 (318)	54	72	75
Less-developed regions **	286 (1 398)	1 208 (2 479)	2 251 (2 745)	17	33	45
World	734 (1 783)	2 048 (2 803)	3 198 (3 063)	29	42	51

Source: United Nations <sup>(16)</sup>.

\* More-developed regions comprise Northern America, Japan, all regions of Europe, Australia, New Zealand and Union of Soviet Socialist Republics.

\*\* Less-developed regions comprise all regions of Africa, all regions of Latin America, all regions of Asia excluding Japan, Melanesia, Micronesia and Polynesia.

The consequences of low incomes and food insecurity can be worse for poor urban groups than for their rural counterparts. The food choices of the urban poor are limited by economic constraints. They often live in poor housing and unhealthy environments, are exposed to occupational hazards, and may become more sedentary. Poverty in urban centres is associated with increases in infant and child undernutrition, alcohol and drug abuse, poor diets, increased risk of cardiovascular and other chronic diseases, and, paradoxically, obesity among adolescents and adults in some societies.

Analyses of the dietary patterns of urban and rural dwellers in the same country show striking differences<sup>(20)</sup>. There is an almost universal increase in fat and sugar consumption in urban areas compared with the rural communities, where diets are based on such staple crops as cereals, tubers, vegetables and fruits, which are low in fat and high in complex carbohydrates. As urban societies grow and generate money, these dietary changes are often accelerated. The more affluent members tend to adopt diets similar to other affluent communities, partly as a symbol of their newly acquired status.



For example, urbanization in the United Republic of Tanzania and in Zimbabwe over the last 20 years has resulted in three distinct population groups: rural, urban and urban slum-dwellers<sup>(20)</sup>. Residents of urban slums face serious dietary and nutritional inadequacies, and a lack of physical exercise among females who do not work outside the home often results in obesity. In contrast, urban elites have drastically altered their food habits and now tend to have diets which are high in energy, fat and salt. At the same time stroke, coronary heart disease, diabetes, and obesity are increasing in this group. It is thus that the dual problems of undernutrition and overnutrition have emerged in the urban context.

Hypertension and heart disease are already major health problems in many African cities and they are causing increasing concern in Asia. The prevalence of high blood pressure in both men and women is at least four times as high in urban as in rural areas of Ghana<sup>(40)</sup>. Mauritius is frequently cited as an example of a developing country undergoing a rapid, often wrenching, economic and social transition<sup>(20)</sup>. Concurrently, non-communicable diseases have become the country's main health problem. Coronary heart disease death rates have doubled and breast cancer among women has tripled since 1960.

Most people who live in cities can no longer rely on the primary products of agriculture and fisheries for their food supply. Their diets are increasingly supplemented by a range of industrially processed foods. Processing food increases its shelf life, improves safety, permits easier distribution over a wide area, and improves its quality and variety. Provided that the products are of good quality and taken as part of a mixed diet, they are generally a benefit to the development process.

Changes in society such as the increasing involvement of women in the work force have meant that meals eaten outside the home are often the main meal of the day. It seems likely that the importance of catering in this context will continue to grow in the future in many countries. Consequently the need to ensure that foods sold and served are of high quality and are safe, particularly as the non-formal sector, including street vendors, expands to meet increasing urban food demands.

### **III. STRATEGIES AND ACTIONS**

#### **3.1 Priority concerns in developed and developing countries**

The incidence of infectious diseases and nutritional deficiencies are major concerns in most developing countries and particularly among vulnerable groups, such as children, pregnant women and the elderly. In developed countries, as well as in some developing countries, problems related to excessive and unbalanced intakes also affect certain sectors of the population and some are emerging as important public health issues. Problems of under- and over-nutrition coexist throughout the world, even if they differ in developed and developing countries in terms of their relative importance and the strategies required to prevent or eliminate them.

Formulating and implementing policies related to nutritional deficiency diseases may be difficult in developing countries with social and economic problems or political instability. Correcting undernutrition requires combatting poverty, increasing food production and availability, preventing communicable diseases, and undertaking a series of social changes, in addition to education, information and legislation. In contrast, prevention of diet-related chronic diseases depends largely on educating and informing the public, and motivating people to change their habits and lifestyles, including their attitudes towards diet, smoking, leisure-time physical activity, and environmental protection, in addition to the availability of means to implement dietary recommendations. Paradoxically, some countries without adequate public health policies, for example to reduce infant malnutrition, do have the financial and technical resources that would allow them to embark on a preventive programme where non-communicable diseases are concerned<sup>(19)</sup>. Despite the cost and complexities, the prevention and control of undernutrition has first priority, even as adequately planned nutrition policies and programmes simultaneously incorporate the measures that are required to discourage unbalanced and excessive dietary intakes.

The development and implementation of policies to improve food supplies and nutrition require the participation of all government sectors and the lasting support of the highest decision-making levels. The private sector, particularly the food industry, agriculture and farmers' organizations, also needs to be involved, together with universities, and consumer and other non-governmental organizations concerned with health and social development. The related scientific and public service communities should provide required technical and operational assistance. A final key element for this multisectoral and multidisciplinary approach is the acceptance of the policies by the general population and the population's involvement in implementing, improving and upholding them. It is thus of utmost importance to include the mass media, and community leaders and representatives in this process.

### 3.2 Measures to promote appropriate diets and healthy lifestyles

#### Policies to improve food and nutrition

A distinction should be made between specific policies relating to nutrition, food production, or food security, and an integrated policy for food and nutrition. The immediate goal is the integration of nutrition objectives into different national sectoral strategies. The policies may relate directly to the specific nutrient intakes of populations as a whole, or of sub-sections of those populations. The immediate goal of a food production policy is to make food available to meet the demands of the population, to generate income and, in many cases, to provide foreign exchange generated through international trade. At the household level, food security aims to guarantee all families access to food. This implies that both the availability of foods and the purchasing capacity of the population are assured.

The objective of preventing diet-related non-communicable disease has introduced a new urgency to link the wider range of nutrition concerns with policies affecting food supply and demand. In a free society, changes in food supply occur in reaction to changes in consumer demand. Policies should be geared to promoting demand for, and provision of, quality foods in the quantities needed to promote and sustain nutritional well-being and health, and to reduce the risk of developing diet-related diseases.

Policies to improve nutrition and food supplies were formulated in many developed countries more than 50 years ago when there was concern about the quantity and quality of the diet being consumed by the general public<sup>(20)</sup>. With the discovery of vitamins, the importance of protein, and the role of minerals and other micronutrients, it was important to ensure that diets are varied and well balanced. The consumption of only a limited range of foods is more likely to lead to a deficiency state since few individual foods are rich sources of all nutrients.

The relatively recent understanding of the need to prevent chronic diseases through improved dietary habits is beginning to emerge as an issue in agricultural policy in some developed countries, and has not yet been considered fully by agricultural economists and planners in the developing countries. Since the nutrition objectives of preventing both deficiency and chronic diet-related diseases have important implications for the economics of farming, governmental, industrial and social policies, and international trade, it will inevitably take time for entrenched attitudes to change and coherent policies and programmes to emerge.

Policies to improve nutritional well-being in developing countries have focused primarily on food production, the control of communicable diseases, food quality and safety, and education. In disaster-prone areas especially, the main focus has been necessarily on maintaining national food availability. It is only in countries where sufficient food is available for all that other strategies have been designed for equitable distribution. Table 5 summarizes the emphasis given in formulating food policies in 21 developing countries. It is interesting to note that none of the policies had a specific nutrition objective, and most policies were dominated by issues of producer welfare and self-sufficiency.

Many governments are now becoming aware of the need to ensure the nutritional quality of the diet as well as its microbiological and toxicological safety. Nutritional quality is also seen to be important for agricultural exports from developing countries. This is partly because of the scale of economic dependency that many countries have on the revenue earned from food exports, but also because in developing countries themselves there are different causes of concern for the health of urban populations as diet-related chronic diseases become a more serious public health problem.

*Promoting appropriate diets and healthy lifestyles*  
*Theme paper No. 5*

**Table 5 - Government food policy objectives for 21 developing countries**

Country	Consumer welfare	Producer welfare	Govt. revenue	Foreign exchange	Self-sufficiency	Stable prices	Food security	Specific nutrition objective +
<b>Africa</b>								
Botswana		x			x		x	
Kenya		x		x	x		x	
Mali		x			x	x		
Morocco					x			
Nigeria		x			x			
Senegal		x			x			
Sudan		x		x	x			
Tanzania					x			
<b>Asia</b>								
Bangladesh	x	x		x	x	x	x	
India	x	x			x	x	x	
Indonesia	x	x			x	x	x	
Philipp.		x			x	x	x	
Sri Lanka	x	x			x	x	x	
Thailand	x	x	x	x		x		
<b>Latin Am.</b>								
Brazil	x			x	x			
Dom. Rep.	x			x	x			
Guatemala	x	x	x	x	x	x		
Haiti		x				x		
Jamaica		x						
Paraguay		x		x				
Peru	x	x					x	

\* Source: WHO, 1990 <sup>(20)</sup>

+ no specific nutrition objectives were identified.

x indicates that this type of objective is specified.

When policy objectives to improve nutrition have been determined at the general level, strategies and actions implemented have included:

- nutrition education and dietary guidance for the general public;
- training of professionals in health care, agriculture extension, and related services;
- development of food-service guidelines;
- involvement of consumer groups and the food industry;
- ensuring food quality and safety;
- monitoring and evaluation of national food and nutrition situations; and
- encourage the availability of the variety of foods needed to meet consumer demand.

#### Nutrient goals and dietary guidelines

To encourage and promote overall health, official nutrient goals and dietary recommendations have been issued by government agencies in different countries and by various national and international panels of experts. Traditionally, recommendations have focused on adequate and safe intakes to avoid deficiencies and to ensure that energy is adequate for the needs of nearly all adults, and for the growth, development and activity of nearly all children. More recently, however, dietary recommendations and guidelines reflect growing concern about diet-related non-communicable diseases and frequently include recommendations for intakes of those dietary components that are associated with risk of these diseases.

In many countries dietary guidelines have been regularly issued following scientific reviews of diet-health relationships. The guidelines provide advice, appropriate for the populations concerned, on selecting a balanced diet that promotes health. Even if numerical recommendations vary somewhat, the basic goals are quite similar in most developed countries. They include the following principles:

- adjust energy intake to energy expenditure to avoid obesity;
- avoid excessive fat intakes and, especially, intake of saturated fat and cholesterol;
- increase intake of complex carbohydrates and dietary fibre and limit sugar intake to moderate levels;

- limit salt intake to a moderate level;
- limit alcohol intake.

Dietary guidelines sometimes include food goals expressed in general terms. A population's food supply, ecological, economic, social and cultural characteristics, should be considered when developing food goals and therefore one set of goals will not apply universally.

In addition to qualitative dietary guidelines, quantitative nutrient goals have been proposed in some countries. The WHO Study Group (1990) has recommended population nutrient goals, that is the upper and lower limits within which average nutrient intakes within countries and communities should fall in order to promote healthy nutrition. The Group envisaged population goals as a general planning tool that relates to the kind, quantity and quality of food produced, imported and consumed, and as one that can be used to determine whether the social communication means employed have in fact been successful in bringing consumption within the desired range.

An important characteristic of dietary guidelines is that they become the guiding principles of nutrition advice provided to the public. This helps to ensure that consistent and scientifically sound messages are given, which can be supported through the mass media, food advertising, and in practice through public feeding, including mass catering and food assistance programmes. Development of related nutrition education materials adapted for particular populations, including low-income groups, will encourage their acceptance.

### Food and nutrition labelling

The use and interpretation of food labelling plays an important role in the education and information strategies for promoting healthy diets. The recommendations of the FAO/WHO Codex Alimentarius Commission, and legislation that has been approved in several countries on this basis, are designed to provide this basic information to consumers, while protecting against untruthful claims by food manufacturers and vendors. The minimum requirement for food labelling typically informs consumers of the name of the product, its ingredients, net contents, and the name and address of the manufacturer or distributor, and an appropriate date-code for consumer use.

Nutrient content information provided on the food label can provide support for implementing dietary guidelines in assisting the public to select a healthy diet. The Codex Alimentarius includes recommended guidelines on nutrition labelling, which apply to all pre-packaged foods and foods used for catering purposes. It is suggested that a declaration of nutrient content be mandatory if nutrient claims are made on the food label. Generally speaking, amounts of nutrients including energy, protein, fat, carbohydrate and selected vitamins and minerals, as well as such dietary components as cholesterol and dietary fibre, are listed in quantitative terms. Recently emphasis has been placed on simplifying nutrition

labelling to include only those nutrients or dietary components that have public health significance, with more emphasis placed on those that are related to diet-related non-communicable diseases.

Many countries have begun to follow Codex recommendations in trying to make nutrition labelling on food products more informative for consumers. Presentation of nutrient information should take into consideration the consumers' level of understanding of information presented on food labels given the limited space available. The need to address the nutritional quality of a single food relative to the importance of the total diet is also important. Consumer surveys indicate increased interest in nutrient content and the need for a simpler format. Considerable research is now underway to examine various nutrition label formats to determine those that are best understood by consumers.

In conjunction with dietary guidelines and certain diet-health concerns, nutrition claims or descriptors on food labels which describe properties of foods, e.g. "low fat" "reduced in calories", are gaining popularity. To encourage uniform use of such terms, Codex Alimentarius standards exist for describing low-calorie foods, while other descriptors are also being prepared. Enforcement of the uniform use of descriptors has been proposed in some countries and will be important to help consumers and to encourage producers to supply products that meet such criteria. In addition, health claims on food labels making specific disease-related statements based on the nutrient content of food products are specifically regulated in some countries. The US Food and Drug Administration, for example, has recently proposed that selected claims be allowed on food labels provided that sufficient scientific evidence exists to support them.

#### Education and communication

Education at all levels plays a key role in promoting healthy diets and lifestyles. A plethora of well-conceived manuals, books and other documents have been published on nutrition education for populations of varying cultural, social and economic backgrounds. In making use of these materials, it is recommended that the following points be taken into consideration in order to increase their usefulness:

- The public should perceive, and identify with, the importance of appropriate diets and healthy lifestyles.
- Messages should be simple and practical, and instructions should be easy to follow.
- The proposed measures should be within a population's economic and material possibilities.
- Teaching techniques should be consistent with a target population's education and culture.

- Suggested changes should be compatible with a population's beliefs. If not, other actions and strategies should be used to gain people's acceptance, including demonstration projects, involvement of influential local people, or modifications of original suggestions.
- Community involvement and commitment should be sought at various levels, such as neighbourhood organizations (including various food-service establishments and street vendors), community leaders, school teachers, students, parents, and consumer groups.
- The credibility of guidelines should be enhanced by preparing, publishing or distributing them through prestigious persons and institutions.

The contents and emphasis of educational messages will vary in rural and urban areas, and according to differences in lifestyle, culture and access to natural or processed foods. The most effective education and public information channels will also vary, since rural people live in more scattered areas or in small clusters, and illiteracy is more common than in urban centres, especially in developing countries. Thus, there is a need for careful planning of all educational interventions aimed at promoting healthy behaviours and lifestyles, including healthy diets. Situation analysis of sound educational diagnosis are essential for identifying target groups, educational objectives, strategies, methods and resources within the local, political, economical and social contexts.

The goal of nutrition communication efforts is to change specific dietary behaviours that contribute to poor health<sup>(41)</sup>. Evidence from a number of developing countries indicates that well-executed nutrition communication campaigns can change knowledge and attitudes and alter behaviours resulting in improvements in nutritional status<sup>(42)</sup>. The majority of nutrition communication projects in developing countries have sought to influence the behaviour of consumers and care-givers, typically mothers of small children and pregnant women, and have addressed promotion of adequate weaning-age feeding and breast-feeding and increase of vitamin A consumption. Although little analysis has been done on comparable costs among nutrition programmes, available evidence indicates that nutrition communication compares favourably with other nutrition interventions where cost-effectiveness is concerned.

While there is considerable evidence that nutrition communication works, programme evaluations also demonstrate that not all education interventions are successful. Over the past two decades, a consensus has developed among professionals who use communication to change behaviour. The importance of systematic planning is emphasized. While many terms are used to describe the process - communication, social marketing, education, development support communication - there is general agreement about the need for an approach that is based solidly on audience research, on messages that are targeted to specific groups, on an understanding of the limits of behavioural objectives, and on the importance of coordination with service delivery and available resources.



Maintaining nutrition communication programmes over a long period is essential to sustaining meaningful, lasting behavioural change. The evaluation of communication projects over time strongly supports the need for a long-term intensive effort. The few available studies in the nutrition field indicate that continual communication initiatives are needed. The Brazil breast-feeding campaign is an example of a highly successful intervention that was discontinued on the assumption that it was no longer needed. Three years after the campaign ended breast-feeding rates returned to their pre-campaign level.

### 3.3 The role of various sectors in promoting appropriate diets and healthy lifestyles

#### The public sector

The health sector bears a major responsibility for promoting healthy diets and lifestyles. Thus, health professionals require an orientation to educating the general public that includes knowledge, training, and skills related to other fields than their own in order to promote appropriate intersectoral action.

Promoting healthy diets and lifestyles can be part of health workers' routine activities when they interact with the people who seek their services. In addition to advice about health and nutrition, they can provide guidance on a variety of other health-related issues, including improvements in and around their homes (e.g. garbage and excreta disposal, protection of water and air), management of resources in conditions of scarcity, rational use of diets (e.g. food preservation, intra-household food distribution, combining foods for a balanced diet), the correct interpretation of dietary guidelines, and the importance of exercise.

The school system has responsibilities that are directed primarily towards children and adolescents, but health education initiatives can also have a positive impact on adults. Nutrition education should become an integral part of a comprehensive school health education programme, which reaches youth and school-age children both in and out of the school setting. The availability of relevant school curricula on nutrition, teacher training, production of pertinent educational materials, influencing school environment to promote healthy diet (e.g. school/community gardens, food safety in the community) and cooperation between school, parents, community and health and social services are essential elements of nutrition education programmes.

School teachers have to be oriented and provided the means to teach such topics as the role of diets in health, preparing and combining foods for a healthy and tasty diet, avoiding tobacco, alcohol and drugs, treating addiction, risks associated with weight-reducing diets and food fads, preventing obesity, preventing sexually-transmitted and other communicable diseases, and the importance of a clean environment and regular exercise and sports. These issues should not only be included in the school curricula for formal teaching, but should also be part of non-formal activities that promote healthy habits, such as daily physical exercise and personal hygiene.

Many developed and developing countries have found that professionals like doctors, nurses, teachers, and agricultural extension and other community workers are uncertain about their role in preventing diet-related chronic diseases because their training has not prepared them for this task. Both basic and in-service training is an essential component of any overall strategy to improve the nutrition knowledge of health-care personnel.

Good nutrition can be promoted at work sites by subsidizing meals or encouraging the sale of appropriate foods in cafeterias and other food outlets. In addition to being of direct benefit to workers, these and other practices, such as sponsoring or encouraging sports teams and exercise facilities, prohibiting the use of tobacco, and providing a clean environment and safe working conditions, all support healthy lifestyles among workers.

### Mass media and influence of advertising

Local and national mass media play a major role in nutrition and health promotion<sup>(20)</sup>. Their complete involvement should be ensured by including media leaders in the early stages of programme development. Representatives of the mass media can make important contributions from the early planning phase, and they should work from the outset alongside government officials and experts in health, nutrition, agriculture and education. By learning more about the importance of particular diets and lifestyles and about the ways these interventions spread from one social stratum to another<sup>(43)</sup>, media representatives will also be in a better position to influence their colleagues about conveying balanced messages to the public when commercial interests are promoting unsuitable products such as cigarettes or alcoholic beverages, or advocating unhealthy diets and lifestyles.

The development and production of educational materials suitable for mass media presentation should conform to well-established principles<sup>(44)</sup>. The skills of mass media experts should be used for this purpose, and to assess the best ways to amplify community action. Based on experience, it is possible to make the following generalizations about nutrition communication:

- specific, action-related behaviour has the best chance of being adopted;
- sustained efforts are required to achieve success;
- frequent, direct message exposure is essential;
- in-depth research may be needed to build an effective communications strategy;
- identifying and reaching appropriate target audiences are critical;
- understanding consumer preferences is key to designing effective nutrition communication campaigns.

Commercial advertising and marketing does not always pursue the best health interests of the community, and this may create conflict with mass media executives. Some countries have legislation to protect consumers and to ensure truth in advertising. However, in most countries, for example, claims can be made that a product contains vitamins and minerals when, in fact, the contents are so low that very large amounts of a product would have to be consumed to make the claim nutritionally meaningful. More dangerous and damaging still is the promotion of tobacco products and alcoholic beverages via advertising that projects images of happiness, success, maturity and well-being to actual and potential users. Such advertising has a particularly strong influence on children and adolescents, and on others who see these products as symbols of sophistication and prestige.

