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SDG2 – The Elusive Global Quest to End Hunger

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Introduction

Access to sufficient, nutritious, and safe food is arguably the most fundamental necessity for a healthy and productive life. At the extreme, hunger results in death from starvation and the appalling specter of famine. More generally, chronic hunger and malnutrition have huge costs to individuals in terms of suffering, low productivity, and poor health, and to society through the cost to economic growth and prosperity, the burden on health systems, and the risks from food riots and political unrest. Yet hunger has been a fact of life of the poor since the beginning of humankind.[1] Today, with more than enough food in the world to provide an energy-sufficient diet for all, the continuing presence of hundreds of millions suffering chronic undernourishment is "morally outrageous and politically unacceptable."[2]

Historically, our understanding of hunger has evolved from its extreme manifestation in the form of death from starvation, to include stunting and wasting of children and underweight and lethargy in adults. More recently, a surge in obesity and its associated health costs is a manifestation of malnutrition resulting from unbalanced diets. Recognition of these broader manifestations of hunger and malnutrition reflects the relatively new science of nutrition that only emerged in the twentieth century with the discovery of the many essential micronutrients needed for a healthy diet. Severe deprivation of individual nutrients is associated with physically recognizable symptoms known as deficiency diseases,

[1] There is some dispute about the prevalence of hunger in hunter and gathering societies with some authors suggesting that hunger is a characteristic of societies based on settled agriculture. See Yuval N. Harari, *Sapiens: A Brief History of Humankind*, First US edition (New York: Harper, 2015).

[2] Amartya Sen, *Hunger and Entitlements* (Helsinki: World Institute for Development Economics Research WIDER, 1987).

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but milder deficiencies—so-called hidden hunger—are now known to be important to a healthy life and especially to normal child development.

There are sound economic, social, and political reasons for tackling the hunger problem on a global scale. However, the overwhelming rationale is ethical—the right of all humans to sufficient and healthy food.[3] A consensus around this social ethic only began to emerge at the national and international levels in the second half of the nineteenth century, and by the middle of the twentieth century was enshrined in international commitments, notably the first United Nations declaration of a goal of zero hunger in 1943.[4] This commitment has been periodically renewed in international fora, most recently in the Sustainable Development Goal 2 (SDG2) of zero hunger set in 2015 and the Food Systems Summit in 2021.

Despite noble intentions the world can claim only mixed success in eliminating hunger and even less so for combatting other forms of malnutrition. This in part reflects the complexity of the challenge. Just for agriculture, the sector explicitly associated with SDG2, the pathways to nutrition are multiple through improved subsistence, more diverse production, higher farm incomes, lower food prices, and growth effects on other sectors. Food systems, including post-harvest transformation, food losses and waste, food environments, food marketing and advertising, and consumer behavior also have profound impacts on nutritional status. Further, nutrition is closely related to the health and sanitation sectors, through maternal and infant health and feeding practices, nutritional education, and access to clean water and sanitation. As we show in this chapter, the understanding of these multiple pathways to ending hunger and malnutrition has changed in several dimensions over the past two centuries and continues to evolve.

This chapter begins with a discussion of famine, the most visible manifestation of hunger throughout history. Famine was once a scourge in most societies but has now largely been eliminated. We then discuss other dimensions of hunger and malnutrition recognized in the first half of the twentieth century and brought to the fore in the League of Nations. The review then moves to the post-Second World War period when the focus sharply shifted to producing enough food for the world's burgeoning population, measured in per capita calories supplied. By the 1980s, access to food through equitable growth and social protection programs had become a priority. The chapter then turns to the period from around 1990 characterized by rising recognition of the multiple dimensions of malnutrition and the concomitant requirement for a multi-sectoral approach involving agriculture, the food industry, nutrition policy, public health, and the status of women. Although global commitments and approaches to ending hunger have followed this broad sequence, there was also much overlap across periods—for example,

[3] Jessica Fanzo et al., "Tying the Knot: An Interdisciplinary Approach to Understanding the Human Right to Adequate Nutrition," *The Columbia Journal of Transnational Law* 57, no. 1 (2018).

[4] Derek Byerlee and Jessica Fanzo, "The SDG of Zero Hunger 75 Years On: Turning Full Circle on Agriculture and Nutrition," *Global Food Security* 21 (2019).

prevention of famine has continued to be a fundamental global objective until today even as the specter of famine recedes. The final section assesses the status of progress in ending hunger, both the achievements to date and the remaining challenges.

In each section, we recognize the common ingredients of all the sustainable development goals—a shared commitment for collective action by the state, civil society, and the private sector to a defined target based on economic, political, and/or humanitarian motives. This commitment goes beyond local efforts and social networks such as informal insurance mechanisms that have, and still do, operate in most communities to reduce hunger. We also note evolving metrics for assessing hunger from input-related measures such as prevalence of undernourishment in terms of calories supplied to outcome-related metrics such as the prevalence of stunting in children. Indeed, the evolving metrics for assessing progress on ending hunger and malnutrition have continually shifted the goal posts in terms of claiming success.

Preventing Famine

In a narrow sense, the first manifestation of a SDG-like goal was the emergence of a widely shared commitment to eliminate death from famine.[5] Famines manifested in mass starvation and extreme undernourishment have been part of human existence from ancient times. They are often precipitated by natural shocks, especially drought, but their impacts are frequently magnified by poorly functioning markets, lack of transport infrastructure, and badly designed state interventions.[6] Famines also result from armed conflict that disrupts production and markets and predatory governments that exploit farmers to extract a food surplus. State and civil society attention to famines in history arises from the high visibility of mass deaths from starvation and associated degradation of human behavior, including sometimes cannibalism. The simple metric of the number of deaths from famine is also obvious, although most famines were accompanied by debates about the actual rate of mortality.[7]

Famines were part of life in ancient civilizations as reflected in religious scriptures and written and graphic descriptions that have survived. Most societies had some mechanisms to alleviate famines through voluntary and religious groups and private philanthropy. Some ancient states such as Rome also instituted policies such as food subsidies and public stock holding of grains to prevent famines.

[5] A commonly accepted definition of famine is an event that leads to at least 10,000 deaths from starvation.

[6] Ravallion Martin, "Famines and Economics," *Journal of Economic Literature* 35, no. 3 (1997).

[7] David Hall-Matthews, "Inaccurate Conceptions: Disputed Measures of Nutritional Needs and Famine Deaths in Colonial India," *Modern Asian Studies* 42, no. 6 (2008).

The Moghul and Chinese states employed similar policies but, as elsewhere, local philanthropy was often more important.[8] Frequently, neither state nor civil society responses were sufficient to prevent periodic food price spikes and the reoccurrence of famine.[9]

In Western Europe and Japan famine during peacetime was largely eliminated by the first half of the nineteenth century.[10] With the rise of the modern nation state, it became unacceptable to the public and politically risky to "tolerate" starvation. By the early nineteenth century, many governments were using policies on food trade, grain procurement, food subsidies, public works programs, and soup kitchens to distribute cooked food to combat the effects of food shortages and high prices.[11] Over time, the most important factors in the decline in famine deaths were improvements in agricultural productivity, living standards, transport systems and trade as part of the industrial revolution. The agricultural revolution in Europe, for example, starting in the seventeenth century, included introduction of new crops, improvements in soil fertility through rotations and integration of crops and livestock, addition of external sources of soil nutrients, use of livestock concentrates, advances in science such as Mendelian plant breeding, and gradual mechanization of labor-intensive tasks.[12] Likewise, improvements in transport through railways and steam ships in the nineteenth century integrated markets within countries and across continents, reducing the severity of spikes in food prices and the incidence of local food scarcity.[13]

Britain was slow to adopt policies to combat famine resulting in the last major peacetime famine in Western Europe, the arrival of the potato leaf blight disease and the Great Irish Famine of 1845–49, with estimated deaths of one million people and the emigration of another one million.[14] British policies were strongly influenced by its famed classical economists—Adam Smith who in the *Wealth of Nations* saw free markets as the answer to famine prevention, and Robert Malthus who in his *Essay on the Principles of Population* saw famine as a "natural condition" to arrest unsustainable population growth and bring it into

[8] Mark Gibson, *The Feeding of Nations: Redefining Food Security for the 21st Century* (Boca Raton, FL: CRC Press, 2012).

[9] P. Garnsey, "Responses to Food Crises in the Ancient Mediterranean World," in *Hunger in History: Food Shortage, Poverty, and Deprivation*, ed. Lucile F. Newman (Cambridge, MA: Blackwell, 1995); W.R. Aykroyd, *The Conquest of Famine* (London: Chatto & Windus, 1974).

[10] John D. Post, *The Last Great Subsistence Crisis in the Western World* (Baltimore, MD: Johns Hopkins University Press, 1977).

[11] Post, *The Last Great Subsistence Crisis in the Western World*.

[12] David B. Grigg, *The Dynamics of Agricultural Change. The Historical Experience* (London: Hutchinson, 1982); J. L. van Zanden, "The First Green Revolution: The Growth of Production and Productivity in European Agriculture, 1870–1914," *The Economic History Review* 44, no. 2 (1991).

[13] Robin Burgess and Dave Donaldson, "Can Openness Mitigate the Effects of Weather Shocks? Evidence from India's Famine Era," *The American Economic Review* 100, no. 2 (2010); William J. Bernstein, *A Splendid Exchange: How Trade Shaped the World*, 1st ed. (New York; Berkeley, CA: Atlantic Monthly Press, 2008).

