

Chapter 2

Food Security Global Overview

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Introduction

This chapter addresses the following issues:

1. The relationship between household and individual
2. The maldistribution of gains in food security in some regions
3. The importance of attending to all facets of food security, not just increasing food availability

Food security is an age-old, seemingly intractable problem that endures today. The United Nations Agency responsible for measuring and monitoring global hunger and food insecurity, the Food and Agriculture Organization (FAO), estimates over 800 million people are chronically undernourished in 2012–14 (FAO 2014). People are food insecure because they are unable to obtain sufficient quantities of food and the appropriate balance of nutrients. Over time, a continuously inadequate diet reduces physical capacity, lowers productivity, stunts growth and inhibits learning. Chronic malnutrition kills, blinds and debilitates (Stringer 2001).

Food security implies an individual has access at all times to enough food for an active and healthy life. The 1996 World Food Summit defines food security as ‘a situation that exists when all people, at all times, have 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’. An important element of this is the cultural appropriateness of that food supply.

FAO currently uses four measurable and interrelated components to estimate the numbers of food insecure people at the country level. These four components are: (i) availability; (ii) access; (iii) utilization; and (iv) stability. Box A explains these

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four components in detail. Barrett and Christopher (2010) helpfully describe the four food security components as inherently hierarchical. In other words, the first component, food availability, means there must be enough physical quantities or supplies of food available to provide everyone with an adequate number of calories. So for individuals to be considered food secure, there must be adequate food supplies available and they must have access to these supplies.

Likewise, having ongoing access to enough calories does not mean individuals have a nutritionally sound diet—the third food security component, utilization, addresses food security issues related to diet quality, food safety and adequate intake of macronutrients and essential vitamins and minerals. The fourth component is stability, which introduces a temporal dimension accounting for risks to availability, access and utilization from economic shocks, natural disasters, or political instability.

Over the past five decades, the food availability component has tended to dominate food security concerns of the international development community. The World Bank, various United Nations agencies and national governments focused much of their policy, program and investment attention on the race between population growth and producing enough food. In particular, during the 1960s and 1970s, when studies often defined food as cereals, low levels of cereal stocks and high cereal prices raised fears about the long-term prospects of the world food system (Reutlinger 1977; Valdés and Siamwalla 1981; Konanderas et al. 1978). The new high-yielding crops that became known as the ‘Green Revolution’ resulted from the coordinated investments in research aimed at producing more food during this period.

The 1974 World Food Conference addressed this growing perception that the world was moving irrevocably toward food shortages, suggesting programs and policies to enhance and protect food supplies. The solutions that emerged focused on improving production, establishing national level self-sufficiency targets, coordinating world food stocks and implementing import stabilization policies (Stringer 2001). Even today, some countries still equate food security with food self-sufficiency, undeterred by widespread evidence demonstrating that hunger coexists with abundant food supplies at regional, national and international levels.

Sen (1981) initiated the debate broadening food security analysis from this narrower focus on national and global food supplies to include an access dimension. Empirical evidence demonstrated that while availability of food supplies is important, access to food by individuals is the greater constraint (Sen 1981; Ravallion 1987; Drèze and Sen 1989). Among other factors, access to food depends on an individual’s access to resources, technology, markets, social networks and food transfer programs and how the right to food is conceived. If food is a consumer right then monetary resources can ensure access if it is defined as citizenship right then access can be conceived in other ways (see chapters on India and South Africa in this volume).

Sen pointed out that during the Ethiopian famine of 1972–1974, food output, supplies and consumption at the national level were normal, yet 50–200 thousand people starved to death. Most died because they could not afford to buy food. These

findings drew attention to the need for policy-oriented growth strategies to complement existing food projection projects aimed at meeting national level food self-sufficiency targets. For example, the new policy-oriented approach began focusing on how the poor can share the benefits of economic growth, pro-poor growth strategies and food distribution programs targeted at vulnerable communities.

