

The Summer Meeting of the Nutrition Society, hosted by the Institute of Food Research, was held at the University of East Anglia, Norwich on 28 June–1 July 2005

The Boyd Orr Lecture

Achieving the goal of halving global hunger by 2015

Prakash Shetty

Food and Nutrition Division, Food and Agriculture Organization of the UN, Viale delle Terme di Caracalla, Rome, Italy

The FAO World Food Summit (WFS) in 1996 set the goal of halving the numbers of the global population suffering hunger by the year 2015, which was later incorporated into the UN Millennium Development Goals (MDG) that commit the international community to an expanded vision of development, and one that vigorously promotes human development as the key to sustaining social and economic progress in all countries. The two targets under the first MDG goal to eradicate poverty and hunger call for halving the proportion of individuals who suffer from poverty and from hunger by 2015. This commitment is another instance of the international community through the UN system yet again renewing its efforts and setting a target and a time frame to deal with the global problem of hunger, poverty and malnutrition. To date, the efforts to reduce global hunger in the developing world have fallen far short of the pace required to meet these targets. There has no doubt been some progress and several countries in the developing world have proved that success is possible. The economic and societal costs to developing countries of not taking decisive action, and thus failing to achieve a reduction in hunger and undernutrition, including micronutrient malnutrition costs, are that every year five million children lose their lives, 220 million disability-adjusted life years are lost as a result of childhood and maternal undernutrition and billions of dollars are lost in productivity and incomes in these countries. Alongside this perennial problem in developing societies are emerging new epidemics of diet-related diseases resulting from the profound demographic changes, urbanization and the economic transition that is transforming and globalizing the food systems in these countries. Thus, many developing countries are facing new and additional challenges of co-existing hunger alongside the emergence of other forms of malnutrition. Meeting the WFS and MDG targets of achieving the goal of halving global hunger is urgent, and the question that needs to be addressed is not whether the international community can achieve this goal in time but whether it can afford not to.

World Food Summit: Millennium Development Goals: Global hunger: Food security: Malnutrition

‘Hunger is at the heart of the world’s troubles.’
(Boyd Orr, 1948)

John Boyd Orr was a pioneer. The results of his Food, Health and Income survey (Boyd Orr, 1936) showed that in Imperial Britain of the 1930s 50% of the population did not have an income that would guarantee them a diet adequate for good health. National enquiries patterned after the ‘Food, Health and Income’ model were carried out in the League of Nation countries and in the USA. The US study showed, in the richest country in the world, the same pattern as Boyd Orr’s (1936) British results; in the USA 50% of the population were underprivileged and

10% of the population were definitely malnourished. So, the world began to come alive to the importance of nutrition in terms of human and social values. Boyd Orr’s solution to this universal problem was ‘a world community in which food and agriculture were factors in the same equation; in which reason and commonsense prevailed over speculation, over slumps and over selfishness; in which the paradox of hunger and plenty was resolved’, which was the highlight of the Hot Springs Conference in 1943 (Calder, 1948). The FAO was born in the subsequent meeting in Quebec in 1945 in response to the challenge posed by Boyd Orr to the international community, and its preamble expresses its objective of ‘raising levels of

Abbreviation: WFS, World Food Summit.

Corresponding author: Professor Prakash Shetty, fax +44 1494 793 328, email pshetty@doctors.org.uk

nutrition and standards of living of the peoples'. Director General BR Sen, who succeeded John Boyd Orr, later stated that the FAO 'was one of the first fruits of the new ideas on international cooperation which arose out of the Second World War...' (Veon, 1970). This outcome perhaps marked the beginning of the succession of international responses to tackle the problem of hunger and poverty.

International efforts to reduce global hunger and poverty

'The people are crying out for bread and we are to offer them pamphlets' J. Boyd Orr 1946

International commitment to the eradication of global hunger after the Second World War ended in 1945 has a long and chequered history. The world community has recognized and articulated on several occasions the sentiments recently expressed by Cardinal Sodano (1997) on behalf of the late Pope John Paul II when he said 'hunger and malnutrition are not phenomena that are natural or even an endemic evil in certain parts of the world. The truth is that they are the result of a more complex situation of underdevelopment, poverty, degradation. Hunger is an aspect of a certain structural condition – economic, social and cultural – strongly opposed to the full realization of human dignity'.

Among principal international events to address the issue of global hunger was the convening of the First World Food Congress, which was held in June 1963 in Washington, DC, on which occasion the late President John F. Kennedy said 'We have the means, we have the capacity, to eliminate hunger from the face of the earth in our lifetime. We need only the will.' This First World Food Congress (Food and Agriculture Organization, 1963) drew particular attention to the Preamble, which refers to 'freedom from want' as 'one of those basic freedoms proclaimed as the highest aspirations of the common people' and states that the 'persistence of hunger and malnutrition is unacceptable morally and socially, is incompatible with the dignity of human beings and the equality of opportunity to which they are entitled, and is a threat to social and international peace'. The World Food Congress stated that a peaceful and democratic world cannot be ensured so long as hunger and malnutrition remain the scourge of millions, and called on the international community 'to pursue and intensify their efforts individually and through collective action to free the peoples of the world from hunger' and 'to eliminate hunger and want from the face of the earth as the primary task of this generation'.

A decade later Dr Henry Kissinger, in his first address to the General Assembly of the UN as US Secretary of State, proposed the holding of the next UN conference on food. In November 1974 governments attending this World Food Conference (United Nations, 1975) proclaimed that 'every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop their physical and mental faculties.' The Conference set as its goal the eradication of hunger, food insecurity and malnutrition within a decade and the international community

needs to remind itself of the pledge that was made on this occasion, 'within a decade no child will go to bed hungry, no family will fear for its next day's bread, and no human being's future and capacities will be stunted by malnutrition'. It would appear that the setting of such lofty and ambitious goals by the international community at a series of summits and conferences thereafter would be a familiar feature, important among which are those that relate to food and nutrition, including the World Summit for Children and the International Conference on Nutrition (Mason, 1996).

Against this background of a collective failure to achieve this goal to eradicate hunger for a complex range of reasons, the World Food Summit (WFS) was convened in November 1996 at FAO headquarters in Rome. The WFS provided a forum for debate on one of the most important issues facing world leaders in the new millennium, the imperative need for eradicating global hunger. The objective of the WFS was to renew global commitment at the highest political level to eliminate hunger and malnutrition, and achieve sustainable food security for all individuals by setting a political, conceptual and technical blueprint to eradicate hunger in all countries. The WFS set the target of reducing by half the number of undernourished individuals by no later than the year 2015.

The Millennium Summit was held at the UN in September 2000 with the overall context to discuss the role of the UN in the 21st century. The summit acknowledged the past half-century of unprecedented economic gains and recognized that 1.2 billion individuals still live on <US \$1/d. The combination of extreme poverty with extreme inequality between countries, and often also within them, was considered an affront to the world's common humanity and the UN membership set as its goal the reduction of extreme poverty by half, in every part of the world, before 2015. The UN Millennium Declaration (United Nations, 2000) stated, 'Men and women have the right to live their lives and raise their children in dignity, free from hunger and from the fear of violence, oppression or injustice' and resolved 'to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day and the proportion of people who suffer from hunger'. These resolutions formed the basis of the two targets set in the first Millennium Development Goal. While the target set in the first Millennium Development Goal reinforces the target set by the WFS in 1996, it is important to note a crucial difference between these two targets; the WFS target speaks of halving the number of hungry while the Millennium Development Goal target is to halve the proportion of hungry by the same date of 2015. The WFS target is a more ambitious one to achieve given the impact on numbers the growing population, particularly in the poorer countries of the world, would have over this time period.