[14] Cormac Ó Gráda, *Eating People Is Wrong, and Other Essays on Famine, Its Past, and Its Future* (Princeton, NJ: Princeton University Press, 2015).

balance with food supply.[15] However, after 1850, increasing literacy and access by the masses to newspapers greatly increased public awareness of the innocent victims of famines—especially women and children—that pressured the state to act. Journalists reporting from the field carried headline stories of suffering, and later, photojournalism graphically portrayed the horrors of famine. During the late nineteenth century, famine came to be seen as a failure of economic and political systems that made it morally imperative for states and civil society to provide emergency famine relief and to invest in preventing future famines.[16] Private relief funds based on individual contributions also emerged across national borders such as the food shipments mounted in the United States for relief during the Irish famine.[17]

The British laissez-faire approach also translated into imperial policy in India where famines sometimes resulted in millions of deaths. Indeed, Malthus taught at the East India Company College near London.[18] However, the disastrous famines of 1866–67 and 1876–78 that together resulted in 10–15 million deaths were among the first to receive widespread coverage by journalists working for major British and Indian newspapers. Newspapers also publicized a network of official famine relief funds across the British Empire to finance humanitarian relief efforts through voluntary contributions. For the first time, stark photographs were widely displayed in public to inspire contributions.[19] Private relief efforts through Indian voluntary organizations that operated nationally also became important.[20]

In the aftermath of the 1866–67 famine, the British rulers of India gradually accepted responsibility to avoid famine through short-term relief and long-term prevention. Detailed Famine Codes developed by 1880 were a turning point in setting a goal of "saving every life, regardless of costs."[21] The Codes institutionalized detailed processes for establishing information systems for early warning, activation of relief measures, use of public works for agricultural improvement, and free food distribution to the destitute.[22] Although district officers were to be held personally responsible for implementing the Codes locally, efforts by central and provincial governments to minimize costs and avoid interference in

[15] James Vernon, *Hunger: A Modern History* (London: The Belknap Press of Harvard University Press, 2007).

[16] Vernon, *Hunger: A Modern History*.

[17] S. Puleo, *Voyage of Mercy: The USS Jamestown, the Irish Famine, and the Remarkable Story of America's First Humanitarian Mission* (New York: St Martin's Press, 2020).

[18] Joanna Simonow, "Understanding humanitarian action in South Asia: Responses to famine and displacement in nineteenth and twentieth century India," (HPG Working Paper, Overseas Development Institute, London, 2015).

[19] Christina Twomey and Andrew J. May, "Australian Responses to the Indian Famine, 1876–78: Sympathy, Photography and the British Empire," *Australian Historical Studies* 43, no. 2 (2012).

[20] Simonow, "Understanding Humanitarian Action in South Asia."

[21] B.M. Bhatia, *Famines in India: A Study in Some Aspects of the Economic History of India with Special Reference to Food Problem* (New Delhi: Kobark Publishing, 1984), 90.

[22] Bhatia, *Famines in India: A study in some aspects of the economic history of India with special reference to food problem.*; Simonow "Understanding Humanitarian Action in South Asia."

markets meant that the Codes were only partially implemented and famines again occurred in the late 1890s.[23] Long-term investments to prevent famine, especially in irrigation and rail networks and growing pressure from Indian political parties and nationalist movements did prevent further large famines in the early twentieth century. However, the Bengal famine of 1943 resulting from wartime measures and indifference and incompetence of British rulers interrupted this record, causing the loss of 2–3 million lives.[24]

In the twentieth century, international relief efforts through private, governmental, and international organizations became mainstream responses to famines. The Commission for the Relief of Belgium (CRB) to supply the population of German-occupied Belgium during the First World War was the world's first massive international relief effort that set the stage for subsequent famine relief operations. Under the leadership of Herbert Hoover, a future US president but at the time a businessman, the CRB was a private humanitarian effort mounted initially through voluntary contributions but then largely supported by government loans. Remarkably, the CRB fed much of the population of Belgium throughout the war by the purchase, shipment, and delivery of over one million tons of food every year.[25] After the war, the logistics experience gained through the CRB was transformed by Hoover into the American Relief Agency (ARA) with US government funding to provide food to war-ravaged Europe. More surprising was US government support in 1921–22 to the ARA relief effort to communist Soviet Union under the leadership of Vladimir Lenin to counter a severe famine from crop failure and civil unrest.[26] Given the ideological differences between the two governments, this effort was clearly motivated by humanitarian concerns, although Hoover did appeal to American farm interests to gain Congressional budgetary support to buy and ship American food.[27]

By the Second World War, the role of international food aid for famine relief was well accepted on humanitarian grounds and after the war was supported by food-exporting countries to dispose of their food surpluses. The United Nations Relief and Rehabilitation Administration, with strong backing from the United States, mounted a major food relief effort in the wake of the war. The United Nations International Children's Emergency Fund (UNICEF), now called the UN Children's Fund, was also created to aid hungry children in Europe but soon expanded to other regions and other types of support to children.[28] Maurice Pate, UNICEF's director for its first 19 years, had worked in the CRB and built on that experience.

[23] Simonow, "Understanding Humanitarian Action in South Asia."

[24] Ó Gráda, *Eating People Is Wrong, and Other Essays on Famine, Its Past, and Its Future*.

[25] Barry Riley, *The Political History of American Food Aid: An Uneasy Benevolence* (New York: Oxford University Press, 2017).

[26] Douglas Smith, *The Russian Job: The Forgotten Story of How America Saved the Soviet Union from Ruin*, First edition. ed. (New York: Farrar, Straus and Giroux, 2019).

[27] Riley, *The Political History of American Food Aid: An Uneasy Benevolence*.

[28] Maggie Black, *The Children and the Nations: The Story of Unicef* (New York: UNICEF, 1986).

By 1954, the US institutionalized use of food aid for development and famine relief through its Public Law 480. In 1961 this was transformed into the Food for Peace program and was reoriented to humanitarian uses, especially school lunch programs.[29] At the international level, food aid was institutionalized with the creation of the UN World Food Program in 1961 that through early warning systems, logistics, and cash and food aid grants is now the global leader in famine prevention. The central role of the World Food Program in preventing famines and providing emergency relief was recognized when it received the Nobel Peace Prize in 2020.

Famine relief also stimulated the emergence of national and international NGOs from the nineteenth century. In Russia, the celebrated author Leo Tolstoy established a volunteer relief agency to provide food to the victims of a severe drought in the 1890s.[30] Religious organizations such as the Society of Friends have long been active in famine relief, including the Great Famine of Ireland. International NGOs were set up specifically to distribute food aid following the two World Wars. Save the Children was founded in 1919, on the initiation of a remarkable British woman, Eglantyne Jebb, to feed children in post-First World War Europe. Similarly, Oxfam (originally, Oxford Committee for Famine Relief) and CARE (originally, the Cooperative for American Remittance to Europe) were established for relief operations during and after the Second World War. NGOs have become especially important in advocacy and more recently have used television and social media to increase awareness of hunger. Live Aid, for example, effectively employed television and popular musicians to galvanize international action to combat the Ethiopian famine in the 1980s.

Although famines associated with international relief efforts have attracted most attention, national efforts have often been more important in avoiding famines. Recent evidence suggests that the Qing dynasty in China had by the seventeenth century established sophisticated state systems of grain storage, price stabilization, irrigation and flood control, and subsidized food distribution that effectively mitigated the threat of famine.[31] Unlike in the British Empire, Qing emperors saw the feeding of its population as part of their responsibility and a source of legitimacy. However, the Chinese famine prevention system was not sustained in the nineteenth century when population growth, environmental degradation, corruption, and external pressure from imperial powers undermined effectiveness of the state, resulting in the major famine of 1876–79.[32] Likewise, after independence, India built on the colonial Famine Codes to anticipate famine

[29] George S. McGovern, *The Third Freedom: Ending Hunger in Our Time* (New York: Simon & Schuster, 2001).

[30] Aykroyd, *The Conquest of Famine*.

[31] Lillian M. Li, *Fighting Famine in North China: State, Market, and Environmental Decline, 1690s–1990s* (Stanford, CA: Stanford University Press, 2007).

[32] Kathryn Edgerton-Tarpley, *Tears from Iron: Cultural Responses to Famine in Nineteenth-Century China*, Asia: local studies/global themes (Berkeley, CA: University of California Press, 2008); Li, *Fighting Famine in North China: State, Market, and Environmental Decline, 1690s–1990s*.

conditions and invested in agriculture to limit famines to very localized events with relatively few deaths. This was despite continuing occurrences of severe crop failures and the ending of massive food aid shipments in the 1960s.[33]

All of these efforts did not prevent major famines until the twenty-first century. However, the largest famines in the twentieth century occurred under predatory governments such as in the Soviet Union during its move to collective farming; China in the Great Leap Forward in the late 1950s (the largest famine in history with 20–30 million deaths); and North Korea in the 1990s. Notably these famines occurred under autocratic regimes that denied access to the international press. At the extreme, Nazi Germany through its *lebensraum* (living space) policy explicitly aimed to starve the populations in the bread baskets of Central and Eastern Europe in order to feed Germany in the Second World War.[34]

In the twenty-first century, large-scale famines have been avoided and the relatively small famines that have occurred have been associated with armed conflict often combined with natural disasters (Figure 2.1). As we write this chapter in 2021, Yemen is on the verge of famine, and famine risk is also high in northern Ethiopia, South Sudan, Somalia, and north-eastern Nigeria—all areas of long-running conflict.

