

CURRENT HISTORY

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“What will it take to meet the global food needs of up to 10 billion people by midcentury in the midst of expanding civil conflicts, human displacement, extreme climate events, and other natural disasters?”

The Elusive Goal of Global Food Security

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Ending world hunger is a universal goal, yet progress and social awareness of the issue waxes and wanes in the course of broader political and economic developments. The massive famine in China under Chairman Mao's 1958–62 Great Leap Forward, a succession of severe droughts and associated famines in India in 1965–66, and the political violence that accompanied regime change in Indonesia in 1964–67 left tens of millions of people starving and drew global attention to the threat of food insecurity. What emerged from these events was an international commitment to agricultural technology transfers, water resource development, and foreign assistance—partly in the spirit of humanitarian goodwill and partly in pursuit of long-term geopolitical and economic interests revolving around the Cold War. Whatever the motivation, the outcome over the ensuing decades was more than a doubling of staple cereal yields in Asia, and a steady decline in real (inflation-adjusted) cereal prices.

Despite these gains, a second, quite different, rallying cry for food security resounded in 2007–8 as international grain prices spiked, food riots erupted in numerous cities throughout the developing world, and the global economy headed into a deep recession. Several factors sparked this crisis, but unlike the earlier periods of dire food shortages, the root causes included unwieldy financial markets and escalating demands for food, animal feeds, and fuel (including biofuels) in a globalized economy. This episode prompted new analyses of the connection between global commodity markets and food security, the political-economy founda-

tions of agricultural development, and the differential impacts of food prices on net producers and net consumers. In the five-year period from 2007 to 2012, international cereal prices were highly unstable, varying by as much as 300 percent.

Today, international agricultural markets have settled at relatively low prices, but civil conflicts, extreme climate events, and other natural disasters are blocking the path toward ending hunger. In February 2017, the United Nations declared a famine in South Sudan, as war and economic collapse ravaged the newly independent nation. Although the famine officially ended in mid-2017, food emergencies and severe undernourishment still threaten tens of millions of people in South Sudan, Yemen, Nigeria, Somalia, and Syria, due to a combination of civil conflict, prolonged droughts, and occasional floods. On the surface, it seems incomprehensible that there could be such difficulty in addressing these looming famines at a time when global cereal production and stocks are at historical highs. But the problem is not a matter of food supply; the problem is war.

According to a 2017 report by UN agencies, “The State of Food Insecurity and Nutrition in the World,” the number of people suffering from chronic undernourishment (as measured by calorie deficits) has ticked up in recent years and now stands at 815 million globally—roughly one in nine people worldwide. The majority, an estimated 490 million people, live in countries affected by conflict, where governance structures are weak, supply chains fail, and displaced populations lose economic and physical access to food. Food insecurity is especially pronounced in conflict-ridden communities throughout the world that are exposed to droughts, floods, and other natural disasters.

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The geographical focus of food insecurity has turned increasingly toward Africa and the Middle East, but even in countries like India, with relatively stable governance structures, climate change and climate variability pose increasing risks to food security. Malnutrition remains a serious problem in India, where it affects some 200 million people or more (depending on which metric is applied) despite real gross domestic product growth of over 7 percent annually in recent years. According to the Population Reference Bureau, India will soon surpass China to become the world's most populous nation, with over 1.4 billion people by 2020 and 1.7 billion by 2050. As population- and income-driven demands continue to mount in the face of rising climate and natural resource constraints, the country's ability to address hunger and malnutrition will be tested.

What will it take to meet the global food needs of up to 10 billion people by midcentury in the midst of expanding civil conflicts, human displacement, extreme climate events, and other natural disasters? Public attention tends to focus on the impact of these major shocks on food security at particular points in time and space, yet the triple burden of calorie deficits, chronic protein and micronutrient deficiencies, and rising obesity plagues countries throughout the world. These chronic malnutrition problems can be solved, given political and social will. But ending hunger and eliminating all forms of malnutrition by 2030—as set out in the second of the UN's Sustainable Development Goals—will be significantly more difficult in the face of protracted armed conflicts and climate change.

A MOVING TARGET

The terms “food security” and “food insecurity” became part of the global development lexicon in the 1960s, when it was clear that national food supplies in certain highly populated countries, such as China, India, and Indonesia, were inadequate to meet rising demand. Throughout the 1970s, international agricultural development experts largely maintained a supply-side orientation toward food security, stressing the need for sufficient cereal availability and reserves to reduce acute and chronic caloric deficits around the world. Promoting food security from this perspective generated investments, technology dissemination, policies, and farm practices that unleashed what became known as the Green Revolution.