History would prove that the setting of goals and targets was but the least of the tasks to eliminate or even reduce hunger and malnutrition. It is in achieving these goals and targets that the global community has often faltered and failed. In beginning to look at the current situation of global hunger it is necessary to seriously ask whether there can be failure yet again to meet the latest challenge that has been accepted, to halve global hunger by the

year 2015. More importantly, whether the international community can afford to fail this time round?

The current global food and nutrition scenario

Food security and malnutrition: the linkages

The links between food security and malnutrition are clear and the conceptual framework (Fig. 1) schematically outlines the linkages between them from the macro-environment to the household level (Food and Agriculture Organization, 2000). Nutritional status is an outcome indicator, and the presence of undernutrition is not only causally related to food insecurity at the household or individual level, but is also determined by other health-related factors such as access to safe water, good sanitation and healthcare as well as the care practices that include proper breast-feeding and complementary feeding and ensuring fair and appropriate intra-household food distribution.

Food security exists when all individuals at all times have the physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (de Haen & Thompson, 2003). Achieving food security means ensuring that sufficient food is available, that supplies are relatively stable and that those individuals in need of food have access to it. Conversely, food insecurity exists when individuals lack access to sufficient amounts of safe and nutritious food and, therefore, are not consuming enough for an active and healthy

life. This situation may be a result of the unavailability of food, inadequate purchasing power or inappropriate utilization of food at the household or individual level. Food security at the household level is a complex phenomenon attributable to a range of factors that vary in importance across regions, countries and social groups, as well as over time. It is described in terms of the availability and stability of good quality, safe and nutritious food supplies, and the access to, and utilization of, this food supply for human benefit. All these criteria must be met for the consumption of a healthy diet and the achievement of nutritional well-being.

Availability relates to the adequacy of a varied and nutritious food supply and is influenced principally by factors that promote agricultural production and trade. Issues that influence these factors include policies and incentives, access to natural resources and the availability of agricultural inputs, skills and technologies including biotechnology.

Stability of the level and types of foods available for consumption is subject to seasonality and by the sustainability of the production and farming systems in practice. These factors, in turn, depend on the efficiency of market systems, including pricing mechanisms and infrastructure such as transport and warehousing, which influences the distribution and flow of food. While reduction of food losses through improvements in food storage and processing also affect stability, the nature of the farming system adopted and its effect on the environment and on sustainability is also a key determinant of the stability of food supplies in the medium to long term.

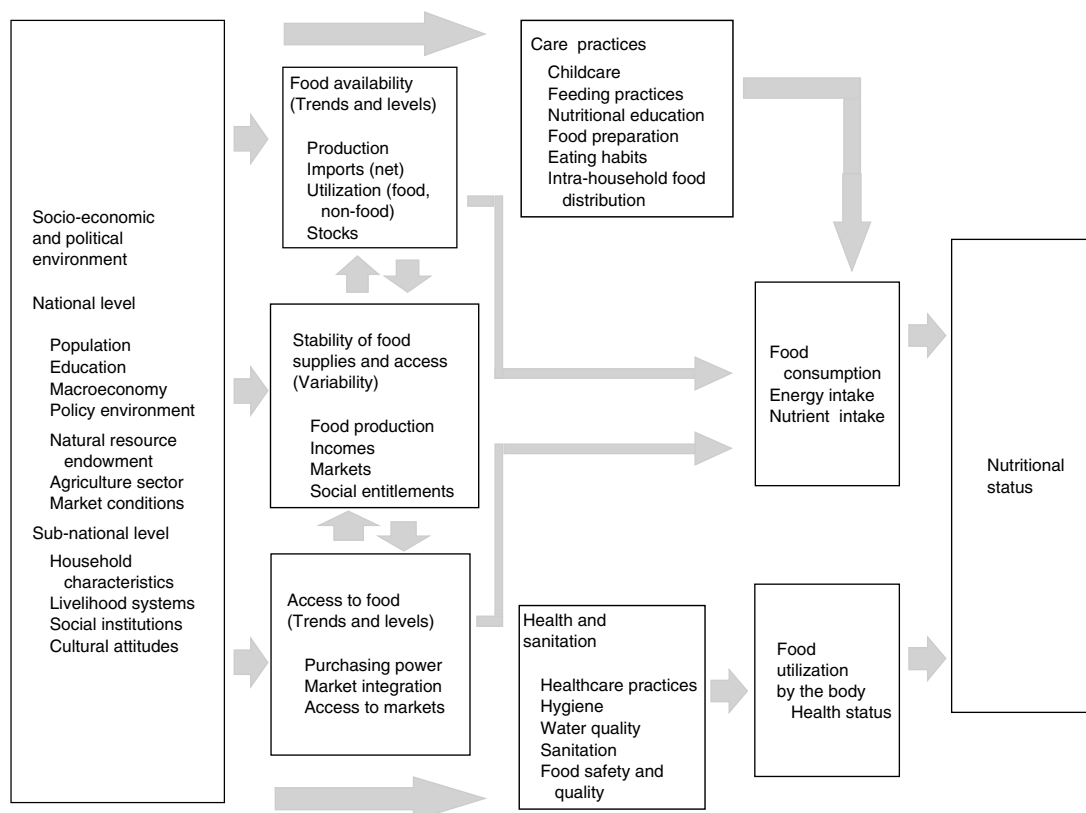


Fig. 1. Conceptual framework linking the nature, determinants, and consequences of food insecurity and malnutrition. (From Food and Agricultural Organization, 2000.)

Table 1. Trends in and prospects for food consumption (MJ (kcal) *per capita* per d) globally and in the different regions (adapted from Bruinsma, 2003)

	1964–6		1974–6		1984–6		1997–9		2015		2030	
	MJ	kcal	MJ	kcal	MJ	kcal	MJ	kcal	MJ	kcal	MJ	kcal
World	9.8	2358	10.2	2435	10.1	2655	11.7	2803	12.3	2940	12.7	3050
Developing countries	8.6	2054	9.0	2152	10.2	2450	11.2	2681	11.8	2850	12.4	2980
Sub-Saharan Africa	8.6	2058	8.7	2079	8.6	2057	9.2	2195	9.8	2360	10.6	2540
Near East and North Africa	9.6	2290	10.8	2591	12.3	2953	12.5	3006	12.9	3090	13.2	3170
Latin America and the Caribbean	10.0	2393	10.6	2546	11.2	2689	11.8	2824	12.4	2980	13.1	3140
South Asia	8.4	2017	8.3	1986	9.2	2205	10.0	2403	11.3	2700	12.1	2900
East Asia	8.2	1957	8.8	2105	10.7	2559	12.2	2921	12.8	3060	13.3	3190
Industrial countries	12.3	2947	12.8	3065	13.4	3206	14.1	3380	14.3	3440	14.6	3500
Transition countries	13.4	3222	14.1	3385	14.1	3379	12.1	2906	12.8	3060	12.9	3180

Access that a community, household or individual has to food is a reflection of the ability to either grow and retain the food grown for consumption, to purchase the food from the market or to acquire it by a combination of strategies that Amartya Sen (1981) has described as representing 'entitlements' to food. This system depends on a range of factors such as: access to resources such as land, water, agricultural inputs and improved technologies; the nature of the food marketing system and the infrastructure to support it; purchasing power and food prices; consumer perceptions, behaviour and preferences.