During the 1980s, researchers further enriched the food security debate by focusing attention on distinctions between households and individuals as the appropriate unit to measure food insecurity. Initially, food security was measured at the household level, not the individual. The measurement changed as empirical research linked individuals to their control over household income and household resources (Sen and Sengupta 1983; Reutlinger 1985; Sahn 1989; Evans 1991; Maxwell 1994).

For example, research found that non-wage household income in urban Brazil has a much more positive effect on child health if it is controlled by mothers (Thomas 1991). Research in Kenya and Malawi found that (a) child nutritional status is influenced by the interaction of income and gender of household head rather than just one or the other and (b) household food security is influenced by total household income and the proportion of income controlled by women has a positive and significant influence on household caloric intake (Kennedy and Peters 1992). This body of research demonstrated that some household members could be considered food secured while other members of the same household were not. Both the measurement of food security and the policy and program attention shifted focus away from households and towards individuals to better address food security outcomes.

The importance of nutritional security also emerged during the late 1980s and 1990s. A food security concept relying too much on target consumption levels (e.g. 80 % of the World Health Organization's average required daily calorie intake) were inadequate for several reasons (Maxwell 1994). First, individual nutritional requirements vary depending on age, job, size and health (Payne and Lipton 1994). Second, behavioural characteristics influence nutritional status including breast feeding, sanitation habits and the use of local foods (World Bank 1995). Third, research demonstrated that micronutrient deficiencies, infectious diseases, intestinal parasites and environmental factors contributed to malnutrition as much as calorie deficiencies (Strauss and Thomas 1998; Del Rosso 1992; Tomkins and Watson 1989). Fourth, nutritional status has important effects on the quality of household labour resources (Kennedy and Bouis 1993).

The Status of Global Food Security

FAO data demonstrate that enough food is produced worldwide to at least provide adequate calories for the 805 million chronically undernourished individuals. The current global population of more than 7 billion has significantly more food

available per capita than had the world's three billion people some four decades ago. After 60 years of substantial economic growth, steady progress in agricultural productivity, remarkable increases in per capita food availability and numerous international and national efforts to address hunger, food security remains elusive. The problem remains one of the access and how that access is defined or interpreted in practice (Drèze and Sen 1989).

In the developing countries as a group, progress in per capita food supplies has been nothing short of remarkable, increasing from 2055 cal. in the early 1960s to more than 2600 cal. by 2005/07 (Tables 2.1 and 2.2). This 27 % gain per person is particularly impressive given that it took place during a period in which developing country population more than doubled. Between 1961/1963 and 2005/2007, per capita food supplies increased by more than 70 % in China and Indonesia; by more

Table 2.1 Per capita food supplies available for direct human consumption

	Kcal/person/day				
	1969/71	1979/81	1989/91	1990/92	2005/07
Developing countries	2055	2236	2429	2433	2619
East Asia	1097	2216	2487	2497	2850
South Asia	2072	2024	2254	2250	2293
Africa, Sub-Saharan	2031	2021	2051	2068	2238
Near East/North Africa	2355	2840	3003	2983	3007
Latin America/Caribbean	2442	2674	2664	2672	2898
Developed countries	3138	3223	3288	3257	3360
World	2373	2497	2634	2627	2860

Source FAO (2012)

Table 2.2 Undernourishment around the world, 1990–1992 to 2012–2014 number of undernourished and prevalence (%) of undernourishment

	1990–1992		2012–2014	
	No.	%	No.	%
World	1014.5	18.7	805.3	11.3
Developed regions	20.4	<5	14.6	<5
Developing regions	994.1	23.4	790.7	14.5
Africa	182.1	27.7	226.7	20.5
Sub-Saharan Africa	176.0	33.3	214.1	23.8
Asia	742.6	23.7	525.6	12.7
Eastern Asia	295.2	23.2	161.2	10.8
South-Eastern Asia	138.0	30.7	63.5	10.3
Southern Asia	291.7	24.0	276.4	15.8
Latin America and Carib.	68.5	15.3	37.0	6.1
Oceania	1.0	15.7	1.4	14.0

Source FAO (2014)

than 50 % in Pakistan and the Republic of Korea; and by more than 30 % in Brazil, Burkina Fasso, the Dominican Republic, Ecuador, El Salvador, Jamaica, Mauritania and the Philippines.

