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"The burden of malnutrition is completely unacceptable by any standards of human decency. We must do something right now to avoid this silent holocaust."
—World Bank Vice-President, Ismail Serageldin, 1997

Richard Jolly, Chairman of the ACC/SCN played a pivotal role in supporting this initiative and substantial editorial help was provided by Sonya Rabeneck and her staff in the ACC/SCN Secretariat.

Detailed research for the Commission was undertaken by Karen McColl, Ann Ralph and Nina Seres. Colette Backwell and Jean James provided additional help.

This report is dedicated to the late Mahbub ul Haq, a member of our Commission who inspired us with his vision and reminded us that too often it is the lack of intellectual courage rather than the lack of wisdom which holds us back from reaching up to what the future could achieve. It may be reproduced without prior permission of the Commission but please attribute to the Commission.

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Food and Nutrition Bulletin, vol. 21, no. 3 (supplement)

United Nations University Press
The United Nations University
53-70 Jingumae 5-chome, Shibuya-ku, Tokyo 150-8925, Japan
Tel.: (03) 3499-2811 Fax: (03) 3406-7345
E-mail: mbox@hq.unu.edu
ISSN 0379-5721
Design and Production by Desktop Publishing & Design Co., Newton, MA USA
Printed by Webcom Ltd., Toronto, ON Canada

Printing costs were supported by the International Obesity TaskForce.

Executive summary: main messages of the commission report

To live a life without malnutrition is a fundamental human right. The persistence of malnutrition, especially among children and mothers, in this world of plenty is immoral. Nutrition improvement anywhere in the world is not a charity but a societal, household and individual right. It is the world community's responsibility to find effective ways and means to invest for better livelihood and to avoid future unnecessary social and economic burdens. With collective efforts at international, national and community levels, ending malnutrition is both a credible and achievable goal.

Vision and goals for the future

» The Commission proposes a new paradigm of nutrition which incorporates the double burden of undernutrition and diet-related adult disease. This double burden is amplified by the link between maternal and fetal undernutrition and a population's susceptibility to adult diet-related disease. This is displayed when food consumption and activity patterns change during economic development.

» The Commission's vision requires an acceleration in the development and implementation of national and international strategies which will allow societies and individuals to improve their life expectancy with minimum health handicaps from these preventable disorders in middle and old age.

» The *International Conference on Nutrition* and the *World Food Summit* embodied remarkable global plans of action with new approaches to combating undernutrition. Why has more not been achieved? The Commission identified several factors:

1. lack of a locus within many countries for highly motivated academics and NGOs to interact with political leaders and decision makers and drive forward the nutrition agenda;
2. frequent failure of health and agricultural sectors to combine forces to ensure coherent plans of action;
3. within-country rivalries: these are often amplified by the selective support of specific national programmes by NGOs, bilateral agencies and UN organisations;
4. the failure of some major financial institutions to follow the World Bank initiatives which require intersectoral measures to improve food security and human health when developing plans for economic reform and development;
5. failure of political leadership in many countries to realise the possibilities of making rapid improvements by prioritizing nutrition when allocating national resources.

» The practical value and impact of existing goals has already been shown. The main need is for strong national action, often mobilised by the catalytic efforts and support of one or more of the UN agencies and its field staff. Many of the current goals relate to the year 2000; work is now needed to adapt and carry forward the goals into the 21st century.

» Until now the UN has considered nutritional deficiencies and "excesses" as separate. This is no longer sensible. The Commission recognises that both dietary deficiency and adult chronic disease now affect developing countries as well as the developed world and Central and Eastern Europe. The two sets of disorders are fundamentally linked through poor maternal nutrition.

» Just as progress against malnutrition will require action in many sectors, supported by professionals from many disciplines, so most of the main UN agencies must necessarily have a role in reducing malnutrition on a global scale. A strengthened mechanism is needed at UN level to ensure that its agencies can combine their best efforts. Table 1 summarises the recommendations of the Commission.

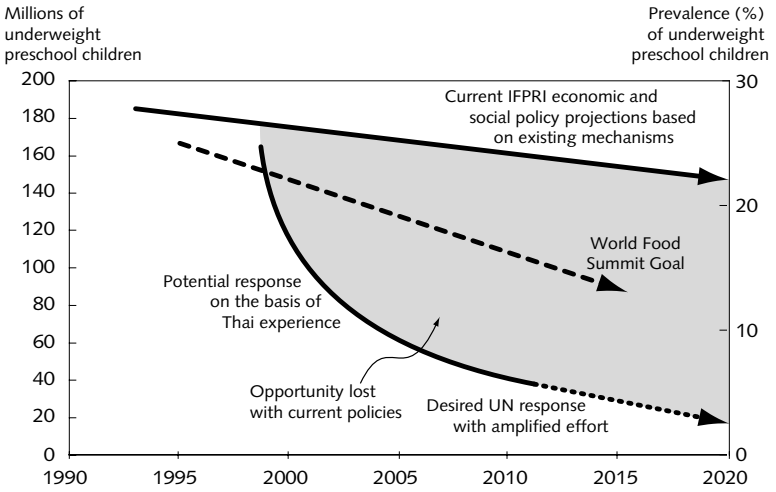
Recent progress and setbacks

» Over the last nine years, major international commitments have been made to reduce undernutrition. These were articulated at the *World Summit for Children* in 1990, the *International Conference for Nutrition* in 1992, and the *World Food Summit* in 1996. These Conferences emphasized the reduction of undernutrition as part of a broader strategy to eliminate poverty. Each Conference also emphasized the vital role of the UN family, and goals were seen as a focus for collaboration among the agencies and organisations involved in mobilizing and monitoring implementation.

» Dramatic progress has been made in some areas of nutrition in recent years, especially in reducing iodine deficiency disorders and clinical vitamin A deficiency. Also, over the past two decades the proportion of underweight and stunted preschool

Table 1: Summary of Specific Recommendations for ACC/SCN agencies

Action is Needed to	Recommendations For Action			
	at the International Level	at the Regional Level	at the National Level	at the Local Level
Ensure an integrated approach	New UN process for integrating programmes and effort is needed. UN Agencies, particularly WHO, FAO, UNICEF and the World Bank, should jointly consider how to strenghen the SCN. The UNU and the IUNS should promote the lessons learned by previous attempts attemptsto develop National Nutrition Councils. The SCN should promote new National Nutrition Councils as the focus for international liaison.	Set up regional task forces involving UN agencies, NGOs, bilateral agencies and national Governments. Have regional meetings to reconsider nutrition goals and set strategies.	Establish new mechanisms, such as National Nutrition Councils, for: • developing coherent nutrition policies • ensuring an integrated approach • raising nutrition as a priority. • widening the agenda for nutrition. A new impetus for UN support at the country level is required.	Creation of state or village level Boards to ensure an integrated approach with full community involvement.
Review and harmonise nutrition-related goals	An overall goal of ending malnutrition by 2020 is proposed. An SCN task force should consider how to harmonise nutrition goals and take them forward. Some proposals for goals are put forward as a basis for discussion in this Report.	Regional task forces should reconsider nutrition goals and set priorities for action.	Overall goals should be adapted to national circumstances… and linked to current levels of malnutrition.	Local monitoring of prevalence of nutrition problems, and success in overcoming these problems, is essential.
Human rights: give real (operational) meaning to the right to food	Further develop the Draft Code of Conduct on the Human Right to Adequate Food and put it forward for formal adoption. Create an appropriate framework for monitoring and supporting the Code.	Encourage countries, international organisations, and civil society to implement the Code.	National governments should implement the Code—first on a voluntary basis, then by official signature when it is proposed for formal adoption.	NGOs and local communties should monitor implementation of the Code.
Develop and implement nutrition policies and action plans	The SCN should re-assess current national action plans.	Task forces should review and revise regional progress on nutrition action plans (post ICN) and workwith countries to produce new plans.	National Nutrition Councils should review and revise existing nutrition action plans or draw up new ones.	Local communities—including the state or district level Nutrition Boards—should be involved in development and implementation of plans.
Build nutrition and health expertise and capacity within countries	UN agencies, particularly WHO, FAO, UNICEF and UNU in co-operation with the World Bank, should play a key role in promoting capacity building.	A key issue for regional task forces forces to address: how to build national capacity?	The IUNS should work with agencies and national professional bodies to promote academic initiatives.	



Elimination of undernutrition: a global deficit in policies and priorities

Note: If current trends continue, the International Food Policy Research Institute (IFPRI) predicts that the numbers of underweight (weight-for-age < –2SD) children less than six years will only drop to 150 million by 2020. The *World Food Summit* set a goal to halve the number of food insecure people in 1996 by 2015. In this diagram it is assumed that the number of underweight children should also be halved during the same time frame. If the *World Food Summit* goal were to be achieved, 84 million preschool children would still be underweight in 2015. Experience from Thailand shows what is potentially achievable with the benefit of political, social and organizational commitment. Thailand was able to reduce the prevalence of underweight from over 50% in 1982 to 10% in 1996. The diagram shows the same proportional change applied to the world's underweight preschool children. The Commission suggests that with an amplified effort from governments and the UN system, eliminating underweight in preschool children by 2020 may be possible. The residual 2.5% reflects the accepted statistically derived lower cut-off point for normal growth in well-cared-for children from a reference population.

children has declined in all regions of the world except for parts of Sub-Saharan Africa but the total number of undernourished children is still projected to increase, particularly in Sub-Saharan Africa. The elements of policy and strategy underlying the successful experiences differ considerably among countries. There is no single recipe for success.

» In Thailand, a coherent national policy with explicit actions and changes in governmental support for wide-ranging community-based improvements led to remarkable declines in the prevalence of preschool underweight. Maternal death rates also fell by over 90%. This example shows that the requirement for achieving rapid reductions in undernutrition is purposeful action: a determined political commitment, clear goals, good strategic and programme planning, sustained action, and systematic monitoring within a physical and administrative infrastructure. To this must be added a process of mobilizing the public at large.

» Costa Rica is another country which achieved tremendous progress in a relatively short period of time. This was brought about by a dramatic increase in health services to cover a very large portion of the population, with emphasis on the prevention of communicable diseases, on maternal and child health, water and sanitation, and health education. These improvements were achieved rapidly within a democratic framework, and serve as an inspiring challenge to other developing countries.

» The social and economic costs of poor nutrition are huge. Investing in nutrition makes good economic sense because it: reduces health care costs; reduces the burden of non-communicable diseases; improves productivity and economic growth; and promotes education, intellectual capacity and social development.

» No economic analysis can fully encompass the benefits of sustained mental and physical development from childhood into adult life. Healthy adults with the physical capacity to maintain high work outputs, and with intellectual ability to flexibly adapt to new technologies, are a huge national asset.

» Until 1997, many developing countries were benefiting from both reductions in poverty and an improvement in the nutrition and health of their children and adults. The sudden emergence of major financial crises in many Asian countries and in South America, however, may threaten much if not all of the progress made over the last decade if appropriate measures are not taken.

» The set-backs are not confined to the developing world. In parts of Central and Eastern Europe there has been a remarkable fall in life expectancy in the 1990s, coinciding with the sudden change in government and national financial management.

Global nutrition challenges

» The Commission identified eight major inter-linked nutrition challenges:

1. Some 30 million infants are born each year in developing countries with intra-uterine growth retardation, representing about 24% of all newborns in these countries. Population-wide interventions aimed at preventing fetal growth retardation are urgently needed.
2. There are still more than 150 million underweight preschool children worldwide, and more than 200 million stunted children. This underweight and stunting is the tip of the iceberg. Suboptimal growth may affect many more. Stunting is linked to mental impairment. At current rates of improvement about one billion children will be growing up by 2020 with impaired mental development.
3. High proportions of Asian and African mothers are undernourished: this is exacerbated by seasonal food shortages, especially in Africa. About 243 million adults in developing countries are severely undernourished, judged by a body mass index of less than 17 kg/m^2 with greater numbers with modest underweight having an impaired. work capacity and a lower resistance to infection.
4. Anaemia during infancy, made worse by maternal undernutrition, causes poor brain development. Anaemia is also very prevalent in school children and adolescents. Maternal anaemia is pandemic, over 80% in some countries, and is associated with very high rates of maternal death.
5. Severe vitamin A deficiency is on the decline in all regions. However, subclinical vitamin A deficiency still affects between 140 to 250 million preschool children in developing countries, and is associated with high rates of morbidity and mortality. These numbers do not take into account vitamin A deficiency in older children and adults and thus seriously underestimate the total burden of vitamin A deficiency.
6. Evidence from both developing and industrialized countries suggests a fundamental link between maternal and early childhood undernutrition and an increased susceptibility in adult life to non-communicable diseases (NCDs) such as diabetes, heart disease and hypertension. These diet-related diseases—including cancers—are already major public health challenges for developing countries.
7. Overweight and obesity are rapidly growing in all regions, affecting children and adults alike. There are about 250 million obese adults already and these problems are now so common in developing countries that they are dominating more traditional public health concerns such as undernutrition and infectious disease. Obesity, especially abdominal obesity promoted by early fetal and childhood undernutrition is a major risk factor for a number of NCDs, adult-onset diabetes in particular.
8. Efforts are needed to sustain the remarkable progress made in the past decade towards universal salt iodization and elimination of iodine deficiency disorders. Monitoring systems, quality control and sound legislation are key priorities, as well as improving outreach to isolated communities.

» Other challenges include the following:

1. *Refugees and displaced persons* There has been an alarming rise in the number of emergency nutrition problems over the last ten years. The numbers of refugees and internally displaced persons peaked during the crisis in the African Great Lakes Region in 1995 when there were over 18 million in Sub-Saharan Africa alone. Experience has shown that when food aid deliveries are uninterrupted and humanitarian organizations have constant access to the displaced population, undernutrition rates can be kept to a minimum.
2. *Physical activity* is usually considered separately from nutrition, but the nutrition community now needs to have professional involvement with this issue. In the developing world, especially in rural areas, adults are engaged in high levels of physical activity which impose substantial demands on food needs. The ability to sustain work without becoming ill is impaired when adults are underweight. Rural and urban transport facilities need to be linked to physical activity and food needs to optimize health.
3. *HIV/AIDS* By the end of 1998 there were about 32 million adults and 1.2 million children living with HIV/AIDS. In total, 3 million children under 15 years of age world wide have contracted HIV since the beginning of the pandemic. 90% were born in Africa. In parts of Sub-Saharan Africa HIV/AIDS is wiping out an entire generation of the most economically active people. There is evidence that transmission rates and the progression of the disease are higher in undernourished populations.
4. *Zinc deficiency* has recently been brought to the attention of the international community. It is thought to be common in children and during pregnancy throughout the developing world. Mild to moderate zinc deficiency may be an important cause of child stunting. Zinc may have an important role in programmes designed to address common life-threatening childhood illnesses, such as lower respiratory infection and diarrhoea.
5. *Changing food consumption patterns* Food production, processing and food manufacturing have responded to mankind's inherent demand for sugary, salty and fatty foods. The culinary and

industrial enhancement of the energy density of foods by adding fats and sugars is invaluable in times of need, but potentially disadvantageous in times of plenty, especially if sedentary lifestyles predominate. As societies become more urban, lifestyles tend to become less active and more sedentary. This set of changes is known as the *nutrition transition*, and is a major challenge facing the world in coming decades.

6. *Food group issues* Development plans have concentrated on increasing cereal production but horticulture should be promoted to aid the increased vegetable and fruit consumption needed to prevent childhood blindness and limit the development of cataracts, some adult cancers and cardiovascular disease. A major increase in fish and lean meat consumption in some communities, particularly in South Asia, would help prevent anaemia, promote childhood growth, enhance resistance to infection and improve maternal and fetal health with their long-term consequences. A transformation in the promotion and processing of fats to limit the rise in fat consumption to perhaps only 20% of dietary energy would also improve health. Economic development can occur without big surges in fat intake.
7. *A double burden* The harsh truth is that developing countries are now having to deal with a double burden of infectious disease, childhood mortality and undernutrition alongside diet-related NCDs. As well as the obvious health effects, this double burden has very serious economic and social implications for these countries. Treatment of NCDs is costly compared with public health preventive strategies. Favouring treatment rather than prevention is a mistake already made in the industrialized world.
8. *Deepening inequalities* In affluent Western societies increasing income inequality is linked to increasing health disparities between the rich and poor, despite sustained economic development. Many immigrant groups and other communities have a poor diet and an excess of the associated diseases. There is clear need for a new approach to health and food policies in most parts of the world. Strategies for improving access and availability of healthy diets at affordable prices for all communities should be a key part of these policies.
9. *Healthy ageing* The issue of healthy ageing is a major concern due to the increase in population numbers and the proportion of elderly. Body composition changes with age, with a decline in lean body mass. This, in turn, leads to decreased strength and mobility, imbalance and an increased frequency of falls. Thus, preserving muscle mass in old age is a strategy for preserving strength. Poor eye-sight is the most common functional impairment in the elderly. Nearly one half of 75 to 80 year olds suffer significant visual loss because of cataracts.

Results and life-cycle approach

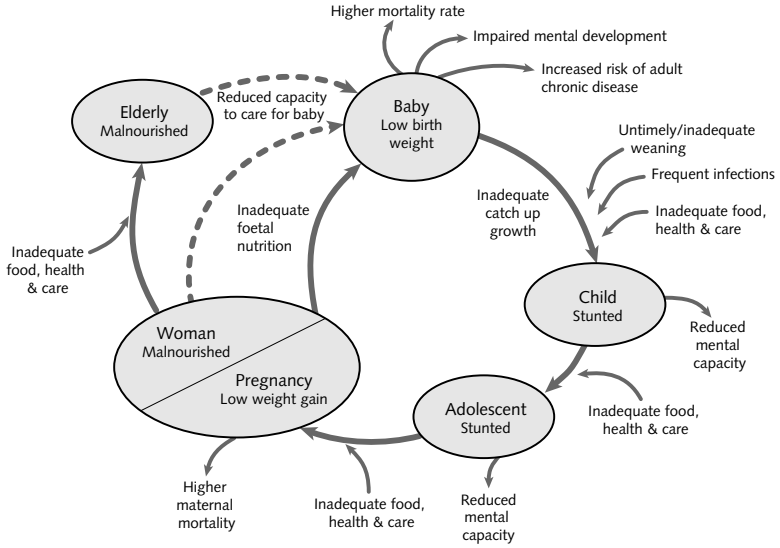
» *Results through concerted action* Norway's experience illustrates how dramatic results can be achieved by concerted action in an industrialized country dealing with the impact of adult chronic disease. Through a mix of public nutrition interventions and coherent policies after WW II deaths attributable to coronary heart disease were halved over a 20-year period. Similarly, a community-based prevention and treatment programme aimed at high-risk groups worked well in Finland.

» *The Commission proposes a life-cycle approach.* Nutrition challenges vary as we progress through the life-cycle. Adequate nutrition for pregnant women and young children is essential for growth and healthy physical and mental development. In adulthood, the issues are different: the challenge is to avoid premature death or disability from diet-related chronic diseases and to progress into fit and healthy old age. Good nutrition in early life pays dividends in childhood and in later life.

Societal issues underlying poor nutrition outcomes

» *Poverty is closely correlated with undernutrition.* However, rapid improvement in nutrition will not necessarily be a direct result of economic growth. Nutrition may not even respond to improved income. Countries with similar Gross National Products (GNP) have very different rates of preschool underweight, for example. If income distribution is very unequal or if economic growth mostly reflects increases in production from agribusiness or large-scale industry, the benefits may not reach the undernourished. Nutrition in such cases may stagnate or even deteriorate.

» *Although economic growth can foster improvement in nutrition, many factors can influence this process.* These include: the status of women in society, education and fertility rates, the burden of infectious disease, governmental commitment at the local and national level to health and nutrition issues, and the development of the primary health infrastructure. The value of these measures in limiting the impact of poverty is well illustrated by comparing the prevalence of underweight children in India as a whole with that in one of the poorest states, Kerala, where sustained educational, social and health and



Nutrition throughout the life cycle

infrastructure policies have brought real benefit.

» *Women are the critical link both biologically and socially.* Currently women in many parts of the world are hindered by gender discrimination. Women are also crucial as gatekeepers of their household's food security and as providers of care. The nutrition benefits that come from systematic community action to improve the care of women and children in particular will have major long-term benefits in economic terms because of the greater capacity of a healthier population for creative societal and commercial development.

» *Changes will be required by men, women and society as a whole.* This will involve new policies to promote the education of girls, and allow women access to and control of local resources. Legislation is also needed to protect and promote the rights of women. Women should be encouraged to participate in the democratic process.

» *Care-giving behaviours influence the household environment.* Care is centrally important to the nutritional welfare of all members of the family. Good care translates available resources, at the family and community levels, into nutritional improvement and encompasses time, attention, support and skills to meet the physical, mental and social needs of vulnerable groups.

» *Sanitation and clean drinking water* are crucial to nutritional wellbeing and have been under-estimated by the nutrition community.

» *Access to and uptake of education must be a key driver of all development policies.* Education has a fundamental role to play in personal and social development. Considerable progress has been made over the last quarter century in expanding the capacity of primary schools in all regions of the world. Expansion in primary school enrolments during this period almost entirely explains the educational gains in developing countries.

» However, there are striking gender disparities. In all regions of the developing world, fewer girls attend school than boys. Still only 62% of women in developing countries are literate. In least developed countries only 38% are literate. These figures are particularly disturbing given that the educational status of a mother is known to be a critical determinant of the health and nutrition of the family.

» *Key role of local communities and NGOs* Although international and governmental change is essential at the highest level, successful strategies to end malnutrition will have to involve the people themselves as well as meeting each community's needs. Top-down strategies imposed on communities are known to fail.

» More successful approaches are based on community needs, involving governmental support and facilitation of the people's initiatives. Governments and international agencies can set in place conditions which will foster public participation and facilitate bottom-up approaches. Key requirements are strengthening democracy and encouraging political participation, and establishing mechanisms for gathering the views of people whose voices often go unheard

» *Public-private cooperation* The food industry is playing an increasingly critical and complex role throughout the world. In industrialized countries, changes in living and marketplace patterns have stimulated changes in food industry practices. One result is a diversity of food processing technologies generating an ever-changing number and type of foods on the market. Recent concerns about health

and the environment have resulted in significant attention to foods and food additives by regulators and legislators, the media, and consumers' groups.
» The challenge is to bridge the communications gap between the public and private sectors by understanding their respective needs.

Food, agriculture and environment

» Access to adequate, nutritious food is obviously a pre-requisite for good nutrition. FAO estimates that some 790 million people in developing countries have inadequate access to food. The causes of food insecurity are complex and a shortfall in food production is often not the issue. However, with a rapidly growing world population, the challenges of producing enough food for everyone in the coming century are substantial. The required additional food production will have to be achieved under conditions of shrinking per capita land and water resources and a number of other obstacles, as follows:
  » *Yield increases are slowing.* Significant expansion of agricultural land is not feasible in most parts of the world, so the increased food production will have to come from more efficient use of land already under cultivation. However, there is a progressive degradation of agricultural lands.
  » *There is a shortage of water*. Although there is still enough water to meet agricultural needs on a global basis, currently 30 countries are water-stressed, of these 20 are water-scarce. Many major gains can be made by minimising water losses.
  » *Soil degradation is a significant cause of crop productivity losses.* Almost one half of the world's poor live on marginal lands. Past resource degradation deepens today's poverty, while today's poverty makes it difficult to care for or restore the agricultural resource base.
  » *Crop diversity is declining*. Today about 20 crops dominate the global food scenario and trade. There has been a drastic reduction in the crop mix of the food basket, and a steep decline in the genetic diversity of crops grown.
  » *Fish stocks are declining*. Over-exploitation of natural fish stocks by aggressive fishing techniques, and severe degradation of marine and coastal environments, have depleted fisheries. Natural fish stocks cannot keep pace with the increasing needs and demand.
  » *Climates are changing*. Warmer air temperatures, increased atmospheric CO_2, raised sea levels and changes in rainfall patterns resulting from projected climate change over the next 60 years will have a significant impact on crop and livestock production.
  » *Urban centers are growing*. The urban population of developing countries is forecast to reach 49% by 2015; this will have serious implications for public health and nutrition and for the provision of services, including social safety nets.
  » *Demand for meat is increasing*. In developing countries this is predicted to grow by 43% by 2020. This may mean a huge increase in the use of cereals for feeding livestock. Research is needed to improve alternative feeding strategies and provide instruction in good husbandry.
  » *Civil strife weakens infrastructure*. Conflict destroys land, water, and biological and social resources for food production, while military expenditures lower investments in health, education, agricultural and environmental protection. Resolving hostilities and reversing associated agricultural and economic losses are critical if agriculture and human development outlooks are to improve in the 21st Century.
» Trade, global finance and new technology also affect food security. The human food chain is being rapidly transformed into a global market with industrialized countries intent on providing their populations with a huge variety of primary products and processed foods, regardless of season and at ever lower prices.
» Globalization has resulted in a weakening of economic control by national governments, leaving developing countries vulnerable to economic factors beyond their control, and to fluctuations in world prices.
» With WTO and *Codex* acting as final adjudicator in disputes over particular food safety or standards issues, a two-tier food safety system may be developing in many countries. Products for export conform to international standards whereas domestic consumers are left with food which does not meet these standards.
» Biotechnology has many potential applications, particularly in agriculture. Biotechnology may be of greater importance for developing countries than for industrialized countries in terms of producing sufficient quantities of nutritionally adequate and safe food but environmental and human safety concerns need to be recognised and improved testing procedures developed.
» New technologies may only be suited for large-scale farming, resulting in further impoverishment of small-scale farmers. Expansion of proprietary science means that small and resource-poor farming families who normally save seeds to raise crops may have to buy these new and more effective seeds each year unless new national and international arrangements are developed.
» A revolution in agriculture will be required to adapt food production systems to growing needs and the changing environment. This new *ever-green revolution,* must take socio-economic and environmental

factors into account by focussing on three elements: production, sustainability and poverty reduction.

Food, nutrition and human rights

» The *World Food Summit* was a milestone in the process of defining the meaning of the right to food and nutrition, and in setting in motion activities to guide states, civil society and international organizations in implementation. To date, the right to adequate food remains one of the most cited in solemn declarations of political intent, and most neglected and violated in practice.

» Basic-needs approaches define "beneficiaries" and their needs; thus there is an element of charity. A rights-based approach starts from the ethical position that all people are entitled to a certain standard of material well-being. A rights-based approach recognizes beneficiaries as active subjects and claim-holders.

Establishing a new agenda for change

» The Commission identified four major tasks to be undertaken:

1. An assessment of the national policies and plans developed in response to the *International Conference on Nutrition* in relation to both the Commission's new perspectives on nutrition and the need for accelerated action. This will require a novel UN process so that all the relevant UN bodies become aware of their own potential contributions. This assessment should be initiated by the ACC/SCN.
2. A new UN process for integrating programmes and effort. The Commission is aware of a number of uncoordinated approaches by different agencies. These often seem to be based on institutional rivalry and different disciplinary and sectoral approaches rather than on collaboration and the development of a cohesive effort.
3. A new national mechanism for developing coherent policies in diet and physical activity. The Commission proposes National Nutrition Councils based on the success of Norwegian and Thai experiences and avoiding the pitfalls of the early Councils. The IUNS and UNU have particular responsibilities here.
4. The acceptance by the UN agencies, the World Bank, IMF and bilaterals that the National Nutrition Councils should be the focus for international linkages and support. The ACC/SCN should be transformed to allow it to become a proactive mechanism for enhancing effective inter-UN agency cooperation.

» Other conclusions and priorities:

1. Elimination of malnutrition should be made a major focus of national strategy and economic and social policy in developing and developed countries. This means:
   a. formulating clear national goals for eliminating all the main forms of malnutrition by specific target dates, in line with existing global goals;
   b. preparing a strategy for achieving these goals linked to the follow-up commitments and processes specified by the global conferences of the major UN agencies;
   c. incorporating these goals into all related sectoral action for food production, health priorities, child care and poverty reduction.
2. Donor governments, as part of the 20/20 Initiative and its commitments, should offer to establish country-by-country compacts with interested governments. Under these compacts, governments would indicate their targets and strategies for accelerating action for nutrition. The compacts should indicate the resources required, as well as the proportion of these resources to be raised locally and the proportion from donor agencies. As part of the compact, donor governments would offer to provide sustained support so long as the developing country remained on track.
3. The World Bank and the IMF should be requested to issue a policy document indicating how progress towards nutrition goals could be maintained and supported as a priority during programmes of structural adjustment and debt repayment, especially of the heavily indebted poor countries (HIPCs).
4. Support is needed to improve national statistical systems for collection, analysis, publication and appropriate use of data on nutritional status and trends. Attention to nutrition and behavioural practices should now be included in economic analyses.
5. Regional task forces should be established to consider ways and means to reach people from community members to policy makers in order to encourage accelerated actions towards improving nutrition. Comprehensive and social mobilisation approaches through mass media, traditional media and interpersonal communication need to be encouraged.

Acknowledgments

The Commission would like to acknowledge with thanks the invaluable assistance from the following individuals:

Lindsay Allen, David Alnwick, Britta Antonsson-Ogle, Alan Berg, George Beaton, Micheline Beaudry, Anne Callanan, William Clay, Joanne Csete, Philip Evans, Edward Frongillo, Hiremagalur Gopalan, Peter Greaves, Ted Greiner, Jean-Pierre Habicht, Lawrence Haddad, Suzanne Harris, Elisabet Helsing, Graham Horgan, Suraiya Ismail, Anna Maria Hoffmann-Barthes, Venkatesh Iyengar, Urban Jonsson, Marion Kelly, Eileen Kennedy, George Kent, David King, Uwe Kracht, Tim Lang, Michael Latham, Michael Lipton, Thomas Marchione, Lilian Marovatsanga, Reynaldo Martorell, Peter Matlon, Judith McGuire, Milla McLachlan, John Mason, Simon Maxwell, Ruth Oniang'o, David Pelletier, Barry Popkin, Clive Robinson, David Sanders, John Sargent, Nevin Scrimshaw, Francis Shaxson, Roger Shrimpton, Francis Stewart, Andrew Tompkins, Kraisid Tontisirin, Barbara Underwood.

Background papers commissioned

Stunting and Mental Development by Sally Grantham-McGregor and LC Fernald

Food-based Strategies to Enhance the Content and Bioavailability of Iron and Zinc in Plant-based Diets in Developing Countries by Rosalind Gibson

Comments received from Howarth Bouis relating to Rosalind Gibson's paper

Milk, Calcium and Osteoporosis with Special Reference to Developing Countries by Anne Prentice

Nutrition in 2000–2050: Demographic Influences by Arjan de Haan, Michael Lipton and Emma Samman

Nutrition in the 21st Century: Food and Nutrition as a Human Right. Letter to the Commission from Wenche Barth Eide

Decentralization of Government Services: Implications for Nutrition in Developing Countries by Julia Tagwireyi

Broadening the Food Security Base and Nomenclature by MS Swaminathan

Modifying Dietary Patterns for Healthier Populations in Low Income Countries: Challenge and Possibility? By Suttilak Smitasiri

Fish Stocks and Implications for Food Security by Meryl Williams

The Role of Multinational/Transnational Corporations and How They Impact on Food Consumption and Nutrition by Michael Latham and Micheline Beaudry

Intellectual Property Rights, Poverty and Food Security by Keith Bezanson

Folic Acid, Anaemia and Neural Tube Defects in Developing Countries: Research Needs and Public Health Options by Rafael Perez-Escamilla

Recommendations for a Healthy Diet by Kaare Norum

Effect of Early Diet on Nutrition and Health in Developing Countries: Policy Implications by Ricardo Uauy

Present at the Chennai meeting (November 1998)

Ramesh K Adhidari (Nepal)
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Isabelle Austin (UNICEF/India)
M.K. Bhan (India)
Sekhar S Boddupalli (Monsanto/ India)
Zulfioar A Butta (Pakistan)
Indira Chakaravarty (India)
Dipti Chirmulay (India)
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Cecilia Florencio (Philippines)
Francesca (FAO/ India)
Shanti Ghosh (India)

C Gopalan (India)
Kamal Islam (UNICEF/India)
S Jayam (India)
Ge Ke-You (China)
Ha Huy Khoi (Vietnam)
Kamala Krishnaswamy (India)
A K Shiva Kumar (India)
Venkatesh Mannar (MI/Canada)
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Funding to support the Commission's work was provided to the ACC/SCN by Canada (CIDA), the Micronutrient Initiative (Ottawa), the Netherlands, Norway and USAID.

1. Recent Progress

1.1 International declarations for action in the 1990s

Over the last nine years, major international commitments have been made to reduce malnutrition. Nutrition goals formally adopted include:

» The World Summit for Children, 1990. Called for "a reduction in severe and moderate malnutrition among children under 5 to half the 1990 rate by the year 2000." The Sub-Committee on Nutrition (ACC/SCN) conducted a series of country-level reviews, in collaboration with national nutrition institutes, for Brazil, Egypt, India, Indonesia, Tanzania, Thailand and Zimbabwe. These aimed to document a wide-ranging base of national experiences in nutrition policies and programmes, looking specifically at why and how actions were undertaken, and evaluating their effect on nutrition. This work showed that through focused action, accelerated progress against childhood undernutrition can be achieved.

» **The International Conference for Nutrition**, 1992. Reaffirmed the goals set out at the *World Summit for Children* and other earlier goals, set them in a broader context and also called for the "*elimination of death from famine.*" The Conference—co-sponsored by WHO and FAO—was to be followed by countries writing their own National Plans of Action for Nutrition. Some plans of action were prepared, awareness of nutrition problems increased, a wide range of people with responsibility for nutrition action were brought together, and some strong local networks were created. More recently the Asian Development Bank, in collaboration with UNICEF, has provided funding for implementation of National Plans in selected countries in Asia.

» The World Food Summit, 1996. This Summit declared "the commitment to achieving food security for all, and to an ongoing effort to eradicate hunger in all countries, with an immediate view to reducing the number of under-nourished people to half its present level no later than 2015." The summit endorsed the 1992 International Conference for Nutrition recommendations and incorporated them into the World Food Summit Plan of Action and the Rome Declaration on World Food Security. Since 1996, several UN agencies have been driving forward the Plan of Action—monitored by the Committee on World Food Security. FAO has developed a number of country-specific programmes working with national governments to implement the summit recommendations. An inter-agency working group has also been set up to take forward a plan for Food Insecurity and Vulnerability Mapping Systems (FIVIMS).