Utilization is more concerned with the biological availability of the food after it has been ingested. While age, body size and physical activity levels influence food utilization, the health and absence of disease and parasitic infestations also impact on the utilization of nutrients by the body. As a consequence, utilization of food is largely influenced by factors such as health, clean water and good sanitation.

Changing food systems and their impact on nutrition and health

While reducing world hunger and food insecurity continues to dominate the development agenda, a shift in emphasis from ensuring food supplies and energy availability to examining the impact of dramatic changes in the food systems with economic development and urbanization of societies is inevitable. At the same rate as the dramatic increases seen in food production and *per capita* food availability (Table 1, Fig. 3) in all regions of the globe (Bruinsma, 2003) food systems are also undergoing dramatic changes worldwide. While this change inevitably leads to greater availability and diversity of food, access to this food is by no means universal. Many of these changes in food consumption and dietary patterns are intimately linked with economic development and the increasing urbanization of societies (Shetty, 2003). These changes in food systems affect availability and access to food through changes to the food production, procurement and distribution systems and the food trade environment. In turn there is a gradual shift in food culture (towards a more universal one), with consequent changes in dietary consumption patterns and nutritional status that vary with the socio-economic strata.

The main drivers of these changes in food systems and their consequent influence on dietary consumption patterns have been extensively discussed elsewhere (de Haen *et al.* 2003; Haddad, 2003; Popkin, 2003; Kennedy *et al.* 2004). Since these drivers are peripheral but related to the present paper, this issue is discussed briefly here.

Fig. 2 provides a conceptual framework of the drivers of these profound changes to food systems in developing societies. It highlights economic growth, increasing urbanization, rising incomes and foreign direct investment in markets of developing countries as a result of trade and market liberalization and globalization as the main drivers influencing this change. Competition for market share of food purchases tends to intensify with entry into the system of powerful new players such as large multinational fast food and supermarket chains. The 1990s was an influential period in terms of impact on forces of supply and demand, which facilitated changes in food retail systems and, in particular, the growth of supermarkets. On the demand side are urbanization, more women in the workforce and access to technology such as a greater access to refrigeration and transport (the latter fuelling and promoting convenience foods), while the supply side is characterized by liberalization of markets, increasing foreign direct investment and better technology to track food stocks and shipments (Reardon *et al.* 2003). Supermarkets bring with them substantial improvements in standards of food quality and safety at competitive prices and convenience, factors that are highly attractive to an increasingly-sophisticated largely-urban consumer. Concomitant social changes are also occurring, which include the entry of more women into the workforce and the adoption of increasingly sedentary lifestyles. Consequent to these changes in the food systems and their impact on consumption patterns are the inevitable changes in nutritional status and the changing burden of disease in developing societies (World Health Organization/Food and Agriculture Organization, 2003).

Current global situation of hunger and malnutrition

Food insecure and hungry. The Food and Agriculture Organization (2004b) estimates indicate that 852 million in the population worldwide were food insecure and hungry

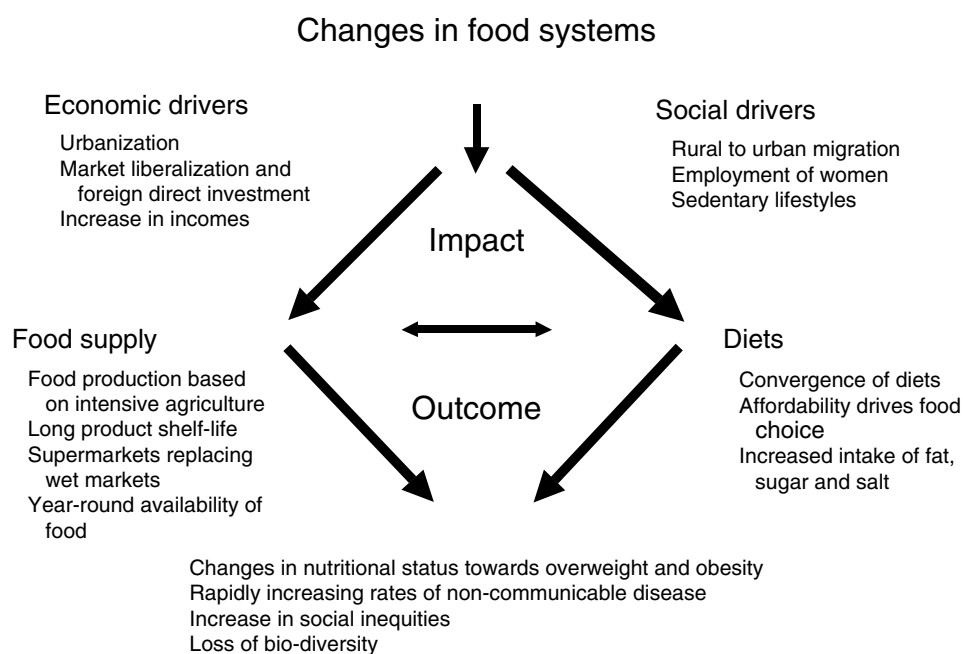


Fig. 2. Conceptual framework illustrating the major driving forces responsible for the observed changes in the modern food system with economic development. (From Kennedy *et al.* 2004.)

in the years 2000–2002. This estimate includes 815 million in developing countries, twenty-eight million in the transition economies of the former Soviet Union and nine million in the industrialized countries. The number in the populations of developing countries estimated to be hungry decreased by only nine million during the decade following the WFS baseline period of 1990–2. During the second half of the decade the number of chronically hungry individuals in developing countries increased at a rate of approximately 4 million per year, wiping out two-thirds of the reduction of twenty-seven million achieved during the previous 5 years. The reversal during the second half of the decade resulted mainly from changes in China and India. China had registered dramatic progress during the first half of the decade, reducing the numbers by approximately fifty million, while India over the same period pared the number down by thirteen million. Gains in these two countries drove the global totals down, despite the fact that the number of chronically-hungry individuals in the rest of the developing world increased by thirty-four million. During the second half of the decade, however, progress slowed in China, where the numbers fell by only four million, while in India it increased by eighteen million. The number of hungry individuals in developing countries other than China and India essentially held steady during the second half of the decade with the percentage declining from 20 to 18. The most pronounced change in trends took place in sub-Saharan Africa. Between 1995–7 and 2000–2 the rate of increase in the number of undernourished individuals slowed down from five million per year to one million per year and the prevalence of undernutrition is now falling at a very slow rate.