Food supply gains resulted from a combination of stable domestic food production and strengthened import capacity. A considerable part of this gain is due to the rapid growth of food imports from the developed countries. Net cereal imports by the developing countries more than tripled during the 1970s, contributing to one-fifth of the increase in their food supplies (Bruinsma 2003).

Regions and countries did not share equally in these gains. East Asia made significant gains. Sub-Sahara Africa is the only region to stagnate, with essentially no increase in per capita food supplies since the early 1970s. The region is generally characterised by high rates of population growth and urbanization with declining or stagnating incomes and food production. Per capita food supplies in the Latin America and Caribbean (LAC) region progressed steadily until the 1980s. LAC is the most urbanized and the most resource rich of the developing country regions.

With 60 % of the world's population, Asia's overall performance was sufficiently strong to pull up the global average. South Asia recorded little progress until the 1980s, however. Asia's food supply gains have resulted primarily from increased domestic food production.

Attempts to understand how some countries have succeeded in reducing food supplies while others have failed is important given the wide range of experiences. To date, world food production has increased continuously because cropped area has expanded and productivity per unit area has increased. For many countries, technological change accounted for much of the food productivity growth over the last three decades, including genetic improvements to major crops and livestock and the adoption of improved farming techniques.

Despite the overall success in food production, access to food and the lack of essential nutrients remain serious problems. Of the 805 million undernourished, 171 million are children under 5 years old. Malnutrition is the underlying contributing factor in about 45 % of the 6.3 million child deaths in 2013 (WHO 2014). At the global level, prospects for future productivity growth are uncertain and intensely debated. Runge and Runge (2010) provide a measured assessment concluding that past success in food production has created a false sense of confidence. Their study highlights worrying signs, including the decline in research and investment. For example, global official aid to developing countries for agricultural research fell by 64 % between 1980 and 2003 (Runge and Runge 2010). A significant issue considering that agricultural productivity improvements experience very long lags, peaking after about 25 years and lasting for another 25 years (Pardey and Alston 2010).

The evidence does demonstrate, however, that food availability is the only major food security success story. Several opportunities suggest continuing success in providing enough calories to feed the world. First, the research infrastructure at both global and national levels is in place—both human and physical capital. The ongoing technological agricultural research advancements at the cellar and

molecular levels, together with increasingly strengthening global research networks, suggest positive prospects for further productivity gains. Second, yield gaps, or the difference between what is technologically possible given agronomic and growing conditions and actual yields is significantly high in large areas of Africa and Asia. The reasons for low yields are many across these agricultural landscapes, but the technology exists today. Overcoming adoption barriers is the challenge.

Third, the evidence of food waste in both low and high income countries presents untapped opportunities. For example, a recent study identified that rodents consume about 6 % of the annual rice harvest, enough to feed Indonesia's 240 million people for 1 year (Normile 2010). To date, very little research focus on how to address food waste issues along the supply chain. Turning policy attention and research funding to address solutions to food waste is likely to provide substantial additional gains in food availability in the coming decades.

Conclusion

No matter if one is pessimistic or optimistic about future prospects for food production, food availability is the only success story among the food security indicators. Today, the world produces enough food to feed every individual. After more than 50 years of coordinated international efforts, however, access to food remains a serious problem. And consuming nutritionally appropriate diet is an increasing problem with 1.4 billion overweight people and 500 million obese.

Box A: Defining and Measuring Food Security

Food security is a complex phenomenon that manifests itself in numerous physical conditions resulting from multiple causes. The World Food Summit of 1996 established four dimensions of food security: availability, access, stability and utilization. The State of Food Insecurity in the World 2013 introduced a suite of indicators organized around these four dimensions with a view to overcoming the drawbacks that arise from relying solely on the prevalence of undernourishment indicator. By measuring food security across its four dimensions, the suite of indicators provides a more comprehensive picture, and can also help in targeting and prioritizing food security and nutrition policies.