By the mid-1980s, a doubling of cereal yields in Asia and Latin America (the initial focus areas for

the Green Revolution) allowed staple cereal prices to fall, benefiting net consumers—especially the poor, who spend a large share of their incomes on food. Increased food availability (supply) thus led to gains in food access (purchasing power and affordability). In both developing and industrialized countries, farm support became institutionalized in the political process. Policy incentives designed to boost cereal production remain strong in many countries to this day, even as diets have diversified with income growth.

A wide array of new definitions of food security sprang up in the 1980s, augmenting the earlier focus on food supply. In 1992, development economists Simon Maxwell and Timothy Frankenberger published a list of more than 200 definitions being discussed at the time. Defining food security is important from an operational standpoint: a precise definition helps to guide interventions by governments, humanitarian groups, international aid agencies, private entities, and other nonprofit organizations as they seek to reduce the scope and persistence of hunger and malnutrition around the world. However, too many definitions can be confusing and counterproductive.

The definition introduced by the UN Food and Agriculture Organization (FAO) at the 1996 World Food Summit has endured as the most widely accepted one: “Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food which meets their dietary needs and food preferences for an active and healthy life.” The FAO definition emphasizes four pillars of food security: availability, stability, access, and utilization. (The last one encompasses food safety and quality issues, and the ability of the body to absorb the required nutrients).

MALNUTRITION'S NEW FACES

While this basic definition of food security has been retained, the landscape of hunger and malnutrition is vastly different today from what it was a generation ago. Given the earlier emphasis on staple grain supplies, basic calorie needs have been met in most peaceful societies, yet protein deficits and chronic deficiencies of micronutrients (such as iron, calcium, and vitamin A), also known as “hidden hunger,” persist in poor communities throughout the world. Half of all women of reproductive age in India, 40 percent of women in sub-Saharan Africa, and one-third of women worldwide suffer from anemia, a condition that

compromises the health of both mothers and babies (in the womb and through breastfeeding).

Nutrition from the time of conception to two years of age essentially determines the trajectory of a child's cognitive and physical development, vulnerability to infection, and long-term health. To prevent stunting, infants require the direct intake of protein and micronutrients from breastfeeding or nutritious foods, since they have a limited capacity to consume the bulk needed to acquire these nutrients from cereals and other starchy staples. Global rates of stunting have fallen during the past decade, but the numbers are still disquieting. Roughly one in four children worldwide, and more than one in three children in sub-Saharan Africa and India, suffer from stunting, with associated risks of cognitive impairment, poor performance in school and work, and long-term health problems.

At the same time, obesity rates have surpassed rates of hunger (as defined by calorie deficits) in many countries, including some in the developing world. In 2016, 13 percent of the global adult population was obese, and 6 percent of all children under five (41 million) were overweight—with high risks of adult obesity—according to data from UNICEF, the World Health Organization, and the World Bank. Of those overweight children, 44 percent live in lower-middle-income countries and 35 percent in upper-middle-income countries. The developing world's current and future health burdens from obesity-related diseases, such as diabetes and heart disease, are staggering. The majority of the world's population now lives in countries where overweight- and obesity-related deaths exceed hunger-related deaths.

The current picture of global malnutrition seems incongruous, with undernourishment and obesity occurring in the same communities, and even in the same households. Many factors determine diet choice, including education, culture, and the marketing practices of international food conglomerates that promote unhealthy processed foods and drinks. Obesity, protein deficits, and hidden hunger often go hand in hand when the cheapest calories available are those dense in starch, sugar, and fats.

Markets for nutritious but perishable food products, such as fruits and vegetables, have been

slow to develop throughout the developing world compared with those for staple grains and vegetable oils. Research conducted by the Overseas Development Institute in 2015 tracked the changing costs of different food groups across a sample of emerging and developed economies, showing that prices for “healthy” foods (like fruits and vegetables) have risen significantly relative to prices for “unhealthy” foods (such as high-calorie carbohydrates and processed foods) in virtually all countries during the past 25 years. These results are consistent with the same organization's findings that over 80 percent of people in low- to middle-income countries consume less than the minimum recommended level of fruits and vegetables, and that the consumption of processed foods, cooking oils, and sweetened beverages has risen across the board.