There is no simple solution to counteracting the undesirable influences of mass media and commercial approaches. The removal of cigarette advertising from television in some countries and a total ban on advertising in some others, together with aggressive educational campaigns, seems to have contributed to a reduction in smoking among adults. Legislation to this and similar effect, including adequate sanctions, may prove useful in some countries, but loopholes and alternative promotional means are usually found to bypass mandatory action. Increasing public awareness and voluntary actions by mass media and the commercial sector may thus be among the most effective means of enhancing the impact and observance of legislation.

In recent decades, effective approaches to encourage behaviour changes to improve nutrition have been developed<sup>(38-44)</sup>. These approaches incorporate into campaigns useful education strategies borrowed from mass communication, including social marketing, and the entertainment industry. There is conclusive evidence that nutrition communication can impart beneficial facts, develop necessary skills, and motivate people to make difficult changes in their lifestyles. Programmes that have adopted the new approach have had a positive impact on nutritional status, even among low-income groups.

### The food industry

The important role of the food industry in promoting healthy diets lies mainly in the development of a variety of foods that can contribute to a healthy diet. Good examples are low-fat milk products, low-fat spreads, lean meats and sausages, and whole-grain breads. It is clear that the food industry can and will respond to consumer demands for foods which better meet nutritional guidelines. The role of the nutritional and health education community in providing appropriate messages to create this demand is important.

A growing proportion of farm output is processed by the food industry before it is purchased by consumers. This is an obvious necessity given the numbers of people living in urban areas and working in industrial or office settings; and the overall growth in world population and the need to preserve food surpluses, process foods into more convenient forms, and promote better marketing. For instance in the United Kingdom, the proportion of farm output processed by the food industry is estimated at 75-80%<sup>(45)</sup>. The power to

determine what is produced lies eventually with the consumer or the purchaser. To some extent this has always been so, but the trend will certainly be strengthened in the future. This is probably the main way in which changes in dietary preferences will influence production.

In an effort to reduce fat intake, consumer demand for leaner meats and low-fat milk products has altered both the production and marketing of these products. For example in Finland, nearly two-thirds of the population use low-fat or fat-free milk. Nutrition and community health education play an important role in providing appropriate messages to create this demand<sup>(46)</sup>. In addition, providing information on the various forms in which fat may appear in the diet, including so-called "invisible fat" contained, for example, in baked goods, biscuits, cakes, or in sauces and dressings, is important to assist consumers in making wiser food choices.

#### Food services (catering)

Many school children, commerce and factory workers, and other people who spend part of their day away from home, each day eat at least one main meal and several snacks that are prepared outside the home. For example in Finland it has been estimated that almost half of the population eats at least one meal a day outside the home<sup>(46)</sup>. Increases in the number of meals eaten outside the home have led to a large growth of the food-service industry, particularly in urban centres. Consequently producers and providers of food services play an important role in promoting healthy diets. Due to their popularity and widespread use, with proper guidance, legislation and supervision, food services can be useful in promoting adequate diets and other aspects of healthy lifestyles.

One of the oldest established school lunch programmes began in Japan over a hundred years ago. The programme was greatly improved after 1954 when the School Lunch Law was passed to include all primary-school students. In 1956 this service was broadened to include junior high schools. At present, 98% of primary-school and 85% of junior-high-school students eat a meal provided by their institutions. Surveys have shown that carefully planned school meals have improved the diet of school children.

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

Many actions can be carried out to promote and maintain healthy diets and lifestyles and they should be developed and applied both locally and nationally. Actions should be taken at the international level to provide policy guidance for adaptation and implementation in countries. For this purpose, coordinated efforts are necessary with a strong involvement of regional and global programmes and organizations, including FAO and WHO, and other United Nations and bilateral-aid agencies, as well as non-governmental organizations that are interested in health, nutrition and human development; consumers; and the private sector, especially international and transnational food manufacturers and traders, and the advertising

media. International and national policies, programmes and advice should be based on sound scientific evidence and judgement to ensure that activities are effective and can be sustained over time.

The essence of promoting better dietary habits and healthier lifestyles should be nutrition education of the public at all levels, and of professionals who have the responsibility to carry out such education.

Actions to be taken may also need to be legislated and regulated at local and national level, but they will be more effective if they are voluntarily accepted and applied. This requires adequate promotion and information to have the general public demand and accept appropriate measures, to convince authorities and policy-makers, to influence investigators' efforts and priorities, and to guide the actions of international organizations.

#### 4.1 Conclusions from lessons learned

Several conclusions can be drawn from past experience:

1. Efforts to improve dietary patterns require close cooperation between government, and agriculture, health, education and trade agencies; consumers and consumer organizations; food producers, processors and marketers; and all levels of the educational system.
2. Government policies affecting food production, processing, distribution, and sales, are often based on considerations that do not include attention to healthy diets. As such, they may be an impediment to dietary change and health promotion.
3. Few health departments have an effective working relationship with such sectors as agriculture, food processing, policies for better education, trade, and finance that is required for the introduction of integrated policies that promote better food supplies and nutrition.
4. With few exceptions, low priority has been given to the non-dietary promotion of healthy lifestyles, such as physical activity, stress reduction, improvement of working conditions and the environment, combating alcohol abuse or, in many countries, the use of tobacco.
5. Social and economic policies that give high priority to agriculture, general and nutrition education, and access to health services, have a positive impact on food availability and control of undernutrition. Policies have an impact only if they are sustained over time, which often implies support by successive governments. Preventive measures should also be given priority in anticipation of the effects that dietary and lifestyle changes may have on the incidence of chronic diseases.

6. Major changes in dietary behaviour or lifestyles are often not given adequate attention by the medical profession. Indeed, the medical profession and health workers often lag behind public demand for health-promoting measures. Nevertheless, their knowledge, understanding and promotion of new concepts in healthy nutrition and behaviour provide an important stimulus for community change.
7. In some societies, populations with access to effective health care may be more inclined to rely on medical advice and less likely to initiate behavioural changes themselves. In contrast, the greater consumers' sense of responsibility for their own health is, the faster the speed of behavioural change in relation to, for example, diet, smoking and exercise.
8. The most successful health-education campaigns are based on simple and easily understood measures which are integrated into school curricula, extension programmes, mass media, adult education, etc.
9. In developing countries, the need to formulate integrated policies for food and nutrition that are appropriate for preventing diet-related non-communicable diseases should receive high priority.

#### 4.2 Messages to national governments

All governments should:

- ensure an adequate and safe supply of food that can be made available to all segments of the population;
- recognize the relationship between the changes in a population's diet and lifestyle that tend to be associated with economic development, and the impact these changes are likely to have on health and their consequences for overall development;
- recognize that it is desirable and possible to develop appropriate dietary guidelines in keeping with economic development that both maximizes health benefits and minimizes health risks;
- recognize that it is desirable and possible to encourage behaviour that has beneficial effects, such as promoting physical activity and discouraging smoking and alcohol abuse;
- develop or adjust food, agricultural, educational and intersectoral health policies based on nutrition and the pursuit of healthy lifestyles. They should be physiologically sound, politically viable, economically feasible, and culturally acceptable;
- promote the participation of non-governmental organizations and the community at large in generating and implementing these policies in order to influence favourably

the production, processing and marketing of foods that are conducive to health, and to increase public awareness of the relationship between diet, lifestyles and health;

recognize that the precise mechanisms by which the tasks of nutrition education and behaviour modification are approached will vary from country to country. However in all cases decision-makers should:

- (a) give high priority and adequate resources to nutrition communication;
- (b) link nutrition interventions to other health and socio-economic development programmes;
- (c) concentrate on a limited number of areas where a major nutritional impact can be achieved;
- (d) enlist the help of universities, advertising agencies, the food-processing industry, and other groups having appropriate expertise;
- (e) ensure that nutrition communication is continued on a long-term basis, and that its effectiveness is regularly monitored.

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**PREVENTING SPECIFIC MICRONUTRIENT DEFICIENCIES**

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## SUMMARY

Micronutrient malnutrition is the term now commonly used when referring to the three main vitamin or mineral nutritional deficiencies of public health significance - iodine deficiency disorders (IDD), vitamin A deficiency and iron deficiency anaemia. Micronutrient deficiencies substantially affect the nutritional status, health and development of a significant percentage of the population in many countries, both developed and developing. Deficiencies in these micronutrients contribute to growth retardation, morbidity, mortality, brain damage, and reduced cognitive and working capacities among both children and adults.

The main causes of micronutrient malnutrition are inadequate intake of foods providing these micronutrients and their impaired absorption or utilization. For iodine, this is largely due to environmental iodine deficiency. For vitamin A and iron, this is often associated with infections that can increase the metabolic consumption of micronutrients or that can reduce their absorption.

Iodine deficiency is a major risk factor for both the physical and mental development of at least 1 000 million people living in iodine deficient environments around the world. Goitre is the most common manifestation of IDD, affecting 200 million people. Individuals of all ages living in iodine deficient areas are at risk of IDD. In pregnancy, iodine deficiency causes spontaneous abortions, stillbirths, impaired foetal brain development and infant deaths. In childhood, iodine deficiency can also cause mental retardation, neurological complications such as speech and hearing defects, squint, paralysis, and other physical disorders. Worldwide, it is estimated that some 20 million people have some degree of brain damage due to iodine deficiency, including 6 million afflicted by the severest form, cretinism. While the more severe effects of IDD are not reversible, they are preventable.

Vitamin A deficiency is the most common cause of preventable childhood blindness. As a result of insufficient dietary intake and absorption of vitamin A, or its impaired utilization, nearly 13 million pre-school age children suffer severe forms of eye damage. At least 500 000 of these children become either partially or totally blind each year, and of these, approximately two-thirds die a few months after becoming blind. Currently, vitamin A deficiency is a serious public health problem in Africa, Southeast Asia and the Western Pacific. Vitamin A deficiency can also contribute to decreased physical growth and impaired resistance to infection and lead to increased mortality in children.

Iron and folate deficiency are responsible for anaemia in approximately 1 000 million people worldwide while another 1 000 million are iron deficient, having deficient body iron stores but without frank anaemia. This is due not only to diets with insufficient iron content, but also to reduced bio-availability of dietary iron, increased requirements and losses due to parasitic infections. Africa and Asia are the regions with the highest prevalence, followed by Latin America and East Asia. The prevalence of iron deficiency anaemia reaches approximately 40%-60% among many population groups with pregnant women and pre-school children being the most affected. Anaemia has serious effects on women's health and contributes to intrauterine growth retardation, low birth weight and increased maternal and perinatal mortality. Iron deficiency in infancy and childhood is associated with significant loss of cognitive abilities, and also impairs ability to resist disease. Iron deficiency anaemia also reduces work capacity, with adverse effects on productivity and earnings.

Various strategies and interventions are feasible to address micronutrient deficiencies. These include dietary diversification, food fortification, supplementation and public health and other general control measures. Each of these strategies is likely to play some role in most countries, but the appropriateness of each needs to be determined at country level. Successful programmes for prevention have to date been most notable for IDD, and to a lesser extent for vitamin A deficiency and anaemia. Better planning and targeting of interventions could generally be possible following an assessment of the magnitude and severity of the problems. This assessment should identify the population groups and the geographical zones within each country that are affected by or at risk of each deficiency.

The basic strategy for preventing micronutrient deficiencies centres on increasing the availability and consumption of micronutrient-rich foods. Food production, processing and preservation activities are part of this strategy. The main advantages to this coupled with nutrition education are its long-term sustainability and cost effectiveness, its ability to correct multiple micronutrient deficiencies simultaneously, and its contribution to people's self-reliance. This approach is relatively less applicable for IDD, but more feasible for iron and especially valuable for vitamin A.

Food fortification is another successful method for reducing micronutrient deficiencies. Fortification of salt with iodine has proved, in many countries, to be the best solution for reducing IDD. As a result of salt fortification, iodine deficiency has already been eliminated in 18 countries, one of the best records of success for addressing any of the micronutrient deficiencies. Fortification of salt with iron has been successfully implemented in the control of anaemia, and fortification of sugar with vitamin A has obtained positive results in Latin America. Many other vehicles have been identified as suitable carriers for micronutrients, including water for iodine, milk and margarine for vitamin A,

monosodium glutamate for vitamin A and iron, and wheat and rice for iron. The main difficulties with food fortification activities, although cost-effective, are related to technical and distribution problems, the necessity of adequate legislation and the need for an effective system for controlling and fortification process. Governments and the food industry need to work together to reduce costs and ensure product quality.

Micronutrient supplementation should, in general, be regarded as a short-term measure to be used until more sustainable food-based approaches are implemented and become effective. Supplementation efforts have met with varying degrees of success. Distribution of vitamin A capsules can be effective in preventing eye damage and may be relatively inexpensive to undertake in countries with well-established health care systems. Iron tablets frequently are distributed to women through health centres and maternity clinics, but often with limited success due to problems of compliance. Iodine oil distribution campaigns in high at-risk areas which are difficult to reach by other methods have been successfully attempted in various countries, but often at a higher cost than if iodized salt is used. The disadvantages of these interventions, in addition to their unsustainability over the medium and long term, are the low percentage of population covered, the lack of capsules, tablets and injectable oils in the areas at risk, the monitoring of such programmes, the difficulty of reaching the populations most in need, the insufficient training of health workers and in the case of injectable iodine, the risk of HIV and hepatitis infections due to the use of non-sterilized syringes.

Public health measures provide necessary support for the above approaches. These include the prevention of infections through environmental health programmes, such as water quality, sanitation, and food hygiene, and others such as immunization, control of endemic diseases, MCH, essential drugs and all primary health care programmes.

Reaching these goals will require action at several levels, and cooperation among governments, non-governmental organizations, the private sector, international organizations and communities.



## I. BACKGROUND

### 1.1 Historical perspective<sup>1</sup>

Micronutrient malnutrition is the term now commonly used when referring to the three main vitamin or mineral nutritional deficiencies of public health significance - iodine deficiency disorders, vitamin A deficiency and iron deficiency anaemia. Although some of the obvious clinical manifestations of the deficiencies, such as goitre, night-blindness and pallor, have been recognized for thousands of years and can be found in records in ancient Chinese, Hindu, Greek and Roman literature, it has only been in the last 60-70 years that nutrition scientists have studied and recognized the fundamental role of iodine, vitamin A and iron in human health. Indeed, it has been only in the past decade that a realistic picture has emerged both of the broad spectrum of disability, morbidity and mortality, and of the vast global dimensions of millions affected by these forms of malnutrition.

This theme paper exclusively addresses these three deficiencies, for although there are also a number of other significant micronutrient disorders and syndromes resulting from either deficiency, excess or interference of other specific micronutrients, such as vitamin C, thiamine, niacin, fluorine, zinc, selenium, copper and several others - none of these approaches the enormous public health importance nor the growing international concern relating to iodine, vitamin A and iron.

From their inception, the Food and Agriculture Organization and the World Health Organization of the United Nations have been active in establishing the scientific basis for control of iodine, vitamin A and iron deficiencies, formulating standards, guidelines, methodology and strategies and, in collaboration with Member States and other international and bilateral organizations, promoting the development of effective sustainable national control programmes.

Other endeavours at international level have been gaining momentum, particularly over the past decade. The International Vitamin A Consultative Group (IVACG), the International Nutritional Anaemia Consultative Group (INACG) and the International Council for Control of Iodine Deficiency Disorders (ICCIDD) have convened a series of global and regional meetings mostly in collaboration with FAO, UNICEF and WHO and helped to stimulate a good deal of action at country level. Under the auspices of these organizations, much necessary applied research has been carried out. Many countries in Africa, South-East Asia and other regions have already declared their resolve to control or eliminate iodine deficiency disorders, vitamin A deficiency and nutritional anaemia.

This growing global movement, comprising accelerating national programmes reinforced by increasing international support aim at overcoming micronutrient malnutrition, has been most effective for iodine deficiency disorders, to a lesser extent for vitamin A

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<sup>1</sup> This paper is an expanded version of the WHO Technical Document (A 45/17) presented at the 1992 World Health Assembly, and entitled National Strategies for Overcoming Micronutrient Malnutrition.

deficiency, and to some extent for iron deficiency. Amongst the most notable achievements have been (a) the visible strengthening of national micronutrient control programmes in many countries; (b) a measurable decline in micronutrient malnutrition in some countries.

Recognizing the possibilities created by this global movement to eliminate or control micronutrient deficiencies, WHO and UNICEF jointly adopted new goals for the 1990s aimed at the elimination of iodine deficiency disorders and vitamin A deficiency and substantial control of iron deficiency anaemia. The World Summit for Children, convened in New York in September 1990 and attended by 71 Heads of State and senior policy-makers from 80 other countries, endorsed these goals and adopted a declaration and a plan of action calling for the realization of the following goals by the year 2000:

- Virtual elimination of Iodine Deficiency Disorders as a public health problem.
- Virtual elimination of Vitamin A Deficiency and its consequences including blindness.
- Reduction by one-third of 1990 levels of Iron Deficiency Anaemia among women of child-bearing age.

An historic conference, "Ending Hidden Hunger: A Policy Conference on Micronutrient Malnutrition", was convened by WHO and UNICEF in Montreal from 10 to 12 October 1991. It brought together over 300 people - ministers, policy-leaders and scientists - from 55 countries, and representatives of over 50 intergovernmental, bilateral and nongovernmental organizations actively interested in collaborating to overcome micronutrient malnutrition. It was supported by FAO, WHO, UNICEF, UNDP, the World Bank and the international development agencies of Canada and the USA, and was assigned inter alia the objective of exploring ways to accelerate progress towards the goals of elimination of micronutrient malnutrition that had been endorsed by the World Summit for Children.

With this visibly growing worldwide effort, accelerated action and enhanced funding possibilities from governments of affected countries, international, bilateral and non-governmental organizations, all actively interested in collaborating to overcome micronutrient malnutrition, there is an urgent need for guidance to countries on how to choose appropriate sustainable strategies for permanently overcoming micronutrient malnutrition.

## 1.2 Magnitude, Causes and Consequences of the Problem

Iodine deficiency disorders: In brief, it is estimated that over one thousand million persons live in areas at risk of iodine deficiency, while 200 million have goitre and 26 million are mentally retarded as a result of the deficiency. This includes 6 million cretins. The affected persons are distributed in 95 countries and their Regional distribution is shown in Table 1.

Vitamin A deficiency: At least 40 million preschool children are vitamin A deficient, of whom 13 million already have some eye damage. Every year 0.25 to 0.5 million preschool children go blind, partially or totally, from vitamin A deficiency. It is estimated

that almost two-thirds of these children die within a few months of going blind. The number of preschool children living in areas where vitamin A deficiency and its consequences (blindness, increased mortality, decreased immunity) occur is estimated to be around 190 million, in 37 countries. Half of these countries are in Africa, but because of the larger population in affected Asian countries, two-thirds of vitamin A deficient children are found in South-East Asia.

Anaemia: This condition, which is the main direct result of iron deficiency, has in fact multiple causes that are reviewed below; and often two or more factors contribute to anaemia in a given subject. Prevalence survey and surveillance data usually do not distinguish between different causal factors. It has been estimated globally that about one half of all anaemia is due to iron deficiency. However, subclinical iron deficiency, low body-iron stores without frank anaemia, is often as widespread as iron deficiency with anaemia.

Data collected indicate that a total of 2 150 million people worldwide (Table 1) are anaemic or iron deficient, according to WHO criteria used to define a public health problem (Table 3). Prevalence rates are higher in developing than in industrialized countries but in the latter still reach levels of public health significance (above 10%) in pregnant women. The most affected groups, in approximate descending order, are pregnant women, preschool-age children, low-birth-weight infants, other women, the elderly, school-age children and adult men. In developing countries, prevalence rates in pregnant women are commonly in the range of 40% to 60%; among other women, 20% to 40%; and in school-age children and adult men, around 20%.

In short, about one thousand million people are at risk of iodine deficiency disorders; 190 million children of preschool-age are at risk of vitamin A deficiency; and over -- 2 thousand million are at risk of iron deficiency anaemia or are affected by some form of anaemia. Many of the affected people are the same underprivileged persons in the same low-income groups and low-income countries, so the total number of subjects is around 2 thousand million. Details of their distribution by regions of the world are given in Table 1.