Childhood undernutrition. The intimate linkages between hunger (food availability, stability and access) and malnutrition (utilization) epitomized in the outcome of

poor nutritional status (Fig. 1), which is also affected by other health and care-related determinants, can best be illustrated by the close correlation seen between dietary energy supply and nutritional status of children in developing countries. The percentage of children <5 years of age from developing countries in 2005 who have been classified as moderately and severely underweight (low weight-for-age) is 27, with sub-Saharan Africa (29) and South Asia (46) showing some of the highest prevalence (UNICEF, 2005). The regional trends for stunting (low height-for-age) also reflect the same pattern; while the percentage in developing countries is estimated at 31, sub-Saharan Africa (38) and South Asia (44) have high percentages of stunted children. However, the global trend in the prevalence of stunting has shown a reduction from 47% in 1980 to 32.5% in 2000, with numbers declining from 221 million to 182 million (de Onis *et al.* 2000). Sub-Saharan Africa as a whole has seen little progress in reducing stunting, with the numbers of stunted children increasing by an alarming 60% since 1980. However, there are wide disparities between countries. Of the twenty-five countries in this region half have improved while the other half have deteriorated badly. Where prevalence rates of stunting are high, the prevalence of low birth-weight is also very high. South Asia has the highest numbers of children who are underweight and stunted (also of low birth weight), which, because of their large populations, accounts for about half the undernourished children in the world. Approximately 40% of the world's poor also live in this region. Developing countries have incidences of low birth weight (17%) that are more than twice that seen in industrialized developed countries (7%), with countries in South Asia having the highest incidence (>30%; UNICEF, 2005). Low birth weight implies poor prenatal nutrition and reflects on the state of maternal undernutrition

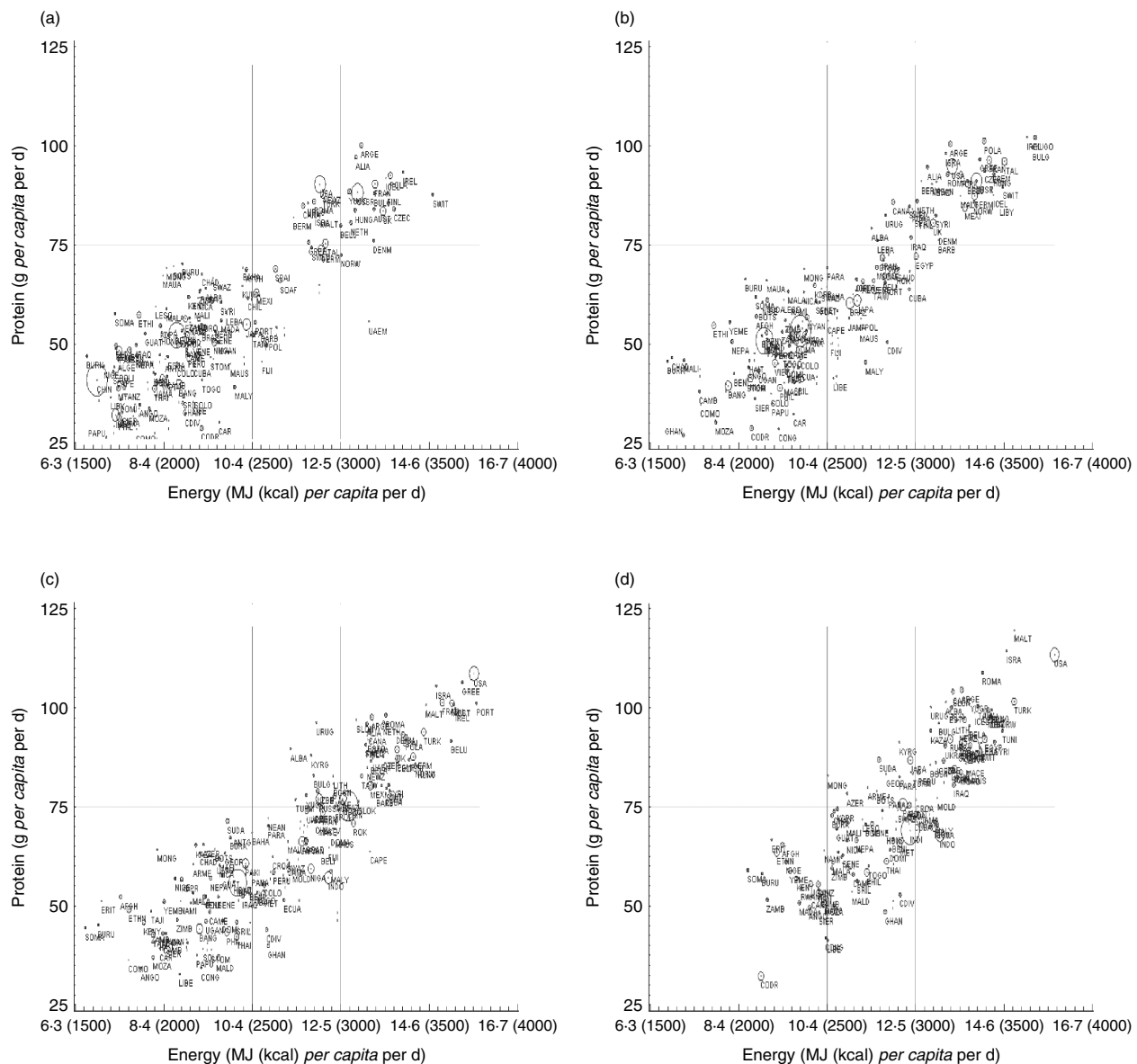


Fig. 3. Trends in total food availability as energy (MJ (kcal) per capita per d) and protein (g per capita per d) from 1961 to 1999 (1961 (a), 1991 (b) and 1999 (c)) and projected to the year 2030 (d), illustrating how countries move from the left lower quadrant to the upper right quadrant, thus increasingly achieving adequate food availability over time. (○), Population size, with the size of the symbol representing the relative population size. (From Schmidhuber & Shetty, 2006.)

in developing countries and contributes to the inter-generational cycle of malnutrition (Commission on the Nutrition Challenges of the 21st Century, 2000).

Micronutrient malnutrition or hidden hunger. Of all the micronutrient deficiencies of public health importance in developing countries deficiencies of vitamin A (including β -carotene), I and Fe are especially important because of both their serious health consequences and wide geographic distribution. Global estimates compiled by Mason *et al.* (2003) suggest that >1200 million individuals suffer from anaemia, half of them as a result of Fe deficiency, which affects 30–40% of the population in developing countries. Dietary vitamin A deficiency is a major problem in many developing countries. Between 100 million and 140 million children suffer from vitamin A

deficiency, which includes more than two million children each year who are afflicted with severe visual problems, of whom an estimated 250 000 to 500 000 are permanently blinded. Vitamin A deficiency is also associated with increased child mortality rates, and lack of vitamin A also impairs the immune system, greatly increasing the risk of illness and death from common childhood infections such as diarrhoea and measles. The most devastating consequence of I deficiency is reduced mental capacity. Approximately 1000 million individuals are at risk of I deficiency disease, about 200 million have goitre and approximately twenty million of the population worldwide are mentally handicapped as a result of I deficiency, including 100 000 born each year with irreversible brain damage because their mothers lacked I before and during

pregnancy. The primary cause of most micronutrient malnutrition is an inadequate intake of micronutrient-rich foods, often in combination with their impaired absorption or utilization because of infections and parasitic infestation, which also tend to increase the need for such micronutrients. Poverty is often at the root of micronutrient malnutrition and is linked to inadequate access to food, sanitation and safe water, as well as such factors as a lack of knowledge about hygiene and appropriate feeding practices.