These conferences emphasised the reduction of undernutrition as part of a broader strategy to eradicate poverty. Reducing poverty is an end in itself and a means to achieve other goals. At the *World Summit for Social Development* in 1995, governments committed themselves to establish national goals for *"substantially reducing overall poverty in the shortest possible time, reducing inequalities and eradicating absolute poverty by a target date to be specified by each country in its national context."* In 1996, the Development Ministers of the OECD's Development Assistance Committee proposed a global development and assistance partnership to meet a core of priority goals, including *"a reduction by half in the proportion of people living in extreme poverty by 2015."* Each conference also emphasised the vital role of the UN family itself: goals should serve as a focus for collaboration among the different agencies and organisations involved in mobilising and monitoring implementation.

The **20/20 Initiative** *enjoins governments in developing countries and donors to devote 20% of their expenditures to basic social services.* This initiative was first suggested by the UNDP's Human Development Report in 1992 and formally approved at the *World Summit for Social Development* in 1995. Many governments and donor agencies are now involved in working towards this goal. Such commitments will help to provide the needed financial support for community-based programmes.

1.2 Progress in accelerating improvements for nutrition

Dramatic progress has been made in some areas of nutrition in recent years, especially in reducing iodine deficiency disorders and clinical vitamin A deficiency (see Section 2.3). The goal of virtual elimination of iodine deficiency disorders by 2000 is beginning to look achievable. Several countries have succeeded in eliminating severe, clinical vitamin A deficiency, although sub-clinical deficiency is still a major challenge. Over the last two decades, the prevalence of underweight and stunting in preschool children has declined in all regions of the world except for parts of Sub-Saharan Africa (ACC/SCN, 1996b and 1997a). In Thailand, preschool underweight fell at the exceptional rate of about 3 percentage points per year (ACC/SCN 1996a). In five other countries—Indonesia, Malaysia, Pakistan, Tanzania and Zimbabwe—the decline was at about one percentage point per year, and in three others—India, Brazil and Egypt—at 0.7 to 0.8 percentage points. In all these cases, the rate of improvement in nutrition was substantially better than the average rate within the region over the 1980s (ACC/SCN, 1996a). ACC/SCN analysis of WHO data on stunting (ACC/SCN, 1997a) confirms these findings, but setbacks are likely in the 1997-99 period as a result of the Asian crisis and global slowdown in economic growth.

The elements of policy and strategy underlying these successful experiences differed considerably among countries. There was no single recipe for success, but common points were identified in the ACC/SCN synthesis *How Nutrition Improves*, which concluded:

> "The interplay of complex factors in development benefiting nutrition can begin to be disentangled. Economic growth is important, but improvement can move ahead of that caused by growth—indeed must do so to tackle nutrition problems within a reasonable timeframe. Observations tend to confirm that investments in health and education, when reaching the undernourished, can help improve nutrition; again this feeds back into better health potential and educability. Finally, deliberate policies to improve nutrition through community-based programmes do appear to accelerate nutritional improvement." (ACC/SCN, 1996a, p 92)

There are examples of achievements that, if sustained over time, can have significant impact. However, policy-makers should not shy away from aiming for more dramatic change.

1.2.1 Thailand: a remarkable success story

The impact of a coherent national policy in Thailand with explicit actions and changes in governmental support for community-based improvements is shown in Figure 1.1. A wide range of social, educational, health and agricultural issues was coordinated at every level of government with a drive to galvanise grassroots involvement (Box 1.1). The remarkable early fall in the prevalence of preschool underweight (from over 50% in 1982 to 10% in 1996) shows how effective coherent, explicit and determined action on the part of governments can transform the health of the nation within a five-year period (ACC/SCN, 1992a).

The requirement for achieving rapid reductions in undernutrition is purposeful action: a determined political commitment, clear goals, good strategic and programme planning, sustained action, and systematic monitoring within a physical and administrative infrastructure. To this must be added a process for mobilising the public at large. Community participation and consumer demand need to be promoted by a three-way communication between the people, the community's non-governmental organisations and its government. Experience with undernutrition and micronutrient deficiencies in developing countries, and with diet-related chronic disease of adults in

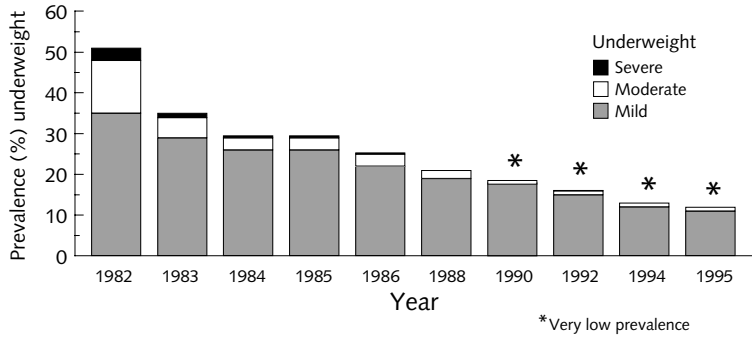

FIG. 1.1. Progress in reducing underweight in preschool children in Thailand from 1982 to 1995

Source: Division of Nutrition, Ministry of Public Health, Thailand (1998)

Box 1.1. How Thailand tackled undernutrition

In 1982 more than half of Thai pre-school children were underweight. Over the ensuing eight-year period, severe and moderate underweight, as well as severe vitamin A deficiency, were virtually eliminated. Mild underweight was significantly reduced. Maternal mortality declined from 230 in 1992 to 17 per 100,000 live births in 1996. Thailand achieved these results through a programme of accelerated action that focused on nutrition and improved its Human Poverty Index (a measure of deprivation in a country) from 34% in 1970 to 12% in 1990.

» Underweight was identified as the most important nutrition problem and for the first time the National Economic and Social Development Plan included a separate national plan for food and nutrition. The plan set explicit goals to eliminate severe, moderate and mild underweight.
» Comprehensive surveillance was instituted through growth monitoring. All pre-school children were weighed and checked every three months at community weighing posts. Those with severe growth failure were given food supplements.
» Nutrition was incorporated into relevant health, education and agriculture policies at national, regional, local and community levels.
» Costs were minimized by retraining existing staff, using volunteers at the community level and allocating funds to selective measures with maximum impact. Each group of about 10 households chose a suitable volunteer to engage in a national training programme and then monitor both mothers and children in their communities.
» A programme of nutrition education and communication encouraged breastfeeding and the timely introduction of complementary foods and proper hygiene. Information was disseminated about food beliefs and taboos. School lunch programmes were established in 5,000 schools in poor areas and salt was iodized.
» Household and community food security was strengthened by promoting home gardening, fruit trees, fish ponds and preventing infectious disease in poultry.

All this was in the context of a poverty alleviation plan for some 7.5 million poor people in the north, north-east and south of Thailand. Thailand improved its Human Poverty Index (a measure of deprivation in a country) from 34% in 1970 to 12% in 1990. The dramatic progress in Thailand shows:

» The need to establish broad-ranging, integrated food and nutrition programmes as part of poverty reduction;
» The need for some form of local organisation through which village-level workers or volunteers encourage and support the families of children who are lagging behind;
» The potential for very rapid progress against undernutrition, especially after periods of economic growth that may have neglected human development;
» Costs can be minimised by retraining existing staff, using volunteers at the community level and allocating funds to selective measures with maximum impact.
» In spite of these impressive advances, the Asian economic crisis of 1997–99 has led to a serious resurgence of poverty although malnutrition is held at bay by a food safety net with a national drive for household self-sufficiency in food.

Sources: Winichagoon et al (1992); UNDP (1997); Tontisirin and Bhattacharjee, personal communication (1999).

the industrialised world, shows that rapid progress is possible if these elements are in place.

1.2.2 Costa Rica: a success story in the 1970s

Costa Rica is another country which achieved tremendous progress in a relatively short period of time. Infant mortality dropped from 62 to 19 per 1,000 live births from 1970 to 1980 and further to 12 per 1,000 by 1997. Life expectancy increased from 67 years in 1970 to 77 in 1997 (UNICEF, 1998). During the seventies, iodine and vitamin A deficiencies were reduced to the point that they were no longer considered a public health problem. In 1978 the proportion of under fives suffering from undernutrition was 45% (Munoz and Scrimshaw, 1995). By 1982 this had declined to 34%. The latest data indicate that the prevalence of moderate and severe underweight has been reduced to about 2%. The prevalence of low birth weight shows a national rate of 7%, the same as for Singapore and the UK (UNICEF 1998).

The nutrition programme, which started in the 1950s but was strengthened in 1975, targeted children under six years of age, school children and pregnant and breastfeeding women. Five hundred nutrition centres were built to facilitate the implementation of the health and nutrition programmes.

The nutrition programme included:

» warm meals to pre-school children, pregnant and breast-feeding women, and undernourished children who had been referred to the nutrition centres by health posts
» powdered milk distribution to pre-school children, pregnant and breast-feeding women
» distribution of food rations (dried skimmed milk, corn-soya blend, vegetable oil and flour) from the World Food Programme and the Costa Rican Mixed Institute of Social Aid to families showing nutritional vulnerability, chosen by health centre staff
» nutrition education including: home visits to families with severely undernourished children; educational talks targeted at pre-school children, mothers and organised groups; demonstrations of how to prepare different meals; magazines and radio programmes
» school cafeterias serving a mid-morning snack (both local food and that donated by international agencies) and a hot meal at breakfast and lunch for 2–13

year-olds. Food for the school meals was obtained from the National Production Council stores and authorised co-operatives, with the school gardens programme providing much of the vegetables, fruit and eggs needed. By 1985, 69% of schools provided lunch, while 30% provided both lunch and breakfast (Novigrodt Vargas, 1986).

» iodization and fluoridation of salt and fortification of sugar with vitamin A.

These improvements were brought about by a dramatic increase in health services to cover 84% of the population, with emphasis on the prevention of communicable diseases, on maternal and child health, water and sanitation and health education. (Expansion in health services was made possible by major improvements in the economic situation in Costa Rica—Box 1.2.) Within four years of the start of the programme, 125,000 children were being screened and 10,000 pregnant women were enrolled in pre-natal clinics (UNICEF, 1984). By the 1990s, 96% of the population had access to safe water, 84% had access to adequate sanitation and over 90% of one-year-old children were fully immunised (UNICEF, 1997a). Around 400 health posts established in rural areas and urban health centres adjusted their activities to concentrate on the high-risk, deprived areas.

Costa Rica's health and nutrition improvements were achieved rapidly within a democratic framework, and serve as an inspiring challenge to other developing countries (Munoz and Scrimshaw, 1995). Costa Rica experienced a significant decline in the rate of improvement in health indicators during the 1980s. This was due to the economic crisis and a decline in investment in public health. However, the slowdown in the pace of improvement was not as severe as expected.

Box 1.2 How Costa Rica brought about accelerated achievement in nutrition

- » In 1948 Costa Rica abolished its armed forces to redirect resources to social welfare and development.
- » Funds were diverted from curative to preventive medicine with a real commitment to reach both rural and urban communities, targeting the most vulnerable.
- » Costa Rica was politically stable and government motivation and commitment to the health service and social reforms was high.
- » In the 1970s a National Health Plan was drafted and implemented to provide health care to the entire population and to control or eliminate undernutrition and common infections. Community participation in all activities pertaining to the health care system was seen as central.
- » Costa Rica has a strong tradition of community participation and a technical capacity for research and training at both the local and regional level.

1.3 The case for investing in nutrition

> "Approximately half of the economic growth achieved by the United Kingdom and a number of Western European countries between 1790 and 1980, has been attributed to better nutrition and improved health and sanitation conditions, social investments made as much as a century earlier." (UNICEF, 1997a, p. 17)

The social and economic costs of poor nutrition are huge. Investing in nutrition makes good economic sense because:

» **it reduces health care costs.** Preventing low birthweight and stunting reduces childhood mortality and morbidity and their substantial health costs. Pelletier et al. (1993) estimated that over half the child deaths in developing countries can be attributed to underweight and its effect on infectious disease. Children hospitalised for severe undernutrition experience a higher case-fatality rate and a longer duration of stay than children in hospital for other reasons (Atakouma et al., 1995).

» **it reduces the burden of non-communicable diseases.** Diabetes, heart disease and cancers in adult life are very costly conditions to diagnose, manage and treat, and are already distorting the health budgets of the developing world. Preventing early undernutrition may reduce the risk of these conditions in later life as reviewed by Scrimshaw (1997). Public health programmes to reduce the dietary contribution to these diseases are also cost-effective.

» **it improves productivity and economic growth**. Undernourished children become smaller adults with reduced physical capacity. Productivity of adults who are undernourished—even on a short-term, seasonal basis—is impaired. Better health leads to longer working lives, reduced absence due to illness and more productive days. Such differences at the individual level contribute to a country's economic growth (Spurr, 1987).

» **it promotes education, intellectual capacity and social development.** Undernutrition during fetal life and infancy can damage a child's mental development and impair capacity to learn. Undernutrition is associated with delayed enrolment in school and with absences from school—and it can be difficult for a child to catch up. Healthier children are expected to live longer, healthier lives. They are therefore more likely to capitalise on the benefits of schooling (Pollitt, 1990). Education is the cornerstone of social development.

The cost-effectiveness of preventive programmes is well recognised as far exceeding those of therapy. Even in the USA (a country with low levels of undernu-

trition, but without universal access to ante-natal care) the National Accounting Office concluded that providing the Women, Infants and Children (WIC) supplementation programme to pregnant women reduced first-year medical costs for US infants by $1.19 billion in 1992, offsetting the cost of the programme (Avruch and Cackley, 1995). Evidence from this Commission's Report implies far greater economic gains when undernourished mothers are assisted.

No economic analysis can fully encompass the benefits of sustained mental and physical development from childhood into adult life. Healthy adults with the physical capacity to maintain high work outputs, and with intellectual ability to flexibly adapt to new technologies, are a huge national asset. Figure 1.2 illustrates the links between improving nutrition and boosting economic growth.

Global financial institutions like the World Bank are now clear about the importance of investing in nutrition:

> " … resources put into nutrition are an investment with significant returns, today and in the future." (World Bank, 1992, p. 1)

1.4 Setbacks to progress: nutritional well-being during economic crisis

Until 1997, many developing countries were benefiting from both reductions in poverty and improvement in the nutrition and health of their children and adults. The successes illustrated above emphasize the impact of community action even in poor circumstances. The sudden emergence of major financial crises in many Asian countries and in South America, however, may threaten much if not all of the progress made over the last decade if appropriate measures are not taken.

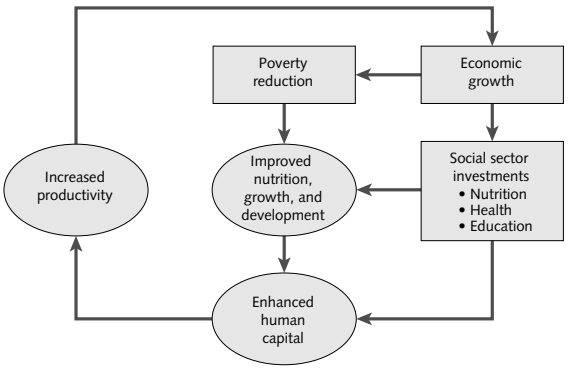

FIG. 1.2. Nutrition, health and economic growth

Source: Martorell, 1996

Recent evidence from Indonesia shows the re-emergence of nutrition deficiencies (Helen Keller International, 1998 and 1999). High inflation, massive unemployment and decline in consumer spending power have led both to a fall in the ability to buy expensive but micronutrient-rich foods such as eggs, meat and milk and to a fall in vitamin A and iron intake. Surveys suggest that four-fold increases in anaemia are likely, as well as increases in wasting, night-blindness and diarrhoea in children, adolescents and women. This may herald the emergence of another 'lost generation' unless rapid action, of the type undertaken in Thailand, is taken to minimise the impact of the financial crisis on the most financially insecure.

More effective safety nets to cushion the social and health effects of financial crises are essential. Some action is already being taken. Governments in Asia have sought to establish safety-nets in response to the 1997/8 financial crisis. The World Bank has established a Social Monitoring Early Response Unit to monitor the impact of the crisis in Indonesia. In January 1999, the Bank brought together governments, donor and development agencies, NGOs and others throughout the region to assess the situation and determine how to respond.

The set-backs are not confined to the developing world. In parts of Central and Eastern Europe, there has been a fall in life expectancy in the 1990s (WHO Europe, 1997), coinciding with the sudden change in government and national financial management. This is in marked contrast to the increasing life expectancy in the rest of Europe. The collapse of the command economies in the 1990s led to dramatic changes in the system of food production and consumption in many countries of Central and Eastern Europe. Russia, for example, became a net food importer: until recently Russia was importing one-third of its food requirements. The collapse of the rouble in the 1998 Russian financial crisis means that the country's ability to import foodstuffs has been severely reduced, and the Russian government has asked the European Union and the US government for food aid. The failure to organise specific economic and organisational measures to safeguard the population's health has led to huge societal costs. These issues are dealt with in later chapters.

2. Global nutrition challenges: a life-cycle approach

"Sound nutrition can change children's lives, improve their physical and mental development, protect their health and lay a firm foundation for future productivity."
—Kofi Annan, UN Secretary General

2.1 Poor nutrition starts in utero

Poor nutrition starts in utero and extends throughout the lifecycle, particularly in girls and women. This amplifies the risks to the individual's health but also increases the likelihood of damage to future generations, through further fetal growth retardation and a limited ability to cope with stresses within the family and in the provision of childcare (Figure 2.1). The girls who survive may grow up to produce low birthweight babies who may have a lower chance of survival than normal-weight babies. Of the 10 million annual deaths of children under five years old, and about half are related to undernutrition (WHO, 1998a). Undernourished children fall ill recurrently and fail to develop optimally—both physically and mentally. This vicious cycle is unacceptable from a human rights perspective. It also severely restrains the development of some of the world's poorest nations, whose workforce, stunted both mentally and physically, may have a reduced work capacity.

The latest ACC/SCN data show that very substantial gains were made in reducing undernutrition in preschool children during the 1980s and 1990s (ACC/SCN, 1996b; ACC/SCN, 1997a). Global prevalences of both underweight (low weight-for-age) and stunting (low height-for-age) have declined, but eight major interlinked challenges remain (Box 2.1).

There is still an unacceptably large number of both underweight and stunted preschool children. Stunting and underweight are particularly common in South Asia, both in terms of prevalence and absolute numbers. This comes about because a large portion of South Asia's children are born too small. In addition, their growth is slowed by infection and poor nutrition including very early introduction of water, often with sugar, of teas and of other fluids, all of which can introduce pathogens harmful to the infant and interfere with breastfeeding. Wasting, or low weight-for-height, reflecting recent nutritional insult, can occur at any age. Wasting is less common but of serious concern given the associations with morbidity and

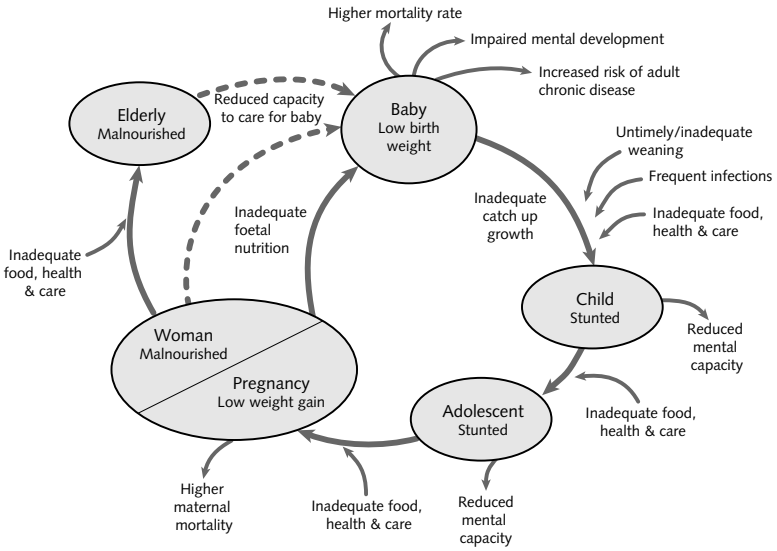

FIG. 2.1. Lifecycle: the proposed causal links

Box 2.1. Eight major nutritional challenges

1. **Low birth weights.** *Some 30 million infants are born each year in developing countries with low birth weight, representing about 24% of all newborns in these countries. Population-wide interventions aimed at preventing fetal growth retardation are urgently needed.*
2. **Childhood undernutrition underestimated.** *There are still more than 150 million underweight preschool children worldwide, and more than 200 million are stunted. This underweight and stunting is the tip of the iceberg. Suboptimal growth may affect many more. Stunting is linked to mental impairment. At current rates of improvement about 1 billion stunted children will be growing up by 2020 with impaired physical and mental development.*[1]
3. **Undernourished adults.** *High proportions of Asian and African mothers are undernourished: this is exacerbated by seasonal food shortages, especially in Africa. About 243 million adults in developing countries are severely undernourished, judged by a body mass index of less than 17 kg/m^2. This type of adult undernutrition may impair work capacity and lower resistance to infection.*
4. **Pandemic anaemia.** *Anaemia during infancy, made worse by maternal undernutrition, causes poor brain development. Anaemia is also very prevalent in school children and adolescents. Maternal anaemia is pandemic, over 80% in some countries, and is associated with very high rates of maternal death.*
5. **Extensive persisting vitamin A deficiency.** *Severe vitamin A deficiency is on the decline in all regions. However, subclinical vitamin A deficiency still affects between 140 to 250 million preschool children in developing countries, and is associated with high rates of morbidity and mortality. These numbers do not take into account vitamin A deficiency in older children and adults and thus seriously underestimate the total magnitude.*
6. **Adult chronic diseases accentuated by early undernutrition.** *Evidence from both developing and industrialised countries links maternal and early childhood undernutrition to increased susceptibility in adult life to non-communicable diseases such as adult-onset diabetes, heart disease and hypertension. These diet-related non-communicable diseases—including cancers—are already major public health challenges for developing countries.*
7. **Obesity rates escalating.** *Overweight and obesity are rapidly growing in all regions, affecting children and adults alike. These problems are now so common in some developing countries that they are beginning to replace more traditional public health concerns such as undernutrition and infectious disease. Obesity is a risk factor for a number of non-communicable diseases, adult-onset diabetes in particular.*
8. **Sustaining iodization programmes.** *Efforts are needed to sustain the remarkable progress made in the past decade towards universal salt iodization and elimination of iodine deficiency disorders. Monitoring systems, quality control and sound legislation are key priorities, as well as improving outreach to isolated communities.*

1 The figure, one billion, was calculated as follows: In 1995, across all regions excluding China, there were 184 million stunted children, plus 36 million stunted children in China (for 1992), (ACC/SCN, 1997a), yielding a total of 220 million worldwide. To allow for some improvement in the prevalence of stunting (since rates are declining in most regions) the 220 was rounded down to 200. The 200 million was divided by 5 yielding an additional 40 million children entering the 0–1 year old age group each year. Forty million per year over 20 years (now to 2020) plus the original 2000 yields one billion.

mortality, especially in stunted populations. Wasting is more prevalent in South Asia than in Sub-Saharan Africa (Figure 2.2) despite the higher availability of food energy (kcals per capita) in South Asia.

As the current definition of preschool undernutrition (% below –2 SD) specifies only those at the extremes, the true impact of undernutrition within populations is underestimated. Those classified as being under-nourished fall below the lowest limit of the reference population. Thus substantial growth failure is required before a child is classified as undernourished. In practice, the whole population tends to exhibit a 'shift', so that the majority of a country's children may have sub-optimal growth, and the societal burden is far greater than currently recognized (Figure 2.3)

2.1.1 Stunting affects mental development

Numerous studies from developing countries show that physical stunting is closely linked to impaired mental development, even after allowing for the relationship of both stunting and poor mental development with socio-economic deprivation (Scrimshaw, 1997). The nutritional and environmental components affecting brain development are unknown except for iron, iodine and alcohol and perhaps folic acid, vitamin B_{12} and the n-3 fatty acid (Lozoff et al., 1991; Stanbury, 1994; Mattson et al., 1997). Nevertheless, interventions which promote catch-up growth also improve long-term mental ability, provided they are timely and accompanied by mental stimulation such as maternal involvement in the child's play (see Figure 2.4). The value of play, taught and encouraged by the mother, is one example of the extreme importance of maternal care for a child's development and well-being.

A new health target has been set out by the World Health Assembly to reduce the prevalence of stunting in preschool children to less than 20% in all subgroups of every country by 2020 (WHO, 1998b). With the prevalence of stunting at over 50% in several countries: Ethiopia 64%, Bhutan 56%, Bangladesh 55%, India 52%, Pakistan 50% (WHO, 1997b), major initiatives will need to be taken to achieve this goal. Without accelerated action millions of children will grow up with lasting impaired mental development.

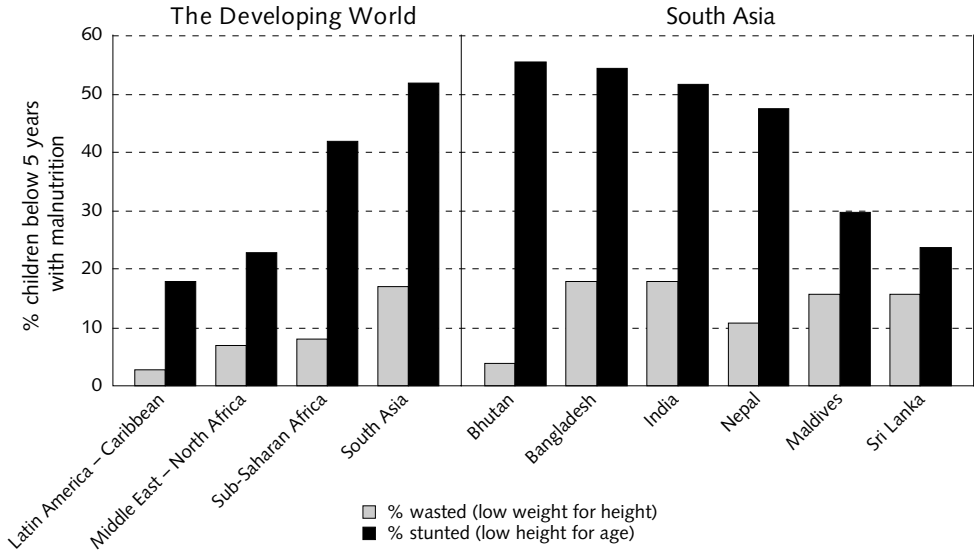

FIG. 2.2. South Asia's undernourished children—and the dominance of stunting

Wasting and stunting are defined as below minus two standard deviations from the median of the WHO reference population. In a normally growing population 2.5% of the children would be expected to be underweight for their height and 2.5% short for their age.

In South Asia 18% of under-fives are wasted and 51% are stunted—far higher proportions than elsewhere in the developing world.

Source: UNICEF, 1997

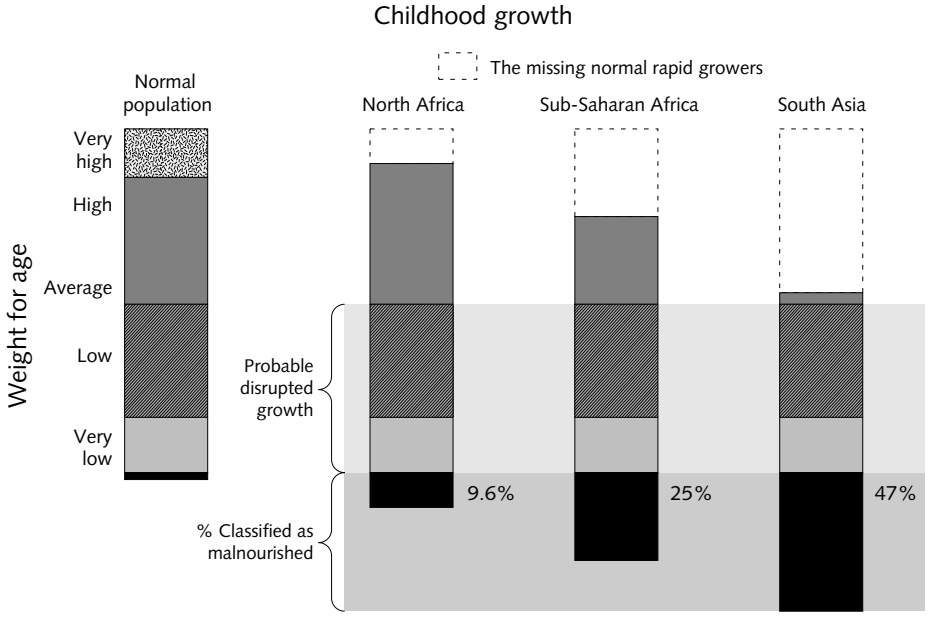

FIG. 2.3. Childhood underweight—the unrecognised population burden

2.1.2 The importance of fetal growth retardation in the causation of stunting

The process of becoming stunted begins in utero and continues for the first two or three years of life. Intrauterine growth retardation is a major public health problem in developing countries, affecting some 30 million newborns each year (Figure 2.5). De Onis et al. (1998a) estimate that low birth weight, defined as less than 2.5 kg at birth, affects 20 million or 16.4% of new-

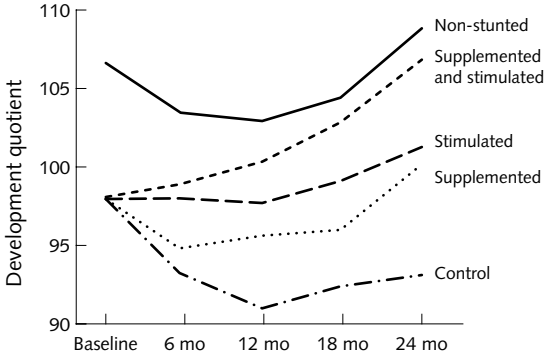

FIG. 2.4. Early intervention reduces the mental disadvantage of stunting

Mental development of stunted babies aged 9–24 months given milk supplement and/or play stimulation for 2 years

Source: Grantham-McGregor et al., 1991

borns in developing countries each year. The proportion of newborns weighed at birth varies enormously from country to country so estimates of levels are considered, by some, to be speculative. Poor maternal nutrition leading to low birthweight, frequent infection, and untimely introduction of complementary foods all contribute to stunting. Inadequate fetal nutrition slows down development of the immune system of the fetus, leading to far higher neonatal mortality in low birthweight babies than normal babies. Those who survive frequently fall ill and get trapped in the undernutrition-infection cycle, retarding both their physical and mental development. Low birthweight babies have lower IQs than those of normal weight, with an average of 5 IQ points difference (UNICEF, 1997a).

Infants who are born small must experience rapid catch-up growth not to become stunted. Thus stunting is very common in countries with a high prevalence of low birth weights (Figure 2.6). Protein, energy, zinc and iron have been suggested as having a specific role in the causation of stunting (Allen, 1994). Potassium, phosphorous and other essential minerals, are also potentially involved (Golden, 1988). Numerous studies over the last 60 years have shown that animal protein, i.e. meat or milk as part of a well-balanced diet is effective in stimulating linear growth in stunted children.

Urgent attention is needed to prevent stunting in utero. Population-wide interventions are needed in countries where intra-uterine growth retardation (IUGR) exceeds 20%, or in the absence of information on gestation age, where low birthweight is more than 15%. A recent review of randomized controlled trials evaluated the effectiveness of interventions to prevent impaired fetal growth (de Onis et al., 1998b). Interventions likely to be beneficial include a balanced protein/energy supplement where diets are deficient, smoking cessation and anti-malarial chemoprophylaxis in primigravidae. Pregnant women at risk with a low body

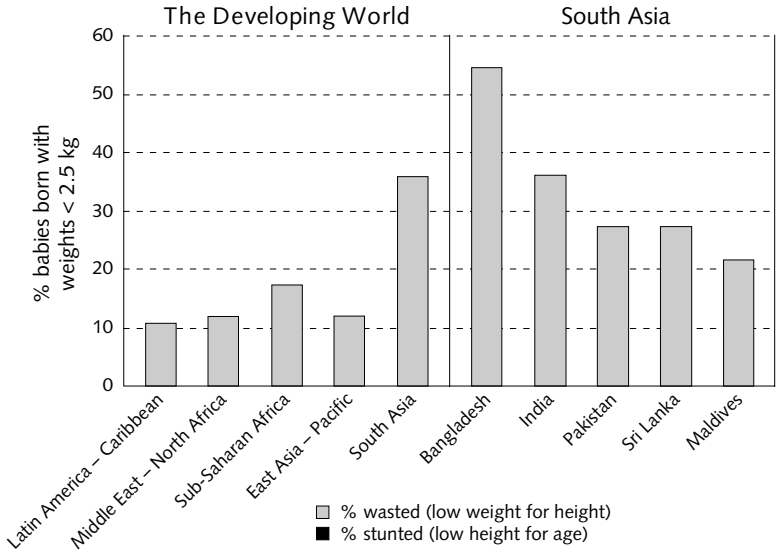

FIG. 2.5. The proportion of babies born with low birthweight by region in the developing world and in selected countries in South Asia

In South Asia, the proportion of low birthweight babies is twice the developing world average of 18%; in Bangladesh, it is three times the size.

Source: UNICEF, 1997

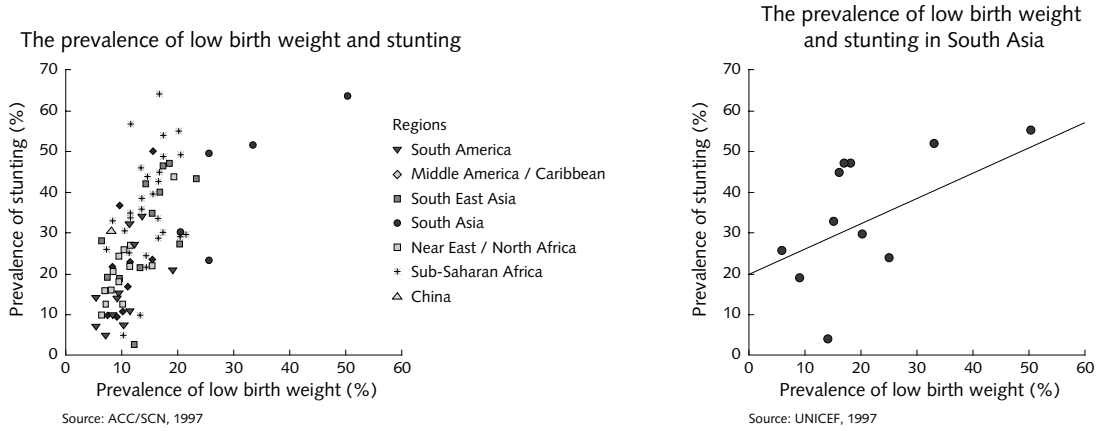

FIG. 2.6. The link between low birthweight and stunting

Note: There is a clear relationship between prevalence of low birthweight (<2.5 kg) and stunting. The Asian figures repeat on the right show that the same general relationship applies in countries with the most extreme problems.

weight show particular benefit. Zinc, folate and magnesium supplementation during gestation were flagged as meriting further research. Field research in the Gambia has shown that low birth weight can be reduced by about 40% and infant mortality by 50% through improved food intake during pregnancy (Ceesay et al., 1997). There is a need for the nutrition and public health communities to develop consensus on best practices to prevent fetal growth retardation, and for countries to develop programmes with broad coverage.