For each deficiency, immediate, underlying and basic causes can be identified. While the immediate cause is essentially the deficient intake or utilization of the specific micronutrient in the diet, underlying and basic causes often play a major role and have to be addressed in planning preventive action. Diagrams illustrating such networks of causes are given in Annex 1. Preventive action has usually to focus on removing underlying and basic causes, as well as tackling immediate ones.

Iodine deficiency occurs in populations whose mean daily iodine intake, obtained through food and water, falls below 100 micrograms. When there is environmental iodine deficiency characterised by poor content of iodine in soil, the foods and water become deficient resulting in iodine deprivation of the population living in that region. In mountainous and hilly areas, this is due to years of washing of the soil by glaciers and heavy rains, and in plains due to recurrent flooding. People living in such iodine deficient

environments are likely to have an inadequate iodine intake if most of their food is locally grown.

**Table 1 - Populations at risk of and affected by micronutrient malnutrition, by WHO region\*, 1991 (population in millions)**

Region	Iodine deficiency disorders		Vitamin A deficiency		Iron-deficient or anaemic
	At risk	Affected (Goitre)	At risk**	Affected** (xerophthalmia)	
Africa	150	39	18	1.3	206
Americas	55	30	2	0.1	94
South-East Asia	280	100	138	10.0	616
Europe	82	14	-	-	27
Eastern Mediterranean	33	12	13	1.0	149
Western Pacific	405	30	19	1.4	1058
Total	1005	225	190	13.8	2150

\* Distribution of WHO Member countries per region in annex 1

\*\*Pre-school children only

Vitamin A deficiency occurs mostly in preschool children largely as a result of inadequate dietary intake of dietary vitamin A. This is often exacerbated by protein-energy malnutrition and/or infections - particularly measles - which interfere with vitamin A metabolism.

Vitamin A in food is absorbed in two main forms. The various carotenoids (predominantly beta-carotene) that serve as provitamins occur mainly in plant material, for example, carrots, green leafy vegetables, red palm oil, yellow vegetables and fruits. Preformed retinol (usually in the ester form) is found naturally only in foods of animal origin, notably liver and dairy fat products. However, preformed vitamin A is sometimes used to fortify other foods, such as sugar and grain products.

In poor communities infants - often of low birth weight - are born with low liver stores of vitamin A due to maternal malnutrition, since dietary consumption of vitamin A among pregnant women is often less than a third of the recommended intake. Though the concentration of vitamin A in breast milk is low among undernourished mothers, breast feeding still offers some protection during the early months of infancy. In most poor

communities, weaning is often delayed beyond the age of one year, and foods containing vitamin A are seldom given. Surveys carried out in preschool children have shown that the daily intake of vitamin A is about 100 ug, while the recommended intake is 400 ug of retinol equivalent (RE). In India, the diets are exclusively vegetable based and, therefore, contain B-carotene, and little preformed vitamin A, except for that derived from breast milk.

Iron deficiency occurs when an insufficient amount of dietary iron is absorbed to meet the body's requirements. This insufficiency may be due to inadequate iron intake, to reduced bioavailability of dietary iron, to increased needs for iron, or to chronic blood loss. There are two distinct types of dietary iron - haem and non-haem iron. Haem iron is a constituent of haemoglobin and myoglobin and is present in meat, fish and poultry, as well as in blood products. Haem iron accounts for a relatively small fraction of total iron intake - usually less than 1-2 mg of iron per day, or approximately 10-15% of the dietary iron consumed in industrialized countries. In many developing countries, haem iron intake is lower or even negligible. The second type of dietary iron, non-haem iron, is a more important source; it is found to varying degrees in all foods of plant origin.

The absorption of dietary iron is influenced by the amount and chemical form of the iron, the consumption during the same meal of factors enhancing and/or inhibiting iron absorption, and the health and iron status of the individual. Meat and fish are enhancers of iron absorption. This means that they are doubly valuable. Not only do they directly contribute rich amounts of haem iron, but they enhance the absorption of the non-haem iron contained in the rest of the meal. Ascorbic acid (vitamin C) is another enhancing factor. In developing countries, where meat intake is low, ascorbic acid is the single most important enhancer of iron absorption.

Many compounds are known to inhibit the absorption of iron, among them phytates, polyphenols (including tannins), and soy protein. Soy protein can impair iron absorption under certain circumstances, especially when it is used as a meat substitute. However, because of the intrinsically high iron content of soy protein products, the net effect of their addition to a meal is to increase, rather than decrease, the total amount of iron absorbed. Phytates are present in wheat and other cereals. Even very small amounts of phytate markedly reduce iron absorption. Fortunately, this inhibitory effect can be counteracted with ascorbic acid. Tannins, which are present in tea and to a lesser extent in coffee, are also iron absorption inhibitors. Other polyphenols are found in nuts and legumes. Once again, the inhibitory effect of all polyphenols can be counteracted by adding ascorbic acid to the meal.

Finally, iron absorption is related to the individual's iron status. More iron is absorbed by iron-deficient persons and less by those who are iron-replete, although the regulatory mechanism involved is not understood. Unfortunately, this adaptive increase in iron absorption is not great enough to prevent deficiency in people consuming diets typical of the developing world. Iron requirements are greatly increased during pregnancy, for the growing foetus, placenta and expanded maternal blood volume. Lactation also increases a woman's requirements. Infants, children and adolescents require iron for their growing body tissue and red cell mass. Menstruation-related iron losses substantially increase iron

requirements of women of childbearing age, and this, along with the high iron requirements of pregnancy and lactation, and the poor dietary intakes of many women, accounts for such high prevalence rates of anaemia in this group.

Infections and parasitic infestation cause iron deficiency. Chronic bleeding is caused by such parasites as hookworm (*Ancylostoma* and *Necator*), *Schistosoma* and possibly *Trichuris trichiura*; these cause frequent infections in countries with hot, humid climates and poor sanitation. Infections interfere with food intake and the absorption, storage and use of many nutrients, iron among them. In many rural communities and urban slums where environmental sanitation is poor, morbidity from viral and bacterial infections is high. It is in these same communities that diets are most often energy deficient. Where the iron balance is precarious, repeated episodes of infection may result in the development of anaemia, particularly in young children whose morbidity burden is much higher than that of adults. This explains in part the high prevalence of anaemia among infants and preschool children. By implication, the control of infection may be the intervention with the greatest impact on the problem of anaemia and iron deficiency in these age groups.

Some of the main consequences of micronutrient malnutrition are as follows:

Iodine deficiency leads not only to goitre - a largely cosmetic manifestation - but also to brain damage in the fetus and infant, resulting in irreversible retarded psychomotor development. Indeed, iodine deficiency is the commonest cause of preventable mental retardation. In severe cases it causes cretinism, deaf-mutism, squint, spastic diplegia and other serious defects. It also affects reproductive function, leading to increased rates of abortion, stillbirth, congenital anomalies, low birth weight, and infant and young child mortality.

Vitamin A deficiency causes night blindness and eventual blinding xerophthalmia, particularly in preschool children. It remains the commonest cause of preventable childhood blindness worldwide. In addition, there is an accumulation of compelling recent evidence that in areas where vitamin A deficiency is a problem of public health importance (Table 3) it substantially contributes to increased mortality in infants and young children, and is associated with increased severity of illness - especially measles, diarrhoeal and respiratory infections. In different population groups there has been considerable variability in the impact of both vitamin A supplementation and vitamin A-related nutrition education. It is thought that some of the main factors responsible for this variation include differences in (a) base-line vitamin A status, (b) nutritional status, (c) exposure to illness, (d) access to health care, (e) socioeconomic status and literacy.

Iron deficiency anaemia has many adverse effects, resulting from both the iron deficiency itself as well as the anaemia that accompanies the marked reduction of body iron stores. Anaemia in pregnant women aggravates the effects of maternal blood loss and infection at childbirth, and is thereby a major cause of maternal mortality. It also leads to increased foetal morbidity and mortality, increased risk of low birth weight, and increased risk of anaemia and protein-energy malnutrition in

infants. In infants and young children there is evidence that it also leads to impaired language and motor development, impaired coordination, impaired scholastic achievement, inattentiveness and fatigue, decreased physical activity and, in short, retardation of physical and mental development. In adults it leads to decreased physical work, low productivity, decreased resistance to fatigue, and thereby has wide implications for the health of the whole family.

In fact, all three forms of micronutrient malnutrition have quadruple effects - through impairment of growth and development (physical and mental) and survival of infants and young children; physical and intellectual development of school-age children; work performance and productivity of adults; and reproductive performance of women. Thus these micronutrient deficiencies both singly and collectively constitute a brake on socioeconomic development, and particularly when combined in synergistic action, are of considerable detriment to the world's already underprivileged groups. This developmental dimension of hidden hunger for micronutrients has recently gripped the conscience of the world, and is a major driving force behind the rising global and national concern about micronutrients.

### 1.3 Past Experiences and Current Activities

There is much to be learnt from both the successes and failures of past attempts and programmes aimed at preventing and controlling micronutrient malnutrition. Eighteen countries have already succeeded in eliminating iodine deficiency disorders, primarily through the introduction and continued use of iodized salt, along with careful monitoring of population iodine status or neonatal thyroid function. Another seventeen countries have well established IDD-control programmes although iodine deficiency disorders still constitute a significant public health problem in some areas. While iodized salt has proven itself to be the successful long term method of eliminating iodine deficiency disorders, widespread experience with iodized oil, both oral or injected, used on a massive scale in many countries, has shown it to be a useful short-term interim intervention for rapidly addressing severe iodine deficiency while a sustainable long term system (iodized salt) is being established. In excess of 40 million doses have been given since the original introduction in Papua New Guinea, and iodized oil is currently used on a wide scale for example, in such countries as China, Indonesia, Nepal, Zaire, Tanzania.

Successful long-term sustainable programmes that have eliminated vitamin A deficiency and iron deficiency anaemia are not so evident. A major reason for this lack of success has been an excessive emphasis on short-term medical interventions - supplementation of target populations with vitamin A capsules and iron tablets- with insufficient attention given to the formulation of sustainable food-based strategies. Such short-term interventions have often shown dramatic results in limited target populations of carefully controlled trials or in hospital and clinic settings, but then fail to work when applied to the real world where malnutrition, socioeconomic deprivation, remoteness, logistic difficulties and costs make such approaches unsustainable. The sustainable elimination of vitamin A and iron deficiencies will only occur when the diets of vulnerable groups are adequate. Recent experiences in Thailand promoting the production and consumption of the

ivy gourd and in Nepal concerning nutrition education illustrate that food-based strategies can be efficient, cost-effective and successful in a relatively short period of time (2-3 years).

Access at household level to a continuously adequate supply of vitamin A and iron containing foods is a crucial factor, and agricultural/horticultural activities must be introduced with sufficient strength to ensure this. Yet this is not sufficient. Change of behaviour to ensure adequate consumption of vitamin A and iron rich foods by infants, young children and pregnant mothers is also essential, and to achieve this requires both national and community based actions such as literacy, income generation, family planning, growth monitoring, food supplementation, and other formal and non-formal education programmes. Other exacerbating factors such as those often found in the unclean overcrowded environments characteristic of social, economic and ecological deprivation must also be adequately addressed for achievement of sustained solutions to micronutrient malnutrition. Experience has shown that only when the underlying causes of inadequate nutrient intake are resolved, will vitamin A deficiency, iron deficiency anaemia, and indeed malnutrition in general, permanently disappear.

In summary, experience from countries that have now freed themselves from vitamin A deficiency and substantially controlled iron deficiency anaemia, through both broad development schemes and specific interventions, suggests that it is a carefully balanced mix of the different strategies available, adapted appropriately to local circumstances and adequate resources that is necessary. Furthermore, the ultimate aim of these interventions should be the long term sustainable adequacy of dietary intake of these nutrients to the population affected.

Activities for combating micronutrient malnutrition have been developed, at least partially, in almost all countries. For instance, there have been some distribution campaigns of iron/folate supplements through maternal and child health services; but in most cases, this has not been done systematically, and very low level of coverage (20%) of the target groups has been achieved. Programmes for control of iodine deficiency disorders are under way in the great majority of the 97 affected countries, but some have not yet begun an action programme. For vitamin A deficiency, the situation is less advanced and so far, emphasis has been given to supplementation strategy that has not achieved marked and sustainable results.

Recently, an assessment was made, through the WHO Regional Offices, in order to obtain up-to-date information on current activities (see Table 2). For this purpose, the activities were broadly classified under the three main headings of initial assessment/analysis; planning and implementation of interventions; and establishment of monitoring/evaluation



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**Table 2 - Current activities for overcoming micronutrient deficiencies by number of countries covered, type of activity, <sup>a</sup> status of assessment, <sup>b</sup> and region, 1991**

Region		Iodine deficiency disorders			Vitamin A deficiency			Anaemia		
		A/A	P/I	M/E	A/A	P/I	M/E	A/A	P/I	M/E
Africa	A	3	1	1	0	0	0	0	0	0
	B	15	10	5	6	5	0	0	0	0
	C	19	15	10	19	11	11	37	37	10
	D	4	15	25	18	27	32	8	8	35
	E	4			2			0		
Americas	A	7	8	1	3	4	3	9	6	4
	B	12	11	18	13	13	14	21	26	29
	C	0	0	0	1	0	0	3	1	0
	D	0	0	0	0	0	0	0	0	0
	E	15			13			0		
South-East Asia	A	8	0	0	2	0	0	1	0	0
	B	0	5	4	4	3	3	4	2	1
	C	2	3	2	2	4	4	4	7	8
	D	0	2	4	0	1	1	2	2	2
	E	1			3			0		
Europe	A	12	10	10						
	B	7	4	5						
	C	7	12	11						
	D	4	4	4	3					
	E	2			29					
Eastern Mediterranean	A	3	0	0						
	B	1	4	0						
	C	3	5	2						
	D	3	1	8						
	E	0								
Western Pacific	A	4	3	2	1	0	0	0	5	6
	B	4	6	2	6	3	1	13	9	7
	C	4	12	17	6	6	8	8	9	10
	D	9	0	0	4	0	0	2	0	0
	E	2			14			0		
Total	A	37	22	14						
	B	39	40	34						
	C	35	47	42						
	D	20	22	41						
	E	24								
Total All Countries with past or present micronutrient programmes (A + B + C + D)		131								

<sup>a</sup> A/A = initial assessment/analysis  
P/I = planning and implementation of action  
M/E = establishment of monitoring/evaluation systems

<sup>b</sup> A = complete/comprehensive  
B = partial  
C = inadequate  
D = none undertaken but problem likely  
E = no problem found (on assessment), nor likely

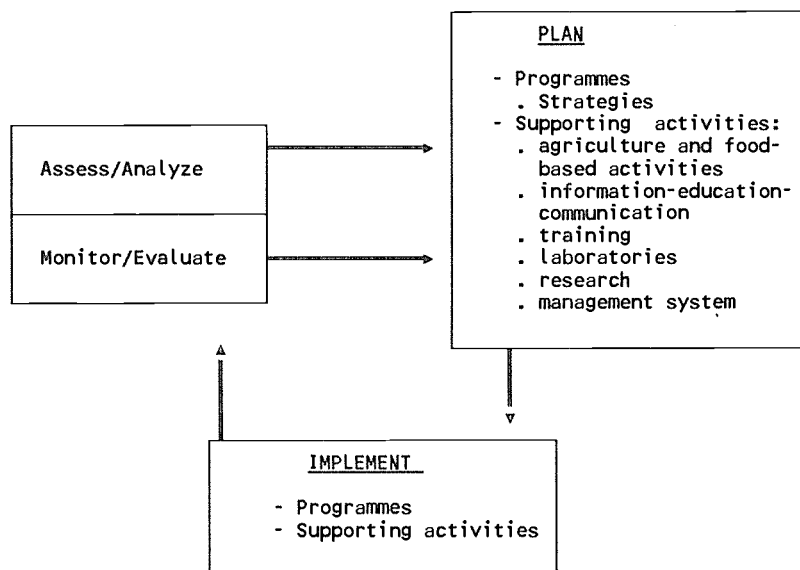
\* Distribution of WHO Member countries by region in annex 1

systems. Although complete returns of the survey are awaited, those available show that for iodine deficiency disorders, assessments are relatively advanced in most regions, with implementation and especially monitoring/evaluation lagging behind; for vitamin A deficiency, all activities are less adequate than for iodine deficiency disorders; and for anaemia, assessments are relatively adequate in the Americas, the Western Pacific and probably Europe, but less so in Africa, South-East Asia and the Eastern Mediterranean. Up to now, few countries have developed concerted and comprehensive national plans or programmes to tackle in a coordinated and sustained manner the different micronutrient deficiencies.

## II. SOLUTIONS TO PREVENT AND CONTROL MICRONUTRIENT DEFICIENCIES

### 2.1 Methodology

The process involved in preventing and tackling, and ultimately overcoming micronutrient malnutrition is as follows:



This cyclical process should be developed at each operational level: family and community, district, national and international. Examples of the process at different levels are given in section III of this document. The challenge is to encourage governments to develop a comprehensive, multisectoral programme aimed at permanently overcoming micronutrient malnutrition. This should promote intensified joint actions, as appropriate, across health, agriculture, education, commerce and industry sectors, with full participation of communities, thereby making the overcoming of micronutrient malnutrition an integral component of development plans at each level.

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An early requirement is the undertaking of an assessment of the magnitude and severity of the problems, to identify the geographical zones (usually by district) within each country which are affected by each deficiency, and also the population groups (in physiological and socioeconomic terms) which are affected or vulnerable. Criteria for assessing the prevalence and severity of a problem on an epidemiological (not clinical) basis are given in Table 3. To be wholly useful, such surveys should cover assessment and analysis of causes as well as prevalence. Local staff of several ministries, and community leaders, can effectively contribute to identification of the main causes of the disorders, especially the main factors underlying inadequate dietary intakes, access to food and level of infection. Apart from these scientific surveys, usually carried out by central and local government authorities in collaboration, there is a need to empower local communities and families to identify their problems and take steps to solve them, with the support of government agents and the private sector. Signs which village health and community workers, for instance, could be trained to recognize are, for iodine deficiency disorders, visible goitre and cretinism; for vitamin A deficiency, night-blindness and keratomalacia; and for iron deficiency, severe anaemia. Recognition of these manifestations by the local authorities will help to ensure compliance with and sustainability of measures for prevention.

Evaluation of impact largely relies on clinical/laboratory/epidemiological assessments, through which the value or usefulness of the intervention programme is estimated in terms of its success in reducing the incidence, prevalence and severity of iodine deficiency disorders, vitamin A deficiency and iron deficiency anaemia. The usual criteria and their cut-off points, which constitute indicators for measuring impact, are listed in Table 3. Monitoring national micronutrient programmes, particularly in terms of comparing the operational accomplishments of programmes with planned targets, is of fundamental importance for successful management and sustainability of micronutrient programmes. For instance, a failure in monitoring - of both impact and process - was probably one of the main factors responsible for a lapse in many salt iodization programmes in Latin America during the 1970s. Monitoring each of the key programme components, such as the success of agricultural programmes in meeting production targets, the proportion of population with access to adequate food, the percentage of coverage of a population with iodized salt, or the delivery of educational messages in schools, is an essential part of ensuring successful micronutrient programmes.

The main four types of strategy that can be part of broad and comprehensive plan and programmes for controlling micronutrient deficiencies are summarized in Table 4: dietary diversification, fortification, supplementation and global public health and other control measures. In Table 5 are specified the main types of vehicles for different interventions that are implementable under each of the different strategies. Between these main four strategies, there are many areas where common action for overcoming micronutrient malnutrition may be possible, as described in the following paragraphs. In such areas as assessment, dietary diversification, fortification and supplementation, the action would take the form of specific interventions; whereas action in relation, for instance, to laboratory services, information-education-communication, development of management mechanisms, human resource

**Table 3 - Epidemiological criteria for assessing severity and magnitude of micronutrient malnutrition in populations**

Iodine deficiency	Severe	Moderate	Mild
A. Goitre rates (%) (schoolchildren)			
Total (grades 1-3) (total goitre rate)	> 50	20-49	10-19
Visible (grades 2-3) (visible goitre rate)	> 10	5-9	1-5
B. Urinary iodine (median, µg/l)	< 20	20-49	50-99
C. Thyroid stimulating hormone (newborn): % > 50 µu/ml (adults or children, not neonatal): % > 5 µu/ml	[criteria still under review]		
D. Cretinism prevalence (%): % > 5 µg/l	> 1	< 1	0
Vitamin A deficiency	Severe or moderate:	Mild or at risk:	
In preschool-age children (survey of 10 000 subjects):			
Night-blindness	> 1%	Any of these symptoms/signs present in community at lower prevalence, or in hospital subjects	
Xerophthalmia			
- grade X1B (Bitot's spot)	> 0.5%		
- grades X2/X3A/X3B (corneal xerosis/ulceration/keratomalacia)	> 0.01%		
- grade XS (corneal scar)	> 0.05%		
Plasma vitamin A < 10 µg/dl	> 5%		
Anaemia	Severe	Moderate	Mild
Mild/moderate anaemia <sup>a</sup> or haematocrit < 33%	> 40%	10-39%	1-9%
Severe anaemia (Hb < 7 g/dl)	> 10%	1-9%	0.1-0.9%
Serum ferritin (µg/l)		< 12	< 12

<sup>a</sup> Hb < 11 g/dl pregnant woman  
11 young child  
12 schoolchild or adult woman  
13 adult man.