Addressing the global challenge of halving hunger by 2015

'There is no need for hunger. Give us the right tools for our job and we'll banish hunger from the earth'
J. Boyd Orr 1946

In order to effectively address the challenge to halve global hunger it is necessary to understand first who the hungry are, where the hungry are and why they are hungry in a world with enough food to feed all its inhabitants? Of the >842 million hungry individuals, most of them are in the developing world, 221 million are in India, 204 million in sub-Saharan Africa, 142 million in China, 156 million elsewhere in Asia and the Pacific, fifty-three million in Latin America and thirty-nine million in the Near East and North Africa (UN Millennium Project, 2005). Of this total, about 214 million (26% of the hungry) have energy intakes so low that they are unable to work or care for themselves. Approximately 50% of the hungry live in farm households in higher-risk environments that are marginal for crop production, i.e. with low, highly-unreliable or excessive rainfall, inherently poor or degraded soils, steep topography and remoteness from markets and public services. Another 22% of the hungry are the landless rural poor, 20% are in poor urban households and the remaining 8% are herders, fishermen and forest-dependent households. At least half the world's most food-insecure individuals are poor smallholder farmers in low-income countries who cultivate marginal lands. If they are to eat, most of them must produce the food they need themselves (UN Millennium Project, 2005). Indeed, between 500 million and one billion farmers are caught in a 'poverty trap' that renders them too poor to adopt productivity-enhancing technologies in basic food grains and too disconnected from markets to profitably engage in commercial agriculture. More than any other region of the world, food production south of the Sahara is in crisis. High rates of population growth and little application of improved production technology during the last two decades has resulted in declining *per capita* food production, escalating food deficits and deteriorating nutritional levels, especially among the rural poor (Borlaug & Dowsell, 2004). While there are some signs that there was an improvement in smallholder food production during the 1990s, this recovery is still very fragile. These regions are not only prone to natural disasters like drought, but are also plagued by conflict in some regions and the impact of HIV epidemic on the adult working population in others. It is important to try to understand some of the issues that are contributing to the

perpetuation of hunger and to critically analyse the lessons that have to be learned in order to alleviate the situation and to achieve the goal.

Importance of agriculture for rural livelihoods

There are several key lessons that have emerged from the Food and Agriculture Organization's (2004a) analysis of hunger, based on the experience of programmes and projects, which provide the focus for national initiatives to help target hunger more directly in order to achieve this goal. Economic growth is essential and necessary because it raises average incomes and creates the climate for investment, human capital development that can pull populations out of poverty. In turn, economic growth will impact on the problem of hunger, since poverty and hunger go hand in hand and those countries that have high numbers or proportions that live on <US \$1/d are also the ones with the highest prevalence of hunger and undernutrition. Poverty and hunger are closely intertwined in a vicious cycle that can be difficult to escape. Poverty is a major cause of hunger, but hunger also results in poverty by its negative affects on health, employment opportunities and labour productivity as well as investment choices, which in turn will perpetuate poverty and deepen hunger. Good economic growth alone is not sufficient in itself to reduce hunger. Improvements in economic growth do not necessarily address the issue of inequalities and inequities in societies; in fact it often has the opposite effect. Hunger is a serious problem that cannot wait for economic growth to deliver benefits; these benefits can often take a long time (if they do at all) to trickle down to the most needy and hungry. That good economic growth is not a prerequisite for hunger reduction is exemplified by some of the most successful countries in hunger reduction, which have not necessarily demonstrated high growth rates (Food and Agriculture Organization, 2004a). The nature of growth in a country also matters. Agricultural growth is critical for hunger reduction, since 75% of the poor live in rural areas with agriculture as the backbone of rural economic activity. Countries in which agricultural growth rates are high have reduced the burden of hunger consistently; expressed another way, countries with higher growth in agricultural gross domestic product have the highest reduction in number of the population who are hungry (Pingali, 2005). Where capital stock per agricultural worker is highest, the proportion of population who are hungry is lowest. Investment in agriculture extends beyond the need for food production. It also contributes substantially to a range of other essential activities, such as off-farm enterprises, thus contributing spin-off effects of agricultural growth into the non-farm economy. Improved farm management can also help speed poverty and hunger reduction through increased food yields and income over the long term. There are thus high pay-offs when investment in agriculture is high.

Public expenditure in agriculture is crucial to the development of livelihoods and can reap dividends in terms of hunger reduction. The FAO (Pingali, 2005) has shown that the agricultural orientation index, i.e. the share of agriculture in total public expenditures/share of agriculture in gross domestic product correlates inversely with the

percentage of the population in a country who are hungry. Directing resources to agriculture helps increase productivity, employment opportunities and access to food. Investing in rural infrastructure, agricultural research, education and developing credit markets as well as providing safety nets are essential for supporting agricultural growth. Countries in which hunger is most common are also usually those that have few resources with the potential for investment. External assistance to agriculture in the form of development assistance or aid then becomes crucial to these countries to help them step out of the poverty–hunger trap. Experience shows that, ironically, external assistance for agriculture is most often not directed to those most in need, and currently those that need the most assistance in this sector receive the least.

While technology has enabled huge increases in food production, the downside is that world prices for food staples tend to fall dramatically with increased production and availability, which in turn may potentially have serious adverse consequences for farmers. The adoption of technological advances in agriculture has to be managed in a manner that protects both rural livelihoods and the environment. There may also be positive multiplier effects as a result of investments in new technologies, which may help promote the conservation of natural resources for long-term food sustainability. They can also help reduce output fluctuations and consequently income fluctuations, which in turn may smooth out consumption shortfalls.

It is, however, important to recognize two crucial points: (1) agricultural development alone has limited potential in alleviating rural poverty; (2) often some of the policies of the developing countries impede the performance of their agriculture. The latter includes corruption and/or economic instability, lack of definition or enforcement of property rights and contract sanctity, underinvestment in rural infrastructure and education, and sometimes the adoption of a ‘cheap food policy’ designed to keep urban consumers quiet, even if it ruins their own farmers and can only be sustained by subsidized imports.

The crucial role for trade in reducing hunger

Trade is vital in empowering developing countries to be self-reliant and to tackle poverty and hunger. While agriculture plays a central role in building broad-based rural development, trade is also an equally important development tool. Hence, trade can have a major impact on reducing hunger and poverty in developing countries (Food and Agriculture Organization, 2004c). Participation in trade allows access to larger markets and opens up opportunities for specialization in production and economies of scale. This outcome can be of special importance for developing countries, particularly for smaller countries in which the limited size of domestic markets discourages full use of production potential. At the same time, trade provides access to better and cheaper supplies (including food imports) and may stimulate flows of technology and investment. To the extent that international trade spurs broad-based economic growth, expanded participation in world markets can contribute to improvements in household food security.

However, increased openness to international trade has its costs. It may gradually redistribute world production according to countries’ comparative advantage. Inevitably this outcome means that in some countries certain industries may shrink, either absolutely or relative to others, as cheaper imports become available. The resulting changes in the production structure and reallocation of resources may have a negative impact on food security, at least in the short term. Unemployment may rise, some productive sectors in agriculture may decline and the food system may become increasingly concentrated, shutting out small-scale farmers and firms. Overall, countries that are more involved in trade tend to enjoy higher rates of economic growth. However, growth rates diverge widely for countries with comparable levels of trade activity, highlighting the importance of other factors in determining economic performance. Such factors include natural resource endowments and the size, skills and training of the workforce, as well as policies and institutions. Indeed, while there is broad agreement that openness to international trade is a fundamental component of a policy mix that can foster economic growth, it is also recognized that, on its own, openness to trade is unlikely to lead to major improvements in a country’s economic performance. Furthermore, it cannot be a substitute for development policies and social safety nets specifically aimed at reducing poverty and hunger.