The battle against poor maternal nutrition, and the directly-related underweight and stunting in childhood, requires novel approaches. These approaches must be made in the areas of societal organisation, women's rights and well-being, sanitation and nutrition. These issues are dealt with in Chapter 3.

2.1.3 Why the high rates of stunting in South Asia?

The much higher rates of childhood stunting and underweight in South Asia seem surprising to many who expect the greatest problem to be in Sub-Saharan Africa. Stunting often follows low birthweight, which is more prevalent in South Asia than in other regions. Babies may be born too small if their mothers are short and begin pregnancy underweight or if they gain only small amounts of weight in pregnancy, e.g. < 5 kg. All three factors have been shown to be much more frequent in South Asia than in Africa (Ramalingaswami et al., 1997).

Osmani (1997) concluded that the cause of low birthweight in South Asia must be connected to maternal undernutrition. Further, that some aspect of South Asian culture must explain the selective deprivation of women with all its inter-generational consequences. Half of all women in India are undernourished before pregnancy (Naidu and Rao, 1994). Similar figures probably apply to other South Asian countries where little weight is gained during pregnancy. Maternal stature and other important pre-natal factors that may determine low birthweight also explain a large proportion of the variability in infant growth across populations. The fact that South Asian women are deprived of sufficient food and health care is well documented (Kishor, 1995).

The limited capacity for catch up growth amongst low birthweight South Asian children also reflects the susceptibility of both mothers and babies to infections in an environment where sanitation and hygiene practices are particularly poor. A significant feature of South Asian nutrition is a vegetarian diet containing surprisingly small amounts of raw ingredients. Cooked vegetables are likely to have fewer nutrients and other valuable bioactive compounds than those consumed raw. Poor hygiene, water, and food safety, as well as the very limited sanitation facilities in South Asia, are directly associated with the high frequency of intestinal infections. These problems contribute to high rates of anaemia in pregnant South Asian women (see Section 2.3.3). The absence of meat and fish, with their dense micronutrient content, is also important (see Section 2.3.3). Iron absorption from cereal-based diets is hampered by the presence of inhibitors such as phytate. It is reasonable to conclude that South Asian stunting relates to the absence of high-quality protein such as meat in the diet as well as the impact of recurrent intestinal infections.

2.2 Adult undernutrition

Only in the last ten years has underweight in adults been recognized as an important concern by nutritionists, public health specialists and the UN. It has

now become a priority in new UN policies. Adult underweight was formerly thought to be a useful form of adaptation to a modest diet and intense physical demands. However, FAO analyses reveal progressive functional impairment and increased rates of sickness and premature mortality as weight declines below the lowest normal range of body weight, i.e. a body mass index of 18.5 kg/m^2 (Shetty and James, 1994). Body mass index, or BMI, is a height-adjusted index of body weight. Some 30–50% of adults in South Asia have low BMI, and 15-30% of Africans are affected, particularly during drought and civil strife (James and Ralph, 1994).

Adult undernutrition is exacerbated by intestinal infections which may induce loss of appetite, fever, and decreased nutrient absorption. However, the principal cause is the lack of readily available food in sufficient quantity and quality to sustain both normal body weight and the physical activity needed for all the tasks of daily life. Low BMI is often accompanied by behavioural adaptation in physical activity. This is mainly related to an individual's allocation of time and energy to various productive and leisure activities. In all communities where low BMI is prevalent there is a drop in work output. The ability to sustain productivity throughout the day is limited in severely underweight adults. (Shetty and James, 1994).

2.2.1 Maternal morbidity and mortality

The close link between maternal undernutrition, low birthweight, childhood stunting and underweight is only now being revealed with its major intergenerational implications (Perez-Escamilla et al., 1995). Poor fetal nutrition has now been linked to the girls' future fate in pregnancy as well as to premature death in young adult life from an increased susceptibility to infections. Thus the season of birth predicts mortality in rural Gambia (Moore et al., 1997). It has, however, been known for at least a decade that anaemia in pregnant women in South Asia affects very large proportions of the population. If half of South Asian women are underweight before starting pregnancy, and most gain too little weight to prepare for breastfeeding, and over three-quarters are frankly anaemic in pregnancy (ACC/SCN, 1997a), it is perhaps of little surprise that maternal mortality rates are so very high.

Interventions in Thailand reveal the capacity of a country to reduce maternal death rates dramatically by having village volunteers identify and help pregnant women with food supplements, iron and folic acid treatment, and with visits to health centres to monitor their response to treatment (Tontisirin et al., 1986). Clearly the political effort and social organisation of many countries needs to improve dramatically, so that girls and women in pregnancy are seen as a major national priority for action.

2.2.2 Seasonal food deprivation and emergency shortages

New analyses reveal the cyclical weight changes of adults in response to seasonal shortages of food. For rural people, these food shortages occur more often—induced, for instance, by complex interactions of climate and soil (Ferro-Luzzi, et al., 1994). Even in western countries, similar but more widespread changes in adult body weights have been found in association with acute changes in food supply due to war or other emergencies (Robertson and James, 1998). Acute deprivation in times of economic hardship also leads to weight loss in adults. Although adult body weight changes seem modest, only 2–3 kg on average, they have now been linked in Gambian studies to low birthweight. The immediate and long-term effects on children born during and after seasonal deprivation or economic crisis can be combated by stronger family support as well as by interventions such as food supplements, so permanent damage to the child is avoidable. Limiting the demands on pregnant women to work and to fetch water and firewood may also help (ACC/SCN, 1998a). Seasonal fluctuations of food production, along with periods of economic hardship or civil strife, can cause seasonal undernutrition. Even when losses are small and relatively unimportant for adults, this can be very important for babies born to women during these times. Figure 2.7 illustrates those areas with low, moderate and high seasonality—demonstrating that Africa is most at risk of this type of undernutrition.

2.2.3 Refugees and internally displaced people (IDPs)

There has been an alarming rise in the number of emergency nutrition problems over the last ten years. The numbers of refugees and IDPs peaked during the crisis in the African Great Lakes Region in 1995 when there were over 18 million refugees and IDPs in Sub-Saharan Africa alone (ACC/SCN, 1998b). Experience has shown that when food aid deliveries are uninterrupted and humanitarian organisations have constant access to the displaced population, undernutrition can be kept to a minimum. The main reasons why this is not always achieved include the following:

» Displaced populations are often completely reliant on food aid. Rations that contain insufficient energy due to problems of supply, delivery or distribution of food aid can precipitate high rates of wasting. Fluctuating beneficiary numbers and the inability to correctly estimate them, donor concern over sales of food aid, gaps in the flow of aid to the front line, political circumstances, moving target populations and deteriorating roads all make it difficult to maintain a constant supply of adequate food aid.

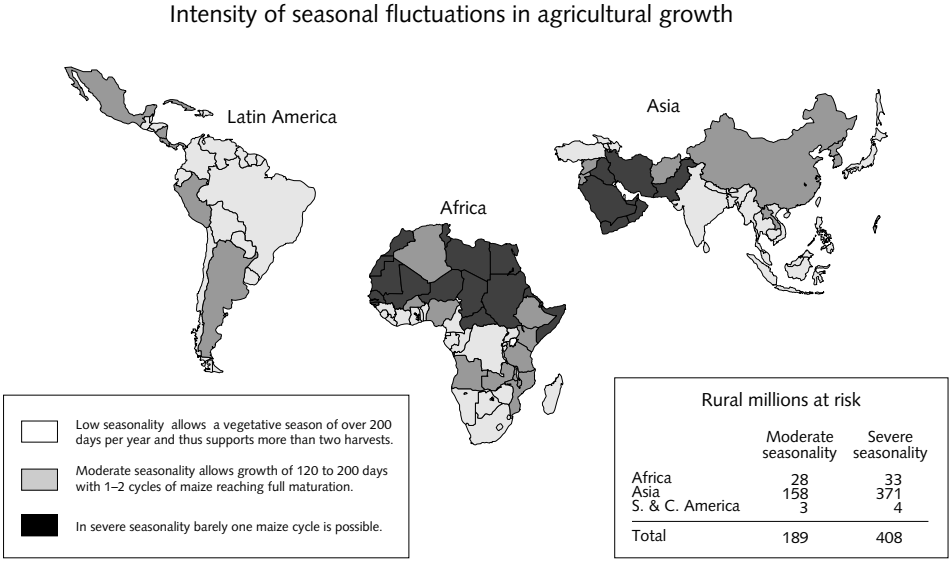

FIG. 2.7. Intensity of seasonal fluctuations in agricultural growth

Source: Ferro-Luzzi et al., 1994

» Inadequate protein and/or micronutrients in the ration may lead to deficiency diseases despite a constant supply of a ration with adequate energy. The inclusion of fortified blended food, parboiled rice and fresh fruit and vegetables in the general ration can help, but there are obvious logistical problems with these foodstuffs.
» Diseases such as diarrhoea, measles and malaria and the need for non-food supplies, such as soap and fuel, are often even more important than food issues in their contribution to undernutrition. Overcrowding, lack of shelter, poor camp structure, as well as lack of water and sanitation also have profound effects on nutrition through their impact on the frequency of infections.
» Tensions may develop between resident and refugee populations. There is often a lack of understanding of the problems that the displaced population face, and how their lives have changed. Greater sensitivity to the specific needs of different displaced populations would allow assistance to be tailored more effectively.
» There is no single UN agency which is responsible for the protection and welfare of internally displaced people. Political and diplomatic tensions within a country may provide difficulties in trying to assist IDPs.

2.2.4 Physical activity and poor nutrition: the stress of extended physical activity in rural communities

Physical activity is usually considered separately from nutrition, but the nutrition community now needs to have professional involvement with this issue. In many developing countries adults are engaged in high levels of physical activity requiring substantial energy intakes. The need to carry water and firewood for long distances and to work long hours on dispersed land is also a major problem, particularly for women whose ability to devote time and energy to child care is severely diminished. Women's lack of time for a whole range of major tasks crucial to the welfare of the family is a major impediment to progress in many developing countries.

An adult's physical capacity and ability to sustain work without becoming ill is also impaired when adults are underweight (Shetty and James, 1994), so there is widespread interest in devising aids to render the work more efficient. In rural communities in the developing world there is a need to develop new strategies for lessening the strain of women's work by improving the availability of water, fuel for cooking, e.g. through use of bio-gas as in Vietnam (Ørskov, 1998), and to enhance energy saving by the greater use of simple tools, bicycles and better rural transport systems.

2.2.5 AIDS and nutrition

The Joint United Nations Programme on HIV/AIDS has estimated that by the end of 1998 there will be 32.2 million adults and 1.2 million children living with HIV/AIDS (UNAIDS/WHO, 1998). In total, 3 million children under 15 years of age worldwide have contracted HIV since the beginning of the pandemic (UNICEF/UNAIDS/WHO, 1998). Ninety per cent of these have been born in Africa. HIV/AIDS is

now the number one overall cause of death in Africa, and has moved up to fourth place among all causes of death worldwide, according to the 1999 World Health Report.

Without appropriate interventions, the risk of an HIV-positive mother passing the virus on to her infant is 15–25% in the industrialized world and 25–35% in the developing world (as reviewed by UNICEF/UNAIDS/WHO, 1998). The infant can become infected during pregnancy, labour, birth or breastfeeding. Many developing countries lack both the resources to purchase adequate supplies of breast milk substitutes, and the access to clean water necessary to safely prepare these substitutes. The choice of infant feeding is thus further complicated.

The importance of nutrition in AIDS has long been recognized and evidence is now accumulating that micronutrient deficiencies may influence the transmission and rate of progress of the HIV virus. HIV-positive individuals in industrialized countries have been found to have low serum concentrations of vitamins A, B_6, B_{12}, C, E, folate, carotenoids, selenium, zinc, and magnesium, in spite of above-average intakes from supplements or dietary means (Sappey et al., 1994; Skurnick et al., 1996). These low serum levels are likely to be even more pronounced in the developing world. Several studies have suggested that micronutrient supplementation may be beneficial (Friis and Michaelsen, 1998). More research is needed to clarify the possible role of micronutrient supplementation in prevention of mother-to-child transmission and in delaying the progression of HIV to AIDS.

One of the most recognisable manifestations of HIV/AIDS is wasting. Weight loss has been shown to be the strongest predictor of mortality in HIV-infected people. Undernourished individuals are more susceptible to contracting HIV; they also develop AIDS more quickly once they have contracted the virus (Fawzi et al 1998, Friis & Michaelsen, 1998). Countries with a high prevalence of HIV/AIDS are also held back in their efforts to attain nation-wide food security because of the burden of the disease on the economy and the population as a whole.

In parts of Sub-Saharan Africa, HIV/AIDS is in the process of wiping out an entire generation of the most economically active people, affecting them in the prime of their lives. These young adults are not only a burden on the health service and economy during their lives, but leave behind them a legacy of AIDS orphans: an additional burden for the struggling communities. Governments faced with increasing numbers of AIDS cases are likely to divert funds that might have been spent on agricultural research and extension to the more immediate problem of caring for AIDS patients. Food security of rural communities in Sub-Saharan Africa is affected by the AIDS epidemic because of the burden of disease.

2.3 Micronutrient deficiencies are major public health problems in nutrition

The following sections discuss four nutrition deficiencies and the progress that has been made towards their elimination. Integrated community-based approaches for improving nutrition are proposed in Annex 3.

2.3.1 Iodine Deficiency Disorders (IDD)

Over the last 15 years a tremendous effort has been made towards virtual elimination of IDD by the year 2000. According to WHO, of the five billion people living in countries with IDD, 68% now have access to iodized salt. This figure incorporates 63% for Africa and 90% for the Americas (WHO/UNICEF/ICCIDD, 1999). The success of this initiative could be used as a model for reaching public health goals through co-operation with industry. In many developing countries, salt iodization is the first large-scale national experience in fortification of a commodity. It has taught valuable lessons in collaboration amongst government, NGOs, industry, the media and other sectors. It has also offered insights into building and sustaining an intervention politically, technically, financially and culturally. Success with salt iodization is generating confidence to address other more complex micronutrient problems. Sustaining this achievement calls for both strong, continued political commitment and motivated industrial involvement. Effective advocacy and social communications are needed in order to assure production compliance and quality control, as well as continued monitoring of salt iodine levels.

2.3.2 Vitamin A deficiency

The 1990 *World Summit for Children* called for the elimination of vitamin A deficiency by the end of the decade. In 1995, over 3 million children were estimated to exhibit clinical or severe vitamin A deficiency (ACC/SCN, 1997a). However, this is only the tip of the iceberg. Some 140 to 250 million preschool children have sub-clinical deficiency (de Benoist, personal communication, 1999). These numbers do not take into account vitamin A deficiency in older children and adults and thus seriously underestimate the total magnitude. Subclinical deficiency in young children is associated with increased risk of severe illness and death. Given the large numbers and the implications for morbidity and mortality reduction, the challenge of subclinical vitamin A deficiency is huge. However, in many countries there is still a preoccupation with clinical deficiency and opportunities to develop programmes to address the more widespread sub-clinical problem are often missed. There is a need to promote vitamin A sufficiency as a vital child health and survival issue.

Vitamin A supplementation is increasingly inte-

grated with immunisation programmes. This is a medium or even long-term strategy to cover very young children and women postpartum until other interventions are in place. In Asia, vitamin A deficiency is common in pregnant and lactating women (Bloem et al., 1995; Katz et al., 1995). Recent attention has focused on the potential benefits to the mother of low doses of vitamin A supplement during pregnancy. WHO has published guidelines for pregnant women recommending daily supplements of not more than 10,000 IU (3000g RE) at any time during pregnancy, where the deficiency is endemic among preschool children and maternal diets are low in vitamin A (WHO, 1998d). There are expanding opportunities to fortify staples such as oils and fats, flour, sugar, milk and dairy products with vitamin A. It is anticipated that over the next 5–10 years at least 30–40 developing countries will have national vitamin A fortification programmes that provide large populations with a substantial proportion of their recommended intake.

The carotenoids in vegetables and fruit, which provide the precursors for the body's production of vitamin A may not be as readily converted to vitamin A as previously thought (de Pee et al., 1995). Nevertheless in practice communities which habitually consume substantial amounts of vegetables and fruit maintain their vitamin A status (Jalal et al., 1998) so strategies to maintain good vitamin A status need to include the promotion of suitable vegetable and fruit sources of carotenoid as well as other foods such as palm oil and eggs.

2.3.3 Iron deficiency anaemia (IDA)

Iron deficiency anaemia affects about 2 billion children and adults, including over 80% of pregnant women in many developing countries, particularly in Asia (ACC/SCN, 1997a) and much slower progress has been made in combating the problem compared with iodine and vitamin A deficiencies. Recent analyses from the Institute of Medicine (1998) highlight the effect of severe anaemia in accounting for up to 20% of maternal deaths in developing countries. Iron deficiency is a major cause of lasting brain damage and death in children. It also limits the work capacity of adults. All age groups are at risk; the low birthweight infant is particularly vulnerable. Iron deficiency anaemia needs to be examined throughout the life cycle, since longer-term impacts occur from infancy and childhood to adolescence, as well as in pregnancy. Even in communities with good dietary and hygienic conditions 10–15% of women have particularly high menstrual losses of iron and are vulnerable to unrecognized iron deficiency anaemia. Trends in IDA are not known.

Iron supplementation during pregnancy, lactation and childhood has been effective under controlled and supervised conditions. However, large-scale supplementation programmes in developing countries have not, on the whole, been effective. The results in reducing iron deficiency anaemia in women and children in relation to a modest goal of reduction by one-third of 1990 levels (set at the *World Summit for Children*) are bound to be very disappointing unless action is accelerated. The challenge is to approach the problem in creative and strategic ways. There is an urgent need to communicate the importance of addressing this problem.

Anaemia is exacerbated by hookworm, by other parasitic infections and by chronic diarrhoea linked to poor sanitation and hygiene. Hookworms attach themselves to the mucosa of the gut and suck blood from the submucosal vessels. A worm-load of around 1000 eggs/g of faeces induces an intestinal blood loss equivalent to 1–2 mg of iron per day depending on the species of hookworm. Although 30-40% of this iron is reabsorbed within the intestinal tract, the loss is still significant (Hercberg et al., 1987). Other parasites which cause significant blood loss are Trichuris trichiura and Schistosomiasis—the latter is endemic in 74 developing countries (WHO, 1998a). The challenge is to improve hygiene and water supplies while initiating efforts to produce and distribute a low- cost generic anti-helminthic drug. An appropriate combination of an iron-folate supplement, with an anti-helminthic drug, would have a greater impact on the prevalence of anaemia than iron alone.

The aetiology of IDA and its inter-relationship with diet and disease are complex. There is no one single intervention to be universally advocated. Water and sanitary as well as dietary improvements need to be combined with supplementation of at-risk groups, fortification, parasitic disease control and overall education of policy makers, professionals and the public. These measures all have their place. Their relative prerequisites, costs, constraints and opportunities all need to be explored to determine the appropriate intervention mix. The interventions, when integrated, could be mutually reinforcing. For instance, the focus on supplementation can benefit from and be reinforced by greater attention to other approaches such as fortification or dietary improvement. The combination of dietary and other measures needed to combat iron deficiencies have recently been reviewed (Micronutrient Initiative/International Nutrition Foundation, 1999).

Iron fortification of staple foods—especially wheat and corn flour—is rapidly gaining ground in large parts of the world, and there is potential for impact comparable to iodization of salt. There is also an urgent need to protect young children with iron through commercial/household fortification of complementary foods. Technological problems are not nearly as serious as the operational difficulty of making programmes work in communities where iron-deficient people live.

Issues of supply and logistics, communications and community participation, alliance building across a wide spectrum of players—public and private—are equally important to ensure the effectiveness and sustainability of efforts to eliminate anaemia and iron deficiency in large populations.

2.3.4 Zinc deficiency

Zinc deficiency has recently been brought to the attention of the international community. It is thought to be common in children and during pregnancy throughout the developing world, and may have wide-ranging adverse consequences (Black, 1998). Evidence is accumulating that zinc deficiency is associated with difficulties in pregnancy and childbirth, compromised immune responses and increased risk of infectious diseases, low birthweight and stunted child growth. Zinc deficiency during recovery from malnutrition retards linear growth and affects the immune response (Golden, 1988). Thus even mild to moderate zinc deficiency may be an important cause of stunting worldwide.

Zinc may have an important role in programmes designed to address common life-threatening childhood illnesses. Several randomized controlled trials show that zinc supplements reduce the duration and severity of acute and persistent diarrhoea (Ruel et al., 1997; Sazawal et al., 1996, 1997). Zinc supplementation may also reduce the incidence of acute lower respiratory infections (Sazawal et al., 1998) and the incidence of malaria in children (Bates et al., 1993). Further research on the benefits of zinc supplementation on a population basis is needed to document the need for large-scale supplementation or fortification programmes and the claim that most, if not all, pregnant women in the developing world have inadequate intakes of zinc (Caulfield et al., 1998). Research is also needed into the relative bioavailability of zinc in foods, acceptability and side effects of the different zinc salts used in fortification. Community food-based intervention studies in Malawi have looked at improving dietary intakes of zinc. This is possible by increasing consumption of foods high in zinc and foods known to enhance the absorption of zinc, e.g. meat, as well as by encouraging the germination and fermentation of plant foods (Gibson et al., 1998). None of these interventions has as yet been implemented on a large scale.

2.4 Changing food consumption patterns

Food production, processing and manufacturing have responded to mankind's inherent demand for sugary, salty and fatty foods. This demand seems to stem from the evolutionary need to benefit from small amounts of these formerly scarce resources. Reducing the bulk of plant foods by shearing the fibrous structure of food also helps young children to consume a higher energy-dense diet. The culinary and industrial enhancement of the energy density of foods by adding fats and sugars is invaluable in times of need, but potentially disadvantageous in times of plenty, especially if sedentary lifestyles predominate. Inadvertent 'passive overconsumption' then becomes the norm. New meals and foods therefore need to be designed to produce foods of suitable bulk with a high nutrient-energy ratio. The benefits of culinary diversity and variety in food supply should also be preserved.

As populations move from rural to urban areas there is an increasing demand for processed foods with a stable shelf-life. There is also a greater demand for fast or street foods. Salt and sugar are used as preservatives; for street foods, fat is often the cooking medium ensuring fast cooking at high temperatures. The high temperature destroys bacteria and renders the food less hazardous if eaten immediately. The diet tends to become more energy-dense and to include less fruit and vegetables, resulting in lower micronutrient intakes. As societies become more urban, lifestyles tend to become less active and more sedentary. This set of changes is known as the nutrition transition, and is a major challenge facing the world in coming decades. Figure 2.8 (adapted from Popkin, 1998) shows the relationship between diet composition and national income.

Vegetable and marine oils are important sources of essential fatty acids. As countries develop and more processed foods are consumed these oils are often hydrogenated for use in the food industry. This process converts very valuable essential fatty acids into non-essential fats and indeed sometimes into potentially harmful trans-fatty acids.

The consumption of meat and milk is increasing in almost every country in the world. Some flesh foods can benefit infants and children nutritionally by promoting linear growth in the first years of life. They can also improve iron intake in women who are liable to anaemia during their reproductive years. Iron and zinc nutrition may be improved by the consumption of flesh foods. For other adequately-nourished groups, however, there are no good nutritional arguments for a further increase in the consumption of meat and milk. On the contrary, high intakes of red meat may increase the risk of colon cancer, and saturated fat from meat and dairy products increases the risk of coronary heart disease. In most high-income countries livestock used in meat production are the main consumers of grain, thus diverting grains that could be used directly for human consumption.

As to refined foods, the change to refined grain flour may have major implications for nutrition, especially in societies where wheat and maize are staple foods. Modern milling procedures produce refined flour

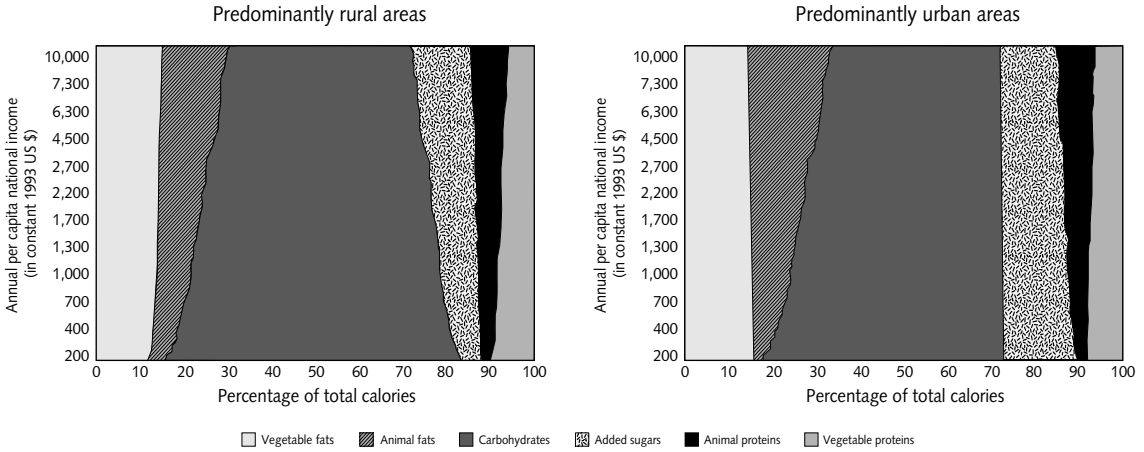

FIG. 2.8. Relationship between dietary composition and Gross National Product per capita (1990)

Source: Popkin, 1998

which has better digestibility but has lost the valuable structure, minerals and vitamins associated with the cell wall (fibre). Present efforts to expand the fortification of staple foods in developing countries helps to restore some of the nutrients lost in milling. Fortification also adds nutrients which prevent deficiencies detrimental to public health.

2.5 Preventing premature adult death and disability

For those who survive childhood and avoid infectious disease, the challenge is to grow old healthily and to avoid the major non-communicable diseases (NCDs) which cause premature death and disability for so many. The latter half of the 20th century has been characterized by emergence of NCDs, such as coronary heart disease, cancers, hypertension, stroke, obesity and diabetes, as huge public health and economic problems. By 1990, coronary heart disease had become the leading cause of death world-wide with 64% of those deaths taking place in developing countries. In 1997, diseases of the circulatory system were responsible for 29% of deaths globally and cancers accounted for 12%. These long-term health issues are closely related to health in the early years. Undernutrition in pregnancy and in early childhood can lead to enhanced susceptibility to NCDs in later life (Hales et al., 1991; Barker 1994). This inter-linking of early nutrition with adult nutrition and health has huge public health significance. There is a clear life-cycle of events in which the well-being of mothers during pregnancy affects the child's growth. Once these children are of child-bearing age, their physical stature affects growth of the subsequent generation. As a result, several generations will benefit from improved nutrition when effective approaches are put in place.

2.5.1 The life-cycle approach

Nutritional challenges vary as we progress through the life-cycle. Adequate nutrition for pregnant women and young children is essential for growth and healthy physical and mental development. In adulthood, the issues are different: the challenge is to avoid premature death or disability from diet-related chronic diseases and to progress into fit and healthy old age. It is increasingly clear, however, that these issues are interlinked. Good nutrition in early life—beginning with the fetal stage—pays dividends in childhood and in later life. Furthermore, the impact of early nutrition on a young woman may, in turn, have an impact on the health of her children. In this way, investing in maternal and childhood nutrition has both short and long-term benefits which will be of huge economic and social significance.

These nutrition issues have become much more, not less, important over the last 50 years because the early childhood deaths from infectious diseases have been combated by immunisation, use of oral rehydration therapy, improved sanitation and better access to primary health care. With improved life expectancy (Figure 2.9), nutrition has become a major determinant not only of survival but also of health and disease—with all its benefits and costs. New scientific understanding amplifies the profound importance of linking maternal nutrition with fetal changes and effects into old age (Figure 2.10).

2.5.2 Low birthweight, maternal undernutrition and long-term health

Evidence from both the developing and developed world now links maternal and early childhood undernutrition to health in adult life and the risk of premature mortality (Barker, 1995; Curhan et al., 1996;

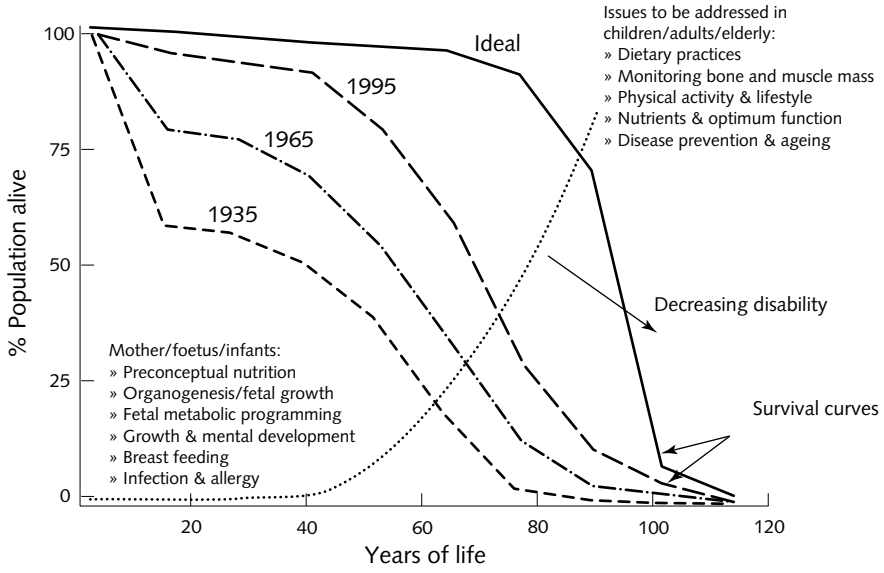

FIG. 2.9. Nutrition over the lifecycle: the changing challenges of preventing physical and mental disability with increasing life expectancy

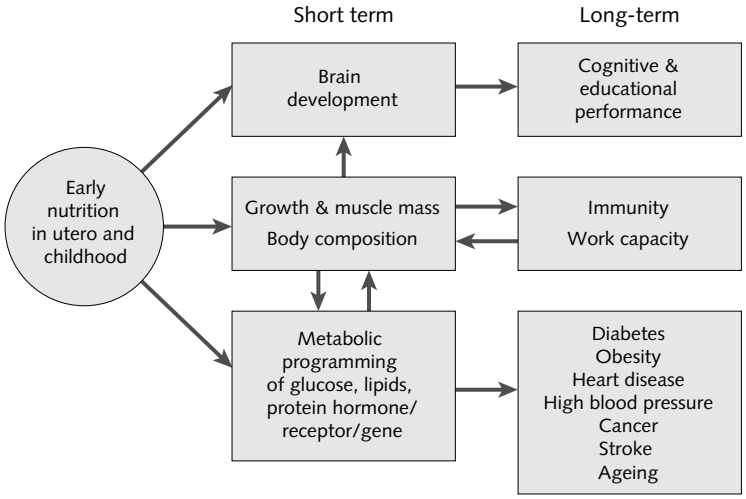

FIG. 2.10. The short-term and long-term effects of early nutrition

Stein et al., 1996). Low birth weight infants who subsequently become overweight in adulthood are prone to selective deposition of abdominal fat (Law et al., 1992; Gopalan, 1998).

Abdominal obesity, as exemplified by a high waist circumference or waist/hip ratio is positively correlated with the development of hypertension, non-insulin dependant diabetes mellitus (NIDDM) and cardiovascular disease (VanItallie, 1998; Lean et al., 1998). When a fetus is deprived of adequate nutrients it adapts metabolically to make better use of what is available. There is extensive, long-standing experimental evidence, including primate studies, to show how adult size, organ size and metabolism, e.g. cholesterol regulation, is fundamentally changed by an altered maternal and early infancy diet. However, these metabolic changes may be a disadvantage at a later stage of life if nutrients are plentiful.

Nutrition over the lifecycle: the changing challenges of preventing physical and mental disability with increasing life expectancy

The experimental evidence is matched by findings in real life. For instance, poorly nourished Dutch women in the closing stages of World War II produced

children who now, as adults, are especially vulnerable to NIDDM, high blood pressure and coronary heart disease. This relationship was found to be associated with pregnancies that were subjected to food shortages in the last trimester of pregnancy (Ravelli et al., 1998) (Figure 2.11). Gambian data also show premature death from infections in middle-age adults born to mothers deprived during seasonal food shortages (Moore et al., 1997; see Section 2.2).

2.5.3 Diet related non-communicable diseases (NCDs): a new global challenge

Until a decade ago NCDs were thought to be found only in industrialized countries and, when present, the victims were relatively old and therefore a lower priority than the young. New evidence shows, however, (Figure 2.12) that the major global burden of chronic dietary disease in adult life affects the developing world more than developed countries. In 1996, over 60% of the 15 million world-wide deaths due to diseases of the circulatory system were in the developing world and 15% were in the Commonwealth of Independent States (CIS) countries. Similarly, 60% of 6 million cancer deaths occurred in the developing world with 10% taking place in CIS countries (WHO, 1997a). There is also an escalating epidemic of obesity, which is becoming apparent throughout the urban communities of the developing world, bringing in its wake the closely linked problem of NIDDM (WHO, 1998c). Obesity and NIDDM continue to rise across the industrialized world, as well. Overweight and obesity affect both children and adults. The fundamental causes of the obesity epidemic are sedentary lifestyles, with a fall in spontaneous and work-related physical activity, and high-fat, energy-dense diets. WHO and Popkin (1998) have stressed that we must view the causes of obesity as environmental rather than personal or genetic.