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**Table 4 - Main types of strategies for overcoming micronutrient deficiencies**

	Dietary diversification	Fortification	Supplementation	Public health and control measures
Iodine deficiency disorders	Promotion of the consumption of iodine rich foods	Production, distribution and consumption of fortified foods  Food quality control, legislation and enforcement	Delivery of supplements to target group population	Improvement of primary health care  Improved processing of goitrogenic foods
Vitamin A deficiency	Promotion of the production and the consumption of vitamin A rich foods  Nutrition education  Improved distribution system  Improved food preservation and processing	Production, distribution and consumption of fortified foods  Food quality control, legislation and enforcement	Delivery of supplements to target group population	Improvement of primary health care  Prevention of infections: - environmental health - immunization - oral rehydration therapy - antiparasitic measures
Anaemia	Promotion of the production and the consumption of vitamin A rich foods  Nutrition education  Improved distribution system  Improved preservation and processing	Production, distribution and consumption of fortified foods  Food quality control, legislation and enforcement	Delivery of supplements to target group population	Improvement of primary health care  Prevention of infections: - environmental health - immunization - oral rehydration therapy - antiparasitic measures (especially against hookworm and malaria)

**Table 5 - Main types of vehicles for intervention for overcoming micronutrient deficiencies**

	Dietary diversification	Fortification	Supplementation
Iodine deficiency disorders	Sea foods Other iodine containing foods (Reduce goitrogens)	Salt Water Baby foods Condiments Flour Milk	Iodized oil Potassium iodide tablets
Vitamin A deficiency	Green leafy vegetables Orange-coloured vegetables/fruits Red palm oil Animal foods Breast milk	Sugar Salt Milk powder Baby foods Condiments	Capsules (oil) in massive or small doses
Anaemia	Green leafy vegetables Pulses Fruits/vegetables (vitamin C) Liver, red meat (avoid tea/coffee with meals)	Salt Cereals or cereal flour Condiments	Iron/folate tablets Parenteral iron

development, applied research and integration would be in the form of supporting activities. The following sections briefly describe the issues involved in both the four main and their several supporting intervention actions. Each country needs to carefully consider the balance of these interventions that are best suited to its own magnitude of problem, resources, priorities and situation.

## 2.2 Strategies

### Dietary Diversification

Increased dietary intake of vitamin A, iron and iodine is clearly the most natural, efficient and inexpensive solution to prevent and control deficiencies of these micronutrients. In many countries, this will require changes in the production, distribution, access and consumption of foods which are sources of these vitamins and minerals to a level that minimizes the risk of developing a deficiency. Overall improvement of the nutritional quality of food supplies stimulates the economy and contributes significantly to improved nutritional status and reduced infection rate.

Micronutrients are available from different food sources and one food may provide several micronutrients. For example, green leafy vegetables and animal foods are rich in iron and in vitamin A, while fish products are rich in vitamin A and iodine. Efforts to raise the food intake of vitamin A, iron and iodine will have an important impact on the

diversification of the diet, especially for those populations consuming diets in which cereals provide up to 80% of the calories. Taking into account local agricultural and ecological conditions, emphasis should be placed on food production and improved access to vitamin and mineral rich foods such as fruits, vegetables, meat, fish and others. Production and availability of the appropriate kinds of food will ensure sustainable self-sufficiency and will also strengthen the production of an adequate supply of vitamin A and iron as well as partial supplies of iodine. In addition, it will ensure that other vitamins and minerals along with protein and fats, are present in the diet.

Diversification of food production and food supplies will achieve several objectives. First, there will be an increased availability of foods with high content of vitamins and minerals which can reduce the incidence and the prevalence of micronutrient deficiencies. Secondly, availability of minerals, proteins and fat (especially in the case of vitamin A and iron deficiency) in those same food sources will enhance absorption of specific nutrients and give a more balanced diet to the populations, with a positive long-term impact on their nutritional and health status as well as working capacity. Thirdly, local activities such as home gardening/community gardens promoted together with nutrition education will ensure food self-sufficiency and consumption of micronutrient rich foods at family level. Women, who have the responsibility of feeding families, will be the main beneficiaries of these activities, since they are producers and at the same time caretakers of children and of the family; this will have a direct impact on the nutritional and health status of the population.

In many circumstances, the poorest of the poor are the main population groups affected by micronutrient deficiencies. Selection of food groups to be produced and promoted for their local consumption must take into consideration these circumstances. In this respect, the costs of the food items from both the production and the market value point of view should be examined before deciding which foods to select and to recommend to the affected populations. For iron and vitamin A deficiency, plant foods (green leafy vegetables) and fruits will generally be preferred for their ease of cultivation and the low cost of production and purchase. Nevertheless, production and consumption of animal food sources (small animals, meat, fish) should be promoted in those areas where ecological, sociological, cultural and economic conditions are favourable. Food habits must be taken into consideration, especially for those populations where consumption of particular food items are forbidden due to religious beliefs or dietary habits. However, since a large variety of foods can provide micronutrients, these social factors are not a major problem but will influence the selection of foods which should become available. In addition, appropriate programmes of nutrition education could modify in a positive way negative food habits and contribute to an overall improvement of the diet in these populations.

In summary, iodine deficiency is not so readily alleviated by food-based strategies, but in some instances more sea foods could be consumed by affected populations. Consumption of goitrogenic foods should be minimized, and the processing of cassava properly done and improved. It is also difficult to meet all the iron requirements in pregnancy from existing mainly vegetable sources in the tropics. The vitamin A problem should be substantially alleviated and iron deficiency partially so. This approach requires adequate and intensive communication and education components to increase awareness in

the population about the micronutrient problem, on the importance of a balanced diet and on the solutions that are available to them to control micronutrient deficiencies through food. It is also important in the establishment of dietary guidelines for the population to give adequate importance on micronutrient requirements for the feeding of infants, young children and women. Yet many countries have not given adequate attention to this: guidelines should be established, and adapted to the particular needs of each country and of different ecological zones within a country.

### Fortification

Fortification of suitable carriers is recommended, especially for those areas of target groups which have no access to fresh or high quality nutritious foods (fruits, vegetables, meat, fish) or for disasters or emergency situations. Fortified foods can be integrated into the conventional food system as value added products that reach a large segment of population. The food selected should consistently reach the population at risk. The fortification process should not change food's appearance or taste and must be bio-available without being inhibited by other components of the diet. Food fortification does not call for changes in food beliefs or practices.

Several foods -- wheat products, rice, salt, sugar, milk and condiments -- have been identified as vehicles for fortification. Recently, salt has been identified as a suitable vehicle for fortification with iron. Iodization of salt has been highly effective both in the developed and developing world for decades. Butter and margarine have been fortified with vitamin A for several years. Guatemala, Costa Rica, and El Salvador have successfully fortified sugar with vitamin A. Successful trials were carried out in Indonesia with fortification of Mono-sodium Glutamate (MSG), a flavouring agent, with vitamin A.

Iodization of salt has been accepted to be the simplest and most cost effective method (US\$ 0.02 to 0.1) per person per year to control iodine deficiency disorders since the 1920s, when it was first introduced in Switzerland and North America. Many countries like Guatemala, Colombia, Argentina and Chile have made a remarkable progress in combatting IDD with salt iodization programmes. In Asia, salt iodization has been initiated in most IDD-affected countries during the past three decades, and rapid, measurable progress is now being made. In Africa, the iodization strategy started in 1970 in Kenya and has spread to 14 countries in the last decade.

In many developing countries, the salt fortification programme has been facing problems such as inadequate appreciation of the programme by the decision makers and the population, poor quality of salt produced, multiplicity of small scale salt producers, erratic and unknown distribution patterns, ineffective legislation, and inadequate programme coordination and management at the Government and local levels.

Fortunately, the long-term use of iodized salt does not lead to any public health problems of toxicity. Indeed, in iodine-rich areas of the world, some communities consume in their natural diets many hundreds of times the quantity of iodine that can be consumed with iodized salt. Iodine prophylaxis for endemic goitre has been reported only to cause



transient increase of 0.01 to 0.04% over the basal incidence in iodide induced thyrotoxicosis peaking 1-3 years after the introduction of iodized salt and normalizing in 3-10 years despite continued iodide exposure.

Salt fortification appears to be the most feasible approach to prevent iron deficiency anaemia. Trials conducted during the past two decades have shown that fortifying a broad range of foods and condiments with iron showed significant improvement in iron status, particularly in iron deficient groups. In developing countries, presence of certain substances (phytates) in cereals greatly reduces the effectiveness of any iron fortificant except iron-EDTA, which remains absorbable. Iron-EDTA has been highly effective in fortification trials with Egyptian flat bread, South African curry powder, and sugar in Guatemala. Indian trials indicate that salt fortification with iron (Ferrous sulphate + Sodium acid sulphate + Orthophosphoric acid) can be effective in the control of anaemia. The estimated cost of iron fortification of sugar in Guatemala, and salt in India is 10 US cents per person per year.

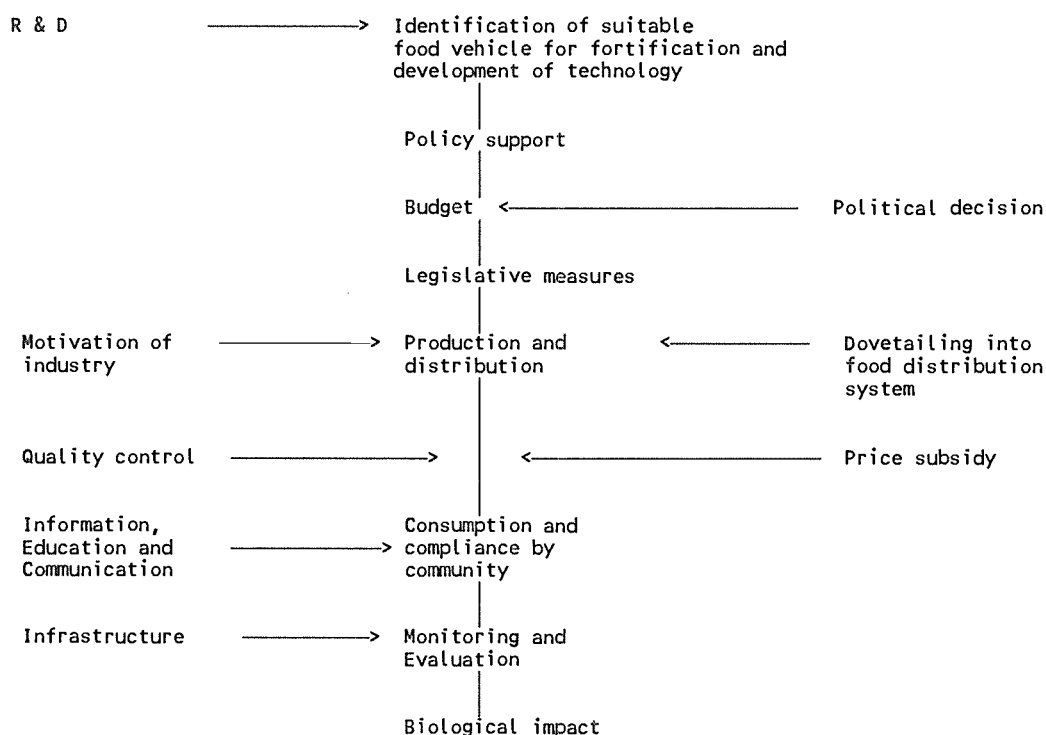
Though food fortification is cost effective, and reaches the entire population in the selected areas as compared to the supplementation programmes, there are logistic problems for its successful implementation. In view of inadequate awareness of both the problem and the programme, there has often been hesitation on the part of policy makers to adopt fortification as a strategy. Though it involves a simple mixing process, the machinery required may have to be imported. Legislative measures have not been initiated in several places, making it more difficult to prevent entry of unfortified salt. There is, in addition, poor monitoring and inadequate quality control. The food fortification process, to be more effective, should be dovetailed into the existing food production and distribution programmes.

Vitamin A fortification of foods such as dairy products, margarine, vanaspati and bread, has been practised extensively for a long time. In Central America, fortification of white sugar with vitamin A became mandatory in Costa Rica and Guatemala as early as in 1974, and in Honduras and Panama in 1976. More recently, fortification of MSG with vitamin A in the Philippines and Indonesia has been attempted. In Central America sugar fortification continued only in three countries (excluding Panama) to permit evaluation. It resulted in a highly significant reduction in the proportion of preschool children with serum retinol less than 20 ug/dl. In the Philippines MSG fortification has been reported to be least costly, as compared to high dose capsule distribution or public health horticultural strategy. Both programmes had social benefits much greater than their costs.

The cost of sugar fortification in Central America was observed to be US\$ 2.02 per person protected per year for those preschool children with serum retinol levels less than 10 ug/dl. An important factor to be considered is to identify the agency that is responsible for providing cost subsidy, and the controlling authority. In Guatemala, the price differentials were subsidized by the National Association of Sugar Manufacturers. The costs of fortification more than doubled, because of fluctuating foreign exchange rates, and this, combined with declining sugar prices in the world market, led to the manufacturers refusing to bear this expense, and ultimately the whole sugar fortification programme was terminated, although recently it has been successfully reactivated. Not all countries can identify a food

item suitable for fortification, especially in the non-industrialized countries of Africa, where only salt can usually be distributed widely enough.

The process of food fortification can be schematically represented as follows:



Thus, for the success of a food fortification programme, the efforts of scientists, technologists, industry and the implementing authority should be pooled with a commitment by the national government. A close monitoring of the quality of the fortificant is absolutely essential, in the absence of which there will not be any biological impact. A multisectoral approach is, therefore, essential for the implementation of a successful food fortification programme.

### Supplementation

Supplementation is discussed here in terms of using iodized oil (oral or by injection), vitamin A (capsules) and medicinal iron. This is usually seen as an immediately effective short-term measure whilst longer-term systems are developed, e.g. for emergency action in displaced populations, or as a temporary intervention like iodized oil until arrangements for salt iodization can be made. However, iron/folate supplements are a feasible and sustainable long-term solution if logistics and compliance problems can be solved, and will remain a necessity unless fortification of salt with iron becomes socially and economically feasible.

The use of such micronutrient supplements has both advantages and disadvantages, and these need to be carefully considered by each country to determine if and how this form of intervention can best be applied. In many countries, if the goals are to be reached on time, long-term sustainable actions will need to be implemented together with short-term measures for immediate impact. Each country should establish a policy appropriate to its own situation.

In selecting the appropriate blend of interventions for developing a truly sustainable national micronutrient programme, it is crucial to ensure that short term interventions, such as iodized oil or vitamin A capsule supplementation - despite their immediately visible benefits in lives saved and handicap prevented - do not undermine, impede or divert resources from the development of infrastructure and strategies that will achieve the permanent elimination and control of micronutrient malnutrition. A careful analysis of short and long-term benefits and costs, in human, financial, health and development terms, will assist in developing the most appropriate national strategies.

### Iodized Oil

Iodized oil, whether given orally or by injection, appears to have a well-established place in public health programmes for the correction of severe iodine deficiency and the prevention of cretinism. Apart from totally preventing this widespread brain damage, iodine supplementation leads to reduction of goitre in younger age groups, with an improved sense of well-being. These effects have led to increased demand for iodine supplementation through iodized salt or iodized oil by iodine deficient populations.

Thus, in public health programmes, correction of severe iodine deficiency can be achieved immediately following the administration of iodized oil. This is most important in circumstances where salt iodization is either not feasible or delayed due to various factors such as remoteness of the region, difficulties in implementation in a market situation, or resistance to change. In the absence of an effective iodized salt programme, many cretins will continue to be born in severely iodine deficient populations unless iodized oil is given.

It is for this reason that iodized oil has been used on a massive scale in many countries and has been found to be quite satisfactory. In excess of 60 million doses have been given since the original introduction in Papua New Guinea. Indonesia has had a major iodized oil programme (10 million injections) because of the formidable difficulties in securing salt iodization in Java where there is a myriad of small suppliers. China has used iodized oil in Sinjiang and elsewhere when iodized salt has not been feasible. Nepal has used iodized oil (4 million injections) because of the difficulties in distributing iodized salt in remote or mountainous terrain. Similar difficulties have led to the use of iodized oil in Zaire, Tanzania, Argentina, Ecuador, Bolivia, Myanmar and Sudan.

Several studies have examined the metabolism of iodized oil. Following its intramuscular injection, peak circulating levels occur in about the second week, and then slowly decline. In contrast, oral administration gives very high levels in the urine during the first week and a steady decline thereafter. A single intramuscular dose of 480 mg iodine

(1 ml Lipiodol) has generally provided satisfactory iodine levels for at least three years. Experience with the duration of effect with oral iodized oil is less extensive. Preliminary results from a carefully standardized trial now in progress in children of school age in Algeria, Peru, and India indicate that an oral dose of 120 mg iodine is not consistently effective beyond five months, but larger doses (240 mg or 480 mg) are. Other studies have shown that a single oral dose gives adequate coverage for up to two years, and occasionally even longer. Some likely factors for variation among these different results on duration of effect are severity of the iodine deficiency, nutritional status, and variation in intestinal absorption

The target population groups for iodized oil in order of priority, are i) women of childbearing age, including pregnant women, ii) infants and preschool children, iii) older children iv) men 15-45 years. The currently recommended dose schedule, including frequency or duration of dose:

Age Group	Dose	Duration (Frequency of Dose)
0 - 1 year	200 mg orally (1 capsule) or 240 mg injected (0.5 ml Lipiodol)	1 year 2 years
1 - 45 years	400 mg orally (2 capsules) or 480 mg injected (1.0 ml Lipiodol)	1 year 3 years

There has been some controversy over the use of iodized oil in pregnancy, based on the findings from the original controlled trial from Papua New Guinea. This trial established that administration of iodized oil before pregnancy prevented cretinism in the offspring, while administration during pregnancy would not entirely prevent it. This finding has been confirmed by subsequent studies, and appears to be due to the fact that unless iodized oil is given very early in the first trimester of pregnancy, it will miss the critical stage of foetal brain development, and irreversible brain damage will occur if severe iodine deficiency is present. However, this inability of iodized oil given in pregnancy to prevent cretinism should not be regarded as a contraindication to its use - this would ignore not only the benefits that do derive from iodized oil in pregnancy as well as to the rest of the population. The controlled trail of iodized oil injections in pregnancy of Thilly in Zaire indicates benefits in severely iodine deficient pregnancy in terms of increased birth weight, and reduced perinatal mortality. Furthermore, no significant adverse effects from administration of iodized oil in the above mentioned amounts to pregnant women have been established.

The costs of an iodized oil programme depend on whether oral or injected oil is used, and whether an existing infrastructure such as the EPI programme is used. Costs usually vary from US\$0.30 to US\$1.00 per person per year. Although administration of iodized oil may be safer and easier because non-specialized personnel or village leaders can be used for the distribution, because of its shorter duration and the larger doses required orally, the cost of oral prophylaxis may be greater than by injection.

### Vitamin A Capsules

Periodic administration of large doses of vitamin A to young children, in endemically vitamin A deficient regions of the world, has been the most popular approach to control xerophthalmia and the consequent blindness. Use of four to six monthly oral doses of 200,000 IU of oil miscible vitamin A has been adopted in a number of developing countries, such as Bangladesh, Brazil, India, El Salvador, Guatemala, Haiti, Malawi, Mauritania and Nepal. However, most of these programmes remain limited to at-risk focal areas and/or immunization days, often not sustained.

Different coverage systems and approaches are being tried. In the universal delivery system - the most widely practised system - prophylactic supplementation of all preschool children at risk of xerophthalmia is attempted. In countries like Haiti, a targeted delivery system which involves prophylactic supplementation of groups with a high risk of vitamin A deficiency (i.e. preschool children, lactating women) through health care system is followed. In several African countries where xerophthalmia is reported, a medical system - a low cost low output system - providing treatment to cases of xerophthalmia, and children with diarrhoea, measles and kwashiorkor, is the system being followed. Periodic large dosing, though conceptually simple, is beset with several operational problems. A universal system that achieves about 65% coverage of target population can have a favourable impact on xerophthalmia. However, highest target group outreach is often achieved only at the outset of the programme, followed by a gradual decline to a markedly low level.