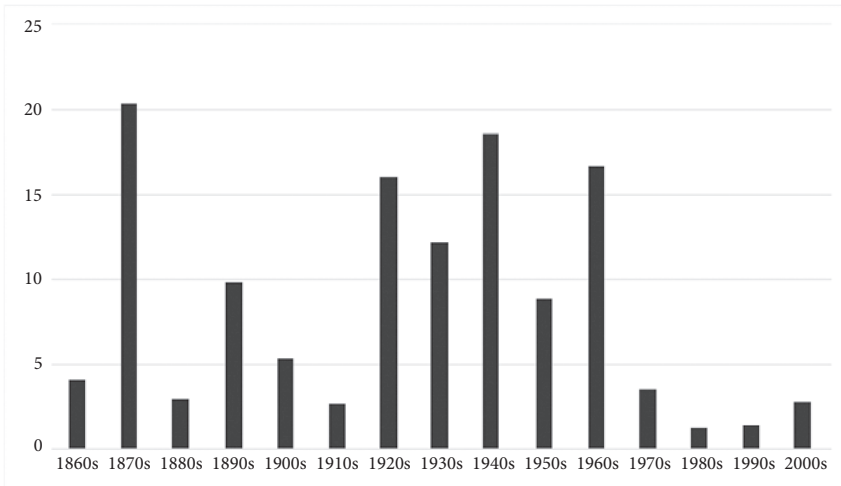

Fig. 2.1 Millions of deaths from famines by decade, 1860–2010
Source: Joe Hasell and Max Roser - "Famines". 'https://ourworldindata.org/famines'. (2013).

[33] Jean Drèze and Amartya Sen, *Hunger and Public Action* (Oxford; New York: Clarendon Press; Oxford University Press, 1989).
[34] Elizabeth M. Collingham, *The Taste of War: World War II and the Battle for Food* (New York: Penguin Press, 2012).

From Starvation to Malnutrition

The major driver of famine prevention was the increase in global and local food production and rising incomes. These resulted from many factors—investments in irrigation and land improvement, better transport, industrialization, and scientific advances. For example, the Colombian exchange after the European discovery of the New World introduced new and more productive crops, notably potatoes in northern Europe and maize in southern Europe, that contributed significantly to population growth and industrialization.[35] Maize and sweet potatoes played a similar role in China in terms of supporting a higher population and stabilizing food supply, even if incomes stagnated.[36] The reverse flow occurred with the opening of vast new lands of the New World to wheat production in the second half of the twentieth century. Together with a sharp drop in global transport costs due to the development of steam power and massive outmigration from Europe, the New World played a major role in feeding Europe. Generally, these exchanges were driven by peasant innovation and market incentives with limited roles for the state and collective action to combat hunger. However, Frederick the Great of Prussia did recognize the higher productivity of potatoes relative to rye and actively championed the production of potatoes to improve food security in the countryside.[37]

From the late eighteenth century states were increasingly conscious that a well-fed and growing population was integral to economic growth, peace, and state power.[38] There was also a growing body of knowledge on nutrition and the contribution of different foods to healthy diets. By 1900 scientists, building on the pioneering work of agricultural chemist Justus von Liebig in the mid nineteenth century, had generally agreed that good human nutrition and health required sufficient intake of energy, protein and fats, and were able to measure the dietary content of these macronutrients in specific foods. By 1900, Wilbur O. Atwater at Wesleyan University in the United States, had built a machine, the calorimeter, to measure actual energy expenditure by humans carrying out different levels of physical activity.[39] This enabled the formulation of prescriptive dietary norms on

[35] Nathan Nunn and Nancy Qian, "The Columbian Exchange: A History of Disease, Food, and Ideas," *The Journal of Economic Perspectives* 24, no. 2 (2010); Herman J. Viola and Carolyn Margolis, *Seeds of Change: A Quincentennial Commemoration* (Washington DC: Smithsonian Institution Press, 1991).

[36] S. Chen and J. Kung, "Of Maize and Men: The Effect of a New World Crop on Population and Economic Growth in China," *Journal of Economic Growth* 21, no.1, (2016), 71–99; Jia Ruixue, "Weather Shocks, Sweet Potatoes and Peasant Revolts in Historical China," *The Economic Journal (London)* 124, no. 575 (2014).

[37] J. Cook, "Potatoes, Milk, and the Old World Population Boom," *Journal of Development Economics* 110 (2014), 123–138.

[38] Rebecca Earle, *Feeding the People: The Politics of the Potato* (Cambridge, UK; New York: Cambridge University Press, 2020).

[39] Nick Cullather, "The Foreign Policy of the Calorie," *The American Historical Review* 112, no. 2 (2007).

food energy requirements and the estimation of the prevalence of undernutrition based on age, sex, physical activity, and dietary intake.

The period 1900 to 1940 was a golden era for the development of nutrition as a science. During this period, many minerals and vitamins, the so-called essential micronutrients in human nutrition, were discovered and isolated. Originally, nutrition researchers focused on deficiency diseases such as night blindness (Vitamin A), scurvy (Vitamin C), pellagra (Vitamin B3), and beriberi (Vitamin B1) associated with extreme lack of these micronutrients in diets. Over time, with better vital statistics, micronutrient deficiencies were recognized as major contributors to maternal and infant mortality as well as less visible symptoms of malnutrition—reduced vitality, slow growth of children, and low resistance to infections.[40]

During the Great Depression that created the breadlines of the 1930s, many Western countries initiated household surveys of nutritional status along with anthropometric measures of height and weight to assess dietary adequacy. One of the most influential surveys was carried out by John Boyd Orr and colleagues at the Rowett Research Institute in Scotland. Boyd Orr's book *Health, Income and Nutrition* published in 1936 identified one tenth of the British population as severely undernourished and another 40% as lacking in several of the micronutrients.[41] Based on these findings, the state in Western countries began to assume responsibility for better nutrition through educational programs and targeted interventions such as programs to provide milk to schools in the UK. In the United States, Food Stamps were introduced in 1938 targeted at the poor with insufficient access to food.

Nutritional studies were also organized in colonial empires, especially the British, such as Boyd Orr's study in Kenya.[42] Perhaps the most ambitious effort was in Nyasaland (now Malawi) where a British team undertook an extensive inquiry into agricultural production, food consumption and health shortly before the Second World War but ran into difficulties of coordinating health and agricultural teams and never published the full study.[43] Anthropologists also became involved through detailed field studies on dietary composition and how social and cultural factors influence diets, notably the pioneering work by Audrey Richards among the Bemba people in what is now Zambia.[44] By 1939 the Colonial Office

[40] Vernon, *Hunger: A Modern History*.

[41] John Boyd-Orr, *Food, health and income; report on a survey of adequacy of diet in relation to income* (London: Macmillan, 1936).

[42] J. L. Gilks and John Boyd-Orr, "The Nutritional Condition of the East African Native," *The Lancet (British edition)* 209, no. 5402 (1927).

[43] Cynthia Brantley, *Feeding families: African realities and British ideas of nutrition and development in early colonial Africa* (Portsmouth, NH: Heinemann, 2002).

[44] Audrey I. Richards and International African Institute., *Land, labour and diet in Northern Rhodesia; an economic study of the Bemba tribe* (London, New York etc.: Pub. for the International Institute of African Languages & Cultures by the Oxford University Press, 1939).

had issued its first comprehensive review that indicated widespread prevalence of malnutrition across the British colonies.[45]

In India, an Institute of Nutrition Research was established from 1922 with emphasis on assessing diet quality and nutritional diseases.[46] The problem of malnutrition, including micronutrients, and its links to agriculture was explicitly recognized in the 1928 Royal Commission on Agriculture in India. A member of that Commission, Nagendranath Gangulee, Professor of Agriculture at the University of Calcutta, went on to write the first comprehensive review of nutrition in India.[47] Although some dietary survey data were available for specific types of workers, there was a marked absence of information on the nutritional status of the peasantry, the great majority of the population. Rough estimates were that 60% of the Indian population were poorly or very badly nourished.[48]

During the 1930s, colonial officials came to realize that chronic malnutrition was a much bigger problem than famine even if the effects were not so visually distressing. From 1850 to 1950, famines on average killed about one million people annually.[49] That compares to the estimated three million children under five years alone who even today die annually due to malnutrition.[50] There was also a growing recognition of the link between nutrition and infectious diseases, and the critical role of malnutrition in maternal health and infant mortality. These findings emphasized the importance of cooperation between the agricultural and health sectors.[51] Colonial governments also came to recognize that the root cause of undernutrition was poverty, and accordingly gave more importance to economic development and by the 1930s started shifting away from an almost exclusive emphasis on export crops such as rubber, cotton, and coffee toward investment in food crops.[52]

[45] Economic Advisory Committee, *Nutrition in the Colonial Empire: 1st report Pt. 1 / Committee on nutrition in the Colonial Empire* (London: H.M.S.O., 1939); M. Worboys, "The Discovery of Colonial Malnutrition Between the Wars," in *Studies in Imperialism*, ed. David Arnold (Manchester; New York: Manchester University Press; distributed exclusively in the United States and Canada by St. Martin's Press, 1988). French research on tropical nutrition began mostly after the Second World War. See Yan Slobodkin, "Famine and the Science of Food in the French Empire, 1900–1939," *French Politics, Culture & Society* 36, no. 1; B.M. Cooper, "The Gender of Nutrition in French West Africa," in *Health and Difference Rendering Human Variation in Colonial Engagements*, ed. Alexandra Widmer and Veronika Lipphardt (New York: Berghahn Books, 2016).

[46] Aykroyd, *The Conquest of Famine*; David Arnold, "The 'Discovery' of Malnutrition and Diet in Colonial India," *The Indian Economic & Social History Review* 31, no. 1 (1994).