These diseases remain a huge problem despite falling mortality rates from a few NCDs, especially coronary heart disease, in some industrialized countries. Other countries, particularly in Central and Eastern Europe, have seen no decline in coronary heart disease mortality. In 1990, adults aged between 15 and 60 in Central and Eastern Europe had a higher probability of premature death than adults anywhere else in the world except Sub-Saharan Africa (WHO, 1997a). And, alarmingly, life expectancy has actually been falling in the Russian Federation. This reflects the high prevalence of diet-related NCDs and alcoholism along with high rates of death due to injury, probably alcohol-related.

2.5.4 Non-communicable diseases (NCDs) in the developing world

Despite this growing burden of NCDs in the developing world—accounting for almost 40% of all deaths—the biggest killers in the developing world are still

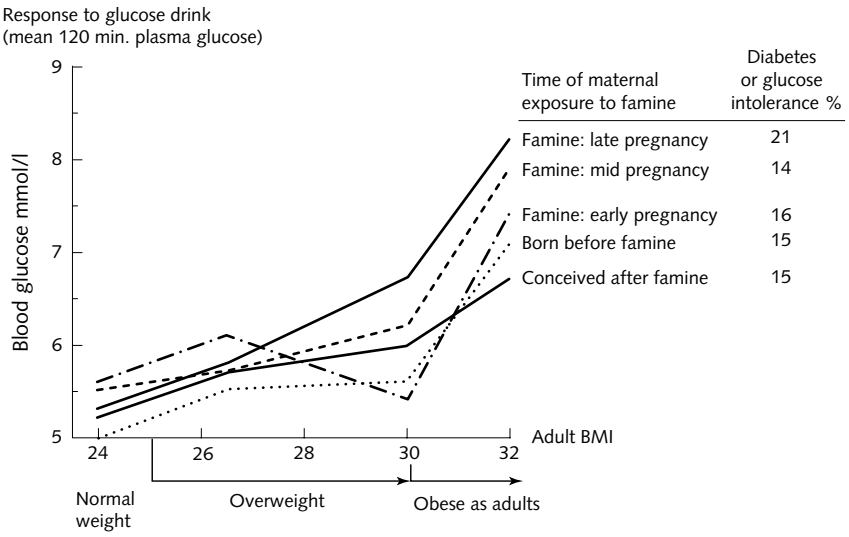

FIG. 2.11. Adult diabetes and glucose intolerance after fetal nutritional deprivation

Famine during the late stages of their mother's pregnancy leads to diabetes or glucose intolerance in those adults who become overweight.

Source: Ravelli et al., 1998

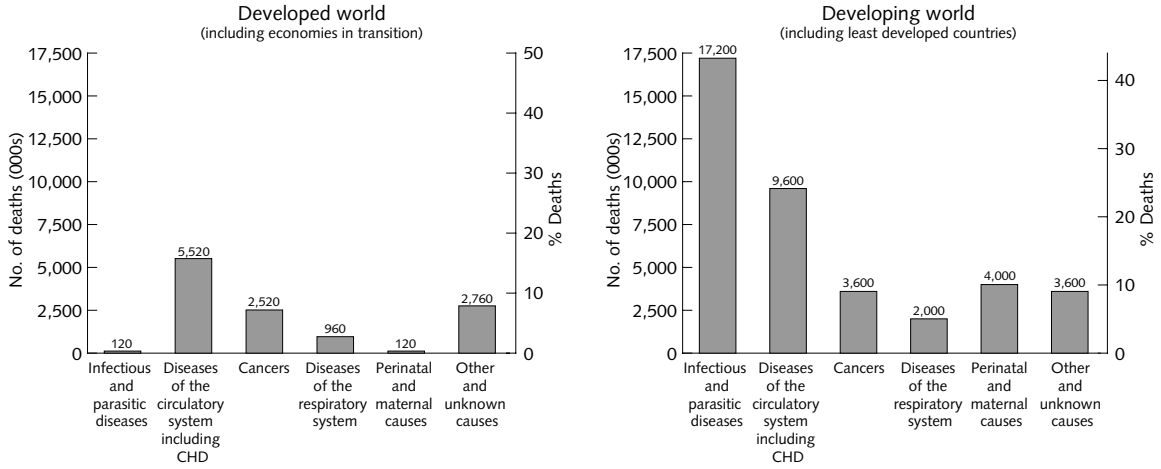

FIG. 2.12. Causes of death in the developed and developing world, 1997

Diet-related non-communicable diseases such as cancers and diseases of the circulatory systems are the cause of large numbers of deaths in the developing world.

From the WHO Health Report 1997, updated by WHO 1998 report.

infectious and parasitic diseases whose impact is markedly increased by poor nutrition. As outlined in Sections 2.1 and 2.3, childhood undernutrition and micronutrient deficiencies remain very serious problems on a global scale. The link between undernutrition in early life and NCDs in later life will exacerbate the situation. Children with low birthweight born to undernourished mothers may overcome one set of hurdles only to be faced with higher risks of chronic, diet-related disease in middle age.

The harsh truth of this newly-documented pattern of global disease is that developing countries are now—and increasingly in the future—having to deal with a double burden of infectious disease, childhood mortality and under-nutrition alongside the growing burden of diet-related NCDs. As well as the obvious health effects, this double burden has very serious economic and social implications for these countries. The escalating death rates from NCDs often occurs in those adults making a particularly valuable contribution to the economy of a developing society.

Evidence from India (Nutrition Foundation of India studies, 1997) depicts the remarkable social-class gradient of overweight. Half the upper middle-class women are overweight with selective abdominal obesity and have heightened risk of associated diseases such as diabetes and high blood pressure. The implication of this socio-economic gradient is that these influential groups are often more likely to receive medical treatment and may in turn divert precious resources from low-income groups in need of help to combat nutrition deficiencies. Evidence is also emerging of very high rates of abdominal obesity amongst the urban impoverished in South Asia. Associated with this are high rates of NIDDM (11%) and the poor glucose handling (a further 18%) which often precedes NIDDM. Thus up to 30% of the urban impoverished in South Asia may be on the verge of major disability from diabetes and its consequences.

Treatment of NCDs is costly compared with public health preventive strategies. Favouring treatment rather than prevention is a mistake already made in the industrialized world. Repeating the same mistakes in the developing world may have alarming consequences for the less privileged, because their needs are likely to be ignored if scarce health funds are diverted to treating the middle classes. The cost of treating NCDs takes up a substantial proportion of health budgets of the industrialized world. If this experience is any guide, the explosive emergence of NCDs in the developing world will affect the long-term economic welfare of these countries.

The enormous economic and social burdens of NCDs in the middle-aged and elderly are both direct and indirect. One method of projecting the global burden of disease in 2020 now suggests that handicaps, both from the number of years of life lost and from the years of life lived with disabilities, will be dramatically different in different parts of the world. The combined global impact, expressed as disability-adjusted loss of life years (DALYs) of these two forms of health handicap is currently dominated by the problems of India, Sub-Saharan Africa and China (Figure 2.13).

When premature death rates are combined and adjusted to reflect age and extent of disability—expressed as disability-adjusted-life years (DALYs) lost—the overall disease burden can be mapped. Recent analysis of the global burden of disease (Murray and

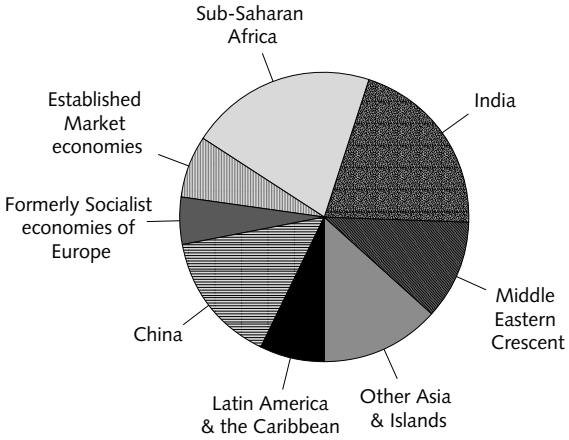

FIG. 2.13. The Proportion of lost and disabled years, by region, in 1990

Source: Murray & Lopez, 1997

Lopez, 1997) shows that childhood underweight alone accounts for 18% of the world's burden, but this Commission's analyses reveal the need to consider the nutrition burden of disability in a far wider context (see Section 6.3.2).

2.5.5 Non-communicable diseases in the developed world—targeting inequalities

In western affluent societies there is new evidence that increasing income inequality is linked to increasing health disparities between the rich and poor, despite sustained economic development. Many immigrant groups and other communities have a poor diet and an excess of the associated diseases of obesity, heart disease, high blood pressure and diabetes. Thus, in industrialized countries the poor also now suffer from both the problems of dietary deficiency and those of obesity and other chronic adult diseases. There is a clear need for a new approach to health and food policies in most parts of the world. Strategies for ensuring healthy diets at affordable prices for all communities should be a key part of these policies.

2.5.6 Physical inactivity: a major health hazard

Economic development can be accompanied by reduced physical activity. The mechanical, electronic, and computing advances of the last 30 years have encouraged this. Town planning and transportation revolve around the use of cars in most parts of the developed world. The need to stand, walk, climb stairs, or cycle has been lessened, in some instances, by the advances in modern architecture, through construction of building which are considered efficient and practical. Work areas with sophisticated machinery no longer require the intense physical efforts that were once the norm. The same is true for homes, with the additional opportunity of passive entertainment offered by television.

These dramatic changes in societal behaviour contribute to significant public health problems which include rising rates of obesity. Physical activity helps to prevent NIDDM, coronary heart disease, stroke, some cancers and osteoporosis, independently of excessive weight gain (Blair et al., 1996). Only modest amounts of exercise are needed, so there is a need to encourage society to allow safe regular walking to become a feature of the lives of children, adults and the elderly (WHO, 1998c). The elderly are particularly vulnerable because physical inactivity, often present in old age, leads directly to health problems as well as a fall in food intake. Nutrition deficiencies are therefore more likely to emerge in the physically inactive older person unless they are on a high-quality nutrient-rich diet.

Collaborative efforts are needed to ensure that appropriate levels of physical activity are achieved in rural communities, and are then maintained as countries develop. In some rural communities in developing countries physical activity levels are too high. These are likely to fall with urbanisation but should be maintained at an appropriate level. The Commission proposes that the ACC/SCN should now include issues relating to physical activity in its agenda.

2.5.7 Healthy ageing: preventing physical and mental disability

The issue of healthy ageing is now of major concern, as shown by the increase in population numbers and proportion of the elderly projected over the next 20 years (Figure 2.14)

Body composition changes with age, with a decline in lean body mass. This change is accelerated in women after menopause, and in both sexes beyond the age of 60 (WHO, 1998f). This deficiency of fat-free mass leads to decreased strength and mobility, imbalance and an increased frequency of falls. Thus, preserving muscle mass in old age is a strategy for preserving strength. Exercise is important in determining body composition and muscle function. Energy requirements decrease about 100 kcal per decade in proportion to the reduction in the amount of lean metabolising tissue. There is also a decline in the relative mass of immune tissue over the life-cycle. With decreasing energy intake, the diet needs to be particularly nutrient-dense to compensate as the elderly are susceptible to multiple deficiencies: protein, and zinc, vitamin B_6, B_{12} and D. Subclinical vitamin and mineral deficiencies may also contribute to the pathogenesis of declining neuro-cognitive function with age (Rosenberg and Miller, 1992). Some of the age-related decline

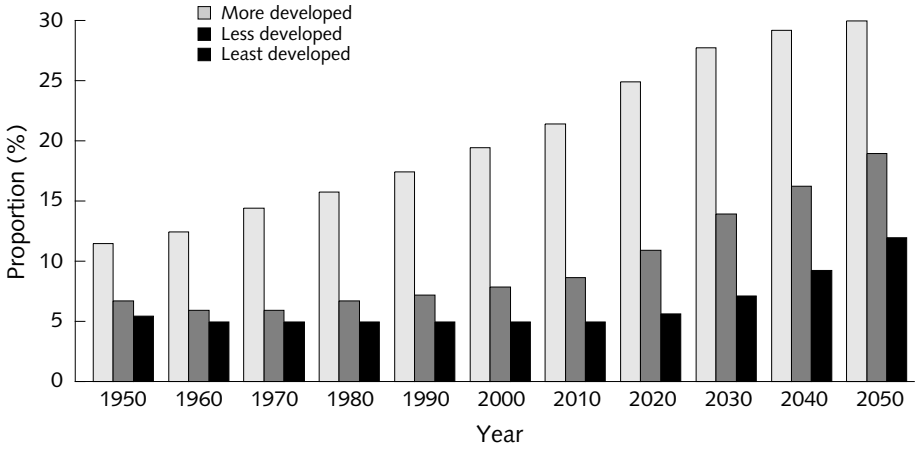

FIG. 2.14. Proportion of the population aged 60 and over, by country category, 1950–2050

Source: UNDP, 1994

in immune function may be preventable by dietary modification.

Poor eye-sight is the most common functional impairment in old people. Nearly half the population aged 75–80 suffer significant visual loss because of cataracts (Kahn et al., 1977). Evidence is accumulating that development of cataracts can be retarded by good nutrition (Taylor, 1992). Antioxidant nutrients (vitamins C, E and carotenoids) in and around the lens may be protective and prevent macular degeneration, the most common irreversible cause of blindness in the elderly (Taylor et al., 1991).

2.5.8 Coherent community-based policies can transform the burden of adult chronic disease

Norway's experience illustrates how dramatic results can be achieved by concerted action in an industrialized country dealing with the impact of adult chronic disease. During the Second World War there was an acute fall in total and saturated fat intake; rates of death from coronary heart disease (CHD) were relatively low. However, CHD death rates escalated after the War. By the 1960s CHD affected a very large portion of the adult population, both men and women. At the FAO/WHO World Food Conference in 1974, the Minister of Agriculture pledged to set out a new national nutrition policy and to establish a National Nutrition Council. Norway's nutrition policy included:

» Self-sufficiency in food supplies of particular benefit to health
» Regional distribution of foods such as vegetables and fruits at constant prices
» A sustained campaign to reduce saturated and total fat intakes combined with an increase in polyunsaturated fat intakes
» Transformation of health care facilities in order to monitor coronary heart disease, high blood pressure and blood lipid concentrations
» Establishment of a culture of routine leisure time and physical activity

Consumers, farmers, the food industry, health care workers and others were involved in the policy's implementation (Norum et al., 1997). Results were dramatic: deaths attributable to CHD were halved over a twenty-year period (Johansson et al., 1996), as shown in Figure 2.15. This was preceeded by a progressive reduction in total and saturated fat intake and an increase in polyunsaturated fat consumption. Blood cholesterol concentrations fell. The Norwegian Nutrition Council reports annually to Parliament on progress towards quantified nutrition goals and monitors the nutritional status of the population.

Other industrialized countries have also made an impact in reducing mortality from diet-related disease. A community-based prevention and treatment programme aimed at high-risk groups worked well in Finland. Mortality from CHD among Finnish men aged 35–64 fell by two thirds between 1970 and 1975. Declines in smoking, reduced dietary fat and better treatment for hypertension appear to have contributed to this achievement (Pyörälä et al., 1985). Among former socialist countries Poland has undergone unusually rapid social and economic changes since 1988, including rapid changes in diet. Mortality from heart disease declined sharply during the early 90s, after long-term increases. Mortality from stroke also declined. Neither access to medical services nor their effectiveness has obviously improved since 1989. Substitution of unsaturated for saturated fats and increased consumption of fresh fruit and vegetables are the most likely explanations (Zatonski et al., 1998).

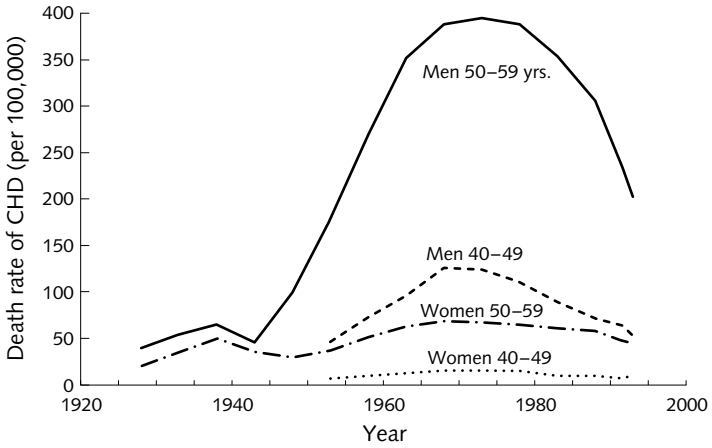

FIG. 2.15. The changing rates of coronary heart disease in adults in Norway

Note: during the Second World War there was an acute fall in total and saturated fat intake followed by a rise at the end of the war. The fall in death rates was preceded by a progressive reduction in total and saturated fat intake and with an increase in polyunsaturated fat consumption. Blood cholesterol concentrations fell.

Source: Johansson et al., 1996

3. Societal issues underlying malnutrition: implications for progress

In this chapter we briefly summarise some of the principal factors which contribute to the high prevalence of undernutrition. These issues have been dealt with extensively elsewhere. Some of the principal sources are referenced for readers who wish to study particular aspects in more detail.

3.1 Conceptual framework

In rural areas, household food security depends mainly on access to land and other agricultural resources which facilitate domestic production. In urban areas, however, food is mainly purchased: a variety of foods therefore needs to be available and affordable in urban markets for adequate food security. Food security depends on the household's access to food rather than simply availability of food. In areas where there is abundant food in markets, families may be unable to afford to buy it and will therefore not be food-secure. Food security in poor households often fluctuates, depending on changes in agricultural production in response to seasonal and environmental conditions. Fluctuating market prices affect poor producers as well as the urban and rural landless poor. Poor farmers and their families are negatively affected by falling market prices. This instability means that families may be able to manage for one month, but, as they do not have the resources to build up new food stores, the following month could see them in very difficult circumstances. A consistent, steady supply of food is needed at the household level.

The conceptual framework shown in Figure 3.1, which was developed in 1990 as part of the UNICEF Nutrition Strategy, shows how the causes of undernutrition encompass food, health and care. The underlying causes are divided into three groups: access to nutritionally adequate food and diet (see chapter 4), inadequate care for mothers and children (see Sections 3.3 and 3.4) and health-related factors (see chapter 2). The basic causes—human, economic and organisational resources and control thereof, economic structure, and education—are discussed below in Sections 3.3 to 3.6. The Commission believes that a concerted effort is needed to address, through integrated initiatives, both the basic and underlying causes. This effort must apply to regional, national and international levels and the goal should be to end childhood undernutrition by the year 2020.

3.2 Poverty and nutrition

Poverty is closely correlated with undernutrition. However, rapid improvement in nutrition will not necessarily be a direct result of economic growth. Nutrition may not even respond to improved income. This is evident through a survey of the performance of countries in reducing preschool underweight.

Countries with similar GNPs have very different rates of preschool underweight. For example Zimbabwe has a lower GNP per capita than its neighbour Namibia, yet Zimbabwe has achieved a much lower prevalence of underweight than has Namibia. Another example is that of China, which has a lower GNP than the Maldives, Sri Lanka, Indonesia, the Philippines or Thailand—yet China has the lowest prevalence of underweight pre-school children (WHO, 1997b). Some countries, e.g. Brazil, Nigeria and Pakistan, have achieved high rates of economic growth over the past decade, but have low rates of improvement in preschool underweight—or even exhibit a decline. If income distribution is very unequal—as in these countries—or if economic growth mostly reflects increases in production from agri-business or large-scale industry, the benefits may not reach the undernourished. Nutrition in such cases may stagnate or even deteriorate.

Although economic growth *can* foster improvement in nutrition, many factors can influence this process. These include: the status of women in society, education and fertility rates, the burden of infectious disease, governmental commitment at the local and national level to health and nutrition issues, and the develop-

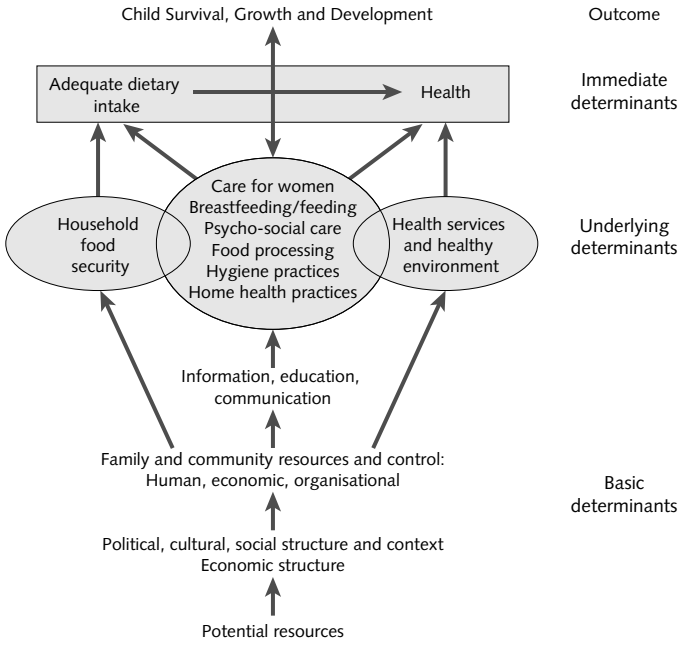

FIG. 3.1. Conceptual framework depicting the causes of poor nutrition outcomes

Source: UNICEF, 1997

ment of the primary health infrastructure. The value of these measures in limiting the impact of poverty is well illustrated by comparing the prevalence of underweight children in India as a whole with that in one of the poorest states, Kerala, where sustained educational, social, health and infrastructure policies have brought real benefit.

A unique feature of Kerala's education system is the high enrolment of girls in schools. Kerala has the advantage of a strong tradition of female education. By 1980, school enrolment among 6 to 11-year-olds was nearly 100%, with a striking relationship emerging between the rise in female literacy and a fall in infant mortality (Soman, 1992). Educated mothers are more articulate in their demands for good health services, and are more effective in the care of their children. Since 1957, the Kerala government has concentrated on proactive social, economic, health and educational policies which have led to dramatic changes in land ownership, in labour union activity, and in literary and material and social benefits. The government, responding to community demand, provided more health-care and obstetric facilities, with the medical college training more doctors than could be absorbed in the government services. These doctors were forced to migrate to rural areas with a health centre catchment area of as little as 5 km^2 (Soman, 1992). Kerala has an impressive transport system, with good roads and an excellent bus service. These differences in social policy and female education, have led to vastly superior health statistics to those for the rest of India (Table 3.1).

The dramatic achievements in Kerala refute the current, almost universal assumption that societies' health and well-being depend on the impact of economic development based on the greater application of market economic forces. Sound development policies (Nag, 1983), improved social justice (Ratcliffe, 1978), and combined improvements in education and health systems (Nair, 1974) have all been highlighted in Kerala as important factors in improving nutrition.

Table 3.1 The Indian State of Kerala—a poor state with surprising health gains

	Kerala	India
Per capita 1991 GDP (US$)	200	225
Average births per woman 1990	1.9	4
Infant mortality (per 1000 live births) 1992	17	83
Women's life expectancy (years) 1990	74	59
% of girls dropping out of school (grades 1–5) 1988	0	50
% of literate women 1991	87	34
% of couples using family planning 1991	80	43

Source: UNICEF, 1995

Asia illustrates the complexity of the relationship between income growth and undernutrition. During the last 20 years, GDP growth rate has been around 5% per year and per capita food production has increased by 19% (UNDP, 1998). Most countries are now self sufficient in major staple foods, and some are even net food exporters. Yet undernutrition in children remains extremely high, affecting over half of the children of South Asia (ACC/SCN, 1996b and 1997a). One half of all underweight and stunted children in the world live in South Asia and although much progress has been made in reducing underweight and stunting in the last decade, accelerated action is required. On the other hand China and South-East Asia, especially Thailand and Malaysia, have made significant progress. In these cases economic development has facilitated improvement in child nutrition.

The nature of the association between economic growth and gains for nutrition permits substantial improvement in nutrition before major economic advance is achieved. This is well demonstrated by the recent experience of many countries in Africa and Latin America. Panama and Costa Rica in the 1970s and 1980s demonstrated that it is possible to improve nutrition despite economic stagnation (Fig 3.2). Tanzania pioneered the Iringa project which, at low cost, reduced undernutrition by over a third and introduced a whole new approach to community action for nutrition (ACC/SCN, 1991). This was achieved despite major reductions in incomes and economic output. These countries, having lived through a 'lost decade' of severe economic difficulty and setback, gave high priority to investing in human development. There have been many major studies of poverty and its impact on food security and health to which the reader is referred (ACC/SCN, 1997b; FAO, 1988 and 1991; von Braun et al., 1992).

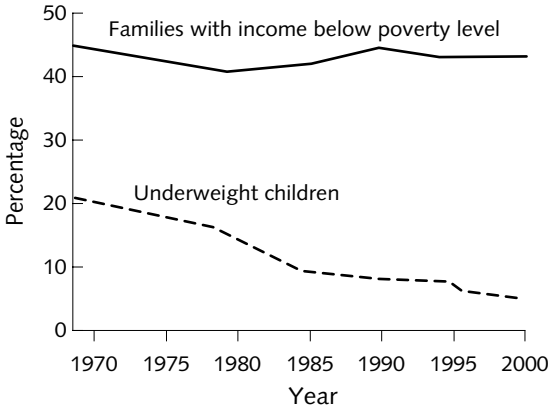

FIG. 3.2. Poverty and underweight in Latin America and the Caribbean

Source: UNICEF, 1997

3.3 Women

Women and girls must be the essential focus in ending undernutrition. Women are the critical link both biologically—because pre-conceptual nutrition and nutrition during pregnancy is of fundamental importance—and socially—because women are usually the key providers of care for children. Currently women in many parts of the world are hindered in both these areas by gender discrimination.

A survey carried out by the National Institute of Nutrition in India found that half of rural women had a low BMI (Naidu and Rao, 1994). Improving the nutritional status of women will improve the growth of the fetus and its subsequent growth through childhood into adulthood. If the negative intergenerational effect is arrested, there may be a bonus of reduced susceptibility to NIDDM, hypertension and other non-communicable but morbid diseases in later life.

Women are also crucial as 'gatekeepers' of their household's food security and as providers of care. UNICEF has promoted the importance of care—including breastfeeding and feeding practices, psycho-social care, hygiene practices and healthcare—in explaining differences in nutrition outcomes in children from households with comparable incomes and resources. This is particularly vital for children under the age of three who cannot fend for themselves within the family and who, for example, vie for their share of the family meals or try to make their needs known. The burden of women's triple role within a family—child-rearing, household management and income earning—can mean that these aspects of care readily slip down the priority list (ACC/SCN, 1998a).

As noted earlier, systematic community action to improve the care of women and children will have major, long-term economic benefits. A healthier population has a greater capacity for creative social and economic development. This seems particularly true if girls are well educated and allowed to contribute fully to the intellectual as well as the social capital of society.

Despite their crucial role, women's status in many parts of the world is often low. Discrimination is evident throughout the life-cycle. At one extreme, selective abortion of female fetuses contributes to the estimated 4.5 million 'missing women' of South Asia (Sen, 1990). In childhood, poor care of girls often leads to higher infant mortality rates for girls than boys. In adulthood, women often lack control over their own destinies—with no cash of their own, no right to land, and an uneven share of the family's physical workload. Empowering women must lie at the heart of a new plan to end undernutrition. This means new legislation to ensure progressive cultural change towards the sharing of rights, responsibilities and burdens between men and women and towards the elimination of discrimination. Women need support

systems, and must be involved in decision-making at local community, local authority, national and international levels. A focus on empowering women and strengthening their rights must not lead to an uneven burden of responsibility for change being placed on women's shoulders.

Changes will be required by men, women and society as a whole. New policies are needed to:

» promote the education of girls. This should have many further benefits such as raising literacy levels, delaying the age of marriage and childbearing and reducing fertility rates.
» allow women access to and control of local resources. Means to promote this include encouraging the participation of women in paid employment. Where benefits (supplementary foods or more direct financial benefits) are provided, steps are needed to ensure that they reach women. Micro-credit schemes may help women to gain access to financial resources, and women should have legal entitlements to property rights.
» legislate on protecting and promoting the rights of women. This should include employment rights, property rights, the entitlement to schooling, and maternity entitlements for all women for four to six months after childbirth. A problem lies in the gap between legal rights and practice. In many countries, women do have property rights enshrined in legislation, but cultural factors and a lack of awareness mean that the practical reality is very different.
» encourage the participation of women in democratic processes. This may include affirmative action policies to ensure adequate representation of women as elected representatives. This was introduced recently in India to ensure one-third female representation on the *panchayat* (village councils).
» provide child-care facilities to enable women to work. Day-care services close to the places of women's work are important to encourage continued breast-feeding.
» organise support services so that they are accessible and convenient for women. This means recognising the multiplicity of women's roles—as wage earners, mothers and family caregivers—and ensuring that services can be utilised by women in paid employment as well as those who work in the home.
» educate and involve men in child-care and other duties. Educating boys and girls in life-skills will be an important contribution. Cultural and religious attitudes need to change to recognise the need for gender equality.
» support NGOs and others to work with women in local communities. These groups can help women become empowered to take advantage of their rights and control over families' lives.

Many national governments are working on these priorities. Knowledge of the importance of women's role in feeding and caring for the family and related intergenerational health effects must now be brought sharply into focus for countries with a poor record. Some communities also suffer because of the unusual interpretation of a religion's emphasis on the equality of the sexes. The record of different countries has been set out by the UNDP scoring of gender discrimination, in the yearly *Human Development Report*. The UN agencies, donor governments and NGOs can all play an important part in promoting the socio-economic development of women.

3.4 Care

There is a wide range of nutrition outcomes from households with comparable incomes and available resources (ACC/SCN, 1996a). Care giving behaviours—including feeding, hygiene practices and health care—all influence the household environment and are now seen as centrally important to the nutritional welfare of all members of the family. Good care translates available resources, at the family and community levels, into nutritional improvement, and encompasses time, attention, support and skills to meet the physical, mental and social needs of nutritionally vulnerable groups (FAO/WHO, 1992). Care is particularly vital during periods of illness and during periods of severe economic hardship. Care is often focused on the needs of the very young infant and growing child. However, other vulnerable groups include the elderly, the disabled, the landless, and the unemployed. Common obstacles to providing care include poor physical and mental health, low levels of education, lack of support from family and community, heavy workload in production tasks, and women's lack of control of resources.

Inadequate caring practices within the household, and limited support for providing adequate care may explain the disappointing impact of so many otherwise well-designed programmes. A Care Initiative has been taken by UNICEF which emphasises the importance of caring practices, both direct and indirect—which affect nutrition. This initiative identifies six areas of care required for the growth and development of children under three years: care of women, breast-feeding and feeding practices, psycho-social care, food preparation, hygiene practices and home health practices.

The psycho-social aspects of care—emotional support and cognitive stimulation for children—are as important as the more physical caring behaviours (such as feeding and hygiene) for optimal cognitive, motor and behavioural development. Verbal and cognitive stimulation for undernourished children result in higher growth rates than for children without such stimulation (Grantham-McGregor et al., 1991). Interactions with parents, caregivers and other children

are essential for the young child. These interactions can be improved by education of parents and other caregivers. Care initiatives might go far beyond focusing on individual practices and behaviours to bring in dimensions of care for the family and the community. The Commission wishes to highlight the value of care throughout the life-cycle. While there is now an extensive literature on the role of care in the nutritional well-being of the very young, this work needs to be extended to other vulnerable groups, including young girls, pregnant women and the elderly. Special approaches and tools need to be developed for refugees and displaced persons.

Actions to improve care should address basic causes of malnutrition and include the development of legislative and political initiatives to relieve constraints on care. Nutrition programmes can be tied to human rights covenants such as the *Convention on the Rights of the Child, and the Convention on the Elimination of All Forms of Discrimination against Women.*

3.5 Education

Access to and uptake of education must be a key driver of all development policies. Education has a fundamental role to play in personal and social development. Learning throughout life will be one of the ways to meet the challenges of the 21st century, building on the four pillars that are the foundations of education—learning to be, learning to know, learning to do, and learning to live together (UNESCO, 1996). Improvements in education are linked to improvements in health (Figure 3.3).

Considerable progress has been made over the last quarter century in expanding the capacity of primary schools in all regions of the world. The overall number of primary school pupils rose from an estimated 396 million in 1970 to some 650 million in 1995. Industrialized and CIS countries achieved universal primary education before 1970. Thus, expansion in primary school enrolments during this period is almost entirely attributable to gains in developing countries. Net enrolment ratios (which take account only of those children in the eligible age group) continue to increase in all regions of the developing world. However there are significant differences across regions: net enrolment ratios range from 57% in Sub-Saharan Africa, and 68% in South Asia to 81% in the Middle East/North Africa (UNICEF, 1998). In all regions of the developing world, fewer girls attend school than boys. This contrast is particularly stark for the least developed countries: net enrolment of girls is only 44% compared with 56% for boys (UNESCO, 1998a). About 130 million primary school age children in developing countries do not attend school, 73 million of these children are girls.