In summary, trade is important for many reasons: (1) it allows access to markets and opens up opportunities for specialization; (2) it can provide access to cheaper and better food supplies, including food imports; (3) agricultural trade in particular is very important for hunger reduction; it stimulates employment and income in rural areas in which most of the hungry live and can also help boost non-farm rural income. However, the whole process of trade liberalization can be beset with problems: (1) countries with physical and infrastructural handicaps such as inadequate rainfall and poor transportation and communication networks may not benefit from trade liberalization compared with those that are better integrated into global markets; (2) dismantling trade restrictions can be beneficial in the long term, as investment and jobs shift into profitable sectors, but the adjustment process can be painful in the short-term and there may be more losers than winners; (3) subsistence farmers may face pressures as a result of high prices for land, water and other inputs.

The current global trading environment, however, is not conducive to promoting agricultural production and trade, and specifically hurts the agriculture of the least-developed countries. According to Thompson (2005) this situation arises because: (1) protectionist barriers to developing country goods reduce their foreign exchange earning capacity and economic growth; (2) agricultural production and export subsidies depress world market prices below their long-term trend and increase the variance and the price volatility around that trend; (3) food aid from the developed countries is most available in years of surplus among the developed countries and not at times of actual food deficits and needs among the least-developed countries; (4) developing countries have not been able to benefit much from past agricultural trade agreements

because they have been dominated by those countries that think they have the most to lose, i.e. the rich developed countries.

Agricultural subsidies in developed countries, such as those to meat, sugar, cotton, milk and rice, have hindered the potential export growth of low-cost producers of these products, of which many are developing countries. Subsidies to cotton production and sugar in developed countries and its negative impacts on producers in developing countries have been the cases most recently publicized. According to Sechler (see Manternach, 2005) the reason that true reform of world agriculture trade policy has proven so elusive is that it has been led to date by those developed countries that have most to lose from reform, because the elaborate system of production subsidies and export subsidies has served them well in terms of domestic politics, while protecting them from what would occur if the laws of comparative economic advantage were allowed to determine which countries produce what and to whom they sell. It is quite evident that the global trading environment hurts agriculture in the least-developed countries and this situation would have to change if the rich countries are committed to reducing global hunger and malnutrition.

International adjustments in agricultural policies are critical to creating a global economic environment conducive to a sustainable and balanced growth of agricultural production, consumption and trade, and the availability and accessibility of food in all parts of the world, particularly in those countries suffering from hunger and malnutrition. Although the food security problem of food-insecure countries cannot be solved by trade policies alone, a reduction or elimination of trade-distorting policies can contribute considerably to establishing an enabling international environment. An objective of the current round of trade negotiations under the World Trade Organization (the Doha Round) is substantial trade-related policy reforms in the agricultural sector. For these reasons there is much at stake in the ongoing World Trade Organization negotiations on agriculture for enhancing global food security and reducing global hunger.

International development assistance and aid

Development assistance or aid is one of the three pillars of the 'Make Poverty History' campaign, the others being cancellation of foreign debts and a fairer deal on trade. The three elements are mutually reinforcing: debt cancellation prevents aid promptly returning to the north as interest payments, while well-directed aid can build the capacity of poor countries to benefit from world trade. In 1970 the UN membership set a target for the rich countries of the world to raise their development assistance and foreign aid budgets to 0.7% of their economic output by 1980. Currently, 25 years after the deadline, only five countries have achieved this target. Recently, at two global summits in 2002 in Monterrey and in Johannesburg, the target of 0.7% of the gross domestic income for development assistance was reaffirmed. While development aid has languished, the amounts of money that have been spent on arms during the same period are both shocking and vulgar. In

2004, the sixth successive year in which arms spending increased, the total amount spent globally on arms reached US \$1 × 10¹², in contrast, the amount spent on aid over the same period was US \$78.6 × 10⁹. Equally, the sums provided as international aid when compared with the amounts made available as subsidies to the agriculture sector are also a serious cause for concern; the total transfers to agriculture in member countries of the Organization for Economic Cooperation and Development is estimated at US \$315 × 10⁹ (Food and Agriculture Organization, 2003). It is little wonder that the new slogan popular with developing countries is 'trade not aid'.

The role of good governance in hunger reduction

Governments use public spending to achieve both economic growth and equity goals. Public spending often consists of long-term investments in research and development, education and infrastructure (e.g. roads, electricity, telecommunication and water), as well as short-term social spending on sectors such as education, health, social security and direct food subsidies to poor households. Public investments in agriculture and rural areas are major contributors to agricultural growth and rural poverty and hunger reduction. Hunger persists in some regions of the world largely because of poor governance and the failure of national governments to provide the minimal and essential domestic public goods (i.e. goods that are available to all and are not diminished in their availability when they are consumed), such as civil peace, rule of law, clean water, electrical power, transport infrastructure and public investment in agriculture needed for sustained growth of farm productivity and rural incomes (Paarlberg, 2002). Public goods delivery at the national level in some regions of the world has been less than adequate, particularly in some countries of sub-Saharan Africa, leaving this region struggling to improve its food security performance. These goods are all essential to farm productivity growth, and lagging rural income linked to lagging farm productivity has been the most conspicuous element of Africa's hunger crisis. Food aid may provide temporary succour. Global markets and inter-state institutions may spread and proliferate, but in the poorest countries in which large numbers of the population are still hungry, and particularly in the rural parts of those countries, international food markets and global institutions tend to have weak influence relative to local or national food markets and national food governance institutions. A government's responsibility is to ensure good governance and transparency, and by this means to provide the public goods needed by societies to remain peaceful and prosperous to help reduce hunger and poverty, goods that are unlikely to be produced in sufficient quantity by private markets alone or by non-governmental institutions, especially in these poor developing countries.

Natural disasters, emergencies and conflict

According to the UN's Hunger Task Force (UN Millennium Project, 2005), approximately sixty million individuals per year face hunger as a result of natural hazards

escalating into disasters, or because of civil conflict. When natural hazards, such as droughts, floods and earthquakes, escalate to disasters they destroy household assets and jobs and undermine investments in agriculture, and may push otherwise food-secure families into acute hunger. Disaster impacts may accumulate over time and may most harshly affect economically-weaker social groups. While the single most serious natural hazard on a global scale is drought, communities in developing countries are also vulnerable to natural hazards such as cyclones, volcanic eruptions, earthquakes and climate extremes. The Indian Ocean Tsunami disaster in December 2004 is a recent example.

Until mid-2004 thirty-five countries faced food crises requiring emergency assistance, most of them in Africa (Food and Agriculture Organization, 2004b). Food emergencies have been rising over the past two decades, from an average of fifteen annually during the 1980s to more than thirty annually since the turn of the millennium. Most of this increase has taken place in Africa, where the average number of food emergencies each year has almost tripled, having been caused by drought and/or conflict. In east Africa alone the food security of more than thirteen million of the population was threatened by a combination of erratic rains and the impact of recent and ongoing conflicts.

The balance of causes of food emergencies has also shifted over time. Since 1992 the percentage of emergencies that can be attributed mainly to human causes, such as conflict or economic failures, has more than doubled, rising from approximately 15 to >35. In many instances natural and human-induced factors reinforce each other. Such complex crises tend to be the most severe and prolonged. Between 1986 and 2004 eighteen countries were 'in crisis' more than half the time, with war or economic and social disruptions causing or compounding the crises in all eighteen countries. The Food and Agriculture Organization's (2004b) latest estimates list thirteen of these eighteen countries among those in which >35% of the population goes hungry. An understanding of food emergencies underscores the importance of stable political and economic environments, the role of democratic institutions and the need for developing good governance and institutions, which enhance food availability and access within a stable environment. Effective hunger-reduction strategies can only prosper when they are the outcome of an all-inclusive process that brings together all stakeholders, from national governments and civil society to the households.