[47] Nagendranath Gangulee, *Health and Nutrition in India* (London: Faber and Faber, 1939).

[48] Arnold, "The 'Discovery' of Malnutrition and Diet in Colonial India."

[49] J. Hasell and M. Roser, "Famines, Our Word in Data," accessed March 1, 2021. https://ourworldindata.org/famines.

[50] Robert E. Black et al., "Maternal and Child Nutrition: Building Momentum for Impact," *The Lancet (British edition)* 382, no. 9890 (2013).

[51] Worboys, "The Discovery of Colonial Malnutrition Between the Wars."; Arnold, "The 'Discovery' of Malnutrition and Diet in Colonial India."

[52] Joseph Morgan Hodge, *Triumph of the Expert Agrarian Doctrines of Development and the Legacies of British Colonialism*, Ohio University Press series in ecology and history, (Athens, OH: Ohio University Press, 2007).

Internationalization of the Hunger Problem

The problems of hunger and malnutrition began to receive attention in international fora during the 1930s through the League of Nations. In 1924, the League at the urging of Eglontyne Jebb (the founder of Save the Children), issued the first international declaration on the rights to sufficient food incorporated in its Declaration of the Rights of the Child. Building on the growing interest in malnutrition, the Health Organization of the League of Nations prepared a report *Nutrition and Health* that made nutrition a central priority of the League.[53] The report stressed deficiencies in both the quantity and quality of diets in both Europe and its colonies. It also noted the paucity of evidence and argued for establishing an international institute to promote research on nutrition.

Based on growing League interest in nutrition, an Australian delegate to the League, Frank McDougall, prepared a memorandum arguing that the high prevalence of malnutrition was an opportunity to use agricultural surpluses that had emerged in the 1930s in some industrialized countries to solve both the agriculture and nutrition problems.[54] Presented by Stanley Bruce, ex-prime minister of Australia, to the full assembly of the League, the idea of a "marriage of agriculture and nutrition" was enthusiastically endorsed.[55] Accordingly, the League formed the so-called Mixed Committee made up of the Health Organization and the International Labour Organization (both of the League) and the independent International Institute of Agriculture to link agriculture, nutrition, and human welfare. The resulting report, *The Relations of Nutrition to Health, Agriculture and Economic Policy*, noted that the "problem of malnutrition is urgent" and that governments should "take all possible steps to make food supplies available at prices within reach of all the classes, while at the same time, safeguarding the interests of the producer."[56] Notably the report was named by the *New York Times* as one of the most important books of the year and the resulting nutrition campaign was the first serious effort mounted on an international scale.[57] Based on the report, nutrition committees were set up in about 30 countries to design food and nutrition policies and set nutrition standards.

Nonetheless, the work of the League was largely focused on Western countries, that were already conducting surveys on the status of diets and health and

[53] E. Burnet and W.R. Aykroyd, "Nutrition and Public Health," *Quart. Bull. Health Organ., League of Nations* 4 (1935), 323–474.

[54] Frank McDougall, *The Agriculture and Health Problems* (Internal memorandum, League of Nations, 1935), http://www.fao.org/fileadmin/templates/library/docs/mcdougall_memoranda.pdf.

[55] Wendy Way, *A New Idea Each Morning: How Food and Agriculture Came Together in One International Organisation* (ANU Press, 2013).

[56] League of Nations, *Final report of the mixed committee of the League of Nations* (Geneva: League of Nations, 1937).

[57] P. Lamartine Yates, *So Bold an Aim. 10 Years of International Co-Operation Toward Freedom from Want: Quebec 1945* (FAO: Rome, 1955); Gibson, *The Feeding of Nations: Redefining Food Security for the 21st Century*.

implementing public nutrition programs such as school feeding. Its promoters, especially Australia, were also motivated by their interests to solve the problems of depressed agricultural prices and food surpluses, rather than out of humanitarian interests.[58] The major policy proposals were a reduction in agricultural trade protection to lower food prices in importing countries along with "social provision of food." Boyd Orr was more realistic that the marriage of agriculture and nutrition would also require major adjustment of the global economic system to raise the incomes of the poor.[59]

The implementation of the League report was interrupted by the outbreak of the Second World War but soon revived by the United Nations conference on food and agriculture called by US President Franklin D. Roosevelt in Hot Springs, Virginia in April 1943. This was the first of a series of conferences on the post-War architecture of the proposed United Nations. The conference arose directly from the League of Nations work when McDougall visited Washington for an international wheat conference in 1942 and was able to meet not only Vice President Henry Wallace, with a lifelong career in farm and food politics, but also Roosevelt and his wife, Eleanor, arguing that freedom in the post-War period should start with "freedom from hunger."[60]

Some 44 countries attended the Hot Springs conference—a major achievement in itself given the difficulties of traveling in the middle of a World War. For the first time, the "less advanced nations," as they were known, made up a solid majority of 27 participating countries. Participants and observers were unanimous in claiming the success of the conference that proceeded over 18 days in a spirit of "good will and optimism."[61] A laudable feature of the conference was the disciplinary balance of participants who were mostly professionals (rather than politicians) drawn from health and nutrition on the one side, and agriculture on the other. In fact, some of the best-known participants were nutritionists, such as André Mayer (France) and William Aykroyd (India/UK) who had been involved in the earlier League of Nations studies.

The Hot Springs conference set the goal of "freedom from want of food, suitable and adequate for the health and strength of all peoples" and agreed that "the most fundamental of necessities is adequate food which should be placed within the reach of all men in all lands within the shortest possible time."[62] This goal was equivalent in many respects to SDG2 to end hunger but without a firm

[58] Ina M. Cumpston, *Lord Bruce of Melbourne* (Melbourne: Longman Cheshire Pty. Ltd., 1989), 146.
[59] John Boyd-Orr, "Preface," in *Health and Nutrition in India*, ed. N. Gangulee (London: Faber and Faber Ltd., 1939).
[60] Way, *A New Idea Each Morning: How Food and Agriculture Came Together in One International Organisation*.
[61] K. Evang, "The Hot Springs Conference," *Proceedings of the Nutrition Society* 2 (1944), 163–176; Craig Alan Wilson, "Rehearsal for a United Nations: The Hot Springs Conference," *Diplomatic History* 4, no. 3 (1980).
[62] US Department of State, *United Nations Conference on Food and Agriculture: Final Act and Section Reports* (Washington DC: Government Printing Office, 1943).

target date.[63] The conference also urged countries to "maintain optimum level of productivity consistent with ensuring the preservation of basic resources"—in other words a call for sustainable agriculture. A proactive role of the state in promoting better nutrition and the need to coordinate across ministries were also made explicit.[64]

Increasing the "Pile of Food" in a Malthusian Era

Since 1798 when Thomas Malthus posited that population growth would inevitably outpace food production, there have been periodic resurgences of the specter of a world running out of food. The twentieth century began with influential books by a distinguished British scientist, Sir William Crooks, *The Wheat Problem*, and an American scientist, Edward East (the inventor of hybrid maize), *Mankind at the Crossroads*. They promoted gloomy forecasts of the ability to feed a growing world population. Their emphasis was on the European peoples including in North America but by the 1930s similar Malthusian alarm bells were emerging in densely populated Asia. These included a comprehensive review of the Indian food problem by Radhakamal Mukerjee and even colonial reports on relatively land-abundant Africa.[65]

In the immediate post-Second World War period, the initial priority was reconstruction in Europe and Asia. However, the "population problem" quickly re-emerged in the new UN Food and Agriculture Organization (FAO) where Boyd Orr was appointed its founding director general in 1945. Despite the broad approach to nutrition in the Hot Springs conference and Boyd Orr's background as a leading nutrition scientist, the metric that quickly emerged in FAO for tracking hunger was the number of people with insufficient calories to provide for an active working life, the metric that still underlies the first indicator of SDG2.[66] FAO mounted a series of world food surveys to provide estimates of the number of people that were undernourished. By 1960, FAO estimated that 10–15% of the world's population was undernourished in terms of calories and that one third to one half suffered other forms of malnutrition.[67] However, available evidence indicated that cereal supply, the main source of energy for much of the world's population, was

[63] Byerlee and Fanzo, "The SDG of Zero Hunger 75 Years On: Turning Full Circle on Agriculture and Nutrition."

[64] Josep L. Barona, "Nutrition and Health. The International Context During the Inter-war Crisis," *Social History of Medicine: The Journal of the Society for the Social History of Medicine* 21, no. 1 (2008).

[65] Radhakamal Mukerjee, *Food Planning for Four Hundred Millions* (London: Macmillan, 1938); Hodge, *Triumph of the Expert Agrarian Doctrines of Development and the Legacies of British Colonialism*.

[66] Defined today to be under about 2000 calories per day for an adult depending on age, sex, and physical activity. Kenneth J. Carpenter, "The Work of Wallace Aykroyd: International Nutritionist and Author," *The Journal of Nutrition* 137, no. 4 (2007).

[67] P. V. Sukhatme, "The World's Hunger and Future Needs in Food Supplies," *Journal of the Royal Statistical Society. Series A. General* 124, no. 4 (1961).

Table 2.1 Per capita grain production in selected regions before and after the Second World War (kg)

	Asia	Latin America	Africa	Western Europe	North America
1934–48	231	254	158	247	768
1957–59	221	213	167	284	1107
% change	−4.3	−16.1	5.7	15.0	44.1

Source: Calculated from Brown (1963).