School enrolment figures do not give the entire picture. Unfortunately, growth in enrolments and school capacity has not been matched by gains in ensuring that pupils persist in their schooling and emerge from primary school with the knowledge and skills they need to function as productive workers, parents and citizens. In least developed countries only one out of two pupils reach grade five, i.e., completing at least the four years of schooling generally considered necessary for achieving sustainable literacy skills (UNESCO, 1998b). Adult literacy rates have risen in

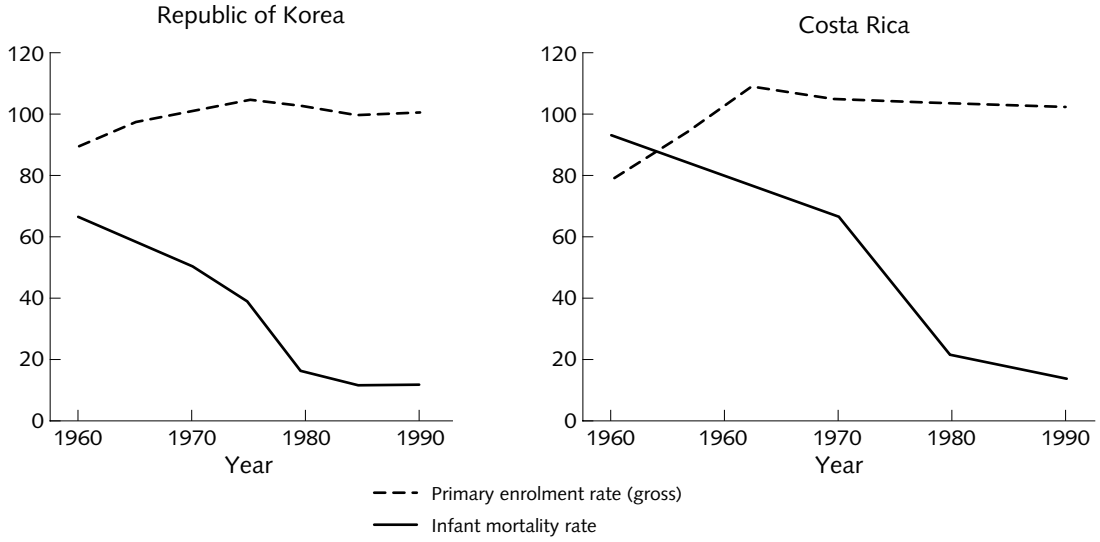

FIG. 3.3. Impact of education on child mortality

Source: UNICEF, 1999

all regions for both sexes during the period 1980 to 1995. However still only 62% of women in developing countries are literate. In least developed countries only 38% are literate (UNESCO 1993; 1998c). These figures are particularly disturbing given that the educational status of a mother is known to be a critical determinant of the health and nutrition of the family.

Undernutrition and poor health are important underlying factors in low school enrolment, absenteeism, poor classroom performance, and early school dropout. This was reflected in the *World Declaration on Education for All and Framework of Action* adopted in Jomtien (World Conference on Education for All, 1990). Research by the World Bank suggests that early childhood undernutrition causes delayed enrolment in primary school (Glewwe and Jacoby, 1995). Poor health or intellectual impairment as a result of poor nutrition can also contribute to school drop-out or poor attendance and performance. A lack of education, in turn, hinders social development, reinforces gender discrimination and contributes to continued poor nutrition, health and poverty.

Whereas it is crucial to strive towards access for all to every level of education, there is also a need to improve the quality and relevance of education. School-based health and nutrition interventions can result in improvements in school performance (Pollitt, 1990). These include health and nutrition education programmes as well as school feeding programmes, which address immediate nutrition needs and alleviate hunger affecting attention span and learning capacity. This, in turn, can result in significant improvements in the efficiency of education systems. There are also important practical grounds on which to give school-based nutrition and health interventions a high priority: notably the size and accessibility of this population and the impact that health and nutrition education can make on reaching the twin goals of *Education for All* and *Health For All*. Special efforts should also be made to increase the educational participation of girls and young women—essential in order to address both their own health and well-being and the health of future generations.

3.6 Key role of local communities

Although international and governmental change is essential at the highest level, successful strategies to end malnutrition will have to involve the people themselves as well as meeting each community's needs. 'Top-down' strategies imposed on communities are known to fail; more successful approaches are based on community needs, involving governmental support and facilitation of the people's initiatives. The remarkable success of Thailand's programme for reducing childhood undernutrition was crucially dependent on the involvement of village health volunteers—well-respected women chosen from within and by the communities, who then mobilised support and developed self-help systems. Each aspect of the programme was developed to take community needs into account, and incentives were used to promote community involvement in the programme. These included free health services for the volunteers. Similarly, policies to tackle very high rates of coronary heart disease in Norway and Finland depended on public concern and a demand for government action. Strategies involved consumers, farmers, the food industry and health care workers.

Governments and international agencies can set in place conditions which will foster public participation and facilitate bottom-up approaches. The key requirements include:

» strengthening democracy and encouraging political participation. Dialogue between the people and government should take place at all levels. Debate can be fostered through open and transparent policy-making. Processes for consultation and input into policy-making involving the public and NGOs are needed. Free elections, freedom of speech and a vigilant free press are, of course, important.
» establishing mechanisms for gathering the views of people whose voices often go unheard. Procedures for local consultation and participation are important. Methods should be used which specifically seek out the views of particular groups such as women, urban slum dwellers, people living in small villages and children.
» empowering individuals so that they can in turn mobilise communities. Information is a key feature of empowerment. To be effective, however, information must be in an accessible and meaningful form. This means using appropriate languages, translating information from the written word, and finding meaningful and interesting ways of conveying messages.

3.7 The importance of non-governmental organisations (NGOs)

From grass-roots action to large international networks, (NGOs) play an important role in nutrition and food security. Local groups—such as women's groups or consumer groups—will play a key role in facilitating community participation in change. Relevant areas of their work include:

» famine and emergency relief—Humanitarian agencies/NGOs are the implementing partners for the UN and other donor agencies' emergency nutrition work.
» the right to food—NGOs, from small community-based organisations to international networks, such

as the Global Forum on Sustainable Food and Nutrition Security, have a long history of campaigning and lobbying to eliminate hunger. An 'alternative summit' of NGOs at the World Food Summit in 1996 was attended by more than 800 NGO participants, and covered by 300 journalists (DEEP, 1997). This NGO Forum was successful in drawing attention to the food security problems of developing countries and has been important in maintaining the momentum generated in the run-up to the *Summit*.

» other development and economic issues—NGOs are leading Jubilee 2000, a campaign to cancel $214 billion of foreign debt owed by 41 of the world's poorest countries by the year 2000. The World Development Movement and other NGOs successfully lobbied against the proposed OECD Multilateral Agreement on Investment (MAI) which would have transferred yet more power from governments to multi-national corporations. The campaign succeeded in urging several OECD member governments not to sign the agreement.
» nutrient-specific nutrition programmes—International bodies such as the International Council for Control of Iodine Deficiency Disorders (ICCIDD) have been effective in co-ordinating action against a particular nutritional problem and establishing effective alliances with the private sector.
» consumer rights—National and local consumer groups monitor and campaign on food issues based on consumer principles such as access, safety, information, quality, choice and equity. At the international level, Consumers International plays an important role in representing public interests in the global food standard forum, *Codex*.
» agriculture and the environment—As the interface between food and environmental issues becomes increasingly blurred, a range of environmental groups have become involved in food issues. In India, for example, NGOs have effectively raised public awareness about the World Trade Agreement and the potential impact of globalization on biodiversity and food security.
» health issues—Individual diet-related health conditions, such as obesity or coronary heart disease, have been taken up by NGOs all over the world, from small self-help groups to multi-million dollar national organisations. These groups, like the International Obesity Task Force or the American Heart Association, raise awareness, fund research and push policy reform to combat these public health problems.

In addition to the areas outlined above, a number of developmental and humanitarian NGOs work within countries to promote primary health care, public health and sanitation programmes over the longer term. A relatively small proportion of these programmes contains any nutrition element. This is an area where NGOs could be more active, particularly given new knowledge about the potential long-term and intergenerational effects of short-term nutritional deprivation. Governments' and UN agencies' support for NGOs has created in some countries an effective interface between the interlocking top-down and bottom-up approaches to community development.

3.8 The potential for public-private co-operation

The food industry is playing an increasingly critical and complex role throughout the world. In the developed countries, changes in living and marketplace patterns have stimulated changes in food industry practices. The result is a diversity of food processing technologies bringing forth an ever-changing number and types of foods on the market shelves. Food fortification has played a major role in the well-being of these populations over the last 40 years. Recent concerns about health and the environment have resulted in significant attention to foods and food additives by regulators and legislators, the media, educators and consumers' groups—all of whom influence marketplace dynamics. The critical need for co-operation between food industry, science, the regulators and legislators at all levels has been clearly identified.

In the developing countries too, fortification is increasingly recognised as a long-term measure to improve the micronutrient status of large populations. Technological solutions to the problems of micronutrient deficiencies exist but are often complicated by economic, social and political factors. Intervention strategies must take these factors into account as well as the emergence of pandemic adult chronic diseases. This is a challenge as well as an opportunity for the food industry—both multinational and domestic, small and large-scale. In this endeavour the food industry can draw upon active support from several sectors. What is urgently needed is to identify a set of priority actions and initiate a continuous dialogue between the various sectors to implement schemes that will eliminate undernutrition and limit the development of age-related dietary diseases. A multi-sectoral partnership needs to be built to work closely on specific issues relating to technology development, food processing and marketing, free-market approaches with minimum price support mechanisms, standards, quality assurance, product certification, social communication and demand creation, monitoring and evaluation.

Guidelines on these issues should then gain acceptance and be implemented at the country level. A multisectoral group within each country should define a

feasible, affordable food/nutrition strategy designed for the target population, identify opportunities for the involvement of the food industry and assist in promotional and educational efforts to reach the target population. This coalition will benefit private sector partners, not just as a lever to improve performance in the marketplace, but also to show that the private sector has social as well as economic interests. It will benefit governments which have a mandate to improve the lives of their peoples. And it will allow national and international development agencies to provide the technical support and seed money in an efficient, economic way.

The basic challenge is to bridge the communication gap between the public and private sectors in understanding their respective needs, roles and responsibilities. While constraints and shortcomings do exist, there is no need to delay action in the following areas:

» Opening channels of communication—All partners need to understand the distribution and impact of macronutrient and micronutrient undernutrition, the public and private resources that can be potentially brought to bear and the benefits accruing to each sector.
» Creating public awareness—Consumers must be made aware that malnutrition diminishes the quality of their lives and that nutritious foods can play a role in a more prosperous future. How this promotion will be handled collaboratively by the public and private sectors will be one of the first issues to address in the public-private co-operation.
» Developing consumer demand—Informed consumers choosing to purchase nutritious products will determine the success of food enrichment and promotion both as a public health strategy and as a private investment. Developing consumer demand entails not simply targeting populations and promoting nutritious products but also developing the right product, price and packaging. Collaborative campaigns with public-private partnerships can be particularly helpful.
» Defining coverage and market segments—While the public health community seeks high coverage of large populations, the private sector segments the market to identify niches of opportunity. How large must a market segment be before it can be recognised as contributing to a public health goal—and therefore eligible for public recognition or support? Each national dialogue will determine its own approach to this issue.
» Identifying food vehicles—Food vehicles for distribution of nutrients must be selected through market research which identifies those foods consumed by a vast majority of a population. that demonstrates that they are consumed by a vast majority of the population. These foods must be affordable to those in need and their choice should reflect political sensitivities and consumer preferences. A number of food products can play complementary roles in a national food and nutrition strategy.
» Keeping products affordable—Consumer prices and producer costs must be balanced so as not discourage supply or demand. With strong communications between public and private sectors, the purchasing, processing, marketing and distribution can be co-ordinated across market segments to keep cost increases to a minimum.
» Assuring quality—Complementary public-private roles need to be defined in developing legislation and regulations, providing resources for laboratories and technical personnel, and establishing quality assurance and monitoring methodologies at the producer and retail levels.

3.9 Purposeful action: the need for equity

Accelerated economic growth can lead to substantial improvements in nutrition only if the fruits of expansion are well used and equitably distributed. WHO emphasises equity as the critical concern for health in the 21st century (WHO, 1998b). This groundbreaking analysis of the need for greater equity is of fundamental importance to nutrition. Greater equity has also been recognised by UNDP as a central concern when attempting to reduce poverty on a larger scale (UNDP, 1997). The World Bank has endorsed the need for greater equity, having found that countries which have pursued equitable strategies have generally experienced more economic growth. Thus an emphasis on reducing malnutrition should be tied to a policy of greater equity, both as an issue of human rights and as an economically appropriate measure.

According to IFPRI the most likely scenario is that 150 million children will still be undernourished in 2020 despite all the implied benefits of the expansion in the economies of the world (Pinstrup-Andersen et al., 1997). This projection was undertaken prior to the current world financial crisis. Clearly the current world order and the expected policy and societal responses to economic change are inadequate. Indeed, without major changes in policy, and approaches by both individual governments and global financial institutions, many developing countries will be handicapped. This handicap will be evident in health outcomes but also in economic terms, because of the direct impact of a reduction in human capital arising from childhood undernutrition.

4. Food, agriculture and environment: future challenges

4.1 Food as an important determinant of nutritional status

Access to adequate, nutritious food is obviously a prerequisite for good nutrition. Immediately after World War II, food security was considered only in physical terms (i.e. food production and availability). In the 1970s it became clear that economic access to food is equally important. In the 1980s, we learned that food security has to be considered at the level of the individual, with particular attention to women and children. The importance of environmental hygiene and safe drinking water as well as the intake of micronutrients has also been increasingly recognised. Poor environmental sanitation and unclean drinking water affect adversely the biological absorption and retention of food.

As the *Declaration and Plan of Action of the World Food Summit* made clear, to ensure a reduction by half of the number of people living with an insecure food supply, the following measures are required:

» expanding food production
» increasing the income of poorer groups
» increasing access to foods of high nutritional quality
» limiting the vulnerability of people to episodic poverty which can induce long-term handicaps.

These needs should also be considered in a broader perspective. At a meeting of Science Academies in preparation for the *World Food Summit* in November 1996, it was agreed that national food security systems should ensure:

» that every individual has *physical, economic, social and environmental* access to a balanced diet that includes the necessary macro- and micro-nutrients, and to safe drinking water, sanitation, environmental hygiene, primary health-care and education, so as to lead a healthy and productive life.
» that food originates from efficient and *environmentally benign production technologies* that conserve and enhance the natural resource base of crops, animal husbandry, forestry, and inland and marine fisheries.

FAO estimated in 1999 that some 790 million people in developing regions have inadequate access to food (FAO, 1999b). The causes of food insecurity are many and complex, and a shortfall in food production is often not the issue. Nonetheless, with the rapidly growing world population, the challenges of producing enough food for everyone in the coming century are substantial. FAO estimates that by 2020 we may need an annual production of at least 3,000 million tonnes of food grains, 200 million tonnes of aquatic foods, and large quantities of fruits and vegetables to provide balanced diets for the predicted world population of over 8 billion human beings. This will require large quantities of fuel-wood, fodder, fibre and other agricultural commodities.

Food availability is unevenly distributed among the world's population. Figure 4.1 illustrates the distribution of consumption between the poorest 20% of the world's population, the middle 60% and the richest 20%. The real challenge is to change these patterns of consumption to reduce the pressures on the planet and on society in the next century. The developing countries' pressing needs are likely to lead to increased consumption pressures, so there is a need for the affluent countries to reconsider their strategies.

IFPRI has sought to identify the key challenges for food and agriculture in its 2020 Vision project (IFPRI, 1995). Its 1995 projections show that although the proportion of the world's population who are food-insecure may fall, this will not translate into a reduction in the numbers of people at risk of hunger. This is because the world's population will continue to grow, so that greater numbers will be at risk. In addition, the extra stress on the planet of the additional millions is likely to increase the numbers of people who are involuntarily displaced from their homes and therefore particularly vulnerable to food shortage.

Obviously, agricultural systems, and the physical, social and economic context within which they operate, vary hugely across the world. The following sections present an overview of constraints and opportunities. Regional and country-level analyses of these issues is

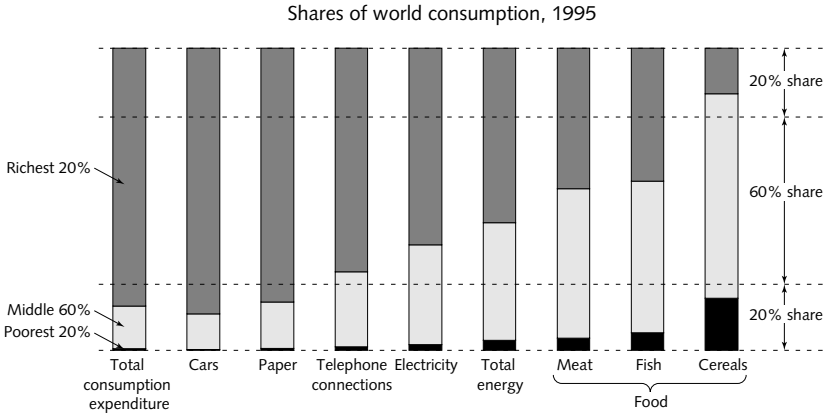

Figure 4.1 Consumption is distributed inequitably

Source: UNDP, 1998

important for planning national strategies. Section 4.2 outlines some of the many obstacles to increasing food production to meet growing needs. Section 4.3 outlines some of the other trends and conditions which have an impact on food security. Section 4.4 then goes on to suggest some opportunities for meeting these challenges; it also highlights some key ideas for future strategies.

4.2 The constraints to meeting future demands

The required additional food production will have to be achieved under conditions of shrinking per capita land and water and a number of other constraints.

4.2.1 Yield increases are slowing

Significant expansion of agricultural land is not feasible in most parts of the world, so the increased food production necessary to feed the growing population will have to come from more efficient use of land already under cultivation. However, yield increases are beginning to slow. There is progressive degradation of agricultural lands. Depletion of soil nutrients is a critical problem, particularly in Sub-Saharan Africa. Thus intensive cultivation is leading to a reduced micronutrient content of the crops, e.g. in India. Fertiliser applications to combat these deficiencies are infrequent because of high prices, lack of domestic production, insecure supplies of imported fertiliser and poor distribution. Total resource management of small farming enterprises, as in China (Box 4.1), parts of Vietnam and Indonesia, is sustainable, labour-intensive and does not pollute. This contrasts sharply with modern westernised farms which seem efficient yet require huge inputs of fossil-fuel energy. Pests are another factor hindering further increases in crop yields. Pre- and post-harvest losses due to pests are large in developing countries. However pesticide overuse and misuse compromises human health, causes environmental damage and can lead to pesticide resistance. Integrated pest management schemes combine biological controls and host-plant resistance with the reduced use of chemicals.

4.2.2 There is a shortage of water

Globally, the consumption of fresh water as a proportion of accessible fresh water has almost doubled since 1960 (World Wide Fund for Nature,1998). Although there is still enough water to meet agricultural needs on a global basis, currently 30 countries are water-stressed—of these, 20 are water-scarce. All developing countries suffer from regional and seasonal shortages. Some regions, e.g. N. Africa, already have a high population for the water available locally; Asia and Kazakhstan are now having to use a high proportion of all the obtainable water in their region (Falkenmark, 1997). By 2025 water scarcity will cause certain regions, containing 55% of the world's population, to be dependent on food imports (Rosegrant et al., 1998). There are many major gains that can be made by minimising water losses, by altering cropping and agro-forestry to minimise evaporation losses, by using root crops to reduce drainage losses and by altering irrigation schemes. Efficiency of water use can also be improved by agronomic, technical, managerial and policy changes, e.g. in water pricing and legal frameworks.

4.2.3 Degradation of natural resources continues

Soil degradation is a significant cause of crop productivity losses. More than 2 billion hectares of land have been degraded in the past 50 years through overgrazing, desertification, salinization, overuse of agro-

Box 4.1. Sustainable land use in China

China, with only 8% of the world's arable land, and 22% of the world's population, producing only 4% of greenhouse gases, feeds over 1.2 billion people and has relatively low rates of undernutrition. While there may be pockets of poverty and some undernutrition, this is far less than in India and Bangladesh because most of the food is well distributed. Chinese farmers are leaders in ecological agriculture, wasting little by recycling crop residues, by-products and general waste. The largest irrigation network in the world (built manually) enables China to grow one-third of the world's rice. Several crops are grown in one field in alternate rows, with symbiotic benefit (beans, for example, fixing nitrogen for wheat). Labour-intensive pest control permits limited crop spraying to deal with particular outbreaks.

Self-sufficient communities, such as found in the Pearl River Delta, combine crop growing, stock husbandry, fish farming, and the use of renewable energy. Some fields may have three successive crops a year. Ducks contribute to the fertility of fish ponds with their own excreta. Ducks, their eggs and the fish are all sources of high-quality protein. The farming units are self-sufficient in food, fertilizer and energy; they also export their surplus to nearby towns. Banana leaves and sugar-cane fibre serve as fish food and fuel for bio-gas stoves. Villages have large bio-digester devices which break down plant material provided by fast-growing plants such as water hyacinths and Napier grass. Pig manure and human waste also contribute to the production of bio-gas. This eases the demand for fuel wood.

Source: Ørskov (1993); Myers (1985)

chemicals, and population pressure. Sub-Saharan Africa and South Asia are of particular concern—between them they contain two-thirds of the world's degraded land (IFPRI, 1995). Almost half the world's poorest people live on marginal lands, where they are often caught in a downward spiral. Past resource degradation deepens today's poverty, while today's poverty makes it difficult to care for or restore the agricultural resource base (UNDP, 1998). Desertification costs the world: $42 billion in lost income, $9 billion in Africa alone, and the livelihoods of a billion people are at risk (UNDP 1998). Forests bind soil to the ground, regulate water supplies and help govern the climate. About a third of the earth's original forests have disappeared and about two-thirds of what is left has been fundamentally changed (UNDP, 1998). There is no consensus as to how much or where forest should be left for future generations and to maintain biological diversity. The experience of the Machakos District in Kenya shows how lands vulnerable to degradation can support a large population provided technological change is supported by a conducive policy framework and much local initiative.

4.2.4 Crop diversity is declining

Food and health systems in the past depended upon a wide range of crops (see *Lost crops of the Incas* (1989) and *Lost crops of Africa* (1996)). This diversity helped to provide both balanced diets and insurance against total crop failure. It also meant that crops suited to different agro-ecological conditions were cultivated, thereby avoiding mono-cultures with the same crop over large areas. With the 'advancement' of civilisation and 'modernisation' of agriculture, the crop-mix in the food security basket started shrinking. Today, about 20 crops dominate the global food scenario and trade (Figure 4.2). Wheat, maize, rice and potatoes have become the most widely grown food crops. There has been a drastic reduction in the crop-mix of the food basket, as well as a steep decline in the genetic diversity of crops grown (Figure 4.3).

4.2.5 Fish stocks are declining

Fish is a key source of protein and other nutrients, especially iron, selenium and iodine. It provides a significant portion of total animal protein intake in the developing world: 22% in low-income food deficit countries (FAO, 1999a). Fish consumption has reached a plateau of about 170g/week per person in developing countries and 500 g/week per person in industrialized countries. Natural fish stocks cannot keep pace with the increasing demand. Paradoxically, much of the total marine haul capture is unwanted—32% in 1995 (FAO, 1996b). Over-exploitation of natural fish stocks by aggressive and efficient fishing techniques, and severe degradation of marine and coastal environments, have depleted fisheries in many parts of the world. Globally, the average marine fish catch for 1990–95 was double that of 1960 (World Wide Fund for Nature, 1998). Some growth of marine fish production is possible, but only if rapid and sustained efforts are made to improve management and rebuild fish stocks and to restore balance to the marine food chain. Aquaculture (fish farming) is the world's fastest growing food production system, nearly doubling its contribution in the last 10 years. However, aquaculture will not meet the increase in demand for fish in developing countries unless local, low-income communities are involved and aquaculture becomes efficient enough to bring down fish prices.

4.2.6 Climates are changing

The warmer air temperatures, increased atmospheric CO_2, raised sea levels and changes in rainfall patterns resulting from projected climate change over the next

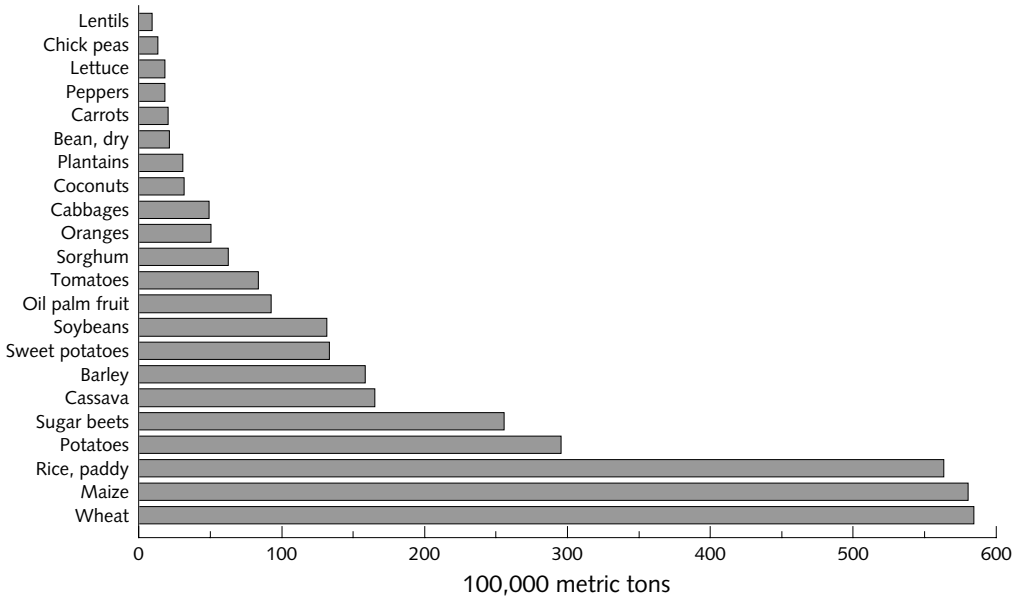

FIG. 4.2. Global production of food crops—1996

Source: Mann, 1997

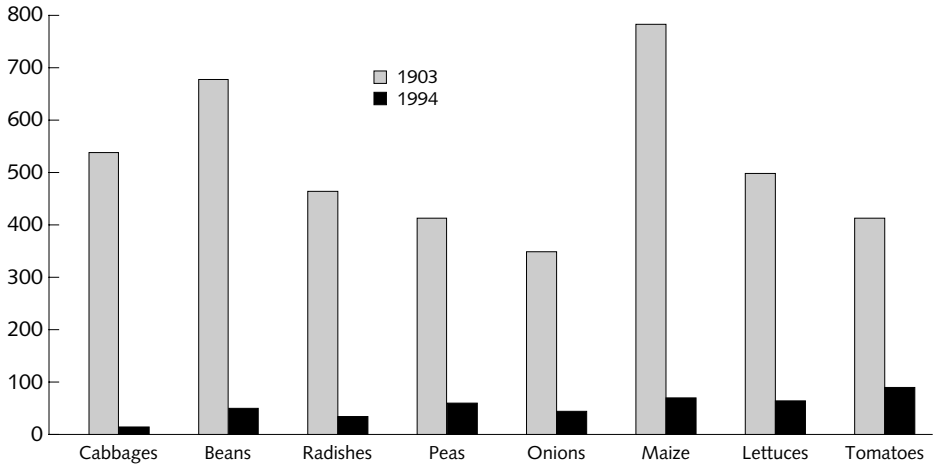

FIG. 4.3. America's lost diversity

Source: Edwards, 1996

60 years will have a significant impact on crop and livestock production. For some crops, warmer temperatures will reduce yields. On the other hand, higher temperatures will enable some crops to be grown in areas where it has not been possible before. The geographical range of maize, sunflower and soybean crops in Europe, for example, is predicted to extend 700–1900km northwards (McMichael et al., 1996). The increased concentration of CO_2 in the atmosphere will also affect crop yields. Wheat, soybeans, rice and potatoes should experience a fertilisation effect from the extra CO_2. Those countries already vulnerable to food insecurity and undernutrition are most at risk from climate change. Particularly vulnerable areas include Sub-Saharan Africa, South and South-East Asia, particularly Bangladesh. Some areas, especially low-lying coastal regions, will be more vulnerable to increasingly common extreme weather events such as flooding, hurricanes or cyclones. Some of the impact of climate change may be minimised by adjustments at the farm, national and global level. Nevertheless, the increasing severity of extreme weather events will have high social and economic costs. Climate change could result in as many as 350 million extra people

at risk of hunger by 2060 (Rosenzweig and Hillel, 1998). The cost of extreme weather conditions should stimulate policy makers to accept a range of measures to minimise the impact of climate change on food production. Some agricultural options are given in Table 4.1.

4.2.7 Urban centers are growing

The urban population is expected to exceed the rural population by 2005; by 2020 over 60% of the world's population will live in urban areas. The urban population of developing countries is forecast to reach 49% by 2015. The rapid, unplanned urbanisation of the last few decades has serious implications for public health with urban slum populations escalating in an environment without clean water, sanitation and other amenities crucial to health. Rapid urbanisation decreases the land available to agriculture and increases the demand for processed food. The geographical area of cities in the developing world is predicted to double between 1980 and 2000 (World Wide Fund for Nature, 1998). Figure 4.4 depicts the 26 cities which are predicted to have populations of 10 million or more by 2015. To feed a city of this size today, at least 6,000 tonnes of food must be imported each day. Urban agriculture and gardening may become increasingly important in providing fresh food for the needs of urban communities (WHO Europe, in press).

Issues such as water security, food transport systems, and the proper use of sewer systems are important in meeting the demands of these urban populations in the developing world. It is important to provide formal safety nets for the urban poor, which do not undermine a household's own response in face of threats to food security and which are tailored to the local situation (Ruel et al., 1998). Policies which stem the tide of urbanisation are also needed—that is, measures to enable people to stay in their rural environments. Investment in rural communities is crucial to secure livelihoods and reduce poverty. In developing countries, only 20% of the rural population, on average, has access to sanitation compared to an average of 72% in the urban population (UNDP, 1997). Other amenities like schools, improvements in transport (including investment in roads), are also important. Rural development policies with an emphasis on agricultural support and development are needed.

4.2.8 Demand for meat is increasing

In the past, meat consumption in developing countries has grown with increasing income. Per capita meat demand in developing countries is predicted to grow by 43% by 2020. This presents the prospect of a huge increase in the use of cereals for feeding livestock. In industrialized countries, the production of 1kg of poultry meat, pork and beef requires about 2kg, 4kg and 7kg of grain respectively. On this basis, a 40% increase in total cereal demand is predicted (Rosegrant et al., 1998). In many developing countries, however, most of the feed that animals consume is unsuitable for human consumption, so more can be done to increase meat production without necessarily diverting cereal production from crops for human consumption.

Research is needed to improve alternative feeding strategies and to provide instruction in good husbandry. Possible approaches include:

» the use of household waste, crop residues (i.e. cereal straw, sugar-cane tops, maize stover and bean haulm) or vegetation from scrub, bushes and trees (Ørskov, 1993).

Table 4.1: Possible adjustments to agricultural systems to minimise the impact of climate change

Minor changes	Minor shifts in planting dates (± 1 month) Improvements to existing irrigation and drainage systems Switches to different varieties or species Changes in tillage practices Changing crop rotations
Major changes	Large shifts in planting dates Increased use of fertilisers Installation of irrigation or drainage systems Development of new varieties or species
National and international policy options	Creation and maintenance of seedbanks around the Flexible support regimes for farmers Investment in agricultural infrastructure (research & development and market flexibility) Improved climate information systems Dissemination of conservation management practices

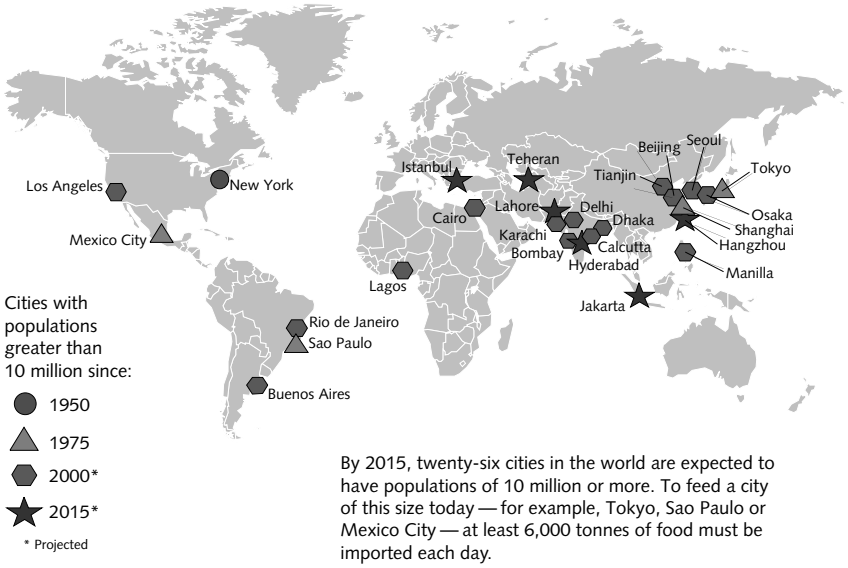

FIG. 4.4. Enormous cities, enormous food needs

Source: FAO, 1998b

» improving the nutritional quality of traditional feed crops or alternative feedstuffs. (Farming techniques to improve the quality of feed crops include ammonia-treated straw. Beef consumption in China has more than doubled between 1991 and 1994 by using this system, and more than 80% of feed has come from crop residues).
» the use of alternative sources of meat for human consumption: animals such as rabbits or indigenous birds and wildlife may well be more efficient converters of biomass than poultry.
» improving the storage of feeds from times of plenty for times of scarcity.

4.2.9 Sub-Saharan Africa: continuing civil strife and weakened infrastructure

Conflict destroys land, water, and biological and social resources for food production, while military expenditures lower investments in health, education, agricultural and environmental protection (Messer et al., 1998). Resolving hostilities and reversing associated agricultural and economic losses are critical if agriculture and human development outlooks are to improve in the 21st century. Conflict prevention must be a goal of development and emergency assistance programmes. The far greater benefits from investing in social, educational and health initiatives than in spending on military systems need to be set out in stark economic terms for each government which has a low index of human development.

AIDS has compromised or disrupted normal activity at a household, community and national level, especially in Sub-Saharan Africa, because it takes its toll on the productive sector of society. Food production and food security of the family have been affected. The head of the household is often too debilitated and ill to continue to work and many communities are now struggling to cope with the smaller number of adult workers. The intellectual capital of many societies is also being badly eroded. Thus, the region's problems are exacerbated by a weakened infrastructure. Investment in training, capacity-building and institutional development—which have characterised regions such as Latin America, the Caribbean and some Asian countries where progress in nutrition has been made—should be considered for Africa in the 21st century.

4.3 Other forces affecting food security: trade, global finance and new technology

In addition to the growing constraints on producing adequate food, there are a number of other forces which will increasingly have an impact on food security.

4.3.1 Globalization of trade and food supply

A major driving force which has already influenced nutrition and food security, and which will be increasingly important in the future, is the process of globalization. The human food chain is being rapidly transformed into a global market with industrialized countries intent on providing its populations with a huge variety of primary products and processed foods, regardless of season and at ever lower prices. Never before have foods moved so rapidly and been used

in such complex ways. Thus a single source of food from a developed or developing country may be used in over 100 different food products which in turn are sold hundreds or thousands of kilometres away.