"Universal" distribution of vitamin A capsules in Bangladesh (two rounds of distribution annually to all children 6 months to 6 years of age) has been conducted by the Government since 1973, with major support from international, bilateral and non-governmental organizations. This "universal" capsule distribution program is still referred to by all involved as a "temporary solution" to the problem of vitamin A deficiency. Although it is estimated that this vitamin A capsule distribution has saved some 6 000 to 8 000 children from blindness each year, this approach has proven to be neither temporary nor very effective in reducing the problem of vitamin A deficiency below the level defined by WHO as a public health problem. Nor is the program "universal". Despite intensive efforts to improve it in recent years, coverage still appears to be only 35-45% of the target group.

In cases where there is adequate utilization of health care services, a mixture of medical and targeted delivery would seem to be more cost effective. But poor attendance at health care facilities by the most needy, like the ill and malnourished children, is a major constraint. The most important operational issues are those pertaining to programme

integration, logistics, costs, availability of vitamin A supplies, and training of health functionaries. Unless the access of the community to the supplement is ensured, the programme cannot be expected to be effective. Despite these limitations there is a specific place for supplementation by liquid vitamin A in oil, by capsule or by dispenser - now being tested - for infants and children from 6 months to 6 years of age, where blinding malnutrition is a public health problem.

Currently recommended schedules, indicating the dosage and frequency for both prevention and for treatment, are as follows:

<b>Prevention</b>		
Age Group	Oral Dose	Frequency
Infants 6-23 months old	100 000 IU	3-6 monthly
Children 1-6 years old	200 000 IU	3-6 monthly
Lactating mothers	200 000 IU	once, only during the 1st month after delivery
<b>Treatment (children* over 12 months of age with eye signs of clinical VAD)</b>		
Immediately on diagnosis	200 000 IU orally	
The following day	200 000 IU orally	
4 weeks later	200 000 IU orally	
*Infants less than 12 months of age, use 100 000 IU orally.		

The cost of vitamin A capsule or liquid distribution, (as for iodized oil) depends greatly on the degree of targeting and whether an existing distribution infrastructure already exists. Approximate cost per recipient per year, using a six monthly distribution and achieving about 85% coverage, is estimated to be about US\$ 0.50. Experience has so far shown that high coverage of at-risk groups, who are generally in the poorest communities, is unlikely to be sustainable for the long term in the poor developing countries. Investing in this supplementation approach for preventing vitamin A deficiency may lead to diversion of resources from alternate, long-term sustainable strategies. In other words, opportunity costs of such a strategy may be very high. These costs and benefits need careful consideration by each country considering the most appropriate long-term solutions for eliminating vitamin A deficiency.

### Iron supplementation

Whether for prevention or treatment of iron-deficiency anaemia, supplementation with medicinal iron has the advantage of producing rapid improvements in iron status. As a

strategy, it also has a desirable specificity: it can be targeted to the population groups in greatest need of iron or at greatest risk of becoming iron-deficient. Indeed, iron supplementation programmes have a greater chance of success when directed at specific groups.

For prevention purposes, any strategy attempting coverage of the entire population is virtually impossible, except where there is an exceptionally effective health delivery system, and in any case it is unnecessary. Supplementation programmes do best to concentrate on high-risk groups such as pregnant women, infants and preschool children, and on "captive audiences", for example, schoolchildren or plantation workers who can receive their supplements at school or work.

For pregnant and lactating women, 60 mg of elemental iron (= 200 mg ferrous sulphate, with 250 mcg folate) per day (1 tablet) for 4 months is recommended in areas where iron deficiency anaemia is of low prevalence; in areas of higher prevalence 2 tablets daily. For infants breastmilk should be adequate for the first 6 months but thereafter supplementation is widely desirable. For low birth weight infants, supplementation from 2 months onwards is recommended. The preventive dose of elemental iron is 1 mg/kg/day. Suitable liquid preparations need to be developed. For older children supplementation is much less widely needed; the dose is 100 mg ferrous sulphate daily (preschool) or 200 mg (school age).

For treatment, the dose depends on severity of anaemia. For severe anaemia in pregnant and lactating women, 60 mg elemental iron (200 mg ferrous sulphate) three times daily is recommended; twice daily for mild-moderate anaemia. In infants and young children the dose of elemental iron is 3 mg/kg/day; for adolescents and other adults 60 mg elemental iron daily is recommended for mild anaemia, and 60 mg twice daily for moderate. Courses of 2-3 months duration will correct severe anaemia while shorter courses of 2-3 weeks will suffice for lesser degrees.

The oral administration of iron can cause gastrointestinal side-effects in some individuals such as epigastric discomfort, nausea, vomiting, constipation, and diarrhoea. The frequency of these side-effects is directly related to the dose of iron. It is independent of the specific iron compound used; no one compound is better tolerated than any of the others. However, certain formulations are better tolerated, particularly the slow-release preparations. In addition, iron consumed with a meal is better tolerated than when it is taken on an empty stomach, although the amount of iron absorbed is reduced.

Lack of compliance among pregnant women was thought to be closely related to side-effects from iron therapy, but recent reviews indicate it is more related to lack of conviction and persuasion by health workers, and to lack of available supplies. Another major constraint is the cost, when it comes to universal distribution. The cost of 250 iron/folate tablets is 25 US cents. In spite of all the constraints, this programme of supplementation, at least for pregnant women, is one of the most valuable and feasible immediate interventions, which should be a high priority measure in almost all countries.

The best opportunities for combined supplementation occur in the MCH and EPI programmes and community-based growth monitoring - all of which facilitate the administration of iodized oil, vitamin A and iron supplements to both children and mothers, at consequently much less overhead cost. Some positive and successful examples include programmes in Nepal, Philippines, Tanzania. There are, however, some limitations due to differences between target groups and frequency of administration of supplements, and due to the time constraint when additional groups have to be reached by itinerant field workers. National and local programme managers have to resolve these problems in the light of local circumstances and priorities. These obstacles are not insurmountable, and given the will and the leadership, the local authorities can certainly find solutions. In practice it may be necessary to start with single-line interventions, but with time it should be possible to move towards greater functional integration.

### 2.3 Supporting Activities

#### Agriculture and food based interventions

Household gardens can guarantee a regular and secure supply of food that are particularly rich in vitamin A and iron. A number of food items can be produced at home, ensuring supply of foods even during periods of crop failure and disruption of food supplies. Studies in Africa indicate that the major supplier of micronutrients, particularly vitamin A, is the home garden. In Bolivia, 16 square metre structures of green houses topped with sun resistant plastic roofs increased significantly supplies of carrots, lettuce, cucumber, tomato and radish. In Nepal, for communities living in remote hilly regions that are deficient of food supplies for substantial periods of the year, home and community gardens are a critical source of food. Studies carried out in Indonesia reveal that home gardening is the most effective approach in preventing xerophthalmia in households with incomes below 50 cents per person per day.

Overall, there is much scope for improvement in processing and preservation of micronutrient rich foods. Many crops are seasonal and harvest surpluses are often lost if adequate processing and preservation techniques cannot be applied. During processing, large quantities of micronutrients can be lost. Efficient preservation methods at the small-scale/artisan level or semi-industrial level which preserve micronutrient values have to be promoted, especially in those areas where seasonality in the production of fruits and legumes is a major constraint. This can also stimulate the creation of small industries and other economical activities related to food processing. For example, there is a considerable wastage of the fruits due to rapid ripening. By using simple preservation methods like solar drying, post harvest losses can be minimized enhancing the value of crops for producers, and increasing the household food security and the availability of B-carotene rich foods during off seasons. Similarly, jams can be prepared from home grown papayas preserving the nutrient composition, and increasing the availability of the fruit for at least a year. In this way, even in the most remote areas, communities' access to vitamin and mineral rich foods can be increased.



Improvement in the food distribution system have to be pursued to ensure a better availability of produced food to the population in need. On a larger scale, reduction of food losses through improved harvesting technologies and conservation have to be pursued as well as food and agriculture planning must take in consideration the necessity of diversifying food production in order to meet not only caloric requirements but also to ensure a more balanced diet.

### Information-education-communication campaigns

Awareness about micronutrient deficiency disorders and the ways to avoid and reduce their deleterious impact through the consumption of nutritious foods must be a major goal of any programme aiming to reduce the prevalence of micronutrient deficiencies. Nutrition education delivered through health, education, agricultural extension and mass communication channels must reach all the target populations and inform them about micronutrient deficiencies. Nutrition education should not be restricted to target groups (pregnant and lactating women, schoolchildren) but must be directed to adults and out of school youth to provide global nutrition information to the population. Awareness of fortified foods, the importance of food preservation, and the consumption of the appropriate kinds of food to prevent micronutrient deficiencies together with the availability of health measures should be a significant indicator for evaluating the success of any programme to reduce vitamin A, iron and iodine deficiency. The successful experiences in Thailand and the results of the studies made in Nepal and in other countries have demonstrated how important it is that people know about the problems, their causes and their consequences in order to be able to participate in a sustained and effective way. In all cases, the main target groups and messages have to be defined, media selected, and suitable materials prepared, tested, used and then evaluated. Social marketing approaches are highly appropriate for promotion of programmes for overcoming micronutrient malnutrition. This is an area in which the private sector can greatly aid governmental programmes.

### Laboratory services

For accurate assessment of micronutrient malnutrition problems, laboratory support is essential. The minimum facilities required in a country are, for iodine, measurement of iodine in salt (if there is an iodation programme) at least centrally, with spot-test kits for measuring iodine in salt at district level; and, for anaemia, accurate haemoglobin or haematocrit estimation at district level. Depending on the size and resources of a country, facilities may be developed for estimation of urinary iodine and/or thyroid-related hormones (thyroid-stimulating hormone, thyroxine), serum vitamin A and carotene, modified retinol dose response, and serum ferritin and other parameters of iron status. In the short term, external facilities can be used. In the longer term, at least for larger countries, such facilities should be incorporated in programme development plans. A network of laboratories for food analysis is also necessary to improve and ensure the quality and safety of food and to better protect and inform the consumers through labelling and advertisement of the nutritional value of foods. Especially in the context of food fortification, legislation and control mechanisms are in need of adequate laboratory facilities for enforcement.

### Integration and management mechanisms

An essential part of developing or strengthening national micronutrient programmes is the formulation of a coherent national plan, covering the whole micronutrient initiative, so that effective integration can be achieved, even if external support comes separately. Integration not only operates across the micronutrient programmes, but in broader programmes it also implies incorporating activities for overcoming micronutrient malnutrition in programmes of primary health care, rural development and socioeconomic development in the country. It also means including the programme for overcoming micronutrient malnutrition in such overall plans of action as the plan of action for achieving the goals of the 1990 World Summit for Children; and the national nutrition plan of action which it is proposed to draw up following the International Conference on Nutrition, to be held in Rome in December 1992. This orientation implies mobilization of financial resources for the whole package of "do-able interventions", as a recognized major component of national action for improved food and nutrition, as well as health, agricultural and socioeconomic development, rather than a series of vertical actions.

At national level, what is also required is a functional mechanism to ensure that micronutrient issues are given sufficient prominence, as a "do-able package", to attract the necessary resources. The main purposes of this mechanism or committee are to plan and review programmes in all three fields of overcoming micronutrient malnutrition and ensure coordination between the three; and to serve as a forum for information-sharing and for dissemination and advocacy to policy- and decision-makers. There will be less need for this kind of committee if only two forms of micronutrient malnutrition are present; and none if the only problem is iron deficiency - as will be the case in about one third of the countries.

Three main scenarios exist at national level for this purpose:

- In larger countries, there are often specialized nutrition institutes, or nutrition units in health or other ministries, of such a size that a group of people is likely to be assigned responsibility for each micronutrient. In such countries, there may be nutrition personnel at intermediate and even district levels.
- In medium-sized countries, there may be just enough manpower to have one person looking after each micronutrient - usually in the health ministry. There may be limited nutrition personnel at intermediate level but not at district level.
- In smaller countries there may be only one officer to look after all the micronutrients, or even the whole nutrition programme, and no nutrition personnel below national level.

The management mechanism required at national level should therefore be an integrated part of the overall national nutrition programme. The mechanism will normally include the creation of a small technical committee for overcoming micronutrient malnutrition; and the designation of an officer with overall responsibility for the

micronutrient initiative, in liaison with the responsible officers for each of the three micronutrients.

In many countries, specific committees exist already, e.g., for control of iodine deficiency disorders or vitamin A deficiency. Several countries have set up a national council for control of iodine deficiency disorders or, in the case of larger countries (China, Indonesia), an international working group to which members of the International Council for Control of Iodine Deficiency Disorders are invited. Any of these models may be likewise useful in promoting control of vitamin A and iron deficiencies. These separate groups may need to continue, with their own terms of reference; but at the same time an overall coordinating group for the micronutrient initiative is required. What is essential is the mechanism of cooperation, rather than the structure. Its main purposes are to pursue common approaches as outlined above as far as possible, and to ensure integration within overall food, nutrition, health, agriculture and development programmes in the country.

#### Human resource development

In most countries there is a tremendous need for intensive human resource development and training programmes for the health, agricultural, educational and other personnel involved, so that they can play their necessary role in generating action at all levels, from community to national. Hence national programmes, if not currently under way, will have to start with massive training programmes in the technical aspects of overcoming micronutrient malnutrition as described above, as well as in approaches to building up the capacities of communities for assessment and for implementation of action plans.

It is very desirable to develop integrated training programmes at all levels. At the local level, extension workers have to be polyvalent. At district and intermediate levels, they have to learn to carry out multisectoral action in a cooperative and complementary way. Besides health personnel, agricultural and community development extension workers and schoolteachers should be involved in the promotion of carotene- and iron-containing crops. The tasks and responsibilities of each category of worker at each level must be defined and become the basis of the task-oriented training programme. They include guiding and monitoring the activities for overcoming micronutrient malnutrition carried out by personnel under their supervision.

#### Applied research

While it is true that the knowledge required for overcoming micronutrient malnutrition is generally available, there are many finer points, relevant to action programmes, which are not fully resolved or which require local adaptation and operational research. Additional research can contribute to promote common approaches. Some of the obvious ones are:

Assessment. Requirements under this heading include refinements to facilitate field-work and render laboratory support more available and less costly; and, especially, development of techniques for joint assessment of the three micronutrients.

Implementation. Requirements for iodine deficiency disorders and vitamin A deficiency include adjustment of frequency and dosage of supplements, according to local circumstances; for anaemia, development of a more acceptable form of iron supplementation, at modest cost, including the use of prophylactic parenteral iron; and for all three micronutrients, study of the possibilities for multiple fortification, together with operational research to develop common intervention procedures where feasible. Necessary agriculture-related research, might include plant breeding for the enhancement of micronutrient content, improvement of retention of provitamin A in red palm oil, and the effects of deforestation and fertilizers on micronutrient content of soils and foods.

Monitoring/evaluation. Requirements include operational research to develop common surveillance systems.

### III. ACTION LEVELS

An effective national micronutrient programme should catalyze, promote and strengthen comprehensive activity clusters at many levels - including community, district and national levels. These activities should be interlinked in a mutually supportive manner, and involve integrated activities across all the different sectors involved in the control of micronutrient deficiencies. A summary of some of these activities is given in Annex 2, by way of example.

#### Community level

Action in communities starts with the assess-plan-act cycle. In general, such action can only begin when the local government officers are in a position to give clear guidance about the nature of the problems, how to assess them and how to take action. The human resource development programmes described above are an essential prerequisite, although some activities such as iron tablet distribution may already be under way. It is usually the role of a village health committee to undertake or review this assessment of the situation and decide on appropriate, feasible and necessary action jointly with the agricultural and education specialists. Such action will most likely become part of the duties of a village team composed of the health, agricultural and educational workers or be undertaken by a visiting team. The action will include elements of assessment, intervention and monitoring/evaluation. Such activities will form part of the village health committee's programme, and the general village development programme. There will be severe limitations where self-reliant village committees are poorly developed. In urban areas, the action will be taken more on an individual basis, under the guidance of a health centre.

#### District level

The district is the most peripheral unit of government administration at which all essential community services are represented. Most countries now have a decentralized mode of administration in which more and more responsibility and autonomy are passed to this

level. A district development plan is formulated periodically and provides the basis for action including problem assessment, programme implementation, monitoring/evaluation and mobilization of resources. The programme for overcoming micronutrient malnutrition has to fit into this complex as an intersectoral activity (involving health, agriculture, community development, information, education and local government) as well as being a significant component of the district agricultural and health development plan.

Training of the district-level personnel for their roles in overcoming micronutrient malnutrition gives them the capacity to provide operational support and training for peripheral staff and communities. As there are seldom specialized nutritionists at this level, the competence has to be developed of other categories of staff such as nurses, health educators and inspectors, agricultural and community development extension workers, and teachers. Normally the district should have a nutrition development plan, of which overcoming micronutrient malnutrition will be a significant part, and these non-specialist workers will have to formulate it. The plan will identify the particular types of micronutrient malnutrition present, the vulnerable groups and villages more affected. It will provide for measures that are immediately feasible and for longer-term ones, and set up systems of monitoring and evaluation, which will be as simple as possible and involve the establishment of an annual work plan and the assessment of activities in relation to the targets. It will be necessary to seek the cooperation of the private sector and nongovernmental organizations in implementing the activities.

#### Intermediate level

At least in larger countries, there are one or more intermediate echelons - province or region - between the district and national levels. Staff at these echelons will be responsible for providing technical support to the district personnel in planning and carrying out their work, including training them in overcoming micronutrient malnutrition, and providing supportive supervision and monitoring. They will usually participate in centrally planned assessments of micronutrient malnutrition and in the planning and support of interventions and surveillance systems.

#### National level

The role of the national level is to provide strategic support to the intermediate level. This includes designing survey and surveillance procedures, assessing and deciding on overall strategies for implementation, and designing and executing programmes for training of trainers in overcoming micronutrient malnutrition for intermediate-level personnel.

A national plan for control of each of the significant forms of micronutrient malnutrition in the country should be drawn up through the work of the established technical units, with appropriate collaboration from, for instance, university departments as well as international, bilateral or nongovernmental organizations, and be reviewed by a national conference, which should then make recommendations on how to mobilize the necessary resources.

It has to be recognized that even if interventions for overcoming micronutrient malnutrition are relatively less difficult than for the control of general malnutrition, they are still very complex. All require intersectoral action, i.e., cooperation between colleagues of different disciplines who are usually not accustomed to work together. This requires considerable physical and mental effort and motivation; and financial incentives may be lacking. All these constraints must be adequately taken into account in the preparation of an adequate and realistic national plan to prevent and control micronutrient deficiencies.

### Regional level

There is much potential, as experience has already clearly demonstrated, in strengthening support for countries that are struggling to develop their micronutrient programmes, through regional cooperation (i.e. between countries in the same world region). Technical cooperation, training, laboratory facilities and monitoring are some areas where regional cooperation has proved useful. International agencies have a useful role in catalyzing these regional mechanisms.

Experience in the development of programmes mainly for iodine deficiency disorders - but also to some extent with vitamin A deficiency - shows the value of regional and subregional approaches. For IDD, countries of specific Regions, WHO, UNICEF and ICCIDD have cooperated well together, and joined forces to form IDD Regional Working Groups or Task Forces to stimulate, develop, accelerate and monitor control programmes. To a lesser extent with vitamin A there have been a number of successful joint activities at Regional level between countries and several agencies including FAO, WHO, UNICEF, USAID and IVACG. These Regional Working Groups, and joint activities have proved useful in stimulating and guiding the generation and implementation of national programmes. The International Vitamin A Consultative Group has also designated some regional coordinators, and the creation of a vitamin A task force in Africa is being considered.

### Global level

In its early paragraphs, this paper has indicated the great growing global movement aimed at overcoming micronutrient malnutrition. The Montreal Policy Conference on Micronutrient Malnutrition, held in October 1991, with its multiple co-sponsorship (CIDA, FAO, UNDP, UNICEF, USAID, the World Bank, etc.) was itself a good example of the growing interest (and need) of international, national, non-governmental and scientific organizations to strengthen and harmonize their activities to thereby ensure well-focused, effective international support.

Several of the major international organizations and bilateral agencies (e.g. FAO, IDRC, WHO, UNICEF, UNDP, USAID, the World Bank, etc.) already have well established infrastructures through which technical and financial support is provided directly into many countries and into Regional support structures. Most of these agencies already provide extensive support for micronutrient programmes in many countries.