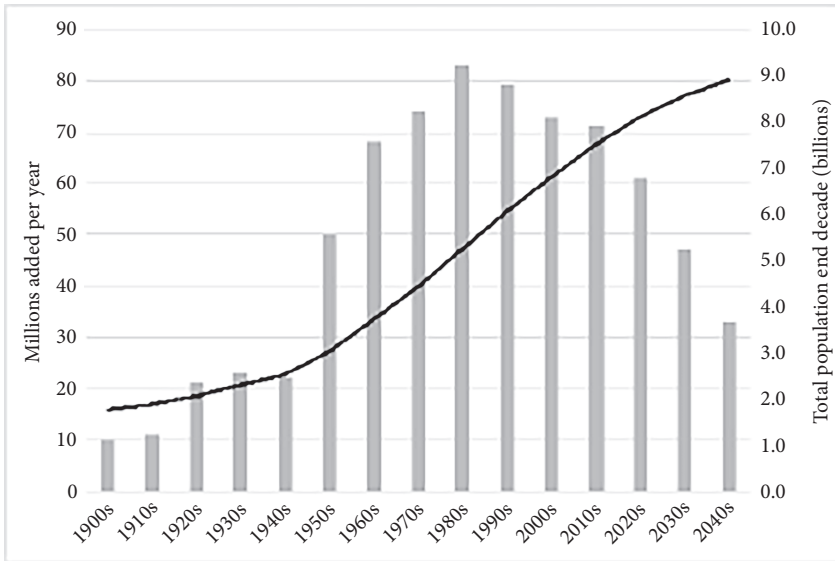

Fig. 2.2 Annual increment in population (left axis and bars) and world population (right axis and solid line), with projections after 2020

Source: Calculated from FAOSTAT http://www.fao.org/faostat/en/#home.

not matching population growth in Asia and Latin America (Table 2.1). This trend was alarming given burgeoning population growth in much of the world.

Attention continued to focus on the "population monster" through the 1980s.[68] Peace, better control of disease epidemics and improvements in health and sanitation led to the largest population bubble in human history, with annual increases in world population jumping from about 20 million in the 1930s and 1940s to 50 million in the 1950s before peaking at 80 million in the 1980s (Figure 2.2). Seen from the perspective of 1963 projections, the population challenge was particularly

[68] Norman Borlaug, known as the father of the Green Revolution, frequently referred to the population monster and may have coined the term.

acute in Asia that was forecast to triple to nearly four billion people by 2000—as it turns out, only a small overestimate. These population numbers were truly scary to analysts of the world food situation and world leaders who were nurtured in the Malthusian views of the early twentieth century. There was no historical precedent for dealing with such a large increase, especially in the land-scarce countries of Asia. It is not surprising that many popular books, including Paul Ehrlich's *Population Bomb*, Georg Borgstrom's *The Hungry Planet; The Modern World at the Edge of Famine* and the Paddock brothers' *Famine-1975*!; *America's Decision: Who Will Survive*?, all published in the 1960s, echoed a deep Malthusian pessimism about looming world famines.

Malthusian perspectives also found supporters in the emerging Cold War politics that started immediately after the Second World War. From 1947, countries of south and southeast Asia gained independence to be followed a decade later by countries throughout Africa. The newly independent countries, often with fragile governments, together with a reassertion of nationalism in Latin America, provided the fuel for intensive Cold War rivalry.[69] Foreign assistance to cash-strapped governments emerged as one of the main weapons to fight communism and became official policy of the United States with President Truman's Point Four program announced in 1949.[70] Given the food-population race, assistance to agriculture was a priority and these programs rapidly expanded to reach most non-communist developing nations by the early 1960s. US philanthropic organizations, notably the Rockefeller and Ford Foundations, enthusiastically embraced the enormous challenge of accelerating world food production to meet population growth and fight communism. The Rockefeller Foundation was already out in front with its Mexican Agricultural Program initiated in 1943.[71]

The UN defined the 1960s as the Development Decade, and many foreign assistance agencies highlighted ending hunger as their priority. The FAO launched its Freedom from Hunger campaign in 1959, under the leadership of its fourth director general, B.R. Sen, an Indian civil servant who had worked in the relief team for the 1943 Bengal famine. Other agencies soon followed such as the Rockefeller Foundation's Conquest of Hunger program in 1963, and the US government's War on Hunger in 1966. Developing countries themselves also stepped up their support to food production, such as the Integrated Agricultural District Program in India.

Despite a strong consensus on the importance of improving agricultural productivity, agricultural performance continued to lag through the mid 1960s. This in part reflected the emphasis on agricultural extension and community

[69] John H. Perkins, *Geopolitics and the Green Revolution: Wheat, Genes, and the Cold War* (New York: Oxford University Press, 1997).

[70] Perkins, *Geopolitics and the Green Revolution: Wheat, Genes, and the Cold War*.

[71] E.C. Stakman, Richard Bradfield, and Paul C. Mangelsdorf, *Campaigns Against Hunger* (Cambridge, MA: Belknap Press, 1967).

development to "educate" farmers to use existing technology more efficiently. Adoption was slow and indeed there was much debate about whether "tradition-bound" small farmers were willing to change.[72] It was not until 1966 that new technology was introduced in the form of high-yielding wheat and rice varieties produced by the Rockefeller and Ford Foundations in collaboration with FAO that cereal yields took off in Asia. Coinciding with a severe drought-induced shortfall in grain production in South Asia, the new varieties combined with rapid adoption of fertilizer quickly increased production and reduced imports in what became known as the Green Revolution. With continuing adoption across much of the tropical and subtropical world, global grain production significantly outpaced population growth and Norman Borlaug, architect of the new wheat varieties, received the Nobel Peace Prize in 1970.[73]

In the Green Revolution era, policy makers and foreign assistance agencies alike assessed progress in terms of yields and self-sufficiency but could not clearly link their success in raising production to a reduction in hunger. Indeed, the various pathways from increasing the "pile of food" to reducing hunger were poorly articulated or even understood. Today, there is ample evidence that the Green Revolution, by raising farm incomes and reducing food prices, contributed to reducing the number of undernourished children (in terms of calories), although it may have aggravated other dimensions of malnutrition.[74] Recent evidence suggests that over the long term the Green Revolution also significantly reduced infant mortality by an estimated 3 to 6 million deaths through lower food prices and reduced poverty.[75]

By 1990, the Green Revolution came under scrutiny for its environmental impacts.[76] These were in part a reflection of the increasing use of inputs such as fertilizer beyond optimal levels, a trend that was exacerbated by outdated policies such as input subsidies. Since around 1990, the mantra has been "sustainable agricultural intensification" that was enshrined as an indicator for SDG2. However, there is much debate about the interpretation and metrics of sustainable agriculture as well as how to achieve it. Approaches vary widely from those promoting

[72] Gunnar Myrdal and Twentieth Century Fund, *Asian Drama; An Inquiry into the Poverty of Nations*, 3 vols. (New York: Pantheon, 1968).

[73] *The Green Revolution, Peace and Humanity* (1970).

[74] R.E. Evenson and D. Gollin, "Assessing the Impact of the Green Revolution, 1960 to 2000," *Science (American Association for the Advancement of Science)* 300, no. 5620 (2003). D. Roy, P.K. Joshi, and R. Chandra, "Pulses for Nutrition in India: Changing Patterns from Farm to Fork," (Washington DC: International Food Policy Research Institute, Washington, 2017).

[75] Jan von der Goltz et al., "Health Impacts of the Green Revolution: Evidence from 600,000 births across the Developing World," *Journal of Health Economics* 74 (2020).

[76] Murgai Rinku, Ali Mubarik, and Byerlee Derek, "Productivity Growth and Sustainability in Post-Green Revolution Agriculture: The Case of the Indian and Pakistan Punjabs," *The World Bank Research Observer* 16, no. 2 (2001); L. Pingali Prabhu, "Green Revolution: Impacts, Limits, and the Path Ahead," *Proceedings of the National Academy of Sciences-PNAS* 109, no. 31 (2012).

a radical shift to agro-ecological or organic agriculture to those seeking to minimize environmental risks in post-Green Revolution agriculture by improving input efficiency.

From the 1960s, the UN also mounted high-profile world food summits that reaffirmed the global commitment to ending hunger. Notably, these conferences emphasized the supply of calories through increased production of food staples and largely ignored the broader dimensions of malnutrition of the 1943 UN conference at Hot Springs. FAO's Sen called a World Food Congress in 1963 in Washington where US President John F. Kennedy declared "we have the capacity to eliminate hunger in our lifetime, we only need the will."[77] Another food summit was held in 1974 in the midst of the 1973–75 world food crisis, that declared that "every man, woman, and child has the inalienable right to be free from hunger and malnutrition." The conference called on "all governments to accept the goal that within a decade no child will go to bed hungry, that no family will fear for its next day's bread, and no human being's future capacity will be stunted by malnutrition."[78] In an effort to improve implementation across some 30 UN and other international organizations, the Summit established an inter-ministerial World Food Council to coordinate and monitor efforts to eradicate hunger and nutrition. However, by 1993 the Council's business had deteriorated into a "confused mixture of general advocacy and action plans" and it was dissolved.[79]

Rebalancing from Supply of Food to Access to Food

By the 1970s, the development community had recognized that the emphasis on increasing the "pile of food" needed more nuance in terms of better targeting the hungry. The first step in this transition was an increased priority to reaching small farmers, especially in rainfed areas that until then had been largely bypassed by the Green Revolution. These farmers depended heavily on subsistence food production and were also counted as a large share of the world's undernourished.[80] The Rockefeller Foundation, for example, invested heavily in the Puebla project in Mexico to showcase integrated research, extension, input supply, and marketing support for rainfed maize farmers in central Mexico and promoted similar crop production campaigns in many countries.[81] The World Bank under Robert McNamara as president soon began investing heavily in integrated rural development

[77] D. John Shaw, *World Food Security: A History since 1945* (Basingstoke, UK; New York: Palgrave Macmillan, 2007).