Trade negotiations with the aim of abolishing artificial barriers and opening borders to international trade began in 1948. The latest round of negotiations—the Uruguay Round of the General Agreement on Tariffs and Trade (GATT)—culminated with the establishment of the World Trade Organisation (WTO) in 1995. Although the WTO operates on a 'one member, one vote' principle, in reality the power base within WTO lies with the major trading countries—principally North America and the European Union. An analysis of the decision-making process within the 19th *Codex Alimentarius* session found that 60% of participants represented northern industrialized countries -collectively home to only 15% of the world's population—(Avery et al., 1993). Furthermore, industrial interests are very heavily represented—in the same study, 140 corporations were represented, compared with 105 nations. Thus, the interests of the developing world are poorly represented.

There are many aspects of the globalization process which may have an impact on food security and nutrition. The huge cross-border flows in international finance and the speculative nature of financial trading have a serious impact on national financial markets and currency valuations. Losses in foreign exchange, for example, will reduce incomes which will, in turn, reduce the capacity to buy food imports. This may result in increasing dependency on aid which is itself under pressure. At the same time, the loss in trade revenue will be felt by governmental programmes to develop the necessary long-term infrastructure. Another example is the effect of the pattern of direct foreign investment. Collectively, North America, Europe, Japan, the eight coastal provinces of China and Beijing have received more than 90% of the total direct global foreign investment (UNDP, 1997). These flows of foreign investment are often tied up with the transfer of new technologies—so large areas of the world (and a large proportion of the world's population) are excluded from technological advancement.

Globalization has resulted in a weakening of economic control by national governments—leaving developing countries vulnerable to economic factors beyond their control—and to fluctuations in world prices. This makes it harder for governments to plan for the future and to invest in other areas necessary for longer-term economic development. A confounding factor is the fact that for heavily indebted countries, foreign creditors may have first claim on any export earnings. Countries which have benefited in the short term from increasing global trade are now more vulnerable to fluctuations in the global market. Given recent intense concern about the future of the global economy, such vulnerability could spell disaster for many countries.

4.3.2 Agricultural trade

Since the Second World War, farmers in North America and Europe have been heavily protected by their governments. These support mechanisms led to overproduction and intensification of agriculture in both areas. Their governments responded to the accumulating surpluses by dumping excess products—including grain and dairy produce—on world markets, to the detriment of farmers in other countries where domestic support has not existed.

One feature of the GATT Uruguay Round is that an *Agreement on Agriculture* was reached. Governments in North America and Europe, however, managed to avoid radical cuts to their producer-support regimes when negotiating the agreement (Consumers International, 1996). Precisely who wins or loses as a result of the liberalisation of agricultural trade depends on a variety of factors including the types of agricultural produce, the other countries which produce competitive products, and the balance of exports and imports.

There is an incoherence in international policies for developing countries, resulting in effects of trade liberalisation which may directly undermine existing efforts of support. Box 4.2 describes an example of such incoherence, in this case within the European Union, which strengthens the argument that international institutions should establish mechanisms to predict the impact of policy measures and prevent such crises.

Box 4.2. Exports undermining aid—the beef dumping case

Subsidized European Union (EU) exports were arriving in coastal West Africa at prices 30–50% cheaper than regionally produced beef, and were destroying the market for farmers in neighbouring countries. The EU exports also undermined the many millions of ECU granted from the European Development Fund to support livestock development in West Africa. In May 1993, NGOs in six EU countries launched a campaign to stop beef dumping by the EU in West Africa. Commission officials received visiting African herders, studied the arguments and made cuts in beef export subsidies to the region. Coincidentally the CFA franc (local currency) was devalued by half in January 1994, making imports to West Africa twice as expensive. Beef imports from the EU by West and Central African states fell by 60 per cent between 1993 and 1994.

Source: Robinson (undated)

4.3.3 New threats and opportunities: global food safety standards

In most Western societies, epidemics of food poisoning are steadily gaining ground in association with huge changes in the distribution and use of farm products. Animal foods are now seen as a particular problem, with bovine spongiform encephalopathy (BSE), *E. coli, Salmonella*, *Shigella*, *Campylobacter* and *Listeria* now becoming of great concern in many countries. Response to early concern about BSE brought developments in the EU, Australasia and North America which may induce major restrictions on the free trade of food due to risks from animal products. These products range from meat and milk as such to the huge variety of food and pharmaceutical uses of tallow and gelatine.

Efforts to combat BSE alone may restrict market access for meat products from many developing countries which do not have adequate animal health surveillance systems. Few countries are likely to pass the stringent requirements emerging from EU, Australasian and North American policy-makers. The experience of BSE is also likely to transform attitudes to the potential inflow of other transmissible forms of spongiform encephalopathies which are endemic in a number of wildlife species in many developing countries.

The development of food standards agencies and their amplified power in many countries is likely to place major constraints on importers and food industrialists in the developed world who will bear the responsibility if contaminated foods are transferred from the developing world and incorporated into food or animal feed. There are currently major imports of feed stocks, bones, meat and other animal products into the developed world with little or no assurance of their safety.

Vegetable and plant products contaminated by human or animal sewage—in organic farm systems—have also been shown to induce major outbreaks of life-threatening food poisoning. The demand for farm assurance schemes with new requirements to limit or eliminate foods with an inappropriate level or range of micro-organisms may place a heavy burden on the developing world. Western food exporters may also gain preferential access to the urban communities of the developing world on the basis of their claimed food safety, backed by suitable marketing techniques.

Another aspect of the globalization process is the development of global food safety standards, with the WTO and *Codex* acting as final adjudicator in any disputes over particular food safety or standards issues. It is important to consider how these global food standards might affect consumers and producers in developing countries. A two-tier food safety system may be developing in many countries—where products for export conform to international standards but domestic consumers are left with food which does not meet these standards. Some African countries have already felt a heavy burden of compliance with imposed safety standards, when other countries rejected their fish on the basis of a cholera infection. The *Codex* Commission decided, however, that this ban was not justified on health grounds.

4.3.4 Structural adjustment programmes, financial crisis and nutrition

The nutritional health of children and adults often deteriorates as a result of cutbacks and austerity programmes imposed by international institutions such as the International Monetary Fund (IMF). There is a great temptation to cut budgetary allocations for nutrition programmes, at a time of major nutritional need when the very elements of adjustment may be adding new constraints on the capacity of ordinary people to meet their own food, health and nutritional needs. The IMF-negotiated adjustment programmes normally focus on an immediate balancing of the budgets even at the cost of human hardship. It is evident that this seemingly temporary sacrifice prejudices the lives of future generations—balancing budgets at a cost of unbalancing children's lives.

There is great anxiety that these effects are under way in East and South-East Asia, where international remedies for a short-term liquidity crisis may well lead not only to reduced growth and high levels of unemployment, but also to more undernutrition for vulnerable groups (see Section 1.3). If this happens, the supposed financial benefits may well be outweighed by the hidden costs of the deteriorating nutrition of mothers and children, these costs lasting a generation or more.

Deteriorating nutrition and health can have serious, irreversible long-term consequences. The World Bank now recognises these and is supporting a wide range of analyses on how to maintain, and indeed improve, the social structures of countries during financial crises. In East Asia, the World Bank and other partners are targeting children and pregnant or lactating women as the focus for short-term action in response to the current economic crisis.

Chapter 7 outlines some recommendations for ensuring that structural adjustment and development policies work in the interests of the world's poor. These recommendations need to be considered by the UN Agencies heavily involved in nutrition. Considerable resources have been allocated to the support of 'safety nets'. Notwithstanding these efforts, evidence exists that health and nutritional status have been worsening in parts of East Asia, and in Central and Eastern Europe. As already noted, in Sub-Saharan Africa as a whole prevalences of preschool underweight and stunting have stagnated for many years.

4.3.5 The challenges of the biotechnological revolution

As we enter a new century, we can look back on the progress made globally and nationally in raising the rate of growth in food production above the rate of growth in population. Economic access, rather than availability of food in the market, has become the more important cause of hunger and undernutrition today. However, there is no room for complacency in relation to the adequacy of the food supply. In 1992 an international conference of experts convened by the World Bank, the UNDP and the FAO concluded that a solution to securing world food supplies while preserving the environment is virtually inconceivable without recombinant genetics and biotechnology (Kendall et al., 1997). Biotechnology has many potential applications, particularly in agriculture. Thus biotechnology could conceivably be of even greater importance for developing countries than for industrialised countries in terms of producing sufficient quantities of nutritionally adequate and safe food for their growing populations (Swaminathan, 1996).

As mentioned earlier, the developing world's agricultural strategy for the 21st century will need to emphasise increasing yields through means that do not produce long-term ecological or social harm. In addition, agriculture has to be a key instrument for producing not only more food but also more income and jobs. The new techniques of genomic and molecular breeding are applied in the search for sustainable advances in crop and farm-animal productivity and quality. The new opportunities created by these advances must be assessed carefully for their benefits and risks.

Research carried out with the new genetic technologies during the last 15 years has shown that they can help improve crops in more precise ways than the traditional Mendelian methods. Designer crops based on novel genetic combinations created by moving genes across sexual barriers are now becoming available. Opportunities for breeding varieties for resistance/tolerance to various stresses, including drought and salinity, and for improved nutritional qualities could be particularly important for farming families struggling to improve yields and quality under unfavourable growing conditions.

Some of the potential benefits of the use of biotechnology in developing countries include:

» crops especially adapted to diverse farming conditions and practices which offer greater nutritional value and substantially higher farm income;
» energy-producing crops which could save natural resources and so conserve the environment;
» the transfer of nitrogen fixation genes to non-leguminous plants such as wheat, rice and other cereals, reducing environmental pollution from inorganic fertilisers;
» increased productivity and production of drought crops in other parts of the world;
» the production of crops which are of higher nutritional value to humans or animals. This might include altering the folate, antioxidant or iron content of crops destined for human consumption, or improving the digestibility of animal forages, thereby increasing the productivity of high-quality animal protein for human consumption;
» animal biotechnology leading to improvements in growth and feed efficiency, animal health, reproductive efficiency, food product quality and the lactational production of novel or valuable proteins.

The biotechnological revolution is so intense, involving huge capital investments, that the land already assigned to the growing of novel crops in 1998 surpasses the land mass of the UK. During 1999, nearly 40 million hectares were under transgenic crops with most of the area being covered by soybean, maize, cotton and canola. Much of this area (74%) under genetically modified organisms (GMOs) is in the United States of America. The USA has not seen the same degree of consumer concern about GMOs that has been witnessed in, for example, India and many European countries. A group of experts constituted by the Royal Society in the United Kingdom has concluded that consumer confidence will ultimately decide whether or not GMOs will make a significant contribution to feeding the world's population (Royal Society, 1998).

The pace of change is intense, with a huge variety of industrial as well as food crops now grown, so the next decade will see a transformation in agriculture. The developing world will have to rely on major trusts, such as the Rockefeller Foundation, or on the Consultative Group on International Agricultural Research (CGIAR) for progress and advice. One exception is India, which has invested heavily in agriculture, and has one of the largest public-sector plant-breeding enterprises in the world. Western biotechnology companies will also be assessing how best to gain access to new commercial opportunities in the developing world. There is a need therefore for new public-private cooperation to ensure that biotechnology can be developed to be of direct benefit to the developing world, whilst incorporating the huge assets and knowledge of the Western biotechnology industry.

4.3.6 Safeguarding small-scale farmers

New technologies only suited for large-scale farming could result in a further impoverishment of small-scale farmers. "Gene protection technology" and the growing expansion of proprietary science means that small and resource-poor farming families who normally save seeds for future crops may feel the pressure to purchase new, improved seeds each year. This needs careful consideration and monitoring.

A major proportion of new technological developments are, in practice, covered by intellectual property rights. So proprietary science is unlikely to help resource-poor small farmers, in developing or developed countries. Biotechnology could also increase inequality in the distribution of income and wealth. For example, weeding by hand provides employment, and this would be reduced by the use of herbicide-resistant plants. The introduction of such technology should therefore be accompanied by social reforms, such as land reform and special support programmes for small farmers and those who may lose their livelihood as a result of biotechnology.

Genetically modified products could also reduce the developed countries' reliance on crops from developing countries—further widening the prosperity gap. Tropical agricultural exports could be replaced with genetically engineered products from elsewhere. Thus, genetically produced vanilla flavouring could displace the output of 70,000 small farmers in Madagascar. Genetically improved cocoa varieties could displace thousands of smallholder farmers in West Africa in favour of plantation farmers in Asia. High-fructose corn syrup produced using biotechnology from corn starch, is already being used as a cheaper replacement for cane sugar, a vital source of income for several developing countries. Vulnerable economies must therefore be encouraged to diversify their production structure. This will require more appropriate domestic policies and funds to support diversification. The impact of genetically modified plants on the environment also needs to be assessed. In developing countries there may be no legislation to monitor their effects. This could result in the use of developing countries as unmonitored laboratories.

The potential loss of natural diversity, resulting from undue reliance on a number of genetically-modified plants and the threat to food security, requires an international strategy to preserve plant genetic diversity as part of a new global food security system.

Exploitation of indigenous genetic resources without appropriate compensation is another area of potential concern. Multinational companies or external research groups may gain control of genes of plants native to the developing world free of charge and then use them to produce superior patented varieties which would then be sold back at high prices. Binding national and international regulations, therefore, need to be developed. One suggestion would be to channel compensation into development co-operation or the CGIAR system in order to create agricultural value in the region where the genes came from (Swaminathan, 1999).

The important political, ethical and trade questions raised by biotechnology, although not all unique to modern biotechnology, must be resolved at government and intergovernmental level by developing a global regulatory framework which takes account of financial resources. To clone a single gene costs approximately $1 million. In developed countries, sales are large, patents protected and risks low, but there is no profit to be made in developing countries. Therefore public-private co-operation may be needed in the developing world as well as technology transfer units in universities and elsewhere, to facilitate technology transfer.

4.3.7 Public health and environmental hazards

Recombinant DNA technologies resulting in genetically-modified organisms (GMOs) have aroused widespread public concern in several areas: direct effects of the transferred genes on the recipient organisms, new possibilities for unfavourable recombinations, effects on environment and biodiversity and the nutritive properties of the food produced by GMOs. One potential problem upon release of GMOs may be 'onward gene transfer' with detrimental effects of the transferred gene or an associated marker gene (e.g. antibiotic resistance) passed from plants to the microflora of animals. Similarly, plant-to-plant transfer could result in transfer of herbicide resistance to 'wild' relatives, which would then become 'serious' weeds.

There are genuine public concerns about the potential adverse impact of GMOs on the environment, biodiversity and human health and there is a clear need to improve the assessment of potential environmental and health hazards. The legally binding *Convention on Biological Diversity* calls for an internationally agreed protocol on biosafety. Recent attempts to agree on such a biosafety protocol failed. However, in January 1999 Indian policymakers and scientists called for a national commission to be established to deal with bioethics, biosafety, biosurveillance, food safety, consumer choice in terms of labelling and new mechanisms for involving the public in a transparent way. The French Government has decided to adopt the following three principles with respect to GMOs: adoption of a precautionary principle, surveillance of the technology in the large scale, and increased openness with regard to consumers and the public. This led to the Montreal agreement on biosafety protocols in January 2000.

4.4 Food production and food security: meeting the challenges

The challenges which face the world in feeding the growing population are varied and numerous. The previous sections have outlined many of these challenges in brief. What are the options for food and agriculture in the future? How should new strategies tackle these issues and meet the challenges? The following sections suggest some general approaches to increasing food production to meet growing demands; to conserve biodiversity (and thus nutrient security);

to promote fish as a food source while conserving fish stocks; and to protect food security and public health in a global economy.

4.4.1 A need for an ever-green revolution

A further revolution in agriculture will be required to adapt food production systems to growing needs and the changing environment. This new revolution (Box 4.3) must take socio-economic and environmental factors into account by focusing on three components: production, sustainability and poverty reduction. This approach has also been called the triple green revolution (Vosti and Reardon, 1997).

4.4.2 Widening the food basket and ensuring global nutrient security

Given the dramatic reduction in the crop-mix of the global food basket there is a need to widen the food basket once more and broaden the genetic diversity of crops grown. This will confer multiple benefits which include: addressing micronutrient deficiencies, insuring against total crop failures, matching crops to specific agro-ecological conditions, revitalising on-farm conservation of agro-biodiversity, and preventing nutritious crops from becoming 'lost crops'. A range of actions is necessary to help achieve a widening of the food basket. Taken together these could form a global nutrient security strategy (Box 4.4).

The CGIAR institutions hold over 600,000 accessions of genetic strains of food crops. There is a new need to analyse these crops for their nutrient content (CGIAR micronutrients project). Such steps may also help in matching crop choice and agronomic practices with specific agro-ecological conditions, such as arid and semi-arid areas. In addition to global food stocks, local grain banks comprising millets, grain legumes and minor crops could be created to provide nutrition security. These local-level grain banks will help both to provide producer-oriented marketing opportunities and to prevent distress sales and/or panic purchase. Clearly these issues are complex, requiring very different approaches in different regions of the world with a need for evaluation. Guidelines need to be developed at a country or regional level. Unfortunately many of these issues are seen simply as matters of production or trade. Their implications for poverty or undernutrition have been seen as an afterthought if considered at all.

Box 4.3. An ever-green revolution

Key aspects of the new approach to food production to improve food security include:

» Increased investment in agricultural and natural resource management. The strengthening of agricultural research and extension systems will be vital. This runs counter to the substantial reduction in funding of agricultural research in the developed world where a crude link has been made between investment in agricultural research and the economic costs of all the food surpluses and export subsidies. The acknowledgement that developed countries will benefit from investing in tropical and sub-tropical agricultural research needs to be established along with much closer links to the needs and experience of small, local farmers.
» Research and dissemination of new knowledge, appropriate technology and novel techniques to farmers. Strong national and international support for innovation is vital.
» Development of total resource management (as in some Chinese villages), integrated pest management and soil fertility programmes to ensure that progress in food production is sustainable over the longer term.
» Policies that ensure property rights to land, improved access to credit, effective and efficient markets and temporary fertilizer subsidies (where prices are high), to prevent further degradation of land.
» Reconsideration of less-favoured lands. These are the rain-fed rather than irrigated bread basket regions. Studies suggest that the marginal returns on government investment are higher in these areas (Fan and Hazell, 1997).
» Reform of water policies at the local, national and international levels to avoid conflict. Improved irrigation, integrated catchment management schemes and the development of ground water resources should yield substantial benefits in improving access to water for food production. The feasibility of water pricing should be considered by local government.
» Community involvement in agricultural development. If technology is to be transferred successfully to local food producers, it is essential that it meets their needs and is suitable for local conditions. In particular, the involvement of female food producers in agricultural development should be actively encouraged.
» The development of stronger property rights for land, water and other natural resources. People invest in resources that they own or can trade. This helps to prevent further degradation of the resources.
» An impetus from international agencies to push world food systems into preparing for the forthcoming changes in global climate. The impact of climate change will vary from location to location, but adaptive changes in agriculture can help minimise the negative effects.
» Improved climate information systems and dissemination of information to food producers, to help offset the predicted increase in the 'extreme' weather events which often constitute disaster for farmers.
» Exploration of public/private co-operation so as to involve private enterprise in tackling the problems of the world's poor.

Box 4.4. A global nutrient security strategy

A strategy to preserve nutrient security should:

» Refocus national priorities in agricultural research to encourage diversity of crop use as well as intensity of production. Horticulture and meat production without the diversion of cereal crops to animal feed need to be higher priorities for development.
» Revitalize the pre-market traditions of cultivating and consuming a wide range of cereals, millets, grain, legumes, oilseeds, vegetables, fruits and tuber crops both by education and creation of markets for such nutritious food crops.
» Promote the development, manufacture and sale of processed and semi-processed foods based on a mixture of nutritious crops, to help overcome micronutrient deficiencies.
» Include neglected and 'minor' crops in global and national food security reserves and in public distribution systems, to provide an economic stake in the cultivation of a wide range of food crops.
» Redesignate 'coarse cereals' as 'nutritious cereals' (and other minor and currently neglected crops) in order to improve the image of such micronutrient-rich crops in public perception. Terms such as coarse grains, minor crops, minor millets, famine foods and feed grains are all inappropriate names. These crops can often withstand drought and relatively unfavourable growing conditions so are vital to future food security.
» Promote the in situ and ex situ conservation of seeds and strains of a wide range of food crops, so as to prevent them from becoming 'lost crops.'
» Promote breeding efforts designed to increase the micronutrient content of crops like rice, wheat and maize.
» Promote mixed cropping and multiple cropping sequences in the tropics and sub-tropics which provide space in the cropping system for under-utilized but nutritionally desirable crops.
» Encourage a better balance between developed and developing countries in world food production, thereby relying more on production from presently under-producing areas such as Sub-Saharan Africa.

The UN needs to encourage better methods to ensure that global food stocks are maintained effectively and with appropriate nutritionally balanced stocks. These should allow those countries with particular food crises after drought, pests or wartime destruction of food supplies, to obtain good quality supplies at affordable prices. The current tendency for Europe and North America to provide whatever stock surpluses they have accumulated as a result of pricing and trade policies is unsatisfactory. The ACC/SCN should explore how best to set optimum proportions or ranges of different foods in these global food stocks.

One additional aspect of widening the food basket should be the promotion of fish food sources. This will require a responsible approach to marine and fresh water resources and research and development of aquaculture. The Commission recognises the need to enhance the direct human consumption of fish already caught rather than its use as animal feed. Better enforcement of the existing marine fisheries agreements is also imperative. Regulations and economic incentives to reduce waste of unwanted fish should be adopted. The United Nations should consider establishing a World Ocean Affairs Observatory to police the seas. This is important to preserve the major nutritional, health and economic benefits of fish and fish products. A "blue revolution" is therefore required to allow local communities and low income groups to benefit from the production as well as consumption of fish.

4.4.3 Ensuring that free trade is fair

The Commission welcomes the establishment of the Global Forum on Sustainable Food and Nutritional Security, which has recently been formed to prepare for this review and collate evidence of the impact of the WTO with a strong Southern perspective. These negotiations should recognise the differing needs of industrialized and developing countries. The rules should distinguish between countries which support over-production by the creation of surpluses and those countries seeking only to achieve self-sufficiency and promote food security. The rules should allow the latter to protect their markets to some degree while they strive for food security. Food safety standards should be developed to meet the needs of the poor countries as well as the needs of the richer countries. A number of other measures are required to ensure that food security and nutrition are adequately protected in the increasingly global economy. These are set out in Chapter 7.

The Commission concludes that new safeguards are needed, as food markets open, to protect public health in terms of food standards, the safety of genetically-modified crops, the protection of the nutritional quality of food and to control the influx of virulent micro-organisms. This requires a new approach by health ministries and the developing world to the work of the FAO/WHO *Codex Alimentarius* as part of the WTO agreements.

5. Food, nutrition and human rights

In the 21st century human rights will increasingly influence what happens in all aspects of life—civil, political, economic and cultural. A human rights vision was in evidence at the 1995 *Copenhagen Summit on Social Development,* when Heads of State and Government underlined their commitment "to a political, economic, ethical and spiritual vision for social development based on human dignity, human rights, equality, peace, democracy, mutual responsibility…." In his 1997 UN reform proposals, the Secretary-General renewed the call for human rights to be mainstreamed in all activities of the UN system as a whole (UN, 1997). It is in this context that the human right to adequate food and nutrition must play a critical role in efforts to deal with hunger and undernutrition.

The right to food is enshrined in Article 25 of the *Universal Declaration of Human Rights* of 1948. It is further spelled out in the *International Covenant on Economic, Social and Cultural Rights* (Article 11) adopted by the General Assembly in 1966, and reiterated with a view to its more qualitative nutritional aspects in the *Convention on the Rights of the Child* (Article 24.1) adopted in 1989. While human rights conventions are binding for member states who ratify them, other instruments are important in supporting their follow-up.[1] Thus nutrition is recognised as a key component of development in the non-binding *Declaration on the Right to Development* of 1986 which calls for all states to ensure equal opportunity for all in access to health services and food.

More recently the World Food Summit was a milestone in the process of defining better the content of the right to food and nutrition, and in setting in motion activities to guide states, civil society and international organisations in implementation. The right to food is already rooted in the philosophy of many ideological and political systems. The special feature of the international human rights system is that this right has been brought into a universal moral and legal normative system with corresponding institutions, mechanisms and procedures for its implementation, as agreed upon by the majority of the UN member states.

Yet, as 790 million food-insecure people testify, commitment and opportunities for action have not yet been transformed into practical activities that will guarantee hungry people enough to eat, in ways that will promote their food and long-term nutritional security in a dignified manner. To date, the right to adequate food remains one of the most cited in solemn declarations of political intent, and one of the most neglected and violated in practice. It is against this background that the *World Food Summit* challenged the international community to give operational meaning to this right.

5.1 What difference does a rights-based approach make?

The differences between a rights-based approach and a basic-needs approach to food and nutrition programming may seem subtle. However, there are fundamental differences. Both have an ethical and juridical dimension. Basic-needs approaches define "beneficiaries" and their needs. This approach is one of dependency in the sense that beneficiaries have no active claim to ensure that their needs will be met. Also, there is no binding obligation or duty for anybody to meet these needs. Basic needs approaches have an element of charity.

A human rights approach starts from the ethical position that all people are entitled to a certain standard in terms of material and spiritual well-being. A

[1] A government may *sign* a convention at the time of adoption, but this would not be binding for the state. It becomes binding only when the government formally *ratifies* the convention, which normally requires the *consent* of the legislative institution, for example, parliament or congress. The state then becomes a *state party* to that convention. By contrast, a declaration, compact, or code of conduct is merely a political commitment by those who participate in its adoption, and is not legally binding unless or until it becomes part of what is considered *customary international law.*

human rights approach thus removes the charitable dimension and emphasises rights and responsibilities. It recognises beneficiaries as active subjects and claim-holders and establishes duties or obligations for those against whom a claim can be held ('duty-bearers'). The concept of claim-holders and duty-bearers introduces an important element of accountability. Accountability holds the key to effectiveness of action and offers "added value."

A human rights framework means:

» human rights are legally binding for States, not optional as in the case of recommendations from global summits and conferences;
» international human rights need to be translated into appropriate national law, in accordance with the Universal Declaration of Human Rights and the international covenants;
» human rights require active and effective remedies, not necessarily by the use of courts, and any person or group whose rights are violated should have access to appropriate remedial measures;
» accountability, both domestic and international, which contributes to 'good governance'. Under the international covenants, states are obliged to submit periodic reports on the human rights measures they have taken; these reports are public and can be used to hold governments accountable for non-compliance.

Introduction of a rights approach also has important implications for the analysis of food and nutrition problems and for policy and programme planning. Analysis of causal factors would need to be complemented by an analysis of obstacles confronting the realisation of the right to adequate food, from the household up to the national and international levels. This would be the basis for determining who is to be held accountable for these obstacles and who would be responsible for their removal. These aspects become all the more important in a globalizing world dominated by the forces of economic and financial markets, which have little respect for the well-being of individuals. Many countries have offered various 'justifications' for not taking the necessary steps to implement the right to food and other economic, social and cultural rights as legal rights. These include the "impossibility" of defining economic and social rights in legally enforceable terms, prohibitive costs to the state, and the impossibility of enforcement when economies are poor or suffer economic and political shocks. A counter-argument is that the "real issue" is lack of political commitment.

These arguments rest at least in part on misunderstandings about the nature of economic, social and cultural rights. The state is *not* to be seen as a primary provider in the sense that people can claim "a free lunch." The state should first and foremost respect citizens' rights to feed themselves. The state should also protect this right from threats by third parties, as in the case of unexpected natural calamities, and generally help facilitate conditions for people to care for themselves. Only as a last resort is the state obliged to provide direct assistance to those who are unable to fulfilll their right to food and nutrition.

5.2 The International Code of Conduct of the Human Right to Adequate Food

In its *Plan of Action* the *World Food Summit* mandated the High Commissioner for Human Rights to take the lead in better defining the right to food and nutrition and ways to implement it. Governments in particular need to come to grips with what is required of them to meet their obligations. These requirements have been developed in general terms in a draft *International Code of Conduct on the Human Right to Adequate Food* (FIAN/WANAHR/Institute Jacques Maritain International, 1997). The *Code of Conduct* is aimed at State Parties which have ratified the relevant Conventions, with a view to the complementary roles of civil society and the private sector. The *Code* was prepared by international NGOs and has now been endorsed by a great number of NGOs from all parts of the world. It was launched in September 1997. While the *Code* would be voluntary for member states, it may—if and when brought up for formal adoption by the appropriate intergovernmental body—pave the way for a more legally binding instrument at a later stage. The *Code* provides a definition of the normative content of the right to food, it proposes corresponding State obligations at national and international levels, responsibilities for international organisations and regulations for economic enterprises, as well as responsibilities for participants in civil society. It addresses means and methods for implementation, a framework for national monitoring as well as recourse procedures and international reporting, monitoring and support mechanisms.

6. Vision and goals for the future

To live a life without malnutrition is a fundamental human right. The persistence of malnutrition, especially among children and mothers, in this world of plenty is immoral. Nutrition improvement anywhere in the world is not a charity but a societal, household and individual right. It is the world community's responsibility to find effective ways and means to invest for better livelihood and to avoid future unnecessary social and economic burdens. With collective efforts at international, national and community levels, ending malnutrition is both a credible and achievable goal.

6.1 A vision

The Commission now wishes to extend this vision to encompass a new paradigm of nutrition which incorporates the double burden of undernutrition and diet-related adult disease. This double burden is amplified by the link between maternal and fetal undernutrition and a population's later susceptibility to adult diet-related disease. This susceptibility is displayed when food consumption patterns change during economic development. Thus, there is a synergy between early undernutrition together with adult lifestyles which may help to explain the pandemic of non-communicable diseases. Our vision encompasses the development and implementation of national and international strategies which will allow societies and individuals to improve their life expectancy with minimum health handicaps from these preventable disorders in middle and old-age. It is not enough to acknowledge this moral imperative. The commitment needs to be translated into effective and strategic action.

We now know *what* needs to be done and have seen that rapid but sustained improvements in nutrition are possible. It is clear that current international support systems are inadequate. Current UN goals relating to undernutrition are incoherent and unambitious, which is why the Commission is challenging the UN to consider a new goal of ending malnutrition by 2020.

This, we believe, is ambitious but achievable. The 2020 date was chosen recognising that international conferences and summits have specified targets already for 2010 and 2015. This Commission is reporting well after these meetings, so a 2020 date is chosen to allow time to both formulate and implement new strategies. To specify an early date for achieving radical improvements in health would be unrealistic.

The 2020 date also takes account of our analyses of the potential rate of improvement in the global burden of underweight, children when this rate is based on the success of one country i.e. Thailand (see figure 6.1). The Commission highlights the issue of childhood undernutrition since it contributes long-term to the global burden; combating undernutrition and other forms of malnutrition, i.e. obesity, diabetes, coronary heart disease and cancer, now needs to be brought into a single strategy so that developing countries can limit the double-handicap of diet-related diseases (see below).

To assess *how* goals should be achieved, there is a need to assess why the international community has failed to implement existing knowledge before now. The outcome of such an assessment, coupled with proposals put forward in this Report, should then be the basis for regional taskforces to develop coherent strategies. We challenge the UN, national governments and other agencies to implement these proposals and turn words into action.

6.2 Achieving rapid progress for the 21st century

The requirement for achieving rapid reductions in undernutrition on a national basis is new purposeful action: a determined political commitment, clear goals, good strategic and programme planning, sustained action and systematic monitoring through a physical and administrative infrastructure. To this must be added a process for mobilising the public at large. Community participation and consumer demand need to be promoted by a three-way communication between the people, the community's non-governmental organisations and its government. With these three elements in place, experience with undernutrition, with micronutrient deficiency in developing countries and with diet-related chronic disease of adults in the developed world shows that rapid progress is possible.

6.3 Factors contributing to current inaction

Given the remarkable international agreements embodied within the *International Conference on Nutrition*

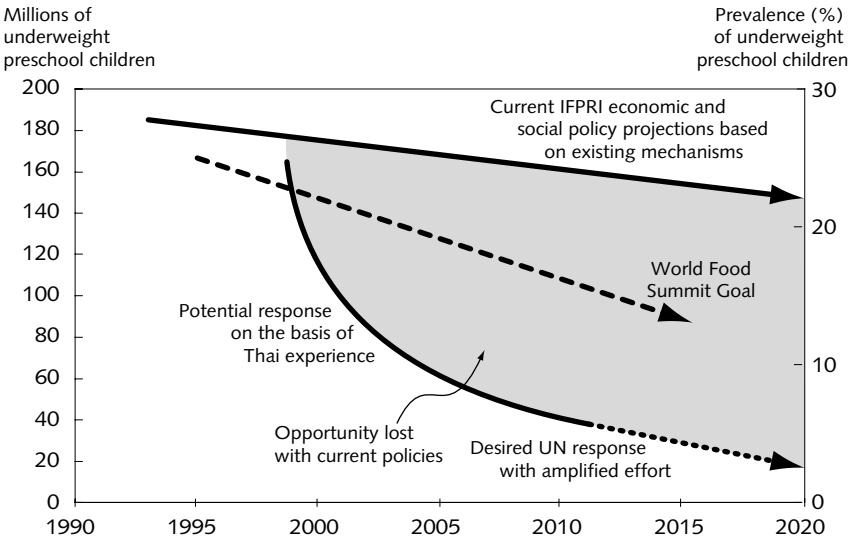

Figure 6.1. Elimination of undernutrition: a global deficit in policies and priorities

Note: If current trends continue, the International Food Policy Research Institute (IFPRI) predicts that the numbers of underweight (weight-for-age < –2SD) children less than six years will only drop to 150 million by 2020. The *World Food Summit* set a goal to halve the number of food insecure people in 1996 by 2015. In this diagram it is assumed that the number of underweight children should also be halved during the same time frame. If the *World Food Summit* goal were to be achieved, 84 million preschool children would still be underweight in 2015. Experience from Thailand shows what is potentially achievable with the benefit of political, social and organizational commitment. Thailand was able to reduce the prevalence of underweight from over 50% in 1982 to 10% in 1996. The diagram shows the same proportional change applied to the world's underweight preschool children. The Commission suggests that with an amplified effort from governments and the UN system, eliminating underweight in preschool children by 2020 may be possible. The residual 2.5% reflects the accepted statistically derived lower cut-off point for normal growth in well-cared-for children from a reference population.

and the *World Food Summit* to develop new approaches to combating undernutrition, it is unclear why more has not been achieved. This Commission concludes that several factors are involved:

» the lack of a locus within many countries for highly motivated academics and non-governmental organisations to interact with political leaders and decision-makers, and thereby help drive forward a nutrition initiative;
» the frequent failure of health and agricultural sectors to combine forces to ensure coherent plans of action. These plans need to be endorsed as necessary for improving the intellectual and physical capital of the population by enhancing their health and welfare and for increasing food security and sustainable high quality food production;
» within-country rivalries: these may be amplified by the selective support of specific national programmes by charities, NGOs, bilateral and UN organisations;
» the failure of some major financial institutions to follow the World Bank initiatives which require intersectoral measures to improve food security and human health when developing plans for economic reform and development. These inadequacies are evident in the approaches taken to deal with the current economic crises;
» the failure of political leadership in many countries to realise the possibilities of making rapid improvements by prioritising nutrition when allocating national resources.