As problems of nutrition security (not simply calorie deficits) have become more widely recognized, new metrics of food insecurity have begun

to emerge. In the early 2000s, the International Food Policy Research Institute introduced a diet diversity index. It also introduced the Global Hunger Index (GHI), a novel measure of food insecurity designed to help governments and relief agencies quickly identify and

respond to conditions of hunger and malnutrition. The GHI combines data on undernourishment within the total population with data on rates of wasting, stunting, and mortality among children under five years of age. High rates of childhood stunting (particularly deleterious in terms of long-term cognitive and physical disabilities) and hunger-related deaths send an immediate alarm to the international aid community.

Overall, global hunger levels measured by the GHI have fallen by more than a quarter since the turn of the twenty-first century. However, this pattern has not been uniform, and several countries, particularly those afflicted by civil conflicts and extreme climate events, are witnessing a rise in hunger levels. The GHI also reveals striking variation within countries; for example, childhood stunting among Nigerian states ranges from 7.6 percent to 63.4 percent.

These trends underscore the deep food inequalities that exist throughout the world. Groups without economic, political, or social power are likely to experience the highest rates of hunger.

The landscape of hunger and malnutrition is vastly different today from what it was a generation ago.

These groups often include displaced people and refugees, ethnic minorities, women and girls, and the rural poor.

CONFLICT AND HUNGER

Sixty percent of the world's chronically undernourished people and almost 80 percent of children suffering from stunting live in countries affected by conflict, according to the UN's 2017 report on food insecurity. Conflict is defined here as a violent situation extending over at least a five-year period and resulting in 500 or more battle deaths. In 2017, the FAO reported that 13 of the 19 countries in protracted crises (characterized by a disintegration of livelihoods and food systems due to human factors or natural disasters and insufficient institutional capacity) were embroiled in conflict. With the exception of Afghanistan, all of these countries in conflict were in Africa or the Middle East.

The recent spike in extended conflicts is a departure from the post–Cold War period up to 2010, when the numbers of conflicts and of violent deaths from civil wars declined globally. Between 2010 and 2015, the number of state-based conflicts increased by 60 percent, while the number of non-state conflicts (between two factions that are not legitimate or recognized government entities) rose by 125 percent, according to data from the Uppsala Conflict Data Program. Roughly one-third of these intrastate conflicts have become internationalized—external countries play some role in the fighting and have a stake in the outcome—much like the Cold War era, when proxy wars were fought by the United States and the Soviet Union through client states.

Since violent conflict erupted in Yemen more than three years ago, more than 5,000 civilians have died, millions have been displaced, and roughly two-thirds of the country's 27 million citizens are severely food insecure. A major cholera outbreak in 2017 has killed over 2,100 people, and at least 900,000 have been infected. The World Food Program now estimates that 7 million Yemenis are on the brink of famine, yet the Saudi-backed military blockade and bombing of the country have made it virtually impossible for international relief agencies to respond. Saudi Arabia and its allies, backed by the United States, are fighting Houthi rebels in Yemen in what is

widely considered a proxy war with Iran. (On November 25, 2017, the Saudis reopened a few vital air and seaports for humanitarian purposes, under international pressure.)

The impacts of this sort of violent conflict on human displacement, regional economies, and food security are immense. In 2016, there were 22.5 million refugees and 40.3 million internally displaced persons globally, according to the Office of the UN High Commissioner for Refugees. The total number of displaced persons, at 65.5 million (which also includes stateless people), is equivalent to the entire population of the United Kingdom or France. There are nine countries with more than 10 percent of the population classified as refugees or internally displaced persons. More than 20 percent of the populations of South Sudan and Somalia are displaced, as is roughly 60 percent of the Syrian population. Before the outbreak of violence in 2011, Syria was classified as a middle-income country. Just five years later, in 2016, four out of five Syrians lived in poverty, and

three-quarters or more of the population relied on food aid and other types of humanitarian assistance to survive.

Between 60 percent and 80 percent of the populations of countries suffering from prolonged conflict live in rural areas and have traditionally depended on agriculture and livestock for their livelihoods. Conflict is often centered in rural areas; rebel groups claim livestock herds and locally produced food for their own advantage. The steady economic erosion that comes with conflict leaves rural households increasingly food insecure. They often resort to adverse coping strategies, such as eating fewer and smaller meals, pulling children out of school, selling their livestock, and leaving their land. All of these coping measures reduce the stocks of human, financial, and resource capital that enable people to escape poverty and hunger.