[78] US Department of State, "World Food Conference Meets at Rome," *Department of State Bulletin* 71 (1851), 821–837.

[79] Shaw, *World Food Security: A History since 1945*.

[80] Shaw, *World Food Security: A History since 1945*.

[81] Sterling Wortman and Ralph W. Cummings Jr. *To feed this world. The challenge and the strategy*. (Baltimore, MD: Johns Hopkins Univ. Press, 1978).

projects that aimed to uplift the welfare of small farmers. These efforts met with mixed success, especially in Sub-Saharan Africa, but smallholders have continued to be at the heart of agricultural and rural development. Indeed, smallholder incomes and productivity are key indicators for tracking progress with SDG2.

More generally in the 1980s, the problem of hunger began to shift from the supply side to the demand side, recognizing that poverty was a major cause of hunger. Amartya Sen, a future Nobel Laureate in Economics, led the movement by persuasively arguing for the "imperative for us to re-orient our approach away from food availability toward the ability to command food."[82] The FAO accordingly revised its definition of food security in 1986 to "ensure that all people at all times have both physical and economic access to the basic food they need."[83] The World Bank also reoriented its lending program around poverty reduction and began supporting programs of targeted food subsidies while the World Food Program scaled up food for work programs aimed at improving agricultural productivity. However, most of these programs still focused on undernutrition measured in calories. The World Bank's first major report on hunger, for example, strongly promoted social protection programs to access food, but assessed outcomes in calories.[84] Despite these shortcomings, some countries such as Sri Lanka had long experience with targeted food subsidies and food-for-work programs that had tangible impacts on nutrition and infant mortality.[85] In recent decades, NGOs, including some of the original multinational NGOs such as Oxfam and CARE, have strongly promoted social protection programs for the poorest and most vulnerable, often channeled through female members of the household.

Rediscovery of Multiple Dimensions of Malnutrition

Several international organizations set up after the Second World War had a mandate to promote improved nutrition in its various dimensions as endorsed by the 1993 Hot Springs Conference. The first aim of FAO in its founding constitution was "to raise levels of nutrition." From its beginning it created a nutrition department under Aykroyd who brought a long career as the head of nutrition research in colonial India, leading the League of Nation's nutrition program, and as a key player in the Hot Springs conference.[86] The World Health Organization, set up in 1948, also had a department of nutrition, and UNICEF as we have seen built its operational programs around improving nutrition and health of children.

[82] Sen, *Hunger and Entitlements*, 9.
[83] Shaw, *World Food Security: A History since 1945*.
[84] Shlomo Reutlinger and Marcelo Selowsky, *Malnutrition and Poverty: Magnitude and Policy Options*, World Bank staff occasional papers, (Baltimore, MD: Published for the World Bank by Johns Hopkins University Press, 1976).
[85] Aykroyd, *The Conquest of Famine*; Drèze and Sen, *Hunger and Public Action*.
[86] Carpenter, "The Work of Wallace Aykroyd: International Nutritionist and Author."

At the regional level, the Nutrition Institute for Central America (INCAP), was founded in 1948 under the leadership of Nevin Scrimshaw who would play a leading role in international nutrition research and policy for the next few decades. Governments in Latin America also established their first nutrition departments around this time. In addition, the colonial services in Britain and France stepped up efforts in nutrition in the post-War period.[87]

Serious efforts were made to foster collaboration among these various agencies (e.g., the FAO/WHO Expert Committee on Nutrition), but often with considerable tension about mandates and priorities.[88] Even so, the nutritionists largely worked in isolation from other sectors, notably agriculture (and vice versa).[89] Further, most of the nutrition interventions until the 1970s were narrowly focused on protein malnutrition as a consensus developed that this was the leading nutritional constraint in much of the developing world.

Protein malnutrition had been first identified by a British-West Indian nutritionist, Cicely Williams, in the form of the disease, Kwashiorkor, through her field research in the Gold Coast (now Ghana).[90] By the 1950s, a joint FAO/WHO report identified protein deficiency as a major problem and the UN formed a Protein Advisory Group that actively promoted interventions with protein dense foods targeted to infants and children (milk and protein dense supplements made from groundnuts and other legumes).[91] UNICEF ran large school feeding programs based on donations of food aid, especially dried skimmed milk.[92] In India, UNICEF worked closely with Verghese Kurien, a future winner of the World Food Prize, to build a highly effective cooperative milk supply chain.[93] By the 1960s, UNICEF programs reached nearly five million children and were being reoriented to infant nutrition. These efforts were recognized by the award of the Nobel Peace Prize to UNICEF in 1965.

Despite the flurry of activity in nutrition, the resources allocated to nutrition programs were small relative to agriculture that continued to prioritize food staples. FAO allocated less than 5% of its budget to nutrition in the 1950s and WHO less than 1%.[94] By the mid 1970s, influential nutritionists had largely debunked

[87] Worboys, "The Discovery of Colonial Malnutrition Between the Wars."; Cooper, "The Gender of Nutrition in French West Africa."

[88] Joshua N. Ruxin, Hunger, science, and politics: FAO, WHO, and Unicef nutrition policies, 1945–1978. PhD diss., University of London, 1996.

[89] R. D Semba, Nutrition and development: A historical perspective. In M. W. Bloem, & R. D. Semba, (Eds.). *Nutrition and health in developing countries*. (Totowa, NJ: Humana Press, 2001, pp. 1–30).

[90] Cicely Williams, "Kwashiorkor. A Nutritional Disease of Children Associated with a Maize Diet," *Lancet* 229 (1935).

[91] J.F. Brock and M. Autret, "Kwashorkor in Africa," *Bulletin World Health Organization* 5, no. 1 (1952).

[92] W.R. Aykroyd, "FAO and nutrition," *Proceedings of the Nutrition Society* 15, no. 1 (1956).

[93] Black, *The Children and the Nations: The Story of Unicef*.

[94] Wilhelm Anderson, Cyrus French, Nevin S. Scrimshaw, and Jean W. McNaughton, "Meeting the Challenge of Feeding the World," *American Journal of Public Health and the Nation's Health* 49, no. 10 (1959).

the evidence for the overriding role of protein malnutrition noting that calorie undernutrition should be the priority. What came to be labeled the "protein fiasco" did lasting damage to the reputation of nutritionists. As expressed by Waterlow and Payne, "it is a most nourishing and stimulating diet to eat one's words."[95] The 1974 World Food Summit did recognize other dimensions of nutrition than calories, particularly for vulnerable groups, but the main resolutions gave priority to increasing food energy supply (Berg, 2013). At the conference US Secretary of State Henry Kissinger noted that the "knowledge of the state of global nutrition is abysmal."[96]

Infighting among nutrition scientists, notably around the protein fiasco but not limited to it, was a significant setback to the development and priority to nutrition in international development in subsequent decades[97] Nonetheless, nutrition interventions made halting steps forward. By the mid 1970s nutritionists had started to recognize the long-term impacts of infant malnutrition not only on physical but also cognitive development as well as the close interaction of nutrition and infectious diseases.[98] This turned attention to maternal and infant nutrition, especially nutrition of the first 1000 days from conception to two years of age and the integration of nutrition with broader health and sanitation. It also gave rise to more robust measures of nutritional outcomes, such as stunting (measured by a child's height in relation to age), rather than dietary nutrient supply (an input metric). The need to work more closely with agriculture on the supply side in what was termed multi-sectoral planning was also recognized but progress was "excruciatingly slow."[99]

The World Summit for Children in 1990 and the World Conference on Nutrition in 1992 were turning points in placing nutrition at the forefront of global food and nutrition policy. As with the food summits, they pronounced lofty goals of eliminating hunger. However, unlike the food summits, they stressed the multiple dimensions of nutrition, especially hidden hunger (Vitamin A, Iodine, Iron, and later Zinc) as well as the critical interactions of nutrition with breast feeding, sanitation, hygiene, and clean water. Specific targets were set for eliminating Vitamin A and Iodine deficiencies and reducing maternal and child mortality and undernutrition by 2000 (Table 2.2).

[95] J.C. Waterlow and P.R. Payne, "The Protein Gap," *Nature* 258, no. 5531 (November 13, 1975).

[96] US Department of State, "World Food Conference Meets at Rome," *Department of State Bulletin* 71, no. 1851 (1974), 821–837.

[97] James Levinson, "Vital to the Creation: Interview with Alan Berg," *Development (Society for International Development)* 56, no. 1 (2013).

[98] Lucile F. Newman, *Hunger in History: Food Shortage, Poverty, and Deprivation*, First published in paperback ed. (Cambridge, MA: Blackwell, 1995).

[99] Alan Berg and James Austin, "Nutrition Policies and Programmes: A Decade of Redirection," *Food Policy* 9, no. 4 (1984).