The Commission sets out in Chapter 7 mechanisms for initiating change and provides some potential approaches to policy development in Annex 4.

6.4 The need to review goals and options

The practical value and impact of existing goals has already been demonstrated because sufficient time has elapsed to both mobilise and achieve results. Experience shows that the main need is for strong national action, often mobilised by the catalytic efforts and support of one or more of the UN agencies and its field staff. Many of the current goals relate to the year 2000 (a table listing existing goals is in Annex 2). Work is now needed to adapt and carry forward the goals into the 21st century. The World Food Summit established a goal to halve the number of food-insecure people

in 1996 by no later than 2015. WHO's Health for all in the 21st century sets its proposals for the next century in the context of "strengthened support for key values: human rights, equity, ethics and gender sensitivity." Nutrition is then identified as the leading goal for improved health outcomes by the year 2020, as follows:

> "By 2005, health equity indices will be used within and between countries as a basis for promoting and monitoring equity in health. Initially, equity will be measured on the basis of a measure of child growth: the proportion of children under five years who are stunted should be less than 20 per cent in all countries and in all specific sub-groups within countries by the year 2020." (WHO, 1998b)

We strongly endorse the goal set out at the *World Food Summit* and the focus on health, equity and child stunting in the WHO document. However, there are new issues which WHO, and others in the UN system concerned with action to reduce undernutrition, now need to address:

» Regional and/or national goals are now needed given the wide range in stunting rates. A single goal as a global objective needs to be supplemented by regional and national goals which challenge prevailing national trends. Consistency is also needed to ensure that goals for reduction of 'undernutrition' are seen essentially as those for preventing the stunting of children. As noted in Chapter 2, stunting is the dominant contributor to childhood underweight.
» Experience shows that goals for 15 or 20 years ahead need to be supplemented by shorter-term goals for the next 5 or 10 years if they are to have political relevance and impact.
» The UN would benefit from ensuring that the goals for reducing poverty and poor nutrition are consistent, even if the two are not necessarily linked.

Our proposal is therefore that the UN agencies, with the help of the ACC/SCN, work together to identify global, regional and country-level intermediate goals for the reduction of childhood underweight by the year 2010, as well as 2015 (see Figure 6.1). As a basis for discussion, we would suggest that by the year 2005 each country should halve the *proportion* of its children under five classified as underweight or stunted in 1995, and halve it again by the year 2015. This is a relevant but feasible challenge for most countries because it would:

» recognise the need to minimise the total number of pre-school underweight or stunted children in all countries by 2020 and ensure equity within all regions of a country. The emphasis should be on the rapid reduction in stunting the worst-affected areas;
» form a bridge with the *World Food Summit* goal of halving by 2015 the *number* of people estimated as chronically food insecure;
» apply to all countries as broad guidelines, but could be modified and adapted to each country's specific situation and prospects;
» draw on the positive experience of UNICEF and UNFPA in using goals expressed in terms of reducing the national *proportions* of people affected by specific forms of deprivation.

There is also a need to explore other nutrition goals in four areas.

» Rapid reduction in micronutrient deficiencies is vital. This, together with an assurance of improved levels of maternal nutrition, should be linked to the stunting goals.
» A new goal specifically related to the need to transform maternal nutrition and health in many countries is essential.
» The *International Conference on Nutrition* introduced a goal for ending deaths from famine. There is a need to elaborate indicators concerned with selective vulnerabilities—e.g. because of seasonal deprivation, in times of drought or other natural disaster and at times of war and economic crisis.
» Goals to stem the rapid rise in overweight and obesity in adults as well as children are needed with a clear need to integrate these goals into a broader strategy against the major adult diseases of diabetes, cardiovascular disease and cancers.

6.5 Integrating goals for diet-related diseases

Until now, the UN has followed the convention of considering nutritional deficiencies and "excesses", i.e. the diet-related adult chronic diseases, as separate. This is no longer sensible. The Commission recognises that both dietary deficiency and adult chronic disease now affect developing countries as well as the developed world and Central and Eastern Europe. The two sets of disorders are fundamentally linked through poor maternal nutrition. Thus, policy developments with community involvement must simultaneously take on this broader range of issues and develop coherent approaches for tackling the problems.

It is vital that all countries wake up to the increasing problem of non-communicable diseases and develop goals to deal with this problem. The Commission proposes the following (adapted from WHO, 1998c and World Cancer Research Fund, 1997):

» establish a population strategy to reduce morbidity and mortality from coronary heart disease in people under 70 years by 50% by 2020, taking account of the Norwegian and Finnish experiences. Dietary guidelines will be needed to take account of local food patterns.
» reduce the incidence of NIDDM progressively by halving the rate in the adult population by 2020.

This will require a major programme to prevent overweight and obesity in all age groups.

» establish a public health goal that population average BMI throughout adult life should be within the range 21-23kg/m^2 thus ensuring that a very high proportion of the population have a BMI within the designated normal range of 18.5–24.9 kg/m^2. This target should probably be lower for Asia with average BMIs of 20–21 kg/m^2 and individual BMIs not exceeding 23 kg/m^2.
» reduce the incidence of common types of cancer by 30% through amplifying vegetable and fruit consumption (World Cancer Research Fund, 1997).
» reduce incidence of hypertension progressively by halving the rate in the adult population by 2020 through comprehensive strategies aimed at reducing salt and alcohol consumption and limiting excess adult weight gain.
» a physical activity goal should be one where adults maintain a physical activity level of over 1.75 times the basal metabolic rate (i.e. activity costing 75% more than basal requirements), with opportunities for vigorous physical activity.

WHO and FAO recently developed a strategy for translating the traditional nutritional population goals into a more practical formulation. Dietary goals should be developed nationally and could be based on recent analyses of the optimum nutritional content (Box 6.1).

It is appropriate to set regional and/or national goals for ending undernutrition and micronutrient deficiencies in refugee camps and in the community, for halving the prevalence of low birthweight by transforming maternal nutrition and health care, by developing breast feeding goals and focusing on improving the education and the economic capacity, as well as the health, of women.

6.6 An integrated approach

Ultimately, success in achieving the goals outlined in this Report will depend upon political choice and public action. A blend of political choice and commitment, professional skill and community participation will be essential if every child, woman and man is to have an opportunity for a healthy and productive life. Policies which integrate various aspects of health, food production and education will be fundamental. Strategies to implement these policies are needed at local, national, regional and global levels. Appropriate institutional arrangements could clearly enhance national, regional and global capability. At every level, it is important to designate responsibility for setting

Box 6.1 Nutritional, activity and dietary recommendations as public health goals

» Populations should consume nutritionally adequate and varied diets based primarily on foods of plant origin.
» Promote year-round consumption of a variety of non-tuber vegetables and fruits in amounts equivalent to > 400 g/day to provide at least 7% of total energy per individual.
» A variety of starchy or protein-rich foods of plant origin, preferably minimally processed, to provide the majority of total energy (e.g. grains, legumes, roots, tubers). These recommendations imply a limited intake of sugars and starches with a high glycemic index. Benefit also accrues from limiting the frequency of sugar consumption in drinks, snacks and foods to improve dental health. In practice, this means free sugars should be < 10% total dietary energy.
» Where animal protein is in limited supply, preference should be given to pregnant women and children.
» Red meat should provide < 10% of energy. Fish, poultry and game are preferable.
» Total fats and oils to provide at least 15% of total energy. Fat intake for women of reproductive age should provide at least 20% of energy. From weaning until 2 years of age children should consume 30–40% of their energy as fat. Active individuals in energy balance should not consume more than 35% of their energy from fat. Saturated fat should provide no more than 10% of energy. A total fat intake of 20–25% should not be exceeded if fat intakes are increasing from low levels in societies becoming more sedentary. Omega-3 fatty acids from fish, and fish and vegetable oils, should be selectively targeted to pregnant women and young children when the supply is limited. The ratio of n-3 to n-6 fatty acids should be increased to at least 1:5 to 1:10.
» Dairy products, where culturally appropriate, may be included if they do not exceed the fat recommendations.
» Salt from all sources should not exceed 6 g/day for adults.
» Alcohol consumption is not recommended. It should be restricted to < 5% of energy for men, < 2.5% for women.
» Perishable food should be stored in ways that minimize fungal and other contamination.
» Perishable food, if not consumed promptly, should be kept frozen or chilled.
» Safety limits should be established and monitored for food additives, pesticides, residues, and other chemical contaminants in the food supply.
» Safe, hygienic methods of food preparation and cooking should be encouraged.
» Production, promotion and use of tobacco in any form should be discouraged.

Based on WHO (1990); FAO/WHO (1994, 1998); WHO (1998c); World Cancer Research Fund (1997); WHO/FAO (1996).

priorities, developing implementation strategies and monitoring progress.

The vision of reducing malnutrition presents both a challenge and an opportunity to the United Nations today:

» a challenge—the goal of rapid poverty reduction has already been adopted at the *World Summit for Social Development* in 1995 and identified by the Secretary General and by many of the UN development agencies as a central goal for UN effort;
» an opportunity—because with the recent reforms agreed, the UN agencies now have the potential structure and commitment for working more closely together, globally and in support of country action. Accelerated improvements in nutrition on a worldwide basis are worthy of a special place within these new efforts.

The United Nations will need to play a key role if the goal of ending undernutrition by 2020 is to be realised and new integrated goals met on a regional and national basis. Supportive action needs to be worked out on a collaborative basis in such key areas as:

» international advocacy;
» support for country-by-country action, led nationally, involving many groups within each country, supported as appropriate by the international community and donors;
» a harmonization of support, analysis, monitoring and evaluation by different agencies. This will allow the resources to be used more effectively with a sharing of results and lessons learned.

Just as action against malnutrition will require action in many sectors, supported by professionals from a range of disciplines, so must the main UN agencies play their part in reducing malnutrition on a global scale. A strengthened mechanism is needed at UN level to ensure that its agencies can combine their best efforts. This is needed to ensure a totally coherent policy by different UN agencies, bilateral and international financial institutions and prevent the current disruption of local effort and national talent. In the next chapter the Commission sets out the stages needed for translating this vision into practical action.

7. Establishing a new agenda for change

This Commission was charged (Annex 1) with reconsidering why the world's burden of hunger and undernutrition is not being reduced more quickly despite all the impressive agreements and world summits of the last decade. In practice, the Commission has only been able to assess the nature of the problem and has not embarked on the next phase which is to develop a coherent plan for solving these problems with the involvement of the UN, national governments, NGOs and the private sector.

The Commission began by extending the analysis of the burden of poor nutrition on society. It developed a new paradigm for nutrition by highlighting not only the new double burden on society (whereby undernutrition and adult chronic diseases coexist within the same country) but also the link between maternal and childhood undernutrition and the subsequent propensity to diet-related diseases in an ageing population.

The Commission concluded that the goals set out by the UN agencies for reducing undernutrition do not go far enough. These goals imply an acceptance of current governmental and national policies and actions. These policies may be realistic but condemn many millions of children and adults to an unnecessarily handicapped life well into the future. Current plans also tend to neglect the emerging diet-related diseases which are beginning to overwhelm the health services of many developing countries.

The next challenge set for the Commission was to produce strategic guidelines for more effective policies and actions. It became clear from our preliminary survey of the UN effort and of national plans that there are four major tasks to be undertaken:

1. An assessment of the national policies and plans developed in response to the *International Conference on Nutrition* relating to both the Commission's new perspectives on nutrition and the need for accelerated action. This will require a novel UN process which evaluates these plans in an effective manner so that all the relevant UN bodies become aware of the plans and their own potential contribution. This assessment could be initiated by the ACC/SCN.
2. A new UN process for integrating programmes and effort. The Commission is aware of a number of uncoordinated approaches by different agencies. These sometimes seem to be based on institutional rivalry and different disciplinary and sectoral approaches rather than on collaboration and the development of a cohesive effort.
3. A new national mechanism for developing coherent policies in diet and physical activity. The Commission proposes National Nutrition Councils based on the success of Norwegian and Thai experiences and avoiding the pitfalls of the early Councils. The IUNS and UNU have particular responsibilities here.
4. The acceptance by the UN agencies, the World Bank, IMF and bilaterals that the National Nutrition Councils should be the focus for international linkages and support. The ACC/SCN could become responsible for promoting this recognition.

7.1 Developing regional and national policies

The Commission considers that taskforces need to be created to evaluate the nutritional problems first on a regional basis using UN mechanisms of support. The Commission was reinforced in its views by having the opportunity to take part in a South Asian workshop on nutrition policies organised in Chennai, India by the ACC/SCN in November 1998. An overview of this meeting is set out in Annex 3.

The regional meetings already being planned for Africa and the Americas, as part of World Bank initiatives, should be used to reinforce commitment and focus at country-level as well as to spread awareness of the possibilities of countries achieving much faster progress in reducing undernutrition. It would be useful in each region to have one or two presentations of country experiences in successfully accelerating action to improve nutrition, along the lines of the example

in Thailand or the programmes to eliminate iodine deficiency disorders and clinical vitamin A deficiency.

Following regional meetings, new approaches are needed whereby the UN agencies as a group, preferably with NGO and bilateral government involvement, meet with national governments to consider how best to support appropriate nutrition policies and plans. Once these policies and plans are developed, the same institutions then need to draw in the private sector and other groups. It is recognised that the UN agency with responsibility at a national level for co-ordination is UNDP. This welcomed development needs to be reinforced and extended. The World Bank has already embarked on a new initiative and a systematic development of programmes at a regional and national level which will reduce childhood undernutrition. New arrangements are needed to link these initiatives with those of other UN agencies.

Much of the practical benefit will come from giving inter-agency support for nutrition a new impetus and support at country level. The new mechanisms of the UNDP with the UN Development Assistance Framework (UNDAF) and the Common Country Assessment (CCA) provide the opportunity for this—so long as nutrition is brought fairly, squarely and strongly within it. This requires guidelines, support from the agencies for their implementation and a system for monitoring, country by country, to ensure that commitments are being met. How this system is developed will depend on the response of the senior management of the principal agencies involved in nutrition.

The Commission was dismayed to discover that some of the UN agencies involved in supporting a given country did not know anything of national plans developed by another agency even when these involved prime ministers or presidents. This communication failure and lack of integrated UN involvement is, in the Commission's view, unacceptable.

7.2 Improving UN mechanisms

The Commission recognises that major developments are under way to allow a more integrated UN approach to help solve national and regional problems through the system of UN reform. This is welcome. The Commission has also considered the role of existing mechanisms for interaction such as the ACC/SCN.

The Commission recognises that the ACC/SCN has performed an extremely useful function in bringing together representatives from many different organisations. Thus the series of *Reports on the World Nutrition Situation* have provided an invaluable analysis of regional trends in childhood undernutrition indicators and stimulated many further surveys as well as providing a basis for the development of the *International Conference on Nutrition*. Its many years of effort to report on *Managing Successful Nutrition Programmes* and *How Nutrition Improves* have been an exceptional stimulus to many countries. The ACC/SCN played a critical role in disseminating the first global plan for the elimination of iodine deficiency disorders in 1985 which led to the adoption of universal salt iodization as the key strategy. The ACC/SCN helped to move forward programmes to address vitamin A deficiency with publication, in 1993 and 1994, of a quantitative estimate of the impact of vitamin A deficiency on young child mortality as well as guidelines for vitamin A deficiency control programmes. Its continuing quarterly analyses of the nutritional well-being of refugees and displaced persons in conjunction with WFP and UNHCR and some 20 NGOs now provide a commendable focus on perhaps the most disadvantaged group in the world.

The Commission therefore considers the contribution of the ACC/SCN as an important catalyst in the process of change and global action to improve nutrition. The Commission has the clear impression, however, that some UN agencies see the ACC/SCN only as a mechanism for information exchange by UN agencies. The current mechanism and institutional support does not allow the ACC/SCN to play the UN role which will be necessary if greater progress is to be made. The Commission proposes that WHO, FAO, UNICEF and the World Bank should conjointly consider how to make the ACC/SCN a more effective mechanism for providing a UN focus for nutrition at a regional and national level in association with the UNDP. It is for senior management within the main agencies to consider how best to develop this new commitment.

7.3 National-level developments—National Nutrition Councils

Although international and regional measures will be important, action at the national level is critical. Targets and goals should be specified in relation to national circumstances. The mobilisation of national governments and local communities will be fundamental to success. To this end, it will be important to have in place national structures which promote an integrated approach to improving nutrition, to mobilising and involving local communities and to creating an interface between national and local levels.

The Commission analysed the need for enhanced action at the national level, considering past and present experiences. Historically National Nutrition Councils were set up to co-ordinate intersectoral programmes and projects defined by a national food and nutrition policy. Conceptually these councils were an appropriate means to address the complex problems related to food and nutrition. In practice

they failed to accomplish the promised co-ordination because government sectors resorted to confronting each other in their efforts to control programmes and budgets. In general, governments had tremendous difficulties in responding effectively to multi-sectoral problems.

The experience of Nutrition Planning and National Nutrition Councils of the 1960s and 1970s was discussed in 1971 at a conference on *International Nutrition Planning* held in Boston (Levinson et al., 1971). UN agencies such as WHO, FAO, UNICEF and the World Bank as well as donor agencies had promoted integrated action by funding governmental activities that included establishing these councils. Most of the National Nutrition Councils remained effective while outside support was provided but were not sustainable under normal national budgetary procedures.

Regional co-ordination of UN agency activities in support of food and nutrition policies was developed in the 1970s to an extent. For example, in Latin America, a co-ordinated inter-agency Programme for National Food and Nutrition Policies was established. Once again, although theoretically appropriate, in practice the central planning effort was extremely cumbersome, expensive and highly bureaucratic. It proved ineffective. National Nutrition Councils in Latin America were effective only under exceptional conditions: when political will at the highest level was strong, funding was plentiful, local institutional capacity was strong, and food and nutrition policy implementation was considered an integral part of national development policy (Scrimshaw and Wallerstein, 1982). In most cases the council lasted several years, but few were able to establish a space in the political process beyond the life-span of a government.

Present experience in Scandinavian countries and in a few other countries demonstrates that National Nutrition Councils can be effective. Key elements for success include a technical secretariat that draws talent from the government and the academic sector, a modest level of economic support and no dependence on the active participation of high-level ministerial officials. Ministerial officials can be excellent facilitators but cannot be expected to be actively involved in driving a programme forward. The active involvement of civil society is a necessary condition for effective and sustained action. Community participation in the planning effort is also crucial for successful programme implementation. Present trends in strengthening democracy and greater participation of people in local governments can help to promote and sustain social development programmes with significant food and nutrition components. The proposed human-rights approach—as opposed to a basic needs approach—to address food and nutrition problems of the community can also do much to catalyse and induce greater and more effective action by governments.

The Commission is keenly aware of the problems in best implementing food and nutrition policies, as well as the documented limitations of national councils. Despite these drawbacks, however, it considers that a renewed effort in establishing National Nutrition Councils with greater participation of civil society and NGOs could help reinvigorate action at the national and local level. Strengthening local capacity for programme and project implementation requires renewed efforts in advanced training of human resources at all levels (UNU/IUNS, 1997). These resources should include community leaders, project managers, trainers and researchers, the communication specialists necessary for advocacy, industry professionals, policymakers and planners, as well as political leaders.

One role of the National Nutrition Council would be to help governments fulfil their commitments to international law regarding the right to food and nutrition. Monitoring and reporting on compliance are essential components inherent in the human rights system to ensure transparency and accountability. Governments are obliged to report periodically on their human rights obligations. Their reports are considered, at the international level, by the respective committees set up for monitoring and supervision. These processes could be an opportunity for nutrition advocacy. Strengthening relevant reporting on food and nutrition issues may also act as an incentive to states to reconsider the effectiveness of their current policies, maintain appropriate surveillance, and take steps to meet their current food needs. Societal recognition of these rights and commitments will mean that governments are more likely to take steps to meet their obligations to respect, protect, and fulfil the human right to food and nutrition for all.

The specific details of how to implement effective National Nutrition Councils is beyond the scope of the Commission's work. We propose, however, that the international agencies, together with national institutions, discuss within a regional and/or subregional context how to develop effective councils. We acknowledge that much remains to be done in defining how to make them effective in practice within different political and social systems.

The Commission recommends that each member nation of the United Nations considers establishing or strengthening an existing National Nutrition Council to provide a mechanism for coordinating many different sectors' approach to policy formulation and an oversight of national programmes. This should assure synergy rather than a dissipation of effort. These processes need to be supported by national, bilateral, multilateral and UN agencies.

Such a Council could have the following composition:

Members:
» Concerned senior officers of government
» Academic experts concerned with applied nutrition and policy
» Representatives of:
  » civil society organisations
  » women's organisations
  » business and industry
  » mass media (printed and electronic)
» Representatives of bilateral and multilateral donors operating in the country in the field of nutrition

The National Nutrition Councils should be required to help develop national action plans, monitor the effectiveness of public-private initiatives and foster community-based action. The formation of a council will also help to promote inter-departmental co-operation within government. The council could assess all progress made in achieving targets and ensure that there is a proper match between programmes and resources. The need for mid-course corrections in strategies and field-level projects is well recognised but often not implemented. This is a major task for a National Nutrition Council.

The Council should be able to place nutrition on a much wider agenda than has been the case. A totally new national leverage should emerge, encompassing board targets for nutrition advocacy. A broadening group of analysts and practitioners would advance the message and mission of nutrition through the perspective of human rights.

In addressing food and nutrition problems through a human rights-based approach, the National Nutrition Council would:
» strengthen national nutrition monitoring and surveillance systems;
» improve methods of analysis and expand this analysis to include issues of accountability for different programmes;
» contribute to improved national reporting on the nutrition situation;
» promote national endorsement of an 'International Code of Conduct on the Right to Adequate Food';
» promote dialogue between the nutrition and human rights communities. This will strengthen both communities and help provide knowledge-based and operational skills needed to advance the human right to food and nutrition.

In countries with a federal constitution and functional democratic institutions at the grass-roots level it would be useful if state and district level nutrition boards could be formed. These boards could help promote broad-based coalitions of all those concerned with fighting malnutrition. A major aim of these boards would be to convert generic national or state-level programmes and targets into local initiatives based on prevailing socio-cultural and socio-economic conditions. These boards can help to impart a horizontal dimension to the numerous vertically-structured programmes which influence nutrition.

7.4 Linking national policy developments and actions to international support

Many national action plans for nutrition have been prepared with assistance from one or more international agencies. However, there seems to be no established process to allow one country to learn from another's success and no procedure for ensuring that different international groups support national improvements synergistically rather than competitively. Should the development of National Nutrition Councils be met with enthusiasm, then previous experience suggests that they could benefit from international links. The UN agencies concerned with nutrition need to develop effective processes to promote regional intersectoral analyses and support for national endeavours.

7.5 Key international issues relating to nutrition

There is a need to protect public health in a global economy. Improvements will not occur unless bodies relating to the ACC/SCN see it as their responsibility to advocate a shift in international and governmental attitudes. This is a particular responsibility for WHO, FAO, UNICEF and the IUNS. The Commission considers that there are three areas in which action needs to be accelerated.
» National governments and international agencies must ensure that nutrition is maintained as a first priority during times of economic hardship, including adjustment periods. This is not only ethically appropriate but makes sound long-term economic sense. The capacity and well-being of future generations should never be sacrificed in the immediate financial response to emergencies.
» The focus of the international finance community should now be on pro-poor structural adjustment giving much higher priority to the human aspects of development. Structural changes should also improve the access of poor people to opportunities for growth and development. International support should include better focused aid, more open markets for African agricultural exports, and debt relief. Safety nets are required that do more with less—by being more self-targeted, more focused on skills development, with more community co-financing and participation are required (Haddad and Zeller, 1997).
» The 20/20 Initiative should be fully implemented. This Initiative sets a goal for 20% of national government budgets and of donor aid budgets to be

allocated to basic social services. UNFPA, WHO, UNESCO, UNICEF, UNDP and the World Bank have estimated that $70 to $80 billion, on top of the currently estimated allocation of $136 billion, is needed to meet the 20/20 goal.

The Commission has benefited greatly from interactions with the membership of the ACC/SCN and of its Advisory Group for Nutrition. A host of questions, potentially useful developments and options for action have emerged. However, the Commission recognized early on that to do justice to the very different needs of countries in Asia, the Middle East, Africa, Latin America and Central and Eastern Europe sustained, detailed analyses at regional and other national levels over several years is required. The time, support and expertise available to the Commission made such analyses impractical so the Commission has assigned some of the options for action to an annex (Annex 4). Only if new, coherent, sustained interagency programmes of analyses and support for regional and national initiatives are now developed will there be any chance of meeting the challenge and vision set out by the Commission.

7.6 Conclusions and priorities

1. Elimination of malnutrition should be made a major focus of national strategy and economic and social policy in developing and developed countries. This means:
   a) formulating clear national goals for eliminating all the main forms of malnutrition by specific target dates, in line with existing global goals;
   b) preparing a strategy for achieving these goals linked to the follow-up commitments and processes specified by the global conferences of the major UN agencies;
   c) incorporating these goals into all related sectoral action for food production, health priorities, child care and poverty reduction.
2. Donor governments, as part of the 20/20 Initiative and its commitments, should offer to establish country-by-country compacts with interested governments. Under these compacts, governments would indicate their targets and strategies for accelerating action for nutrition. The compacts should indicate the resources required, as well as the proportion to be raised from local resources and the proportion from donor agencies. As part of the compact, donor governments would offer to provide sustained support so long as the developing country remained on track.
3. The World Bank and the IMF should be requested to issue a policy document indicating how progress towards nutrition goals could be maintained and supported as a priority during programmes of structural adjustment and debt repayment, especially of the heavily indebted poor countries (HIPCs).
4. Support is needed to improve national statistical systems for collection, analysis, publication and appropriate use of data on nutritional status and trends. Attention to nutrition and behavioural practices should now be included in economic analyses.

Regional task forces should be established to consider ways and means to reach people from community members to policy makers in order to encourage accelerated actions towards improving nutrition. Comprehensive and social mobilisation approaches through mass media, traditional media and interpersonal communication need to be encouraged.

Annex 1

The establishment and membership of the Commission

The Commission was set up by the ACC/SCN following discussions with participating UN agencies, bilaterals and non-governmental organizations and others at the 24th ACC/SCN Session in Kathmandu, Nepal in March 1997.

The Commission was asked to consider how best to meet the nutrition challenges in the 21st century, and to consider the role that the UN should play in meeting these challenges. A review of the global prospects in relation to nutrition was clearly needed, recognising:

a. the exceptionally high rates of childhood undernutrition in South Asia and, despite evidence of some improvement, a possible slowing in progress such that child undernutrition could be expected to affect many millions of children for decades to come;
b. the absolute deterioration in nutrition in Sub-Saharan Africa, with little prospect of appreciable improvements;
c. that these disturbing features had become apparent despite the rapid progress that is being made in combating clinical vitamin A and iodine deficiency disorders.

The objectives of the work were set out as:

a. to take stock of the achievements and the failures regarding world nutrition and to describe how the UN system has contributed to these achievements and failures;
b. to review the challenges facing member states in the 21st century and the opportunities to overcome them;
c. to define the collaboration, services and activities that the member states should expect and would need from the UN system to meet these challenges; to identify priority support needs;
d. to identify ways to co-ordinate between and among UN agencies, as well as between UN agencies and member states, for the purpose of responding optimally to the challenges;
e. to discuss ways to enhance commitment and interest in nutrition by governments, UN agencies, donor agencies and development banks;
f. to describe the role of the SCN in this process.

Procedures

Preliminary discussions took place in Montreal in July 1997 when a formal announcement of the establishment of the Commission was also made to the International Union of Nutritional Scientists Congress. Nutritionists were invited to contribute and to expect repeated involvement as the Commission's work progressed. The Commission then met in London in September 1997, January and February 1998, and in Oslo in April 1998. The Commission's expanded membership followed preliminary discussions about how best to respond to the Commission's task. The membership of the Commission is given below.

Within weeks of the Commission's first meeting, a number of UN and other international agencies had produced their own perspectives on the nutritional challenges for the next 20 years. These included the following:

1. FAO's *World Agriculture: towards 2010*. A draft of FAO's analysis of food requirements and population growth was also provided,
2. IFPRI's closely related 2020 vision for food, agriculture and the environment,
3. FAO's Prospects for the *World Food Situation on the Threshold of the 21st Century*, June 1997,
4. WHO's Draft Policy Document on *Health for All in the 21st Century*. This was considered in Helsinki in November 1997;
5. UNICEF's *The State of the World's Children, 1998* with its focus on nutrition,
6. The Human Development Centre's report from Karachi on Human Development in South Asia, 1997,
7. World Bank Sector Strategy for Health, Nutrition and Population, November 1997.

The membership of the Commission is as follows:

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The Commission was supported by Research Assistants based within the Public Health and Policy Section of the Rowett Research Institute, Aberdeen: Ann Ralph and Nina Seres with additional help from Colette Backwell and Jean James, and Karen McColl in the Public Health Nutrition Unit, London School of Hygiene and Tropical Medicine

Annex 2

Existing nutrition goals which should be maintained, developed or refined

World Summit for Children 1990

» reduce undernutrition among children under five to half of the 1990 rate by the year 2000
» reduce rate of low birthweight to less than 10%
» reduce iron deficiency anaemia in women by one-third of 1990 levels
» eliminate vitamin A deficiency by 2000
» virtual elimination of Iodine Deficiency Disease (IDD) by 2000
» empower women to breast-feed their children for the first four to six months of life and to continue breast-feeding into the second year
» institutionalize growth monitoring and promotion in all countries
» disseminate knowledge and supporting services to increase food production and ensure household food security.

International Conference for Nutrition 1992

Elimination of death from famine

World Food Summit 1996

Reduction in the number of food insecure people to half the present (1996) level by 2015

OECD Development Assistance Committee 1996

Reduce by half the proportion of people living in extreme poverty by 2015

Human Development Report 1992

20% of government budgets and 20% of donor aid budgets to go to basic social services, the 20/20 Initiative

Annex 3

Ending undernutrition in India by 2020

A report on a meeting of the Commission with Asian nutrition advocates, managers and scientists held in Chennai 23–24 November, 1998.

Prepared by staff of the MS Swaminathan Research Foundation

Qualitative and quantitative dimensions

Developmental transition in India has been taking place over the last 50 years since independence. We have moved from the famine situation of the 1940s to one of self-sufficiency in food production, at the prevailing level of purchasing power, due to major initiatives like the Green Revolution. However, we still have over 200 million children, women and men in our country who are undernourished.

The question that arises is whether developmental transition resulting in increased food availability has translated into nutritional transition characterised by opportunities for a productive and healthy life for all. If not, is there a need for a change in strategy? Changes have been taking place, but they have made the nutrition problem greater than ever in the context of development.

Four stages of nutritional transition can be identified during the course of development in a country*:*

Famines

This was the stage that India was in just after independence (1949). Food grain production was insufficient to meet the country's needs. Survival strategies were required. There was also a need to decrease infant mortality rates and calorie shortages through initiatives such as the Green Revolution for augmenting food production.

Famines under control

This is the stage when a nation moves from a high prevalence of clinical undernutrition to moderate undernutrition, resulting in phenomena like intrauterine growth retardation and stunting. As far as India is concerned, only the tip of the iceberg of undernutrition has been eliminated**.**

Normalcy

This is the stage when a nation achieves a degree of nutritional stability and increased productivity.

Over-nutrition

This is the affluent stage when dietary imbalances set in and faulty lifestyles lead to chronic diseases.

India is now moving to a stage beyond basic child survival. It is in the second stage of nutritional transition i.e. moderate undernutrition, and needs to move quickly out of this. In the transitional stage not all sections of the population move together in the same way. On one hand there is a burgeoning middle class due to acquired affluence by the group born in poverty. On the other hand there is a population that suffers from moderate undernutrition. We are burdened with problems at both ends of the spectrum. What we need, therefore, is to adopt strategies that go beyond survival.

After independence, the country needed survival strategies. The application of health technology through measures such as oral rehydration therapy reduced infant death rates. The Green Revolution resulted in increased per capita calories, and famines disappeared. However once the first stage was conquered policymakers become complacent. They need to be alerted to the second stage, since this relates to human productivity. We must move to the next stage quickly in order to improve the quality of the Indian peoples' life.

A series of measures need to be adopted for the country as a whole. There is a need to go beyond chronic starvation to ensuring the nutritive quality of food. In India, where most of the population is vegetarian either by compulsion or choice, this is an important measure. Pulse production, which has decreased over the years, needs to be increased, as does the production of fruits and vegetables. There is great scope for research in the areas of food and micronutrient availability.

The major problems that demand attention today are low birthweight in infants, and iron, iodine and vitamin A deficiencies. The problem of low birthweight is an issue of concern. Low birthweight is common in India. This results in slower growth. In the past, many infants with low birthweight succumbed to diarrhoea and respiratory infections. However, due to the improved management and control of such infections in recent years, there has been a steep decrease in child mortality in poor communities. From 146 infant deaths per 1,000 live births at the time of independence, child mortality has almost halved to 71 per 1,000 in 1997.

Child survival, however, is not synonymous with good child nutrition; the inputs needed for the latter are far greater and need to be more sustained than those for the former. Decline in child mortality without a corresponding improvement in child nutrition has resulted in an expanding pool of undernourished survivors, and this is reflected in the high prevalence of stunting in under-fives in poor communities.