In addition, there are a number of substantial non-governmental organizations with large international networks working in the field of micronutrient malnutrition. Also there are a number of prominent university departments and institutes which provide essential training and research in the field of micronutrients, on an international scale (e.g. PAMM-Atlanta, Institute of Child Health-London, IAC-Wageningen, CDC-Atlanta, NIN-Hyderabad, CRDN-Bogor), which already work well in these areas. The various consultative groups like IVACG, INACG and ICCIDD can provide specialized technical collaborative support in the assessment of the problems, and organization of information exchange, and provide documentary support for training of manpower.

There are, in fact, a wide variety of strengths that each of the agencies has to offer, including areas and sectors of emphasis and interest, entry points to government ministries, collaborative links with institutions, differing magnitudes of resources and resource-generating capabilities, technical expertise, access to community programmes, favoured countries for support ...etc.

Whilst this global proliferation of interest and action in micronutrient deficiencies is tremendously encouraging and indeed essential if micronutrient malnutrition is to be eliminated, there is a critical need for cooperation and collaboration across the multitude of interested organizations, primarily in the interest of ensuring that countries are effectively, appropriately and optimally supported in developing their own sustainable micronutrient programmes. In this context at the recent (February 1992) meeting of the Subcommittee on Nutrition of the Administrative Committee on Coordination of the United Nations (ACC/SCN) it was agreed to strengthen the cooperation of all these agencies and enhance the harmonization of the proliferating global activities for overcoming micronutrient malnutrition.

The ACC/SCN already has three well functioning Ad Hoc Groups (Iodine, Vitamin A, and Iron) which meet and report every year at the time of the SCN. At the recent SCN meeting it was resolved to establish, within the SCN, a Micronutrient Forum, which would provide a forum for information sharing and policy and programme harmonization between agencies concentrating particularly on issues common to all 3 micronutrients. The Forum will initially take the form of a one-day meeting at the time of the SCN, and as with the 3 Ad Hoc Working Groups, the forum will not have an operational or executive role.

For the 3 main UN agencies (FAO, WHO, UNICEF) already having large programme commitments aimed at overcoming micronutrient malnutrition, there are a number of unique and essential activities within the framework of their individual mandates that each needs to further reinforce, to provide the necessary leadership and support in efforts to overcome micronutrient malnutrition.

For FAO this includes technical guidance and support to countries in planning, establishing and implementing the agricultural and food quality aspects of micronutrient programmes - activities that lead to long term sustainable food-based diversification, and appropriate strengthening of food technology capabilities including food processing and quality control.

WHO should provide strengthened technical guidance support in developing national micronutrient programmes and national capabilities focusing on the role of the health sector and its coordination with other sectors. This support should be aimed, in collaboration with FAO, at achieving the essential actions described earlier in this paper - assessment, monitoring and evaluation, dietary diversification, fortification, supplementation, public health measures, and the crucial support activities such as education and training, laboratory support, legislation, etc.

UNICEF has a major role in providing funding and machinery for establishing and implementing these programmes, and also in preparing, in association with various national agencies, an analysis of plans and actions undertaken by the nations to achieve the goals.

Apart from these more national-level action, FAO, UNICEF and WHO have vital mandated roles to promote and support regional mechanisms which in turn support national programmes, to promote mobilization of necessary resources and support international programmes for human resource development, applied research, and technical cooperation among the partners in this global micronutrient movement. Both FAO and WHO also have major international responsibilities and regular reporting mechanisms for providing information on the assessment of global status of micronutrient intakes and micronutrient malnutrition, and the progress of micronutrient control programmes.

#### IV. TARGETS

As a result of the global initiative for overcoming micronutrient malnutrition outlined above, it is hoped to attain the goals of elimination of iodine and vitamin A deficiencies and reduction of iron deficiency anaemia; the target will be to reach 50% of the at-risk population by 1995 with some form of intervention, and 100% by 2001. Each country will determine its own targets for specific interventions and activities. The following operational targets for overcoming micronutrient malnutrition are suggested - in addition to those established individually by each country for the three forms of micronutrient malnutrition:

- Assessment/analysis. By 1993, all countries will have at least initiated an adequate assessment of each form of micronutrient malnutrition, sufficient to launch an action programme. By 1995, such assessments will be completed, reported and acted on.
- Planning/implementation. By 1993, each country will have established a national plan or mechanism for overcoming micronutrient malnutrition and have designated a national responsible officer for the purpose. By 1995, each country will have established and be implementing an action plan for overcoming micronutrient malnutrition in respect of each micronutrient malnutrition problem existing in the country. There will be one or more effective and appropriate strategies in each case. These will include, for iodine deficiency disorders, iodation of salt, oil or water; for vitamin A deficiency, supplementation programmes in areas affected by emergencies, fortification trials under way where considered feasible, dietary diversification programmes under development jointly with a nutrition education and information



campaigns and concurrent public health measures such as immunization and environmental health; and for iron deficiency, widespread supplementation programmes under way, systematic monitoring of Hb levels in pregnancy, a dietary diversification programme under development jointly with a nutrition education and information campaign and concurrent public health measures such as immunization, environmental health and parasite control. There will be adequate laboratory and information-education-communication support, trained national personnel available and necessary problem-solving research under way.

- Monitoring/evaluation. By 1995, there will be effective monitoring and evaluation systems in place for each form of micronutrient malnutrition existing in each country, and an operational assessment of all current interventions; stronger global and regional mechanisms will be in place for supporting national efforts for overcoming micronutrient malnutrition; and an international conference will be held, to review progress towards the attainment of the goals. By 2001, each country will have made a reassessment of its micronutrient malnutrition problems, have determined the population coverage, and have identified the constraints to be removed if the goals have not been attained.

The international community and indeed the governments of the World, have endorsed and re-endorsed, through the 1990 World Summit for Children, the World Health Assembly, the 1991 Montreal Conference and now the International Conference on Nutrition, their determination to achieve the set of goals for the 1990s aimed at the virtual elimination of iodine and vitamin A deficiencies, and the reduction by one third of iron deficiency anaemia among women of child-bearing age. The current situation of micronutrient malnutrition is alarming: around two thousand million people are at risk from one form or another. Programmes to alleviate micronutrient malnutrition are under way in a great majority of countries but many are ineffective, for lack of an integrated and comprehensive plan of action, inappropriate resources and insufficient commitment.

The international community is committed to do far more to support these efforts. It is expected that major resources will become available for overcoming micronutrient malnutrition as the countries and the communities are realizing the negative impact of micronutrient deficiencies.

This paper therefore calls for reinforced action and the mobilization of the necessary resources and support, and emphasizes the role that the major international organizations should play in this great opportunity. This global micronutrient movement can succeed in achieving the virtual elimination of iodine deficiency disorders, vitamin A deficiency and substantial reduction of iron deficiency. It requires the heightened commitment and support of international, bilateral and non-governmental organizations, scientific institutions and public and private partners in this exciting alliance to End the Hidden Hunger of micronutrient malnutrition. Its fundamental thrust needs to be one of appropriate responsive support to the needs of governments as they strive to establish effective durable programmes for achieving their goals for overcoming micronutrient malnutrition.

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Burundi	Ghana	Namibia	Uganda
Cameroon	Guinea	Niger	United Republic of Tanzania
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*Preventing specific micronutrient deficiencies*  
*Theme paper No. 6*

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Belarus	Iceland	Norway	The Russian
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Czechoslovakia	Italy	Romania	Great Britain and
Denmark	Latvia	San Marino	Northern Ireland
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	(Federated		
	States of)		

## **TYPES OF ACTION NEEDED AT DIFFERENT LEVELS**

The following are intended simply as examples of the types of action needed at different levels, not as an exhaustive list of the action to be taken.

### **A. FAMILY AND COMMUNITY LEVEL**

- Information-education-communication through village health workers or committees, about symptoms and signs of micronutrient malnutrition, and their causes and consequences;
- identification of clinical cases and referrals for treatment where necessary, and notifying them in monthly reports;
- ensuring that recommended measures are implemented (e.g., using iodated salt where available, avoiding practices leading to loss of iodine, and taking iron tablets for the full duration during pregnancy);
- adopting practices that promote iron absorption (e.g., increased consumption of vitamin-C foods) and avoiding practices (e.g., drinking tea or coffee with meals) which inhibit absorption;
- measures to minimize infections and parasitosis, including attendance at immunization sessions, and environmental health measures in such areas as water, sanitation and food hygiene;
- home gardening to ensure optimum availability of, for instance, green leafy vegetables, orange-coloured vegetables and fruits;
- ensuring the availability of and providing training in simple surveillance methodology such as recognition of goitre, night-blindness or anaemia - pallor, and reporting these surveillance data to village authorities for general discussion and appropriate action;
- ensuring the involvement of schools, teachers, women's groups, youth groups and others concerned in information-education-communication and horticulture.

### **B. DISTRICT LEVEL**

- Collection of minimum data on prevalence of micronutrient malnutrition through hospital records and a sample of the village population;
- reporting data to district and provincial development committees, and establishing a monitoring system;

- promoting information-education-communication for district authorities, services and local nongovernmental organizations, particularly by equipping the district health team for activities such as the simplest type of haemoglobinometry, and providing training in the recognition of goitre, cretinism, Bitot's spot and xerophthalmia;
- training in the management of severe cases, and establishment of referral criteria;
- promotion of production and consumption of green leafy vegetables, orange-coloured vegetables and fruits, and other fruits through, for instance, agricultural extension services, school gardens, community gardens and women's groups;
- assessment of other possibilities (e.g., use of red palm oil, other oils and wild vegetables or crops) which could be introduced.

### C. NATIONAL LEVEL

- Establishment of a national micronutrient malnutrition unit if one does not already exist;
- establishment of a technical committee (with subcommittees for each of the major forms of micronutrient malnutrition), which will include representatives of universities and other specialized institutions, the private sector and - on invitation - representatives of other potential collaborating United Nations, bilateral and nongovernmental organizations;
- programme formulation for combating iodine deficiency disorders, vitamin A deficiency and anaemia;
- producing manuals/guidelines for training of intermediate and district-level personnel, and organizing training programmes from central down to peripheral level;
- organizing a surveillance system as well as national surveys and applied/operational research where needed;
- review of ongoing programmes (e.g., for iron supplementation) in order to assess coverage, impact, efficacy and main constraints;
- organizing national meetings to review the situation of micronutrient malnutrition (separately or together) and work out strategies and a plan of action for combating it, or to assess ongoing programmes and make recommendations for improvement;
- integration of activities for overcoming micronutrient malnutrition in the national nutrition programme, the national health and agriculture plans, and the socioeconomic development plan.

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**ASSESSING, ANALYSING AND MONITORING  
NUTRITION SITUATIONS**

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## SUMMARY

Nutritional status is an outcome of a wide range of social and economic conditions and is a sensitive indicator of the overall level of development. Nutrition-related information is essential for selecting and implementing effective policies and programmes to improve nutritional well-being. To be useful, information must be provided to the appropriate decision-makers in a timely manner and in an easily understood format. Information related to nutrition is needed for a variety of purposes, such as: identifying chronic nutritional problems and their causes; predicting and detecting short-term or acute nutritional problems; targeting population groups for both short-term relief efforts and longer-term policy and programme development; monitoring changes and evaluating the impact of interventions and development programmes.

Efforts to collect and analyse nutritional information must be cost-effective, timely and directed toward specific goals such as preparation of development plans, programme design and management and budget decisions. Two fundamental principles in choosing assessment and monitoring methods are: 1) information is useful only if it is used, and 2) the resources used for data gathering and analysis must be balanced against the even greater resources required for intervention. Clearly, only relatively minor resources for information are justified in an exploratory phase. While the cost of information is low compared with ineffective expenditure, continued expenditure on information in the absence of action is clearly inappropriate. However, interventions likely to have a significant effect on nutrition can be expensive, and the cost of obtaining relevant information, including through special surveys, is likely to be readily justifiable in terms of ensuring effective use of public funds.

Governments considering increased commitment to solving nutrition problems will need, early in the process, to assemble some information as a basis for deciding priority problems and possible action. Generally, this assessment will include indicators of nutritional problems by various population groups, possibly with trends in these; indicators for subsequent monitoring will often be the same.

Particularly when resources are very constrained, emphasis should be on drawing on existing sources of data. In many countries, growth monitoring programmes accumulate much data which can be tapped. Similarly, birth weights, when available may be compiled. Price monitoring is part of many

routine statistical systems, and may be used for monitoring trends in household food security. When resources are very limited, and/or rapid reporting and improved quality are important, a few reporting points (sentinel sites), often in the most vulnerable areas, can be selected. Rapid assessment procedures have a potentially important role in obtaining detailed information on programme delivery and in following up indications from reporting systems that further investigation is required.

Defining information needs first depends on deciding on the problems of concern. An initial distinction is between priority for malnutrition due to underconsumption and infection, for which poverty is a major cause, and diet-related non-communicable chronic diseases (NCCDs). In most developing countries malnutrition/infection remains the major problem. Acute food crises now mainly experienced in Africa should be distinguished from endemic (chronic) undernutrition - usually the most serious problem - and from micronutrient deficiencies. If not already done, an initial assessment of priority problems, including identifying people most affected is required. This can usually be based on compilation and analysis of existing information.

Generally, the most practical approach to nutrition monitoring is to use a minimum number of indicators and to focus on those that lend themselves to regular assessment. The prevalence of underweight status in pre-school children is the most commonly used indicator of undernutrition. Some analysis by criteria such as administrative areas, urban/rural areas, ecological zones and possibly selected socio-economic factors, such as income source, access to services and programmes is useful.

Ideally, information should be provided on the number of people who are currently affected by specific types of malnutrition, as well as those who are likely to become malnourished. Additional information about the location of malnourished groups and changes in their nutritional status over time should also be provided. Gathering information on the factors affecting nutritional well-being is also important for cost-effective programme development and monitoring.

In the case of **food crises**, timely commitment of resources for public works and food distribution is required. Often, the most important early warning indicators are based on forecasts of food availability and price indicators. In drought-prone countries, it is useful to combine data on rainfall and food crop and livestock conditions with other information on food stocks and reserves, market conditions and various socio-economic indicators to predict food crises. Experience from Botswana, India and Indonesia shows that food crises can be successfully resolved with the help of appropriate and timely information.

Addressing **endemic undernutrition** requires assessment and monitoring of general nutritional status, usually by anthropometry (birth weight, infant and child weight and/or height; women's weight and height) sometimes mortality rates. While assessing the **food security** status of specific households may be difficult, monitoring changes in food prices is relatively simple and can be reported in some national early warning systems. These should be based as far as possible on existing survey data, including reanalysis and regular information such as prices relative to wages and local production changes. Health data may be more directly related to intervention - detecting a specific disease leads to defining action.

Monitoring of **infectious diseases** can be conducted at the community level through the health system or the Primary Health Care service. Monitoring of **breast-feeding practices** and their determinants should be undertaken, given their importance for nutrition in early life and their influence on maternal health. Infant feeding and weaning practices should also be assessed.

Assessment and monitoring of **caring capacity** needs development. A central issue concerns women's constraints, such as lack of knowledge, time and access to and control over resources, and improving their position. A situation analysis could provide information on aspects such as education, access to services and technology, property and income rights and social security, as well as women's nutritional status.

**Micronutrient deficiencies** - primarily of iodine, iron, and vitamin A - can be assessed and monitored in terms of: dietary availability, clinical signs of deficiencies and biochemical tests. Combinations of surveys and data from the health system can provide information as can deficiency control programme monitoring. For **iodine**, vulnerable areas can be identified from knowledge of the iodine content of foods and soils, often in mountainous areas and flood-prone regions where the soil has been leached, which can be mapped. Where salt is iodized, salt supplies should be monitored. Iodine deficiency can be assessed clinically by goitre rates, as well as by more severe manifestations such as cretinism. Such data may be obtained by surveys, or by reports from health centres.

**Iron** availability in the diet can be assessed from consumption survey results and iron status can be assessed from clinical and biochemical assessment, focusing on the most vulnerable groups (women and young children). **Anaemia** resulting from iron deficiency is most commonly assessed. **Vitamin A** intakes vary widely with availability of fruits and dark green leafy vegetables and changes in their prices, so that assessments of consumption need to take account of such

need to take account of such effects. Clinical assessment, by survey or through clinic reports, primarily uses observation of eye changes based on established diagnostic criteria.

Following dietary and lifestyle patterns and disease trends may be useful for monitoring **diet-related chronic diseases**. Trends often assessed at the national level from food balance sheet data relate to total energy intake, percentage of energy from fat and from fat of animal origin. Disease outcomes can be tracked using both morbidity and mortality data. The latter can be compiled from death registrations, and in many countries improving the coverage of vital registration, including causes of death, would be useful for this and other purposes. Morbidity data are scarcer still; possibly sentinel site reporting from selected hospitals and health centres should be considered while systematic coverage through the health system is built up.

Information is also needed on the implementation and cost-effectiveness of programmes aimed at resolving particular nutritional problems or targeted at a particular group or geographic area. Appropriate institutional capacity is central to nutrition monitoring. Many countries are still at the stage of establishing nutrition information systems, generally starting with data on childhood undernutrition. Often, with the use of established data sources and information systems, a more multifaceted system can be developed in accordance with a country's priorities and resources.

Global-level assessments of food security have two types of objectives: to advocate the allocation of resources to address hunger and malnutrition; and to alert donors to impending food crises. These are based on various sources, two of which are FAO's food balance sheet procedures, and the Global Information and Early Warning System (GIEWS).

The GIEWS monitors continuously the world supply/demand outlook for basic foods in order to assist governments to take action in quickly changing situations, to identify countries and regions where serious food shortages and worsening nutritional conditions are imminent to assess possible emergency food requirements, and to support the efforts of governments to establish and strengthen national and regional food information and early warning systems.

International health monitoring projects are under way through WHO involving a number of countries, such as MONICA and EURONUT projects. The MONICA project is being extended to include some developing countries through the Global Cardiovascular Disease Monitoring and Prevention Network (GCMP Network). WHO has also established the global nutritional anthropometry data bank and the Global Data Base for Nutritional Trend Analysis.

Nutritional well-being is largely determined by the level of food consumption and infection. Many of the major nutrition effects of agricultural and rural development projects are likely to operate through changes in the availability of food to the malnourished as influenced by food production, incomes and prices. Maximizing production alone through technological inputs has not necessarily led to corresponding improvements in nutritional status or in quality of life. To do so planners need to take a more comprehensive approach to development to encourage a more equitable distribution and consumption of food, as well as to increase the purchasing power of the nutritionally deprived, poor and disadvantaged groups of the population.

While traditional nutrition interventions have an important role to play under certain circumstances in combatting nutritional deprivation, direct nutrition interventions contribute to lasting improvements in food consumption and nutrition only when integrated with the overall planning and development process which address the causes of malnutrition; otherwise if simply tagged on to a project they are at best short-term palliatives. This may be why conventional agricultural and rural development strategies and traditional nutrition interventions have been unable to satisfactorily address the needs of the poorest and nutritionally at-risk population groups and communities.

Many households within these groups continue to be significantly disadvantaged to the extent that their livelihood system is no longer able to provide for their health and nutritional security. Each of these households has its own opportunities and constraints which cannot be effectively addressed by conventional planning approaches and, consequently, a flexible approach is needed to cater to different individual and community needs. As nutritional status and food consumption are more significantly affected by broader development issues, the inclusion of nutrition objectives in development projects should begin by focusing on the appraisal of the design and implementation of project activities in terms of their impact or potential impact on nutritional status and food consumption.

A more effective means to improve nutrition is to incorporate food consumption and nutrition objectives in mainstream policies and projects which support and shape the country's development process. Consequently, nutrition should not be considered as a separate activity within a project, compensating perhaps for a negative nutritional impact, but should be deliberately built into all development programmes at the planning stage, especially the larger-scale investment and area development policies and programmes, to ensure that appropriate resources to improve food consumption and nutrition are channelled to the most malnourished sectors of society or to those most at-risk. For this purpose FAO has developed a methodology<sup>(94)</sup> for introducing nutrition considerations into agricultural and rural development projects (see box).

### **Methodology for introducing nutrition objectives into agricultural rural development projects**

A training package for agricultural and nutrition planners based on FAO's methodology for introducing nutrition objectives into agricultural rural development projects has been produced, and customized versions are being used in the Asia and Pacific, African, and Latin American and Caribbean Regions. The methodology has been applied by nutritionists and planners in a variety of situations and has proved of value in agriculture, fisheries and forestry projects as well as in women in development projects and those which conduct training in project planning<sup>(95)</sup>.