Table 2.2 Summary of major summits and their declarations by the UN on ending hunger

UN Summit	Declaration	Comment
1963 World Food Congress (FAO), Washington DC	Agrees 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" Pledged that "elimination of hunger and malnutrition is a primary task of this generation"	Addressed by President J.F. Kennedy, who declared "we have the capacity to eliminate hunger in our lifetime, we only need the will"
1974 World Food Summit (UN), Rome	**Universal Declaration on the Eradication of Hunger and Malnutrition** stating, "every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties." Called on "all governments to accept the goal that within a decade no child will go to bed hungry, that no family will fear for its next day's bread, and no human being's future capacity will be stunted by malnutrition"	Called in response to a world food crisis and resolutions reflected the major concern to increase food supply and stabilize prices
1992 International Conference on Nutrition (FAO & WHO), Rome	**World Declaration and Plan of Action for Nutrition** "to eliminate hunger and to reduce all forms of malnutrition." Pledge to make all efforts to eliminate before the end of this decade (i.e., 2000): • famine and famine-related deaths; • starvation and nutritional deficiency diseases in communities affected by disasters; • iodine and vitamin A deficiencies	Less-specific pledges to reduce chronic hunger, undernutrition of women and children, other micronutrient deficiencies Explicit links of nutrition to breast feeding, sanitation, hygiene, and clean drinking-water.

Continued

Table 2.2 *Continued*

UN Summit	Declaration	Comment
1996 World Food Summit (UN), Rome	**Rome Declaration on World Food Security.** Commits to "implement policies aimed at eradicating poverty and inequality and improving physical and economic access by all, at all times, to sufficient, nutritionally adequate and safe food and its effective utilization." Pledge to "eradicate hunger in all countries…with an immediate view to reducing the number of undernourished people to half their present level no later than 2025."	Focus on access to food and increasing attention to broader dimensions of nutrition. Recognition of sustainable agriculture Basis for setting the target for MDG1.
2009 World Summit on Food Security (FAO), Rome	"Ensure urgent national, regional and global action to fully realize the target of Millennium Development Goal 1 and the 1996 World Food Summit goal, namely to reduce respectively the proportion and the number of people who suffer from hunger and malnutrition by half by 2015."	Renewed focus on food supply reflecting the world food crisis of 2008–12
2014 Second International Conference on Nutrition (FAO & WHO), Rome	**Rome Declaration on Nutrition.** Commits to: "eradicate hunger and prevent all forms of malnutrition worldwide, particularly undernourishment, stunting, wasting, underweight and overweight in children under five years of age; and anemia in women and children among other micronutrient deficiencies; as well as reverse the rising trends in overweight and obesity and reduce the burden of diet-related noncommunicable diseases in all age groups."	Explicit recognition of the problem of rising obesity Set the stage for many of the SDG2 targets and indicators

Although the focus continued to be on "medicalized treatment," some success was achieved for reducing the prevalence of Vitamin A and Iodine deficiencies.[100] The prospects for biofortification to increase the micronutrient content in food staples through plant breeding also emerged as a way to attack hidden hunger led by the CGIAR. This has shown notable progress with crops biofortified for Vitamin A and Iron. These trends were reinforced by the so-called Copenhagen Consensus group that identified micro-nutrients (Iodide, Vitamin A, Iron, and Zinc) as highly cost-effective development interventions.[101] The CGIAR led by the International Food Policy Research Institute also initiated work on the nexus of nutrition, health, and social protection[102] The renewed focus on nutrition was also incorporated into the World Food Summit of 1996 that for the first time moved away from a focus on food supply and explicitly called for linking agriculture with a range of nutritional outcomes.

The rediscovery of nutrition in its broader dimensions came too late to have much impact on setting the targets and indicators for the Millennium Development Goals (MDGs) in 2000 that were largely framed in terms of undernutrition measured in terms of calorie supply. In this sense, the SDG2 targets of 2015 were a significant advance on the MDGs by incorporating indicators for child stunting and obesity. The problem of obesity that had been mostly associated with rich countries emerged as an epidemic in middle-income countries by the 2000s. The so-called nutritional transition associated with rising incomes, urbanization, and industrial food processing has been attributed to rising consumption of sugars, fats, and ultra-processed foods.[103] Many countries are now faced with the "double burden of nutrition" where both undernutrition and "overnutrition" exist side by side in the same country or in the same household and even for the same individual over his or her lifetime.[104] The second International Conference on Nutrition in 2014 raised the alarm on the rapid rise in the obesity problem and its health risks globally.

In 2020, the FAO further expanded its toolbox of metrics to include measures on the affordability of diets. According to *The State of Food Security and Nutrition in the World 2020*, "low levels of productivity, high production risks and insufficient diversification towards the production of more nutritious foods are key

[100] Shlomo Reutlinger and Anne-Marie del Castillo, "Addressing Hunger: A Historical Perspective of International Initiatives." In Ismail Serageldin and Pierre Landell-Mills (eds), *Overcoming Global Hunger*, (Washington DC: World Bank, 1994).

[101] S. Horton, H. Alderman, and J.A. Rivera, "The Challenge of Hunger and Malnutrition," in *Global Crises, Global Solutions*, ed. Bjørn Lomborg (Cambridge: Cambridge University Press, 2009).

[102] Per Pinstrup-Andersen, *Twenty-Five Years of FOOD POLICY RESEARCH* (IDPRI, 2000), http://www.ifpri.org/publication/25-years-food-policy-research.

[103] Barry M. Popkin, "The Nutrition Transition in Low-Income Countries: An Emerging Crisis," *Nutrition Reviews* 52, no. 9 (1994).

[104] Barry M. Popkin, Camila Corvalan, and Laurence M. Grummer-Strawn, "Dynamics of the Double Burden of Malnutrition and the Changing Nutrition Reality," *The Lancet (British edition)* 395, no. 10217 (2020).

drivers of the cost of healthy diets, especially in low-income countries." Moreover "inadequate food storage, poor road infrastructure and limited food preservation capacity, especially for highly perishable foods, lead to food losses and inefficiencies along the food supply chain that drive up the cost of nutritious foods" and "in both urban and rural areas, the lack of physical access to food markets, especially to fresh fruit and vegetable markets, represents a formidable barrier to accessing a healthy diet, especially for the poor."[105] Notably, the report shows that approximately three billion people cannot afford what is considered a healthy diet that meets nutrient needs and promotes overall health. This was an important milestone in recognizing the central role of nutrient-dense diets and of the ability for populations to access those diets.[106]

The growing recognition of the complexity of the problem of malnutrition beyond the narrow metric of calorie undernutrition requires a corresponding multi-sectoral approach to its solution. On the one side is the need to link to dimensions of public health, especially maternal and child health, water, sanitation, nutritional education, and improving the status of women more generally. On the other is the need for closer linkages to food systems and agriculture to supply a safe, diverse, and nutritious diet. Fortunately, agriculture and nutrition are now better integrated than at any time since the original Hot Springs Conference in 1943.[107] These multi-sectoral approaches are also starting to show impacts in improved nutritional outcomes, although mostly on a relatively small scale.[108]

Conclusion

Throughout history, societies have to various degrees tried to eliminate hunger motivated by economic, political and humanitarian concerns. Since at least the nineteenth century this struggle has had international dimensions, starting with voluntary famine relief, then inter-governmental programs, and finally international governance led by the League of Nations and the United Nations. If hunger is very narrowly defined in terms of the incidence and severity of famines, humankind has largely succeeded—in the twenty-first century, famines have

[105] FAO, *State of Food Security and Nutrition in the Wo*rld (Rome: FAO, 2020), 155.

[106] Anna Herforth, Yan Bai, Aishwarya Venkat, Kristi Mahrt, Alissa Ebel, and William A. Masters, 2020. *Cost and Affordability of Healthy Diets across and within Countries*. Background paper for The State of Food Security and Nutrition in the World 2020 (FAO, 2020); Derek D. Headey and Harold H. Alderman, "The relative caloric prices of healthy and unhealthy foods differ systematically across income levels and continents," *The Journal of Nutrition* 149, no. 11 (2020).

[107] Byerlee and Fanzo, "The SDG of Zero Hunger 75 years On: Turning Full Circle on Agriculture and Nutrition."

[108] Stuart Gillespie and Mara van den Bold, "Stories of Change in Nutrition: An Overview," *Global Food Security* 13 (2017); Marie T. Ruel, Agnes R. Quisumbing, and Mysbah Balagamwala, "Nutrition-sensitive Agriculture: What Have We Learned So Far?," *Global Food Security* 17 (2018).

been eliminated except in areas of armed conflict. This success reflects growing prosperity in many countries, combined with institutionalized national and international early warning systems and famine response mechanisms.

Yet as we have already noted, deaths from famines, distressing as they may be, pale in comparison with deaths from malnutrition more generally, not to mention the huge social and economic costs of chronic malnutrition for those who survive. The moral imperative of the right to food for all is now widely accepted. In assessing progress in these broader metrics, the glass is only half full.

No metric provides reliable long-term data on trends in malnutrition. Since its establishment FAO has been providing estimates of the number of undernourished in terms of calorie supply. Initially, Boyd Orr estimated that one half to two thirds of the world's population was undernourished but this assessment was based on weak evidence.[109] Not until 1961 did a distinguished FAO statistician turned nutritionist, P.V. Sukhatme, develop the procedure to estimate undernutrition based on food balance sheets and the distribution of income. This methodology has been periodically updated so that consistent long-term trends are not available. However, broad trends are provided in Figure 2.3 indicating that the share of the world's population that is undernourished fell from about half in 1945 to 10% today.