The problem of low birthweight cannot be looked at in isolation. There is a need to look at the nutritional status of the mothers, which in turn is linked to their status in society and the degree of empowerment that they enjoy. Improving maternal health and ante-natal care, especially during the first and second pregnancies should be considered a mother's right.

In the post-independence era, the nutritional deficiency diseases have disappeared, giving way to hidden hunger or micronutrient deficiencies. Though stunting was once attributed to protein energy undernutrition or PEM, the role of micronutrients such as zinc, iron and folic acid is now also recognised. In many instances micronutrient deficiency might be the first limiting factor to growth. With the gradual correction of gross energy deficits in diets, micronutrient deficiencies may emerge as the major factor responsible for growth retardation in poor communities.

The role of good nutrition in healthy ageing is another issue of concern. Increased life expectancy has led to a large elderly population. Therefore management of the elderly population forms an important aspect in formulating any strategy towards ending moderate undernutrition.

There is a need to strengthen nutrition research capability by building more laboratories. Research findings need to be translated into policy, into programmes, and then back to research in the field. Developing countries need to have resources to make their own decisions and to resist approaches of the developed countries. Solutions to the problem of undernutrition can come only through local action and cannot come from outside sources.

India emerged from colonial rule with a heavy backlog of under-development. It is not yet totally free from the legacies of the colonial past or of the effect of an inequitable world economic order. However it has successfully engineered and ensured that at least food grain availability kept pace with population growth—no mean achievement. This remarkable change was brought about not through programmes consisting of the distribution of synthetic vitamins, drugs or special formulation but through improvements in the traditional diets of the people and through parallel improvements in their socio-economic and health status.

Policies for combating undernutrition must be firmly rooted in a food-based rather than a drug-based approach. We need the help of farms rather than pharmacies for the solution of our nutrition problems. This can be achieved through greater linkage between agricultural research and nutrition research. Nutrition research laboratories and institutions need to be partners with agricultural and women's universities in order to bring about changes and synergy in agricultural policies and food production. Thus the country would be empowered to have a food base that attacks moderate undernutrition.

Lessons learnt from ongoing programmes

India, and in particular Tamil Nadu, has had a long, rich and varied tradition in implementing health and nutrition programmes. The Integrated Child Development Services Programme (ICDS), aimed at improving the nutritional status of pregnant and lactating mothers as well as fostering improvement in the nutritional status of children up to six years old, is implemented throughout the country. The primary healthcare system and several health intervention programmes at the grassroots level aim at improving the health of the population in general and that of the mother and child in particular. Noon meal programmes in schools have tried to address the problem of undernutrition in school aged children and in reducing drop-out rates from schools.

While these efforts have not entirely succeeded in reducing undernutrition on a large scale, the valuable lessons learnt from these experiences have provided important insights into prioritising activities and in adopting a multi-pronged approaches.

1. The ICDS was initially conceived to foster better growth and development in children up to six years old. However, the programme largely focuses on children above the age of three years and is not equipped to cater to the needs of children younger than two years of age.
2. With a well-designed programme it is possible to eliminate severe undernutrition. However, causes of undernutrition vary from one area to another. In the Indian State of Orissa, for example, causes ranged from inadequate care due to both the parents being involved in income-generating activity, to malaria

and poverty. Therefore a common blueprint for action cannot be recommended as a solution to the nutrition problems of the country as a whole.

3. Eliminating severe undernutrition might be an objective in emergency situations; however, the problem of mild to moderate undernutrition should be tackled on a long-term basis. This can be done only through addressing the needs of women, who are the primary caregivers to children.
4. In general there is very poor appraisal of the social causes of undernutrition. Thus services need to be modified to respond to the changing situation.
5. Eliminating undernutrition is not a priority on the political agenda. At the moment the problem is visible only to professionals and not to politicians. There is a need to convince policy-makers, through cost benefit studies and sustained advocacy, about the importance of investing in early intervention programmes which lead to substantial saving on supplementary feeding at a much later date.

Suggestions for an action plan

The primary focus of attention is adolescent girls, who are the mothers-to-be, and pregnant and lactating women. The vulnerable period in the life-cycle is from conception to two years of age, and so includes the pregnant woman, the breastfeeding mother and her child. Prevention of low birthweight is an important aspect of improving nutrition. While breast-feeding is still a common practice, complementary feeding practices are poor and need to be addressed through appropriate communication channels.

The efficiency of the delivery of services needs to be improved. No progress in child health can be achieved unless undernutrition is eliminated. Common elements of success and failure in different parts of the country need to be discussed before changes and policies are made. More innovative, region-specific short-term measures, with a sharp focus on high risk, are needed. Outreach of medical facilities and the manpower base at the grassroots level is poor and needs to be improved. There needs to be improved co-ordination between doctors and nutritionists in programme implementation. There is an urgent need to reduce childhood morbidity rates.

Since its inception in 1974, the ICDS programme has not changed in response to changing needs. Restructuring the ICDS is essential to improving the programme's efficiency. Training and communication support to the workers is essential in order to improve the quality of services. Changes which aim at reducing the time spent on administrative work by functionaries, such as reduction in the number of records to be maintained, and providing incentives would go a long way in improving the quality of services provided.

There should be a population-based approach to improving the nutrition problem in India because the number of afflicted people is very high. There should also be better appraisal of adult undernutrition and the problems of the emerging affluent class.

While achievement in food security at the national level is impressive, at the household level it still is not satisfactory. A mix of strategies, both long-term and short-term, is needed. The long-term goals should aim at influencing agricultural and food policies towards an equitable distribution of resources, while the short-term ones could include measures such as double fortification of salt with iron and iodine.

Fortification technology should be affordable. Synergy between various sectors such as Government, NGOs and private bodies is essential. For example, in less than 10 years the global community has succeeded in providing iodised salt and addressing the problem of iodine deficiency. This was possible only because of the co-ordination between government and private agencies.

In order to solve the problem of undernutrition there is a need to look for solution beyond food. Non-nutritional problems which cause undernutrition need to be addressed on a priority basis by fostering convergence and synergy among different sectors. Adequate sanitation, innovative approaches for improving horticulture and a specially targeted public distribution system for the disadvantaged should receive priority attention. Development initiatives such as low-cost investment in bio-manure and recycling of waste for energy production need to be extended.

Safe drinking water, which plays a vital role in the prevention of gastro-intestinal disorders, should be easily accessible and freely available to the population.

The prevailing systems for monitoring and surveillance in any programme, and the priority accorded to these issues in any action plans, are inadequate and need to be improved. There is a need to indicate the processes through which changes are attempted.

Social mobilisation needs to be attempted on a large scale to generate community awareness for better articulation of demands and to enable the public to participate and deliberate on the services provided.

Child-care support for women is an important issue in empowering women to take care of children. Most women from the lower socio-economic categories are employed in the informal sector which has no provisions for child-care services. Many of the children are under the care of older siblings while their mothers are away at work. If the mother is away at work and is unable to provide complementary food the child may become nutritionally deprived.

Micro-credit interventions at the village level through self-help or women's groups help women to gain a better status within the family. Providing credit to women's groups for consumption or for produc-

tion would result in increasing their income, which would have direct bearing on the nutritional status of the family. Women belonging to these groups could also be targeted in nutritional and non-nutritional interventions.

Implementation structures

In India there are a number of development programmes being implemented by various governmental departments. However, in most cases there is no coordination in implementation; in many cases, the target groups are not even aware of their entitlement. The poorest among the poor get left out of the programmes and the benefits reach only the relatively well off among the poorer sections.

Effective implementation needs to ensure that all programmes reach those for whom they are meant. This can only be achieved through information empowerment. One strategy for ensuring effective implementation of all development programmes at the grassroots level could be through a household entitlement card.

The entitlement card, listing all the development programmes for the region—by age, gender and occupation—could be made available to the Panchayat at the village level for distribution to the poor households. It would help in empowering people with information about developmental programmes. It would demystify the complicated bureaucratic process of applying for assistance, and make it closer to the people.

The system of decentralisation through the Panchayat Raj system could be another method of improving implementation of various programmes. Panchayat Raj brings democracy closer to people as it consists of elected representatives chosen from the local area who tackle issues of local concern. Since 33% of the Panchayats are women, involving them in implementation of programmes for women and children would result in better functioning. Panchayat Councils for the Elimination of Malnutrition should be set up at the village level in order to tackle the problem at the regional and local level.

Measurement and monitoring tools

The implementation of various programmes and their impact on the nutritional status of the population should be systematically monitored and evaluated. Beginning with maternal mortality rate, several indicators for assessing progress in children's health and nutritional status can be used.

» Maternal mortality rate would indicate the availability of safe motherhood practices and obstetric care within the healthcare system.
» Infant mortality rate is reflective of the morbidity pattern, overall health care facilities, feeding practices and the socio-economic situation of the family.
» An imbalance in the male-female sex ratio would be suggestive of survival threat to the girl child in the form of selective abortion, infanticide or neglect.
» Low birthweight of children would be a measure of assessing the poor health and nutritional status of mothers and intra-uterine deprivation for the fetus.
» An increase in the average life span is indicative of improvement in the quality of life and standard of living.

Annex 4

Issues to be considered by regional and national meetings

In this annex we deal, in turn, with a number of issues which will need to be considered by regional meetings and members of the SCN:

» Strengthening the base for action at the national level
» Capacity building
» Reinforcing the 20/20 Initiative
» Priorities for action
» Multi-sectoral approach
» Targeted vs. population approaches
» Emphasis on prevention: start early for optimum short- and long-term benefits
» Pre-conceptual nutrition and ante-natal care
» Breastfeeding and complementary foods
» National political commitment to improve maternal and child survival
» Social policies for improving nutrition
» Safe water and sanitation
» Moving to a regional approach for action

Strengthening the base for action at the national level

» Strengthening the base for action within a country requires a sequence of events, all of which are needed if effective progress is to be made. These are:
» Ensuring adequate national capacity for handling the complex issues associated with improving the education, health and welfare of the population.
» Establishing an appropriate policy and institutional framework to develop strategies and drive forward integrated action.
» Determining the priorities for action based on analyses of the specific needs of the country and its regions. This should include integrating the lessons of indigenous knowledge about food.
» Integrating strategies to allow a coherent plan to be developed and implemented—using community involvement together with government, academia and the private sector.
» Developing realistic targets for organisational, infrastructure, policy, dietary and other changes needed to achieve defined health goals.
» Engaging governments through political processes which ensure continuing commitment to the selective support of the disadvantaged in society.
» Ensuring monitoring systems which allow an assessment of the effectiveness of new measures.

Capacity building

One of the key areas for action in the future should be building sufficient nutrition expertise and operational capacity within countries to implement the necessary programmes. This kind of capacity building is fundamental to sustainable nutrition policies.

There is also a need for a coherent global approach to capacity building. Developing expertise and operational capacity within countries must be a key priority for the future. UN agencies, particularly the United Nations University (UNU), and the International Union of Nutritional Sciences (IUNS) should play a key role in promoting local capacity building, with the help of bilateral funding and other UN agencies.

IUNS has already held one workshop on promoting local capacity building in Manila in 1996. Together IUNS and UNU also held a follow-up regional workshop in June 1999 in Cape Town, South Africa; they anticipate further regional workshops for Latin America (collaborating with Pan American Health Organization), Asia and Eastern Europe. All these workshops are planned collaboratively with regional planning groups, the primary outcome being a 10-year action plan. The Commission strongly supports this initiative and urges that sufficient funds are made available.

The Commission therefore recommends that IUNS take the initiative in promoting, with national academic societies, the need for academic initiatives and the establishment of National Nutrition Councils. The IUNS is currently being reorganised, so the Commission proposes that IUNS be asked to undertake a special role as part of its promotion of international

expertise in nutritional sciences. The standing of the nutritional science community will be enhanced if it is seen to apply its knowledge in a coherent way and for the benefit of society. This can be done by promoting and becoming involved in a National Nutrition Council, with the authority and accountability to parliament which denotes the newly recognised importance of nutrition to all societies. To do this IUNS will need to call on experience in established Councils and seek new ways of ensuring the practical application of new knowledge.

Capacity building strategies need to include training, human resource development, strengthening of the infrastructure for nutrition policies within states, and implementation of comprehensive national strategies. UN agencies should play a major role in facilitating this process.

It is important that:

» Capacity building includes novel ways for linking centres of excellence as part of a network that includes the principal resources of expertise in North America and Europe. This is a need to which the IUNS should contribute.
» The UNU is embarking on such a programme. Novel ways are needed to link expertise in many different scientific, medical, agricultural, social and economic areas.
» New approaches should be developed to interlink funding initiatives involving governments e.g. the US and EU, with major foundations such as the Wellcome Trust, the Rockefeller and Ford Foundations.
» More emphasis is put on capacity building at the organisational level. This is important in reducing the turnover rate of well-trained individuals from local nutrition organisations.

Reinforcing the 20/20 Initiative

The Commission commends the 20/20 Initiative. This Initiative should be fully implemented, and donor countries should also honour their commitment to providing development aid to the value of 0.7% of their GNP.

Specifically in relation to nutrition and health and maintenance of the investment in health education and social policies:

a. The IMF and the World Bank should be asked to build into their guidelines for adjustment programmes a specific and explicit provision for protecting the nutritional safety of children and for the other vulnerable groups in society, e.g. pregnant and breast-feeding mothers.
b. National governments should be asked not to cut their budgetary allocations for poverty alleviation and nutrition programmes.
c. Monitoring of adjustment should include public reporting on nutritional trends as well as the health and educational opportunities of the population. The emerging consensus on these needs should be reinforced by the G8 financial leaders.

Priorities for action

National and regional priorities for action need to be set in relation to the magnitude of the problems and taking account of their associated risk factors. Such an approach is set out in Table A1 (at the end of this Annex). This scheme has been applied to a range of major deficiency diseases, with four levels of population risk being selected. This approach is based on that developed recently by the US Institute of Medicine (1998). Different national plans of action are set out appropriate to each level of population risk. It is vital to integrate policies so that measures for dealing with iodine, vitamin A and iron deficiencies are linked, to maximise benefit and limit costs.

There is a need to assess other diseases and risk factors now prevalent or emerging as major issues, might be included in single co-ordinated approaches. Existing actions plans often involve very high level decision-makers and are geared primarily to one set of deficiency problems. The challenge is to extend and integrate these programmes so that all UN agencies can be involved and include the range of societal challenges now set out, for example, in Tables A1 and A2.

Table A1 sets out a possible set of criteria which national governments, perhaps in conjunction with UN-led regional meetings, should consider using when defining congruent strategies at a national level. Table A2 then illustrates potential linkages between the needs for combating prevalent micronutrient deficiencies and strategies for dealing with the other dietary diseases. By progressing through these analyses, a series of specific measures and targets may be formulated leading to a government or international plan for an integrated programme of action. The values and approaches are, for the present, simply inserted to help focus discussion and to illustrate the potential synergy which could come from these new national strategies.

Multi-sectoral approach

The agenda for action needs to incorporate the many components of societal change. It is increasingly recognised that achieving improvements in health requires action in a wide range of government policy areas. This approach is embedded in WHO's Health for All for the 21st Century global health policy and increasingly in national policies. Those seeking improvements in

Table A1. An approach to defining the level of population risk based on sub-clinical signs of micronutrient deficiency and on indices linked to long-term ill health

Level of population risk	Average seasonal weight loss (kg)[a]	Percentage of the population affected										
		Women's low BMI[b]	Low birth weight[c]	Stunted children[d]	Iodine deficiency	Vitamin A deficiency	Iron deficiency	Visceral obesity[e]	Coronary heart disease: average blood cholesterol[f]	High blood pressure[g]	Stomach cancer[h]	Large bowel cancer[i]
IV (severe prevalence)	> 3	≥ 40	≥ 25	≥ 40	> 99[j]	≥ 20[k]	≥ 80[l]	≥ 20	> 6.0	> 20	> 40	> 30
III (moderate to severe prevalence)	≥ 2 to < 3	≥ 30 to < 40	≥ 10 to < 25	≥ 20 to < 40	≥ 50 to < 99	≥ 10 to < 20	≥ 50 to < 80	≥ 10 to < 20	5.0 to 6.0	> 15 to 20	≥ 20 to < 40	≥ 20 to < 30
II (mild and widespread prevalence)	≥ 1 to < 2	≥ 20 to < 30	≥ 5 to < 10	≥ 10 to < 20	≥ 20 to < 50	≥ 2 to < 10	≥ 30 to < 50	≥ 5 to < 10	4.0 to 5.0	10 to 15	≥ 10 to < 20	≥ 10 < 20
I (mild and clustered prevalence)	< 0.5	≥ 10 to < 20	< 5	< 10	< 20	< 2	< 12	< 5	< 4.0	< 10	< 10	< 10

Note: This scheme is based on that proposed by the US Institute of Medicine (1998). The limits used are the Institute's for subclinical micronutrient deficiency. The others are provisionary and for discussion and analysis by UN agencies and Governments.

a Based on Ferro-Luzzi *et al.* analyses (1994). These values are inserted to illustrate but Ferro-Luzzi proposes a more intense index of absolute weight but taking account of the pre-existing BMI.

b This is proposed based on FAO's analyses of BMI in women of >18 years (see Shetty and James, 1994 and James and Francois, 1994)

c Based on birth weights of < 2500 g as listed in UNICEF's *The State of the World's Children*, 1998

d Stunted children aged 1 to < 5 years defined as below –2 SD of height-for-age using the WHO reference

e Defined as % of population with ≥ 1.0 ratio of waist:hip circumferences in men and ≤ 0.8 in women and not on basis of Caucasian waist measurements alone as given in the *WHO Obesity Report*, 1998

f Average total blood cholesterol levels in mmoles/l in adults aged 40–60 years

g Blood pressure limit taken as 140 systolic and 90 diastolic

h Cancer incidence rates, age standardised per 100,000

i Colon cancer incidence data usually includes rectal cancer so the combined value is used

j Subclinical iodine = prevalence of median urinary iodine values < 100 micro g/L

k Subclinical vitamin A = prevalence of serum retinol levels ≤ 0.7 micro mol/L

l Subclinical iron = prevalence of iron deficiency indicator below cut off (usually serum ferritin)

Table A2. A potential scheme for the preferred initial approaches to prevention and control of dietary disorders in populations. This Table illustrates the benefits of different interventions for level IV prevalence problems only

Prevalence level IV												
		Condition/deficiency										
Intervention		Seasonal weight loss	Women's low BMI	Low birth weight	Stunting	Iodine	Vitamin A	Iron	Coronary heart disease	High blood pressure	Stomach cancer	Large bowel cancer
Supplementation	Targeted	+++	+++	++++	++++	++++	++	—	—	—	—	—
	Universal	+	++	++	++	—	++++	++++	—	—	—	—
Fortification	Targeted	—	—	++	—	—	+++	+	++	++	—	—
	Universal	—	—	—	—	+++	—	—	++[d]	++[e]	—	—
Food-based approaches	Nutrition education	++	++	++	++	+	++	+	++++	++++	++++	++++
	Food production	+++	++++	+++	+++	NA	+++	++	++++	++++	+	+
	Food-to-food[†]	++	+	+++	++	—	++++	++++	++++	++++	++++	++++
Public health health measures	Immunization	—	—	—	++++	—	++++	++++	—	—	—	—
	Parasite control	—	++	++	+++	—	++	+++	—	—	—	—
	Healthy water/ sanitation	—	+++	+++	++++	—	—	+++	—		++++	—
	Transport policies	+++	++	++	+	—	—	—	++	++	+	+++
	Diarrhoreal disease/ acute respiratory infections	++	++	+	++++	—	+++	+++	—		+++	—
	Personal sanitation/ hygiene	++	+++	+++	++++	—	++++	++++	—		++	—
	Activity facilities	++[b]	++[a]	++[c]	—	—	—	—	++	+++	—	+++

Note: This scheme for level IV, i.e. high prevalence rates, is based on the US Institute of Medicine's (1998) analysis of the prevention of micronutrient deficiencies. The scheme has been extended to other dietary problems. Transport and physical activity facilities for leisure activity in the community and at work have also been added. ++++ very strong emphasis, +++ strong emphasis, ++ moderate emphasis, + light emphasis,—no emphasis.

a Low BMI may be exacerbated by the demand for work, e.g. carrying water, harvesting; improved facilities and tools may limit underweight by reducing the demand for energy expenditure

b Seasonal weight loss may depend on strategies to limit women's exercise demands.

c Novel selective community action may be needed to protect women, particularly in late pregnancy, from excess work.

d Folic acid fortification will reduce high levels of blood homocysteine levels and limit the risk of low birth weight as well as neural tube defects: in addition it potentially reduces the risk of cardiovascular disease.

e Potassium/sodium substitution should be a strategic approach to food processing in societies with prevalent high blood pressure.

nutrition need also to recognise potential synergies with other policy goals—within or outside the health sector. Many of the agricultural and food security issues raised in Chapter 4, for example, also relate to protection of the environment.

Similarly, action is required at various different levels. International agencies and central government clearly have important roles. The input of local government and, most importantly, local communities is also vital.

Thus, for example, in India where adult underweight is prevalent a range of strategies will be needed. Relevant policies include agricultural development, land reform, rural development and social policies, empowering women, educational policies and the provision of ante-natal health care. Strategies for limiting the very high anaemia rates also require a major new effort on sanitation. Agricultural strategies will also need to include potentially major adjustments to enhance meat and milk production without increasing cereal use. Nutritional health policies also need to recognise the danger of any measures which promote and increase dietary fat production and consumption as a means of combating inadequate food intake. The agricultural priority should be to promote the production and use of nutrient-dense foods.

The need for regional and national approaches to these problems becomes evident when comparing the potential measures needed to combat deficiencies or disorders which may dominate in one society but not in another. Table A2 sets out the approaches needed for highly prevalent conditions. Thus, in countries where women have a low body weight there needs to be a strategic focus on the welfare of women during pregnancy. This priority does not obviate the need to deal with all women's undernutrition, but the impact of pregnancy in undernourished mothers has an intergenerational effect which is clearly a priority. Similarly, high rates of stomach cancer in Japan can best be reduced by a national move to limit the consumption of salted and fermented fish.

Until now, policy-makers and the public have considered the correction of deficiency diseases as fundamentally different from those measures needed for combating the epidemic diseases of adults such as obesity, adult-onset diabetes, heart disease, stroke and cancers. Deficiency diseases are societal concerns whereas the chronic diseases of adults are often seen to be an individual's responsibility to avoid dietary excesses. This disjunction in approach fails to recognise the scientific evidence on the nutritional basis of adult chronic diseases. The average blood cholesterol level of adults in a European or Scandinavian country, for example, was and often still is nearly double that found in Japan. Thus the vast majority of the population may need to change their diet; individualised approaches fail to recognise the societal issue. The individual approach neglects 15-year-old concepts which recognise the far-reaching impact of modest changes in individual health on the national burden of disease if a substantial proportion of the population is affected. The individual approach also assumes a preventive strategy based on personalised health education which US experience has shown to lead to a greater disparity in the health of different groups than in any other Western society where more coherent public health strategies are used.

The evidence on combating the deficiencies and disorders listed in Tables A1 and A2 is increasing rapidly. It is clear that substantial improvements can be made if national governments recognise the immense economic and societal benefits that can come from taking population-based approaches to these problems.

The agenda for action, therefore, should be based on the following principles:

» a multi-sectoral approach to improving nutrition and public health
» application of this integrated approach at all levels —international agencies, central governments, local government and within local communities
» strategies adapted to regional, national and local needs
» coherent public health strategies to combat NCDs; these should not focus solely on individual responsibility or rely on health education alone.

Targeted vs. population approaches

Targeted approaches can play an important role in improving national health in three ways. First, there is targeting of special groups where the societal mechanism allows cohesive action to be applied—for example, school meals for children or measures designed for use in ante-natal clinics. Secondly, there is targeting of vulnerable groups, e.g. in parts of a country where the availability of vegetables and fruits is limited by agricultural constraints. Thirdly, there is the selective targeting of individuals with particular nutritional/health problems. This third approach involves some form of health screening system which presupposes a health service with the capacity to do this. This could include, for example, identifying anaemic children and women or identifying families with a propensity for diabetes. However, diseases such as cancer or obesity are better targeted by the population approach. Until low-cost methods of identifying selective at-risk groups are made readily available, such groups cannot easily be targeted with special measures. The Commission concludes that in general, population approaches are those that deserve the highest priority since they tend to deal with major national issues where co-ordinated action by government is likely to bring the greatest benefit.

Emphasis on prevention: start early for optimum short- and long-term benefits

It is clear that the emphasis for nutrition in the 21st century should be on improving early nutrition and ensuring that the next generation have the best nutritional start they can hope for. Strategies are required to improve maternal nutrition for the prevention of low birthweight and to improve the nutrition and care of 0–24-month-old infants, for the prevention of stunting. Effective strategies will bring considerable benefits in the short term and in the long term—both in terms of better health in adult life and for future generations. Multi-pronged strategies are required.

Eliminating childhood undernutrition should now be seen as a social and moral imperative. The costs and benefits of different approaches will vary. The Commission proposes, therefore, that during the next two years a series of analyses be undertaken to evaluate the likely costs and potential benefits of different possible approaches to tackling this problem, given the different national mechanisms for transforming policies on prevention.

Pre-conceptual nutrition and ante-natal care

The focus for the first stage in a policy to improve early nutrition should be the avoidance of low birthweight (LBW) and the promotion of an optimal birthweight distribution. Since low birthweight is such a major contributor to stunting, particularly in South Asia, the prevalence of low birthweight should be used as an intermediate target. A reduction in the prevalence of LBW requires a major programme focused on reproductive health starting from young girls through child-bearing age. Since fetal growth is affected by maternal height, pre-pregnancy weight, and weight gain during pregnancy, a new prevention strategy that considers the full life-cycle is needed.

A recent meta-analysis of published nutritional supplementation trials during pregnancy (de Onis et al., 1998b), conducted using the rigorous randomised clinical trial model, suggest that, in addition to smoking cessation and anti-malarial prophylaxis, the most effective dietary measures for combating LBW involve the provision of a balanced protein/energy supplementation. This supplement should also contain zinc, folate and magnesium. The n-3 fatty acids, obtained from fish oils, could well be helpful. Vitamin A provided in modest amounts as part of the supplement may also be needed, depending on the national prevalence of vitamin A deficiency. Although iron has no selective effect on LBW as such, women's iron status before and during pregnancy is important for their own health; it may also prevent the fetal programming of long-term susceptibility to such problems as high blood pressure, diabetes and heart disease. Maternal anaemia also limits an infant's iron stores at birth particularly with low birthweight. Thus poor iron status amplifies the risk of impaired brain development.

Ideally, nutritional care should begin before pregnancy is established. For example, the benefit of folate is maximal if given for at least two months before conception occurs. Healthier women can also make a greater contribution to the welfare and development of young children—a feature of great long-term significance not only to the family but to society as a whole.

Thus a new and coherent approach to combating maternal ill health, LBW, and long-term susceptibility to adult chronic diseases is emerging and should be developed into national programmes which are tested and evaluated.

Nations need now to:

» define whether they have a high or low prevalence of LBW
» specify the national target for halving the prevalence of LBW
» devise appropriate general or targeted supplementation programmes, and
» ensure appropriate evaluation of the different programmes.

These strategies need to be seen as the first phase of action: the longer-term impact of improving the growth and health of girls so that they mature healthily before starting pregnancy will be far-reaching.

Breastfeeding and complementary foods

As well as the prevention of low birthweight, the focus on early nutrition demands appropriate strategies for 0–24-month-old infants to prevent stunting. Breastfeeding and suitable complementary feeding form a key part of such strategies.

Exclusive breastfeeding for about the first six months of life and maintenance of breast-feeding into the second year of life should be the goal of major national programmes. Complementary feeding from around six months of age presents a major problem for many millions of women. Appropriate national strategies now need to be adopted.

Breastfeeding and complementary feeding strategies should include:

» regular regional assessments of exclusive breast-feeding rates;
» more attention to the inappropriate use of water/sugar supplements while supposedly exclusively breast-feeding (a particular problem in South Asia);
» providing women with selective support—with suitable foods for complementary feeding. Different approaches should be explored. For example, food vouchers might be proposed as a programme to be

tried experimentally in two or three countries with donor support;
» immunisation; this must be maintained, with target dates set by countries not yet at 80% coverage;
» increased efforts to protect parents from commercial pressures to feed their infants artificially through global implementation and enforcement of the International Code of Marketing of Breastmilk Substitutes;
» encouraging the use of appropriate weaning foods, of low bulk and high nutrient density and based on locally available foodstuffs. Simple food technologies, such as germination and fermentation, to improve the quality of these foods should be further developed.

National political commitment to improve maternal and child survival

As the basis for accelerated action, a number of experimental approaches should be tried.

A new basic care proposal for maternal monitoring and intervention to prevent low birthweight could be developed on the basis of national trends in solving the problem. One such scheme might be as follows, based on Gambian experience.

1. All women who are pregnant should be registered by with a health centre by a particular stage of pregnancy, e.g. 20 weeks, with a monitoring of their weight (in relation to height) and of their haemoglobin.
2. All women from 20 weeks of pregnancy should be considered vulnerable and potentially eligible for a special balanced protein, energy and nutrient-rich supplement based on various criteria which need to be considered on a regional or national basis. Thus in some regions, if maternal weight (as BMI) is less than 20 kg/m^2, or if maternal anaemia is present, if the country has seasonal food shortages, or is subject to a natural disaster, e.g. drought or crop failure, the selective interventions need to be specified.
3. Smoking cessation should be a goal and anti-malarial prophylaxis should be proposed for mothers in at-risk countries.
4. Pregnant women should be monitored by a health centre to see if they gain sufficient weight with no deterioration in their anaemia. Special measures could then be developed on a national basis for those who have failed to respond, e.g. because of parasitic infections.
5. Pregnant women should be encouraged to come for further health checks later in pregnancy.
6. Breast-feeding needs to be encouraged in all countries. The latest research shows a wide variety of benefits, especially if a mother breast-feeds her baby exclusively for six months, with further benefits if she continues breast-feeding for another six months or more, while providing complementary food and liquids. Mothers need to be enabled and supported to do this, through maternity leave and other supportive provisions and practices in the workplace as well as at home and in the family. Specific goals need to be established in relation to these needs.

Special schemes are needed based on the experience of Thailand in training a national group of health workers from every village and town precinct to involve all pregnant women. The nature and provision of the food supplements should be based on local food sources and should ensure adequate protein, energy and micronutrient intake. Special national schemes may well be needed to see these measures effectively implemented.

Social policies for improving nutrition

The previous sections outlined a range of nutrition, public health and food policies to improve the nutrition situation. In addition, a range of measures aimed at controlling the impact of global economic policies and actions have been recommended. Other areas of social policy, however, have been discussed in earlier sections and these can also have an impact on nutritional improvement (or deterioration). The relevant recommendations can be summarised as follows.

Efforts to improve community and nutritional health must involve the communities themselves, and mobilize them to ensure success. Governments and international agencies must set in place the conditions to help foster community participation, including strengthening of local democracy and finding ways of listening to community views.

New approaches are required to cater for the needs of expanded urban communities. Local and national governments need to make provisions for water security, food transport systems, urban gardening and access to sanitation facilities. At the same time, policies to stem the tide of urbanisation are required. This means measures to encourage people to stay in their rural environment—by providing amenities and income-generation projects, and by investing in roads and transport.

Access to safe water and provision of sanitation must be a cornerstone of any serious public health policies. Accelerated action is required to widen the provision of proper sanitation, ensure access to sufficient water for good hygiene and provide access to safe drinking water. Improving access and uptake of education is fundamental. Rights to education for all should be strengthened and enacted.

Women and girls should be the key focus: measures to eliminate discrimination and empower women are

fundamental to social development. Legislative rights for women and support systems are part of the story. Long term societal change to end discrimination and promote equal sharing of burdens and responsibilities is also crucial.

The formation of informal credit and savings groups to reduce seasonal fluctuations in consumption should be supported. These informal groups should link up with the more formal financial systems to further insure against shocks that hit everyone in an area at the same time (Zeller and Sharma, 1998).

Safe water and sanitation

To make a real impact on childhood undernutrition it is essential to reduce the huge burden of gastrointestinal infection and parasitism which affects infants and young children as well as adults. The vicious cycle whereby infections exacerbate undernutrition which then increases susceptibility to infections has devastating implications for maternal and child health. Vomiting and diarrhoea can also cause a lack of appetite, substantial losses of micronutrients and may be a contributory factor to chronic adult energy deficiency.

Over 60% of the population in developing countries do not have access to proper sanitation. Similarly, at least a third do not have access to safe water. Strategies to widen access to safe water have brought their own problems. Water from many of the tubewells which have been dug has been contaminated with fluoride, arsenic or salt.

Access to safe water, improved sanitation and promotion of good hygiene should reduce the burden of intestinal disease. This in turn will improve the iron status of children, limit anaemia and prevent permanent brain damage.

Urgent action is needed to:

» accelerate progress in provision of proper sanitation for all
» promote good hygiene through community education
» ensure that people have access to sufficient water for good hygienic practices
» test the quality of water from recent tubewells and close dangerous wells
» develop new targets and accelerated action for the provision of accessible safe drinking water.

Moving to a regional approach for action

There are major imbalances between what is needed and what is being done on a regional basis in different parts of the globe. In particular, there is continuing nutritional deterioration in many parts of Africa and the high prevalence of undernutrition in South Asia remains of great concern.

To solve these problems strategies are needed on a regional and then a national basis. These issues will need separate consideration at regional meetings in different parts of the world. It is suggested that these regional meetings should be held over the next two years with the involvement of all the relevant UN agencies. Particular UN agencies might well take the lead in a specific region, but it is important to engage the whole international community in establishing the appropriate framework.

To develop these potentially very different regional actions will need new approaches so that undernutrition and the prevention of other disorders can be achieved at an accelerated rate. There will be a need to mobilise the commitment and support of all the principal stakeholders in the regions—governments, NGOs, the private sector, academics—and include local and international agency involvement.

Countries will need to be encouraged to produce their own targets which can then be seen within a regional framework. This will allow the benefits displayed in one country to be readily considered by another. This in turn requires monitoring and reporting arrangements be developed so that countries can benefit from the experience of others.

These developments should build on the process established by the *International Conference of Nutrition* and the *World Food Summit*. The regional meetings have clearly been of value; now there is a need to bring in other agencies such as UNICEF, the World Bank and donor agencies. This complementary approach suggested by the Commission also has a long-term perspective and can build on and benefit from the ICN process.

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