The methodology calls for nutrition considerations to be taken into account by development planners at every stage of the project planning cycle in order to ensure (i) that development projects are not detrimental to nutrition or at least that their negative impact is minimized and (ii) to encourage the identification of potential opportunities in the project design for securing nutritional improvement.

Thus, the nature, extent and causes of food and nutrition problems need first to be defined and population groups, functionally classified by, for example, location, occupation and socio-economic level, need to be ranked according to their nutritional status. In pursuance of these objectives, the guidelines call for the collection of available information and, where necessary, the collection of additional data in order to answer the following key questions:

- (i) What is the extent of malnutrition? Who is malnourished, for which nutrients, by how much and when?
- (ii) What is causing malnutrition and what is the trend of its incidence?
- (iii) What is being done about malnutrition in terms of government policies or project plans and interventions?
- (iv) What can be done in the project about the nutrition problems identified?

To translate the benefits of development into long-term improvements in the nutritional status of the rural poor, development projects should contain components to augment income and provide time benefits to at-risk households, increase subsistence food production, and improve secure access to food in all seasons. Environmental and nutritional components which act to reduce infectious disease by improving the environment or which modify family behaviour through nutrition education should also be considered in integrated agricultural and rural development programmes.

#### 4.1 Agriculture Policies and Programmes

Agriculture policies, in particular those which incorporate nutrition objectives, can have pronounced beneficial effects on nutrition outcomes through their impact on the level and fluctuation of income of nutritionally at-risk households, food prices, women's labour demands and time allocation, and the nutrient content of foods made available. Agricultural development, however, has often been concerned more with raising aggregate production of selected crops than with increasing consumption levels of poor households or generating sustainable livelihoods. Thus, some social groups may fail to benefit from an overall increase in food production due to their poverty and consequent lack of access to food, or to other constraints. Many examples exist of countries with "adequate" food supplies, whose populations still suffer from serious malnutrition.

The effects of the agriculture sector on nutrition go far beyond the matters of food production and supply, and nutrition considerations can be influential in the design and selection of a variety of agriculture policies and programmes. As previously discussed, the ultimate role of the agriculture sector should be seen as producing livelihoods and improving nutrition, by the production, processing and marketing of agricultural products not simply by producing crops and commodities alone. The implications that who produces how much of what, and how they do it, may be as important as how much is produced. Similarly, how food and other commodities are processed and distributed is also important. This is because the nutritional impacts of the agriculture sector are mediated through a number of mechanisms other than food availability. These include employment opportunities and incomes, prices, time constraints, labour demands and energy expenditures, environmental and living conditions, gender issues, and a variety of social factors. Depending upon the circumstances, there will be "winners and losers" associated with most policy options; and from a nutrition planning perspective the need is to determine who will actually benefit, and to what degree, from given agricultural policies and to try to ensure that such benefits are directed to the poor and malnourished. Similarly, a safety net for the "losers" would have to be put in place.

The introduction of new technologies can illustrate the importance and the difficulty of trying to assess the differential impacts that various policy options may have on nutritional status. While the increased utilization of tractors, for example, should result in greater productivity per unit of labour input, and thus greater agricultural output, the net effect could be nutritionally detrimental if this is associated with a decreased demand for labour and the elimination of agricultural jobs. In many underdeveloped countries or areas, the overriding nutritional problems are more closely associated with a shortage of jobs, not a shortage of food. The most pressing need is often for employment creation.

### **Improved Agricultural Technology**

Since most developing countries depend heavily on agriculture as a source of revenue and employment, improving agricultural productivity by means of technological improvements, is an obvious approach to promoting economic development. Technological improvements by raising productivity, raise farm incomes and thus the demand for other goods and services provided in the local economy. The introduction of HYV rice in a region of India had proportionately as great an effect on small farmers and even on the landless as on larger farmers because of the generally positive effect of farm productivity on incomes<sup>(96)</sup>. However, these effects depended on two sets of factors. First, policies were explicitly designed to integrate poorer, smaller farmers into the modern agricultural system through provision of agricultural extension and access to credit. Second, market infrastructure was in place, which permitted all farmers to buy needed inputs (such as fertilizer and agrochemicals) and to market their increased production outside the region. The benefits from improved agricultural production extended to non-farmers in local towns. Once again, this was due to the explicit policies to facilitate integration of these non-farmers into the improving economy by means of credit availability, information dissemination, and roads linking urban to rural areas. The importance of all of these factors is to ensure that income benefits of improved agricultural productivity are not restricted to large landowners. In Africa, market infrastructure and communications are so poor that efforts to raise productivity need to be complemented by other policies to link labour and product markets across regions and to ensure access to credit and related inputs<sup>(97)</sup>. Thus the benefits of improved productivity in agriculture are felt largely through the effect on incomes, not through the impact on local food supply. In fact, the benefits are greater if the food (or other commodity produced) can be sold outside the local region to take advantage of a wider market.

Policies which single-mindedly pursue food production, focusing on its availability for domestic consumption, may be misguided for a number of reasons. For instance, promoting domestic consumption through export barriers lowers the potential for raising agricultural incomes. Export barriers in the short run may keep food prices low and thus benefit consumers but in the longer term, these lower prices will reduce investment in increased agricultural productivity and slow the potential for economic growth. Promoting food crops in preference to potentially more profitable cash crops can also limit agricultural income growth unnecessarily. There is no necessary tradeoff between promotion of cash crops and that of food crops; in most countries, production of both cash and food crops expand together<sup>(98)</sup>. The same policies which benefit one kind of agricultural production benefit the other: investment in agricultural technology, high-yielding varieties, irrigation, assurance of widespread availability of credit at market rates; development of market infrastructure (in particular, roads and transport facilities); and dissemination of market information.

It is important that technological improvements aim not only at increased production, but at a sustained level of production as well. Long-term ecological stability should not be undermined by technologies which achieve short-term production goals. Technical improvements in agriculture should be environmentally sound (e.g., promote soil and water conservation and maintenance of soil fertility) and thus help promote sustained production over the long term. Various technologies, such as agroforestry and integrated pest management, are being developed to encourage increased production (and in the case of agroforestry, product diversification) and ecological stability and sustainability. The links between agricultural development and improved nutrition and health are indirect, however. Increased agricultural production does not necessarily translate into greater availability of food or lower prices because what is produced may be marketed elsewhere rather than consumed at home or sold locally.

For agricultural development to promote equity and the nutritional well-being of the poor, the technologies introduced need to be applicable to small as well as large farms. In most instances, they should not be labour-displacing (though local circumstances of labour-scarcity do exist). Suitable technologies may not exist for all regions, particularly in Africa, where much farmland is dependent on highly variable rainfall and soils vary widely in quality. Efforts to disseminate a new technology through agricultural extension should explicitly target small farmers - including women, as in most parts of the world women constitute a significant proportion of farmers (even the majority in much of Africa). Furthermore, the effects of improved agricultural productivity depend on an effectively functioning market, linking the agricultural region with its markets and with off-farm suppliers of goods and services.



Off-farm employment creation, especially in agro-industries in agricultural-based economies, is crucial for improving nutrition. Again, careful attention should be paid to the impacts that new labour-saving technologies in agro-industries and other rural industries may have on employment and incomes, and on living conditions and lifestyles. For the protection of both on- or off-farms jobs in a situation of labour surplus, care should be taken not to allow macro-economic policies, for example maintaining an overvalued domestic currency, to artificially reduce the domestic cost of imported capital and inflate the domestic cost of labour.

Nutrition concerns should also underlie other agriculture policy decisions. For example, it could be nutritionally beneficial to promote the production, distribution and consumption of traditional or underutilized food crops, especially those consumed by the poor and food insecure. Increasing the production of these foods by small producers would automatically target a nutritionally vulnerable group. Moreover, the increased availability of a wider selection of foods would be of immediate nutritional benefit. Some of these foods, particularly roots and tubers, serve as staples, but others, including a variety of legumes, oilseeds, vegetables and fruits, serve as the primary sources of required vitamins and minerals in the diets of many people. As these foods tend to be well-suited to their environments, they may also provide an extra measure of food security during times of seasonal or environmental stress.

In addition to the direct nutritional benefits, the more extensive production and consumption of these foods may result in significant economic benefits as well. At the local level, increasing the utilization of traditional foods could result in increased income for those involved in their production, processing and marketing - many of whom are women. At the national level, stimulating the production, processing and marketing of these foods could also reduce the demand for imported foods.

Many of these traditional foods have been relatively neglected by ministries of agriculture as they have tended to focus more on the production (often by the larger producers) and marketing of cereals, such as wheat or rice, and cash crops. Promoting production of traditional food crops will require the selection and breeding of improved plant varieties that are high-yielding, pest and disease resistant and nutritious, as well as supportive research and technological innovations in the areas of processing and preparation. Extension efforts to propagate improved varieties should be intensified, and appropriate technical advice on their processing should be available on a scale similar to that provided for the main staples and cash crops.

Cash-cropping also illustrates the complexity of trying to balance tradeoffs among various effects. In addition to increasing foreign exchange earnings, cash-cropping is usually associated with increased household incomes, which often are associated with improved levels of food consumption. However, the increase in income may not always lead to improved dietary intake, if, for example, they result in a shift within the household in the control or the allocation of the additional income such that expenditure on food is not improved. As another example, an agricultural policy that encourages an increase in mechanization may lead to increased production, but may also lead to the displacement of agricultural labourers

and the marginalization of small-holder farmers. Consistently addressing the social and nutritional effects of agriculture and sub-sector policies can result in avoiding their adverse effects and in increasing their beneficial impacts.

#### 4.2 Macro-economic Policies and Structural Adjustment

Macro-economic policies present an interesting example of how nutritional status of the population may be affected by policy-decisions which are outside the conventional nutritional framework. In the first place, it is essential that macro-economic policies do not discriminate against the food and agriculture sector and rural areas, where often most of the poor live. Furthermore, many developing countries are at present undergoing structural adjustment programmes which could have adverse impacts, either directly or indirectly, on nutritional well-being. Indirect nutritional effects may arise through the effects of adjustment on economic growth, employment, income distribution or reduced government expenditure on social services, such as health or subsidized food distribution. A more direct effect would be the immediate decrease in food consumption among net food purchasers due to higher prices which may arise from increased producer prices designed to promote domestic food production, or associated with a removal of food subsidies, or liberalization of food markets. Cuts in government health services may also have a direct impact on nutrition. In many cases, the burden of adjustment falls disproportionately on the poor and nutritionally vulnerable.

The issue here is not the need to adjust, because, in the long run, it is the poor and vulnerable who will continue to suffer or even suffer more if economic disequilibria continue. But the question is about the designing and sequencing of the adjustment programmes. Is it possible to select a mix and sequence of policy actions that will allow macro-economic balance and economic growth while protecting the poor and vulnerable? Two approaches have generally been adopted, but the common feature in both is the need to identify the nutritionally vulnerable and to address their needs within the process of adjustment. The first approach is socially oriented and is intended to specifically reduce the adverse impacts of adjustment on the poor. This might entail selecting less deflationary economic policies in the medium term, promoting a more equitable resource allocation between productive and social sectors while increasing the efficiency in both, improving the targeting of interventions and subsidies, and monitoring the living standards and the health and nutritional status of the poor.

The other approach is to set up compensatory programmes designed to help relieve negative effects when they occur. These typically have included supplementary feeding programmes, moderation of price policies or subsidies, expansion of health care, and institution of income-generating programmes. Compensatory programmes have tended to be more expensive and often required additional donor support. In most instances of adjustment, focusing attention on the nutritional needs of the poor may lead to considerable policy modifications which should help protect their welfare. It is just this concern with monitoring the effects of adjustment on the poor that has led to the development of the World Bank's Social Dimensions of Adjustment Programme.

A package of macro-economic policies was widely implemented in the 1980s as a means of coping with problems of increasing government indebtedness and economic stagnation. The policies commonly part of the structural adjustment package were devaluation of overvalued local currency; lowering of international trade barriers; domestic market liberalization, including reduced government involvement in marketing and in the fixing of prices and margins; and sharp reduction in government spending to cut government deficits. In return, governments were able to reschedule their loans and obtain additional financing from the international lending community. The intent of currency devaluation is to make imports into the country more expensive, and to make the country's exports relatively less expensive in world markets. Over the long run, this change in relative prices should raise demand for domestically produced goods both within the country and on the world market, and this higher level of demand should translate into more jobs. Raising the relative prices of goods imported into the country typically results in capital goods becoming more expensive relative to labour, which should encourage the use of labour-intensive technologies, further expanding employment. The positive welfare effects of currency devaluation are medium term, and they depend on the ability of the vulnerable poor to be integrated into the economic activities stimulated by the opening of the economy. In the short run, all consumer prices generally are expected to rise: those of imports because of the devaluation, and those of domestically produced goods because of the pressure of increased demand, as consumers shift away from imported goods. At the same time, market liberalization means less government procurement and distribution of goods, and lowered government expenditures could be expected to reduce social spending in areas such as consumer food price subsidies, food supplementation programmes, public health clinics, and public schools, with negative welfare consequences.

Negative consequences were in fact observed in many of the countries which implemented macro-economic policies consistent with structural adjustment. Infant mortality rates rose in much of Africa<sup>(99)</sup>, and the rate of decline in this measure slowed in Latin America. The reduction of food subsidies in Sri Lanka and of feeding programmes in Chile resulted in an increase in severe undernutrition and in child mortality among the lowest income classes<sup>(100)</sup>.

The effects of structural adjustment in general, though, are rather context-specific. In many cases, social sector spending declined, but in others government spending was cut in other areas, such as capital investment<sup>(101)</sup>. The negative welfare effects of the cutbacks in feeding programmes in Chile and Sri Lanka were due to the fact that these programmes were widely accessible and effective; in other countries, social spending had not reached the rural areas or the vulnerable poor in any case, so the effects of reducing spending were less severe<sup>(102)</sup>. In Nigeria, the macro-economic package in fact resulted in a fall in consumer prices, because of the lifting of administrative price controls<sup>(103)</sup>. Nigerian exports increased after structural adjustment (due to other factors as well), with the result that public spending on health and education actually increased. Structural adjustment policies were generally implemented by countries which could no longer sustain their high levels of debt, due to international borrowing and domestic deficit spending, and to economic stagnation. In the years following the period of structural adjustment, those countries which adopted the

policies grew more rapidly and achieved higher levels of GNP/capita than similarly placed countries which did not adopt the policies<sup>(104)</sup>. The implications of this growth for welfare indicators depends on factors discussed above; the distribution of income and the specific uses of public spending varied widely among the countries studied<sup>(105)</sup>. This section discusses those public programmes most likely to translate economic growth into welfare improvements.

The construction of roads and transportation facilities enhances market function. Transportation is the critical link between rural areas of potential surplus agricultural production and their markets in urban and in other rural areas. Access to markets is essential to provide incentives to farmers to use modern technology to improve productivity. This access is also essential for farmers to obtain the inputs they need - a factor of increasing importance as agriculture modernizes. An effectively functioning market, for which transportation and communication are basic, contributes to price stability by permitting the free flow of food (and other goods) from areas of surplus to those of scarcity. Confidence in stability of prices contributes to a reduced sense of risk, which should help encourage farmers to adopt improved methods, new varieties, and new crops. Transportation and communication are the links among labour markets, permitting the benefits of an improved agriculture to extend to the rural non-farm sector. Good links among rural areas, which result in higher levels of rural non-farm income earning, may also reduce some of the pressures of rural-to-urban migration. The effect of improved transportation and communication should be fairly rapid self-reinforcing over time. There are likely to be short-run winners and losers, since one effect of this intervention is to equalize prices across regions, meaning prices will rise in some areas and fall in others, with differential impact on net purchasers and net sellers of the goods produced in each region. Where new roads provide access to a large and higher-priced market (an urban area or the export market, for example), the short-run impact might simply be to raise food prices in the producing region. In the longer run, higher incomes should draw food supplies into the region if indeed incomes rise and no other barriers exist.

The cost of road construction depends on the terrain and distances in the country. Maintenance costs also depend on local conditions. Generally, road construction has the benefit of using large amounts of unskilled labour, making it ideal for public employment programmes; moreover, its effectiveness is not highly sensitive to management and implementation. Where lack of transportation is a barrier to market function, and where particular areas of a country are isolated from the larger economy, investment in roads and resulting improved transportation and communication and mobility of goods and labour should promote equitable economic development.

Lack of access to capital is a barrier to poor households (and individuals) raising their incomes through improved agricultural practices or through self-employment in small enterprises. Small-scale credit programmes, which specifically target the poor, who have no assets to use as collateral, have a good record of raising household incomes. The repayment record of such programmes is also good, often better than that of banks. Those programmes which explicitly seek out female borrowers have the added advantage of raising the recognized economic contribution of women, with all the benefits which come from women's

improved position in households. Such programmes promote equity in economic development by reducing barriers to the integration of the poor into the larger economy. Small-scale credit programmes do not require large amounts of capital and generally are self sustaining. But they are management-intensive, so that replicating them on a national scale is difficult. The effects of credit programmes on individual welfare are through their effect on income in general and, for women, through their probable effects on the allocation of household resources.

#### 4.3 External Economic Environment

A growth-promoting external economic environment also has an essential role to play in improving the nutrition status of the poor. Essentially, policies in this domain encompass improving the international trade environment, alleviating of the external debt problem and increasing the flow of external resources. While recognizing that policies in all these areas have to be formulated through discussions and negotiations in appropriate fora, it is necessary to underline the crucial importance of these policies which together could constitute the creation of the external economic environment that would enhance the ability of the developing countries to adopt policies aimed at improving nutrition.

#### 4.4 Population Policies

The implications of population policies on nutrition are significant, particularly in food deficit countries of the world where rapid population growth continues and where urbanization is increasing. As with environmental issues, addressing population concerns is fundamental if sustainable improvements in nutrition are to be achieved. Policies to address population growth should include promoting more equitable economic development and providing better access to health, education and family planning services. Issues of urbanization and population distribution particularly need to be taken into account in the broader planning for agricultural production and trade, and in the marketing and distribution of food and other commodities.

#### 4.5 Education-related Policies and Activities

In general, education can be viewed as having both direct (immediate) and indirect effects on nutrition. The direct effects include improved dietary intakes and health status of children participating in school feeding and school-based health programmes and the improved eating habits attributed to a better understanding of food and health. The direct effect of maternal education and literacy on better nutrition status of children has been determined. The indirect effects, perhaps even more important, are the multiplying effects that education and literacy have on development and income, which in turn contributes to improved nutrition. Finally, education and training of people to address food and nutrition concerns at the community and regional level will have a potentially great impact in those areas where such skilled personnel are lacking. The overall effect of education on nutrition may be viewed as long term, perhaps generations, as education efforts are often aimed at those who are expected, through better opportunities, to provide better living conditions for their children, resulting in improved health and nutrition.

In many developing countries, attending school allows children to participate in feeding programmes which may provide a significant contribution to their daily food intake. School feeding programmes may also attract children to school who would otherwise not attend. Many school feeding programmes are based on donated foods and constitute one of the major means of using food aid.

School-based health programmes may provide dietary supplements, such as vitamin A or iodine and may also be used as the venue for treatment for intestinal parasites. Simple health and nutrition messages directed to school children may be communicated at the same time, for example footwear to prevent hookworm infestation, or personal hygiene. At the same time efforts to impart information to the school child may be of benefit to other family members. For example, information from school gardening programmes to increase students' knowledge and use of healthful foods not familiar to them at home may be shared with other family members.

Universal primary education is probably the most equity-promoting development intervention available, because it raises the productivity, or earnings potential, of all people, irrespective of their location or their ownership of other productive assets. Education is strongly associated with growth in GNP per capita. Educated people can earn more and have more flexibility to migrate in search of work, including work outside the country, providing foreign exchange in the form of remittances to their families. Such national income growth makes possible expanded government provision of other welfare-promoting services, including social insurance to guarantee at least minimum consumption levels of those unable to provide for themselves.

Education is a relatively long-term intervention; its effects take ten or fifteen years to begin to be realized. But the benefits are consistent, reliable, substantial, and sustainable. In the short run, requiring universal primary school attendance may have a cost to poor households in terms of the loss of children's productive labour. Children begin to make a positive contribution to household production starting as early as age six; they may fetch water and fuelwood; care for younger siblings; help in other household tasks, and engage in market work<sup>(106)</sup>. Loss of this labour may reduce household real income in the short run and increase the work burden of adult household members, particularly women.