The availability dimension captures not only the quantity, but also the quality and diversity of food. Indicators for assessing availability include the adequacy of dietary energy supply; the share of calories derived from cereals, roots and tubers; the average protein supply; the average supply of animal-source proteins; and the average value of food production.

The access dimension comprises indicators of physical access and infrastructure such as railway and road density; economic access, represented by the domestic food price index; and the prevalence of undernourishment.

The stability dimension is divided into two groups. The first group covers factors that measure exposure to food security risk with a diverse set of indicators such as the cereal dependency ratio, the area under irrigation and the value of staple food imports as a percentage of total merchandise exports. The second group focuses on the incidence of shocks such as domestic food price volatility, fluctuations in domestic food supply and political instability.

The utilization dimension also falls into two groups. The first encompasses variables that determine the ability to utilize food, notably indicators of access to water and sanitation. The second group focuses on outcomes of poor food utilization, i.e. nutritional failures of children under 5 years of age, such as wasting, stunting and underweight. Since 2013, four more micronutrient deficiency indicators have been added: the prevalence of anaemia and of vitamin A deficiency among children under five; and the prevalence of iodine deficiency and of anaemia in pregnant women. Data for the suite of indicators are published in FAOSTAT and on the FAO Food Security Indicators website.

Source State of Food Insecurity (2014), FAO, Rome.

References

- Barrett CB (2010) Measuring food insecurity. *Science* 37:825–828
- Bruinsma J (2003) World agriculture: towards 2015/2030 an FAO perspective. Earthscan Publications Ltd., London
- Drèze J, Sen A (1989) Hunger and public action. Oxford University Press, Oxford
- Evans A (1991) Gender issues in rural household economics. *IDS Bull* 22:1
- FAO (2014) The state of food insecurity in the world 2014. Food and Agricultural Organization of the United Nations, Rome
- Kennedy E, Peters P (1992) Household food security and child nutrition: the interaction of income and gender of household head. *World Development* 20(8):1077(9)
- Konandreas P, Huddlestone B, Ramangkura V (1978) Food security: an insurance approach. Research Report No. 4. IFPRI, Washington, D.C
- Maxwell S (1994) Food security: a post-modern perspective. Institute of Development Studies, Working Paper No. 9, University of Sussex
- Pardey PG, Alston JM (2010) U.S. agricultural research in a global food security setting. A Report of the CSIS Global Food Security Project. CSIS, Washington, D.C
- Normile D (2010) Holding back a torrent of rats. *Science* 37:806–807
- Ravallion M (1987) Markets and famines. Oxford University Press, Oxford
- Reutlinger S (1977) Food insecurity: magnitudes and remedies. World Bank Working Paper No 267. The World Bank, Washington, D.C
- Reutlinger S (1985) Food security and poverty in LDCs. *Financ Dev* 22(4) IMF, Washington, D.C
- Runge CF, Runge CP (2010) Against the Grain. *Foreign Aff* 89(1):8–14

- Sahn DE (1989) A conceptual framework for examining the seasonal aspects of household food security. In: Sahn DE (ed) *Seasonal variability in third world agriculture: the consequences for food security*. John Hopkins University Press, Baltimore
- Sen A (1981) *Poverty and famines: an essay on entitlement and deprivation*. Clarendon Press, Oxford
- Sen A, Sengupta S (1983) Malnutrition of rural children and the sex bias. *Econ Polit Wkly* 18:855–864
- Stringer R (2001) Food security and poverty in developing countries', 2001. In: Ghosh BN (ed) *Contemporary issues in development economics*. Routledge, London
- Valdés A, Siamwalla A (1981) Chapter 1: Introduction. In: Valdés A (ed) *Food security for developing countries*. Westview Press, Boulder
- WHO (2014) *Children: reducing mortality*. World Health Organization, Fact sheet No. 178, Sept 2014, Geneva