Civil wars often result in the collapse of local and national institutions, including banks and health services. Inflation causes food prices to spiral upward. According to calculations by the World Food Program, the world's poorest households pay more than a full day's wages for a plate of rice and beans or other staple foods, assuming food is even available. Violent conflict puts food out of reach of the poorest and most afflicted populations.

Malnutrition afflicts billions of people in both war-torn and peaceful countries.

The collateral damage from civil wars and other violent conflicts is broad in its geographic scope and impact over time. In Cameroon, threats of an incursion by the terrorist group Boko Haram from neighboring Nigeria have forced the government to allocate a significant portion of its development budget to protect its northern borders—funds that otherwise could be spent to enhance food security through improvements in health, education, infrastructure, and agricultural development. Cameroon is one of the world's poorest nations, with a Human Development Index ranking of 153 out of 188 countries measured.

Much has been written about the connection between food and conflict, including a 2013 volume, *Food Security and Socioeconomic Stability*, edited by the economist Christopher Barrett. The general proposition that food price spikes and associated food insecurity cause conflict remains somewhat speculative. There is widespread evidence, however, that violent conflict over significant periods of time worsens food insecurity.

THE CLIMATE THREAT

Even in peaceful settings, climate change will pose serious challenges for agricultural systems around the world. The impacts of climate on crop production and food prices will likely intensify between now and 2050, even if all countries were to roll back their emissions of carbon and other greenhouse gases today.

The latest report by the Global Carbon Project at the Bonn Climate Change Convention in November 2017 revealed that global fossil fuel emissions are rising again after three years of zero growth, with China in the lead and India close behind. Because carbon released from fossil fuel use stays in the atmosphere for hundreds of years and traps heat, the damaging impact of rising temperatures on food production will be experienced for decades to come unless climate mitigation and agricultural adaptation strategies are implemented. Under all realistic climate scenarios evaluated by the Intergovernmental Panel on Climate Change (IPCC), the global annual mean temperature is expected to rise by 2 degrees Celsius or more by 2050.

Natural year-to-year variability in the global climate system (particularly the El Niño–Southern Oscillation events) demonstrates the types of disruption that changing climatic conditions can have on food security. The 2015 El Niño, one of the strongest on record, had dev-

astating effects on countries throughout southern Africa. In its 2017 “Global Report on Food Crises,” the Food Security Information Network estimated that 12 million people in that region were adversely affected by extreme drought, low crop yields (especially for the staple crop, maize), reduced agricultural trade among neighboring countries, and consequent food price spikes. Humanitarian aid was needed in 2016 to avert a severe or emergency food crisis.

Ethiopia experienced one of the most severe droughts in the past half-century, which was also linked to the 2015 El Niño event. This drought affected roughly 9.7 million people, or 13 percent of Ethiopia's rural population. While the crisis was precipitated by the El Niño event, eight countries in eastern Africa (Ethiopia, Somalia, Kenya, Djibouti, Eritrea, South Sudan, Sudan, and Uganda) have experienced a severe and recurrent drought since 2011. Relief agencies estimate that 17 million people in the region still suffer from climate-induced hunger and illness, made worse by violent conflicts. As Ethiopia struggled to support its agricultural production with rainfall 50 percent below normal, it also received a large influx of migrants from Somalia, Kenya, and South Sudan, driven from their homelands by drought and conflict. Ethiopia currently hosts some 890,000 refugees, straining the country's ability to feed itself and its new arrivals.

Coping with the impacts of climate variability on agriculture is daunting, but the longer-term challenge of avoiding a perpetual food crisis under conditions of global warming is far more serious. As extreme weather events proliferate, it is becoming increasingly difficult to distinguish natural variability from climate change. Severe droughts and floods often affect the same communities at different times, and extreme heat waves are now damaging crops and killing record numbers of people around the globe.

Numerous studies reviewed by the IPCC have concluded that unabated warming will lead to substantial declines in mean crop yields by 2050, and that the most significant agricultural impacts will occur in the tropics and subtropics where the majority of the world's food insecure population resides. Collaborative work I did with climate scientist David Battisti reveals a very high probability (greater than 90 percent) that, by the end of this century, the full distribution of growing-season temperatures in most tropical and subtropical countries will exceed the highest tem-

perature in the observational record dating back to 1900. In other words, even the coldest growing seasons in the future will be warmer than the hottest growing seasons in the past. In the absence of new heat-tolerant crop varieties and irrigation, unprecedented heat during the growing season will result in reduced soil moisture—even in areas with normal rainfall—and sharp declines in yields. African countries are particularly vulnerable to climate impacts on agriculture, since less than 5 percent of the continent's cropped area is irrigated.