The epidemic of HIV/AIDS

HIV/AIDS (and malaria) are the leading causes of adult morbidity and mortality. Africa is at the epicentre of the HIV/AIDS epidemic, with more than twenty-five million adults (about 70% of the known global total) living with the disease in sub-Saharan Africa alone (World Health Organization, 2005). HIV/AIDS prevalence rates in adults of 10% are common in many countries. Conservative estimates suggest that the rates are 15% and rising in countries such as Botswana, Lesotho, Swaziland and

Zimbabwe (Food and Agriculture Organization, 2004a), while other estimates suggest that the top twenty-five countries with the highest prevalence of adults living with HIV/AIDS are in Africa (apart from Haiti), with Botswana (37.3%), Lesotho (28.9%) and Namibia (21.3%) recording the highest prevalence in 2003 (Nationmaster, 2005).

The short-term effects of HIV and AIDS on food production and income are staggering in the labour-based economies of the poor. The spread of HIV/AIDS is eroding the capital base and undermining the productive capacity of many countries. HIV/AIDS has dramatically altered the landscape in which agriculture operates in southern and eastern Africa (Food and Agriculture Organization, 2004a). The impact of HIV/AIDS, combined with other diseases, is that it: depletes human capital, agricultural production and productivity; withdraws financial resources from economic activities in favour of health and funeral expenditures; makes it financially impossible for agricultural households to intensify production through the use of labour-saving and capital intensive technologies; reduces the ability for poor households to generate their usual income from casual labour; restricts access by households to economic services such as credit; reduces food security of extended families that take care of the orphans. The impact of HIV/AIDS places a particular burden on women, the primary producers of food and the main caregivers. In the long-term it may markedly hamper the sustainability of knowledge transmission and the capacity of countries to invest in agricultural growth and food security (Food and Agriculture Organization, 2004a).

UN Millennium Project Hunger Task Force

The report of the Hunger Task Force of the UN Millennium Project lead by Jeffrey Sachs (UN Millennium Project, 2003, 2005) sets out priority interventions for the world to address the challenge to halve hunger by 2015. It builds on the many previous attempts to eliminate world hunger that have resulted in cutting the percentage of the world population that are hungry from 33 to 18 in the past 40 years. Most current plans share the view that it is feasible to rapidly reduce hunger. What is needed now, according to this report, is to translate recommendations into action on a scale commensurate with the problem. The report indicates the need for business plans created at the country level that, in addition to identifying the recommended interventions, outline how they will be implemented, where the priority areas of intervention are, which organizations should implement them, how much the interventions are going to cost and what the benefits will be. What is often lacking is the political will and the commitment to achieve this goal.

Conclusions

At the WFS of 1996, the global community agreed to halve the number of hungry individuals, to 400 million, by 2015. This goal was reconfirmed in September 2000 at the UN Millennium Summit, and subsequently at world gatherings

in Monterrey, Johannesburg and Doha. This reconfirmation of the goal represents another instance in which the international community through the UN system has yet again renewed its efforts and set a target and a time frame to deal with the global problem of hunger and malnutrition. To date, the efforts to reduce global hunger in the developing world have fallen far short of the pace required to meet these targets. There has no doubt been some progress, and several countries in the developing world have proven that success is possible. The economic and societal costs to developing countries of not taking decisive action and thus failing to achieve a reduction in hunger and undernutrition, including micronutrient malnutrition costs, are that every year five million children lose their lives, 220 million disability-adjusted life years are lost due to childhood and maternal undernutrition and billions of dollars are lost in productivity and incomes in these countries.

While the level of hunger reduction anticipated in the adoption of these goals is certainly possible, to reach it (starting in 1997) twenty-two million individuals must escape from food insecurity every year. The analysis of long-term trends at the global levels suggests that progress in reducing hunger slowed considerably during the 1990s. The rate of hunger reduction needs to be increased if the WFS target is to be met, and at present the rate of reduction is only five or six million per year. Although the global performance is relatively poor, there are successes, which can help point the way forward for a better rate of hunger reduction. Ghana, Thailand and Peru are just a few countries amongst many that have achieved notable reductions in the numbers of undernourished.

The Millennium Development Goal target, expressed in terms of halving the proportion of the population who are hungry, remains within reach. However, with continuing rapid population growth in many of the worst-affected areas, approximately 600 million in the population of the developing world will still suffer from chronic hunger even if the proportion is reduced by half. Achieving the more ambitious WFS goal of reducing the absolute number of hungry individuals from about 800 million in 1990–2 to 400 million in 2015 will require much more rapid progress, equivalent to reducing the proportion by two-thirds instead of half (Food and Agriculture Organization, 2005). Can this goal be achieved?

Failure to reach this goal may be a result of insufficient political will and commitment. The technology is available to double world food production and to do it in environmentally sustainable ways. However, achieving food security for the hungry cannot be achieved without broad-based participation by food-insecure individuals in their own development, in combination with much higher levels of investments in basic education, healthcare facilities, water resource development, transport systems, power grids and agricultural research and extension. Urgently needed are reforms of the global trading systems to provide a fair and level playing field for developing countries.

What would be John Boyd Orr's reaction if he were alive today, 60 years after the founding of the FAO to the creation of which he made an important contribution by

steering its nascent years as its founder Director General, on which he had pinned much hope and for the work of which he fostered great ambitions. He would perhaps have mixed feelings, on examination of the current food, agriculture and nutrition scenario, of some considerable achievements and much failure, and a sense of satisfaction that the world has proven its capacity to produce sufficient food for its growing population and that science has contributed in numerous ways to increase global capacity to produce food. Boyd Orr said in his autobiography, 'The most important question today is whether man has attained the wisdom to adjust the old systems to suit the new powers of science' (Boyd Orr, 1966). He would probably be pleased with the results of the green revolution, and in all likelihood would have a balanced and positive view of the contributions that biotechnology could make to provide for adequate, safe and nutritious food for the world. His frustration and despair at the persisting numbers who continue to have limited or no access to adequate food would be commensurate with what he must have felt when he wrote his seminal report *Food, Health and Income* in 1936 (Boyd Orr, 1936), which revealed the appalling malnutrition among the population of England and Scotland (Boyd Orr, 1934).

The increasing commodification of food and the increasing dominance of food as a trade commodity would certainly not please him. He would certainly be saddened to know how these developments have affected the poor rural farmer in developing countries, not to mention their impact on farming and livelihoods in his own country. Boyd Orr would perhaps also state more strongly than most of the international community do today his concerns at the increasing privatization and consolidation in agriculture and food production and supply, and the continuing lack of support for research and innovation in agriculture from the state and public sector, which in his view might even amount to abrogation of the state's role and responsibility in this important sphere. While the public sector will have a role and the involvement of the private sector is to be encouraged, the need to ensure a proper balance, such that efforts of either sector complement the other for the benefit of the whole of mankind, is a sentiment that he would certainly have strongly endorsed. There is little doubt that the situation of hunger and malnutrition in Africa would continue to burden his conscience (Boyd Orr, 1964), despite his likely enthusiasm for developments such as the right to food, developing concepts of food sovereignty ('the right of peoples, communities, and countries to define their own agricultural, pastoral, labour, fishing, food and land policies which are ecologically, socially, economically and culturally appropriate to their unique circumstances'; International NGO/CSO Planning Committee, 2002) and possibly even movements such as the 'slow food' movement (an international movement that promotes the consumption of locally-produced food products and regional cooking, as opposed to globalized industrialized food products).