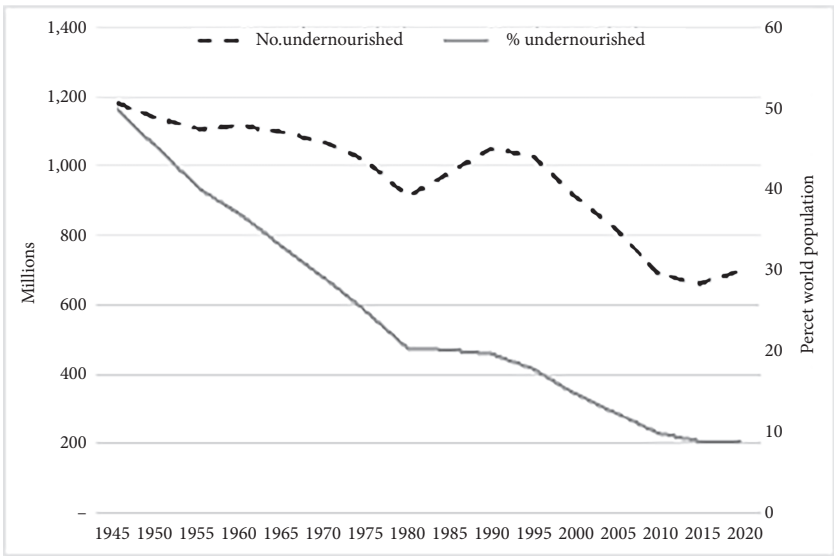

Fig. 2.3 Approximate trends in the number undernourished (left axis) and prevalence of undernourished (right axis)

Source: http://www.fao.org/faostat/en/#home and M. Qaim (pers. comm.). Figures are very approximate due to changes in estimation methods over time.

[109] John Boyd-Orr, "The Food Problem," *Scientific American* 183, no. 2 (1950).

Given population growth, the trend in the number of undernourished has been more modest although the MDG target of halving the *prevalence* of hunger was almost achieved. There is also some evidence that the MDG process itself may have accelerated the downward trend in undernutrition and infant mortality.[110] However, due to armed conflict the number of undernourished has increased in recent years.

As expected, these aggregate numbers hide wide heterogeneity in performance. China alone accounted for nearly two thirds of the decline in hunger since 1990, largely due to its impressive agricultural performance distributed widely across its smallholder farming population.[111] Countries in Southeast Asia also met their MDG target again mainly through smallholder-led agricultural growth. Brazil also performed well in reducing hunger but the biggest impact in Brazil was not due to its impressive large-scale farming sector but the implementation of massive social protection programs, most recently its *Zero Fam* (Zero Hunger) program. Countries in South Asia and Sub-Saharan Africa lagged in meeting MDG targets. Low agricultural productivity in Africa together with high population growth was a major reason for slow progress. Although South Asia had experienced the Green Revolution, other factors such as the inferior status of women and lagging productivity of pulses, fruits, and vegetables have slowed progress in ending hunger and malnutrition in that region.[112]

Perhaps the most impressive achievement is that the Malthusian projections of the 1960s were not realized at the global level. Rising cereal yields since 1961 have outstripped rapid population growth resulting in a long-term but volatile decline in grain prices, at the same time that per capita cropland has declined by over half (Figure 2.4).[113] Although the Green Revolution from 1960 to 1980 is often credited for this progress, agricultural total factor productivity has continued to improve at 1.5 to 2.0% annually since 2000.[114] Supply of food staples in most regions is no longer the major constraint on reducing hunger. The main exception is Sub-Saharan Africa although there have also been recent success stories, notably in Ethiopia, the second most populous country in the region.[115]

Other metrics also suggest significant progress. Child mortality to five years of age declined globally from 23% in 1950 to under 5% in 2013 and child stunting

[110] Jessica Fanzo, "Does Global Goal Setting Matter for Nutrition and Health?," *AMA Journal of Ethics* 20, no. 10 (2018); John W. McArthur and Krista Rasmussen, "Change of Pace: Accelerations and Advances During the Millennium Development Goal Era," *World Development* 105 (2018).

[111] Shenggen Fan and Paul Polman, *An Ambitious Development Goal: Ending Hunger and Undernutrition by 2025* (Washington DC: International Food Policy Research Institute, 2014).

[112] Pingali, "Green Revolution: Impacts, limits, and the Path Ahead."

[113] R.A. Fischer, Derek Byerlee, and Gregory Edmeades, *Crop Yields and Global Food Security* (Canberra, ACT: ACIAR, 2014).

[114] Keith Fuglie, "R&D Capital, R&D Spillovers, and Productivity Growth in World Agriculture," *Applied Economic Perspectives and Policy* 40, no. 3 (2018).

[115] Paul Dorosh and Bart Minten, *Ethiopia's Agrifood System: Past Trends, Present Challenges, and Future Scenarios* (Washington DC: International Food Policy Research Institute, 2020).

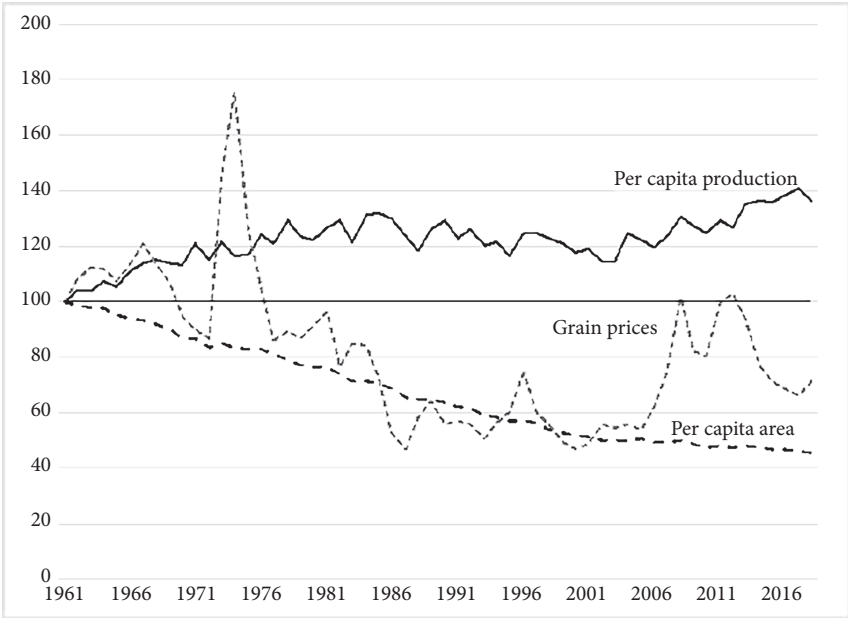

Fig. 2.4 Indices of global per capita cereal production, cereal area per capita, and real grain prices (1961 = 100)

Source: Calculated from FAOSTAT http://www.fao.org/faostat/en/#home.

from 39% in 1990 to 21% in 2019.[116] Increased food supply may have accounted for one fifth of the decline in infant mortality along with women's education, better sanitation, and maternal health services.[117] Some of the progress can be attributed to progress in overcoming micronutrient deficiencies, especially Iodine, Vitamin A, and Iron. Still, it is estimated that malnutrition accounts for about half of infant mortality today.[118]

Yet, as the world entered the SDG era, it confronted a shameful legacy of continuing high numbers of malnourished in a world of growing prosperity. Some 690 million people today are undernourished according to FAO's recently revised estimates.[119] Some two billion suffer from hidden hunger, over 20% of children are stunted, and 3 million children die annually from malnutrition causes. In addition, 2.1 billion adults and 38 million children under the age of five are overweight or obese. These results reflect several biases in public policy—public expenditure

[116] M. Roser, H. Ritchie, and B. Dadonaite, "Child and Infant Mortality," (2013), accessed March 1, 2021, https://ourworldindata.org/child-mortality; "Child stunting," *World Health Organization* (2020), accessed March 1, 2021, https://www.who.int/gho/child-malnutrition/stunting/en/.

[117] L.C. Smith and L. J. Haddad, *Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis*, Vol. 111 (Washington DC: International Food Policy Research Institute, 2000).

[118] Black et al., "Maternal and Child Nutrition: Building Momentum for Impact."

[119] FAO, *State of Food Security*.

on agriculture is low in Africa, official development assistance for agriculture has stagnated while that for nutrition remains miniscule, investment in international agricultural research needed for continued productivity growth has fallen recently, and agricultural policy still favors staples at the expense of more diversified food systems needed for healthy diets.[120] The double burden of undernutrition and rising obesity, particularly in low-income countries, further complicate the design of appropriate responses to SDG2. As Shaw concluded his detailed history of world food security since the Second World War: "the graveyard of noble intentions depicts a civilization that now seems able to live with the ignominy and shame of knowing that a large number of its citizens continue to live in hunger and poverty."[121]

It is also clear that success with SDG2 requires parallel progress in other SDGs, notably poverty reduction, economic growth, gender equality, health, water and sanitation, and climate action.[122] We know that undernutrition (but not other forms of malnutrition) is highly correlated with the prevalence of absolute poverty. However, even for poor countries, there are proven instruments such as social protection to greatly reduce hunger that could be scaled up.[123] At the same time, progress in reducing hunger is fundamental to success with other SDGs. Adequate nutrition is key to better health, productive employment and even reduction in conflict. The knowledge base for addressing hunger and malnutrition has greatly expanded and the cost of achieving SDG2 is well within the capacity of national and international actors.[124] Ultimately it will be sustained and committed leadership by countries themselves backed, as needed, by global actors that will drive success.

[120] Prabhu Pingali, Bhaskar Mittra, and Andaleeb Rahman, "The Bumpy Road from Food to Nutrition Security—Slow Evolution of India's Food Policy," *Global Food Security* 15 (2017).
[121] Shaw, *World Food Security: A History since 1945*, 461.
[122] Horton, Alderman, and Rivera, "The Challenge of Hunger and Malnutrition."
[123] Drèze and Sen, *Hunger and Public Action*.
[124] Fan and Polman, *An Ambitious Development Goal*.