In some cases, attending school can present food security problems for some families who rely on school age children for assistance during times of peak labour demand. Relatively high school fees and associated costs may also present a financial burden for poor families. It may be possible to mitigate these effects by scheduling of the school day and year. To the extent that schools can be located close to where the students live, time costs of school attendance are reduced. If labour-saving household technologies can be developed at the same time that schooling availability is expanded, these may compensate for the loss of household labour.

Of course, universal primary education includes education for girls as well as boys, but there are sound reasons to focus particularly on providing education to girls, and a special focus is justified because girls in many settings face barriers to education which do

not confront boys. Education of girls has benefits beyond those of education in general. Women, like men, earn more if they have some primary education. But educated women are also more likely than women without education to work in the paid labour force. Women's work outside the home is associated with delayed marriage and childbearing and lower total fertility, which has welfare benefits at the household level (lower physical demand on the mother; less competition for family food and resources) and at the national level (slower population growth). Women's paid economic activity is also strongly associated with better health and nutrition for female children as well as adults, because their implicitly perceived value to the household gives them greater access to food, health care, and other resources. Women who are economically active in their households apparently have a stronger role in household decisions regarding consumption and intra-household allocation, which appears to promote greater equity in consumption and better health and nutrition for household members. Another welfare benefit of educating women is that educated women have better household hygiene and child care practices and make better use of available health sources. They are better able to use information in health and nutrition education campaigns.

Once again, education of girls is a relatively long-term strategy, with short-term costs in terms of household labour. Special efforts may be needed to encourage girls to attend school, especially in countries where girls above a certain age are not permitted to mix with boys. Still, the economic development and welfare benefits of educating women should make this among the highest priority public services.

#### 4.6 Environmental Policies

Environmental policies can also have a major role in influencing the nutritional status of the poor, especially those who live in environmentally fragile areas. Of particular relevance for nutrition objectives are the policies that can promote sustainable development of agriculture, including forestry and fisheries. Policies must aim at creating an economic environment in which it is more profitable to manage and conserve natural resources rather than to destroy them. The most serious environmental problems that affect the attainment of nutrition objectives in developing countries are deforestation, desertification, and resource degradation of cultivated lands. The most demanding challenge from the environmental point of view concerns technologies for sustainable production on resource-poor land. In this context, it must be recognized that farming practices which cause environmental damage and adversely affect nutrition are symptoms of a malfunctioning system rather than root causes of the damage. Policy formulation must, therefore, be based on a thorough understanding of why undesirable land uses are practices. Policies must induce farmers, especially poor farmers on marginal lands, to adopt improved farming methods which are ecologically sound, socially acceptable and economically beneficial.

Increasing attention is being given to the long-term sustainability of development initiatives at every level. This refers to the long-term effects on the environment. Depending on the kind of intervention being considered, the issues range from environmental degradation - soil exhaustion, water pollution, and reduced air quality<sup>(107)</sup> which may be brought about by agricultural or industrial development initiatives - to the impact of

population pressure engendered by health policies which concentrate on child survival but not on the quality of the saved lives<sup>(108)</sup>. Much more is known now than 25 years ago about the long-term environmental costs of various development initiatives, but good methods of internalizing those costs into the cost-and-benefit calculus of development planning are still needed.

This is an area where the trade-off of long-term and short-term costs and benefits is most acute. Even people aware of environmental risks may place a higher priority on immediate survival and livelihood than on the longer-term health of the environment. Furthermore, the benefits of environmental protection and conservation may accrue to a different generation or to a different country from the one incurring the cost. An institutional framework for dealing with these issues does not yet exist.

The importance of environmental impacts is by now well recognized, but up to now this recognition has not materially altered the mix and design of most development interventions, probably because appropriate ways of balancing these longer-term costs against long- and short-term benefits have not been well developed. Consideration of environmental impacts itself represents major progress in thinking about development; but effective policies to deal with these impacts have yet to be developed.

The leading cause of environmental degradation in developing countries is the abject poverty of rural populations who, in their desperate struggle for immediate survival, may be driven to adopt practices which degrade the environment. Deforestation, for example, is caused primarily by the clearing of land for the planting of additional agricultural crops by poor farmers and landless people. With continued expansion in cropped area, land of relatively moderate or low agricultural potential is brought under cultivation and the combination of deforestation with low agricultural production has serious implications for both human populations and the environment. Poverty is thus a cause and effect of the deterioration of land and water resources and the poorer the villagers become, the more likely they will be involved in the exploitation of such fragile resources. The reverse is also likely in that once poor farmers are assured of their own food supply they will likely adopt relevant extension advice more easily. Cooperation between nutrition and efforts to attain sustainable agricultural development is thus mutually advantageous. Consequently we need to ask ourselves how agricultural projects can help to improve nutrition and food supply and we need to identify the problems, formulate policy, and select programmes and projects with target groups and immediate objectives clearly defined.

The safety, quality and wholesomeness of the food supply needs to be protected from harmful physical, chemical, or biological effects related to the production, processing, distribution and consumption of foods. This requires control and monitoring of any food contamination, including pathogenic bacteria or toxins. Microbiological contamination, pesticide or veterinary drug residues or chemical contaminants should be kept within limits designed to protect the health and well-being of the consumer and the monitoring of environmental contamination by mycotoxins, heavy metals, chemical farm inputs, radionuclides, etc. is becoming more important with industrial development and environmental pollution.



Environmental sanitation has a high and short-term impact on health and nutrition, by reducing disease exposure. Piped water may be safer to drink, and the easy availability of large quantities of water encourages improved hygiene, including handwashing and washing of dishes and utensils used for food. Sewerage reduces exposure to disease as well. Piped water may also have significant benefits in terms of the household's use of time. The availability of piped water may eliminate the need for a household member to spend hours each day fetching well or river water. This may make it easier for a child to attend school or for a woman to spend time in more productive work at home or in the market.

The association of publicly provided water and sewerage with reduced mortality and improved anthropometric status is well-documented. The cost to the household of making use of the service is nil, except if a charge is made for household hookup or for use of the water. While piped water and sewerage systems do require maintenance, the recurring costs of these systems are low.

## **V. ISSUES IN THE SELECTION OF DEVELOPMENT POLICIES AND PROGRAMMES**

This section discusses some of the issues which must be considered before recommending or selecting specific development-oriented policies and programmes for a particular situation.

### **5.1 Uniqueness of Each Country**

Each country represents a unique combination of characteristics - its physical size and location, resource endowment, population size and distribution, and cultural traditions. The needs of countries differ, as do their constraints. For example, the costs to development of closing an economy to international trade are much higher in small countries than in larger, better endowed ones where domestic demand can drive growth. An open economy may be equally of benefit in both cases, but small countries have no viable alternative. Similarly, the government of a country which has resources to export - oil, minerals, agricultural products, labour - is better able to derive income to be used for development and social spending of the kinds discussed here. The relative strategic importance of countries has historically been a part of their resource endowment as well, because it is a factor in the reliability of access to foreign aid, which can make a substantial contribution to the resources available for development. Thus countries vary widely in the kinds of policies they are able to implement.

The appropriateness of any intervention needs to be evaluated in terms of the particular constraints, needs, and resources of the country. Developing countries lie at different points of the spectrum from subsistence to market economies. Therefore, a combination of policy and programmes must be properly chosen, bearing in mind the country's situation and a balance struck between the classical economic development approach with more socially-oriented strategies to fit the varying national contexts.

## 5.2 Long-term versus Short-term Objectives

Development takes time, and development interventions take a long time to work. Education, for example, possibly the single most important factor for economic development, requires a generation for its effects to be felt. A cross-national study of factors influencing development in some 150 countries found the strongest predictor of a jump in per capita GNP was an increase in government investment in primary education ten to fifteen years earlier<sup>(109)</sup>.

Recognizing the long-term nature of development interventions is important because continuity is essential for their effectiveness. People and institutions will not change their behaviour in response to a change in policy if they have no confidence that the new situation will continue.

Investors will not construct new factories to produce export goods if they believe the government is likely to reimpose export restrictions or taxes. Farmers will not respond to new price policies by changing their crop mix or technological level if they have no confidence in the long-term continuation of these policies. For example, farmers in Mali failed to make use of a government price-support programme of grain procurement because they did not want to risk their long-established private marketing arrangements in return for a short-term, one-time profit. They had no confidence in the government's ability to continue price supports over time, and, indeed, it took less than one season before the government was forced to abandon price supports for lack of funds. This example underlines the importance of realistically evaluating the long-term feasibility and economic sustainability of a policy or programme before deciding to implement it. One experience of a policy reversal on the part of government is enough to inhibit response to subsequent policy initiatives for a long time.

The need for continuity in development policy has implications for the international donor community as well. Policies and programmes should be recommended with caution and, once undertaken (that is, backed with technical resources and funds), they should not be lightly dropped. The assurance of long-term support should be part of a government decision to implement a programme or policy with outside funding. This concern for the long-term effects of an intervention should not blind planners to their short-term consequences. Programmes which require people to sacrifice their well-being or even survival in the short run are unlikely to be implemented successfully regardless of their potential for long-run benefit. No matter how well-intentioned, or how important a programme is, if its proximate effect is negative, it is doomed to fail.

It is easy to identify programme approaches in which short-term and long-term objectives conflict. For example, market liberalization policies implemented as part of a structural adjustment programme, which allow food prices to rise to their approximate open-market levels (in cases where price controls or implicit subsidies were previously in effect), may, in the right circumstances, have widespread long-run benefits: greater availability of food in the market, higher agricultural incomes, a more active rural economy generating

employment and income for non-farmers as well. But if the prices which rise are those of the staples consumed by the poor, the price rise may jeopardize poor households' food security in the short run, before any multiplier effects have had a chance to work.

For example, freeing the food markets of the former Soviet republics from state control should increase the national food supply and improve the availability and variety of foods sold in stores. The social cost of standing in line for scarce price-controlled goods would be eliminated. Both producers and consumers would be better off. But the supply response to higher prices and private incentives will take at least a year simply due to the cropping cycle, let alone the possible inhibiting effect of lack of confidence in the permanence of the changes. Meanwhile, food prices have increased manyfold, and no provisions have been made to protect minimum consumption levels during this transition. In the past, such short-term negative effects have caused public outcry, forcing the withdrawal of the policy. This occurred in Egypt, Tunisia, and Morocco, among other countries, when the elimination of food price subsidies was proposed.

A similar conflict in long- and short-term objectives is evident in many environmental protection programmes. For example, deforestation has a number of serious negative consequences for welfare: loss of topsoil through erosion; loss of forest products and forest-dwelling animals; loss of household members' time as they must travel farther and farther for fuel; and even, indirectly, perhaps increased incidence of diarrhoea if household members fail to cook or reheat food adequately due to fuel scarcity. But if short-run survival depends on the sale of firewood and charcoal, or if cutting the forest is the only possible way for people with no cash income to cook their food, then attempts to prevent deforestation will fail through lack of compliance, or have disastrous short-term welfare consequences.

Thus, continuity of development initiatives depends not only on a strong, long-term policy commitment and the assurance of availability of needed resources, but also on finding ways to mitigate or compensate for short-term negative impacts. In China, the elimination of government rice price controls was implemented gradually, in one region at a time. The government first shifted substantial food stocks into the region where price controls were to be lifted to control the degree to which prices would rise. As a result, the shock of market liberalization was softened and the negative welfare consequences reduced. The policy proved to be sustainable as a result. Similar considerations can be applied to programmes of environmental protection, for example, by developing alternative sources of fuel or fodder or of employment to raise compliance.

### 5.3 Feasibility and Cost

The feasibility of a development strategy has much to do with its costs. These include financial and resource costs, the institutional and human capacity to carry it out, and the strategy's acceptability in political and social terms. Because countries have different socio-political contexts and widely different resource bases, interventions which are quite reasonable in one setting may be inappropriate in another.

Not all development interventions involve direct financial outlays. Policy adjustments such as reducing trade barriers (import or export restrictions), allowing the foreign exchange rate to float, or reducing government intervention in food or related markets (eg., by removing price controls or restrictions on interregional trade) entail no direct financial costs to the government undertaking them, although where import tariffs and export taxes are an important source of revenue for governments, their loss is indeed a financial cost. Changes in the legal system to protect property rights and the interests of disadvantaged groups or to reduce discrimination against women or minorities, for example, do not entail fiscal cost to the implementing government although the political cost may be very substantial. Many policy adjustments - reducing price subsidies, for example, or dismantling parastatal food trading organizations such as those in the Dominican Republic, Mali, and elsewhere - may in fact reduce direct government expenditures.

Such "cost-free" policy changes do result in losses to some, however. For example, devaluation raises the prices of imports, reducing consumers' purchasing power to the extent that they buy imported goods while contracting the market served by importers. These categories of people lose, even if in the long run the economy as a whole gains. Dismantling the parastatals and other policy actions which cut government employment may cause substantial numbers of people to lose their jobs. Resistance to change on the part of these groups can represent a substantial political cost to the governments which undertake them, a cost which explains why some interventions which appear both cost-effective and reasonable are not implemented.

Financial costs of an intervention are the most obvious: the recurring costs of paying staff at schools and clinics or buying food for supplementary feeding programmes, for instance, or the costs of constructing and maintaining schools, roads, storage facilities, clinics. The financial feasibility of an intervention depends on the sources of revenue available, as well as the size of the outlay needed. Thus relatively resource-rich countries such as India can afford national-scale welfare interventions such as the Integrated Child Development Scheme and the mid-day school meals programme. In Thailand, an area-based approach was adopted (see box), while very resource-poor countries such as Chad or Mali could not consider such interventions without outside assistance, even though the need is as great.

Of course, access to foreign aid has helped India in its welfare programmes, as it has other countries. Foreign aid is a national resource just as is the ability to tax the population's income or wealth, or to export raw materials. Dependence on the continuing availability of foreign aid may be risky, but so is depending on a single export for which the world market may be unstable. As with households, nations are more secure if they have diverse as well as ample income sources. The difference between reliance on outside assistance and reliance on domestic resources is that outside assistance is often tied to particular development strategies and priorities which may differ from those of the receiving country.

Institutional and human resource costs receive far too little attention in the choice of development interventions. The institutional base available to a country can greatly alter the feasibility of an intervention. For example, the distribution of subsidized food throughout South Asia was made easier by these countries' long experience, dating to World War II, with ration shop systems. The existence of national networks of shops, distribution chains, and, equally important, experienced shop managers meant that any decision to distribute subsidized commodities could be quickly and easily implemented. For example, the Government of Pakistan decided to subsidize edible oil in the early seventies in response to sharp price increases worldwide; adding oil to the system was easy to do because the distribution network was already in place. Similarly, food stamp schemes, in which the government issues vouchers to consumers which can be used only for food or for certain foods, absolutely depend on having a reliably functioning banking system, so that food retailers have confidence that they will be able to exchange the vouchers for cash.

#### **Experiences from Thailand**

In several developing countries benefits of macro-economic development policies and interventions may not "trickle down" to the need because of unequal distribution of physical and social infrastructure. Often direct nutrition intervention programmes do not address the fundamental causes of malnutrition and are not adequate to attain sustainable improvements in nutritional well-being.

In Thailand a strategy for poverty alleviation and the fulfilment of basic human needs based on self-reliance was adopted. The inclusion of nutrition objectives into this and into the primary health care strategy significantly contributed to the decline in malnutrition among children under five during the 1980s. Poverty alleviation programmes target basic services to areas of high poverty concentration, create rural jobs, implement village development projects, develop and introduce community skills and introduce low-cost technologies. Area targeting efficiently utilizes limited resources, with all sectors focusing their efforts on the same geographical areas and thereby concentrating resource allocation for the attainment of a set goal.

From the Thai experience, when nutrition is perceived as a means or an element to bring about development, the sectoral barriers are more easily broken and intersectoral cooperation is improved. Effective coordination and integration of the multisectoral efforts at various administrative levels, as well as within the communities, is needed. A single coordinating organization with full authority and mandate at each level may be better than several ones with overlapping responsibilities. Such an organization should be above ministerial level to guard against potential conflict of sectoral interests.

To strengthen the community-based programme implementation, effective information systems are critical for monitoring the situation. Communication between the central policy body and the communities must be established. The advantage of this two-way flow is better macro level decision-making based on the information from the communities. At the community level, the people themselves decide on the activities with the supervision and assistance from government personnel to put together a proposal for action. Therefore, the planning from the macro level becomes more relevant to the community's needs.

In a resource-rich environment, a variety of interventions can be undertaken; where resources are scarce, selection needs to be much more stringent. The human resource cost of implementing a programme requiring extensive administration may be trivial in a country where literacy, numeracy, and un- or under-employment are high; if only a small proportion of the population is literate/numerate, then limiting the administrative burden of an intervention is critical. In the United States, for example, targeting of food stamps to the poor is achieved by means of a fairly cumbersome formal written application process implemented by a staff of intake workers in every food stamp office throughout the country. This would be a massively wasteful use of the scarce literacy skills of the Malian population, for example, whereas many Latin American countries might have large numbers of educated people available to do such work.

The institutional and human resource costs of any development initiative are borne by the country implementing the initiative. Even when outside donors supply cash, goods, and technical assistance, there may be a significant cost in terms of both institutional capacity and the use of human resources. Investment in nutrition may be seen as an investment for the development of human resources, not just as a health or social welfare concern. Malnutrition is a problem compromising social, economic and human capital development which results in lost productivity and human capital depletion. Nutrition interventions should be viewed as national investment for intermediate and long-term objectives. Parents should also consider well-nourished offsprings as long term security rather than just an immediate burden. This attitude is very crucial at all levels. Therefore, an increase in "nutrition awareness" should be an integral part of planning nutrition programmes. Nutritional status assessment linked to socio-economic criteria and geographical setting for targeting purposes acts to maximize the cost effectiveness of allocating scarce resources to the most needy population groups and areas.

#### 5.4 Risk

Policies which have a very high potential pay off but involve significant risk are wisely avoided, and risk reduction is an important element in the decision to adopt any initiative. Issues of risk arise in the context of increasing the openness of a country's economy and raising the level of dependence on international markets or outside donors. No country has an entirely free and open economy with regard to food; there is always some level of intervention in the food market, whether protection from outside competition or restrictions on exports to assure domestic supply, despite the fact that such policies are costly in terms of fiscal costs, lost income and consumer prices. Blind adherence to the calculation of comparative advantage and domestic resource cost based on current international prices is misguided, because world market prices are not stable over time. But risks exist in any strategy. For most countries, attempts at food self-sufficiency are unnecessarily costly and themselves involve risks of crop failure for various reasons. A key to risk reduction is diversification, both of food sources and of income sources, rather than insistence on self-sufficiency. There is a role for the international community to assist in lowering the risk involved in encouraging countries to adopt more open economic policies, for example by maintaining emergency stocks of food or emergency loan facilities. These can provide a kind of "safety net" for countries facing price or supply shocks.

## 5.5 Priority Setting

Setting priorities for development interventions depends on identification of the binding constraints in each setting, as well as on the feasibility, long-term sustainability and cost of the proposed solutions. Highest priority should be given to changes in the policy environment which will create an environment conducive to long-term and self-sustaining growth which integrates all population groups into the national economy. Policies which have the potential to improve welfare by several pathways are preferable to those with narrower effects. Interventions which are very sensitive to correct implementation are less desirable than interventions which are likely to have an effect even if management and implementation are less than perfect.

In the context of selecting priorities among a range of possible alternatives, it is important to recognize that widespread improvements in real welfare may not be achieved by any single policy or programme, even if successfully implemented. As has been discussed, a whole set of determinants of welfare (health, nutritional status) must work together to ensure food availability, employment, good health, and individual access to resources. Thus identification of priorities must include recognition that a minimum set of policies and programmes is necessary to achieve development.

A further issue in the identification of priorities is who is entitled to set the development agenda. It is not uncommon for the priorities of the various donor agencies - bilateral, international, and private non-governmental - to differ to some degree from those of the country receiving aid. Developing priorities may be a matter of contention within a government as well, with advocates arguing for the primacy of their own particular sectors, whether agriculture, health care, industrial development, or export promotion. Regional and rural/urban differences in the assessment of relative priorities are also likely to be contentious. It is probably not realistic to expect donors to give up entirely their own perspectives on priority development initiatives. Belief in the rightness of these priorities is, presumably, deeply held. The international donor community can perhaps help by being conscious of the national resource costs (human, institutional, and infrastructure-related) of externally financed initiatives, as well as by recognizing the critical importance of continuity and consistency over time. Genuine government commitment is essential to maintain such continuity. Thus, development initiatives should be assessed not only in terms of their feasibility and long-term sustainability, but also in terms of the degree to which they fit with and strengthen an overall set of long-run approaches to development which is agreed upon by the implementing government as well by outside donors.

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