The goal of halving global hunger is urgent, and the question that needs to be addressed is not whether the international community can achieve this goal in time, e.g. by 2015, but whether it can afford not to. The final goal

must be to eradicate global hunger within the foreseeable future. Hunger must be a thing of the past, since food is a primary necessity of life for all individuals. The international community should constantly remind itself of what John Boyd Orr (1948) said: 'A civilization which cannot provide the primary necessities of life for its people is one which cannot endure'.

References

- Borlaug NE & Dowsell C (2004) The green revolution: an unfinished agenda. <http://www.fao.org/docrep/meeting/008/J3205e/j3205e00.htm>
- Boyd Orr J (1934) *The National Food Supply and Its Influence on National Health*. London: King.
- Boyd Orr J (1936) *Food, Health and Income*. London: Macmillan.
- Boyd Orr J (1948) Can mankind make good? *Survey Graphic* **37**, 96–98.
- Boyd Orr J (1964) *The White Man's Dilemma: Food and the Future*, 2nd ed. London: Allen & Unwin.
- Boyd Orr J (1966) *As I Recall*. London: MacGibbon & Kee.
- Bruinsma J (editor) (2003) *World Agriculture towards 2015/2030: An FAO perspective*. London: Earthscan.
- Calder R (1948) The man and his message. *Survey Graphic* **37**, 99–103.
- Commission on the Nutrition Challenges of the 21st Century (2000) Ending Malnutrition by 2020: An Agenda for Change in the Millennium. Final Report to the ACC/SCN by the Commission on the Nutrition Challenges of the 21st Century. *Food and Nutrition Bulletin* **21**, Suppl., 3–89.
- de Haen H, Stamoulis K, Shetty P & Pingali P (2003) The world food economy in the twenty-first century: challenges for international cooperation. *Development Policy Review* **21**, 683–696.
- de Haen H & Thompson B (2003) Food security in a world without borders. In *Modern Aspects of Nutrition – Present Knowledge and Future Perspectives*, pp. 375–380 [I Elmadfa, E Anklam and JS Konig, editors]. Basel: Karger.
- de Onis M, Frongillo EA & Blossner M (2000) Is malnutrition declining? An analysis of changes in levels of child malnutrition since 1980. *Bulletin of the World Health Organization* **78**, 1222–1233.
- Food and Agriculture Organization (1963) Freedom from hunger campaign and World Food Congress. <http://www.fao.org/docrep/> (accessed June 2005).
- Food and Agriculture Organization (2000) *Food Insecurity and Vulnerability Information Mapping Systems: Background and Principles*. Rome: FAO.
- Food and Agriculture Organization (2003) *The State of Food Insecurity in the World 2003*. Rome: FAO.
- Food and Agriculture Organization (2004a) Assessment of the World food security situation. <ftp://ftp.fao.org/unfao/bodies/cfs/cfs30/J2716e.doc>
- Food and Agriculture Organization (2004b) *The State of Food Insecurity in the World 2004*. Rome: FAO.
- Food and Agriculture Organization (2004c) *The State of Agricultural Commodity Markets 2004*. Rome: FAO.
- Food and Agriculture Organization (2005) *The State of Food Insecurity in the World 2005*. Rome: FAO (In the Press).
- Haddad L (2003) Redirecting the diet transition: what can food policy do? *Development Policy Review* **21**, 599–614.
- International NGO/CSO Planning Committee (2002) Developing a new relationship between the Food and Agriculture Organization and Non-Governmental and Civil Society Organizations. http://www.foodsovereignty.org/forum_documents/doc/summary2002.doc
- Kennedy G, Nantel G & Shetty P (2004) Globalization of food systems in developing countries: a synthesis of country case studies. *Globalization of Food Systems in Developing Countries: Impact on Food Security and Nutrition*. FAO Food and Nutrition Paper no. 83. pp. 1–25. Rome: FAO.
- Manternach D (2005) World Ag Forum still sees food miracle needed. Doane Agricultural Report Summary. <http://www.worldagforum.org/DoaneSummary.pdf> (accessed June 2005).
- Mason JB (1996) 'Within a decade no child will go to bed hungry'. *Proceedings of the Nutrition Society* **55**, 621–640.
- Mason JB, Lotfi M, Dalmiya N, Sethuraman K, Deitchler M, Geibel S, Gillenwater K, Gilman A, Mason K & Mock N (2003) *The Micronutrient Report: Current Progress and Trends in the Control of Vitamin A, Iron, and Iodine Deficiencies*. Ottawa, Ont: Micronutrient Initiative.
- Nationmaster (2005) HIV AIDS – Adult prevalence rate. http://www.nationmaster.com/graph-T/hea_hiv_aid_adu_pre_rat (accessed June 2005).
- Paarlberg RL (2002) *Governance and Food Security in an Age of Globalization. Food, Agriculture, and the Environment Discussion Paper* no. 36. Washington, DC: IFPRI.
- Pingali P (2005) The road map to hunger reduction. *Journal of Agricultural Development Economics* (In the Press).
- Popkin B (2003) The nutrition transition in the developing world. *Development Policy Review* **21**, 581–597.
- Reardon T, Timmer P, Barrett C & Berdegue J (2003) The rise of supermarkets in Africa, Asia and Latin America. *American Journal of Agricultural Economics* **85**, 1140–1146.
- Schmidhuber J & Shetty P (2006) The nutrition transition to 2030: why developing countries are likely to bear the major burden. *Food Economics* (In the Press).
- Sen A (1981) *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.
- Shetty P (2003) Impact of globalization on food and agriculture from the farm to the plate. *Impacts of Globalization on Agricultural Production and Marketing with Focus on Food Quality*, pp. 43–63. Tokyo, Japan: Japan–FAO Association.
- Sodano A (1997) Address on behalf of Pope John Paul II at the 29th Conference of FAO. http://www.vatican.va/holy_father/john_paul_ii/speeches/ (accessed June 2005).
- Thompson R (2005) The Doha round: making trade work for economic development and growth. <http://www.worldagforum.org/Thompson.ppt>
- UNICEF (2005) *The State of the World's Children 2005*. New York: UNICEF.
- United Nations (1975) *Report of the World Food Conference* E/CONF. 65.20. New York: UN.
- United Nations (2000) United Nations Millennium Declaration. <http://www.un.org/millennium/declaration/ares552e.htm>
- UN Millennium Project (2003) *Halving Global Hunger – Background Paper of the Millennium Task Force on Hunger*. New York: UNDP.
- UN Millennium Project (2005) *Halving Hunger: It Can Be Done. Report of the Task Force on Hunger*. New York: Earth Institute at Columbia University.
- Veon J (1970) Notes from the World Food Congress. <http://www.womensgroup.org/WORLDFOO.html> (accessed June 2005).
- World Health Organization (2005) HIV/AIDS fact and figures: global burden. <http://w3.who.org/EN/Section10/Section18/Section348.htm> (accessed June 2005).
- World Health Organization/Food and Agriculture Organization (2003) *Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint WHO/FAO Expert Consultation*. WHO Technical Report Series no. 916. Geneva: WHO.