In future decades, it will be extremely difficult to balance food deficits in one part of the world with food surpluses in another: rising temperatures will adversely affect all major agricultural regions. Without significant gains in developing heat-tolerant crops, even temperate agricultural systems, which currently operate at close to the optimum yield, will experience yield declines and increased yield variability as the global mean temperature rises by 2 degrees Celsius or more.

As with violent conflicts, severe climate disruptions can result in human migration and displacement of communities dependent on agriculture for their livelihoods. Climate shocks can also cause food price spikes. When these spikes reverberate through international markets, they often lead to protectionist trade policies, particularly by large agricultural countries, which further destabilize world prices. Rising instability in food production, farm incomes, and prices undermines the prospects for improved food security.

WAVERING COMMITMENT

The combination of conflict- and climate-induced food insecurity has placed enormous stress on the financial resources of humanitarian relief organizations, foreign aid agencies, and governments affected (directly and indirectly) by these crises. Food aid expenditures disbursed through the World Food Program more than doubled between 2009 and 2016, from \$2.2 billion to \$5.3 billion. International donor assistance has risen in response to the escalating humanitarian crises since 2013, but still falls about \$3 billion short of what is required to meet basic emergency needs. And the fact that virtually all foreign aid for food security now goes to short-term relief

efforts—just to keep people alive today—means that minimal funds are available for investments in agriculture and rural development that could help improve global nutrition and build resilience in regions vulnerable to climate and conflict crises.

During the past six decades, the United States has played a leading role in international food assistance. In 2016, Congress passed the Global Food Security Act, a codification of the earlier Feed the Future Initiative. However, just when international cooperation is most needed to address the complex and intersecting problems of global food insecurity, civil conflict, infectious disease, climate change, and displaced persons, America appears to be turning inward. In President Donald Trump's first address to the UN General Assembly in September 2017, he delivered a decidedly "America First" message. He emphasized the importance of sovereignty and argued that the United States should no longer bear a disproportionate share of the burden, either militarily or financially,

for ensuring human rights, security, and well-being around the world.

The president's speech was consistent with his proposal for the US federal budget earlier in the year, in which he called for cutting foreign assistance by

roughly one-third and eliminating financial support for international family-planning programs. His budget proposal also sought to subordinate the US Agency for International Development (USAID) further within the State Department—essentially stripping the agency of its authority, and likely curtailing the US funding commitment on issues such as global food security and disease prevention. Adverse reactions to these proposals by several influential members of Congress were quick and forceful, and budget discussions are still underway, but the administration's antipathy toward spending on humanitarian programs is clear.

The level of public support in the United States for foreign assistance is higher than most people might think. A 2017 report by the Brookings Institution highlighted the results of public opinion polls showing that 75 percent of Americans generally support foreign assistance programs. The report also showed that most Americans believe foreign aid accounts for one-quarter of federal spending, though it actually comprises less than 1 percent.

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In fact, the United States falls behind most other wealthy countries in its foreign aid contributions as a share of the national budget. Data from USAID and the Department of Agriculture show that the United States spent between \$2 billion and \$3 billion per year on international food aid and related programs between 2005 and 2016—accounting for about half of the World Food Program's food assistance expenditures. But in real terms, the US food aid budget is less than a third of what it was in 1965. The importance of US participation in international foreign assistance cannot be overstated, yet many other countries also play important roles in fighting hunger and malnutrition.

SOLVING THE FOOD PROBLEM

Addressing the current state of global food insecurity requires a complicated mix of humanitarian, economic, political, and military tactics. The acute hunger crises stemming from conflict, climate extremes, and human displacement are a humanitarian disaster that needs to be remedied by international relief agencies and the governments, nonprofit organizations, and private entities that support them. Solving chronic hunger in these situations will be possible only if the world's economically powerful countries renew their commitment to conflict mediation through the UN Security Council and provide more funding for their foreign aid agencies. Even with these measures, long-term solutions require the establishment of sound governance and a commitment to food security and health services within the affected countries.

These crisis situations—horrible in their extent and impact on human lives—reflect one dimension of food insecurity, but overshadow the malnutrition that afflicts billions of people in both war-torn and peaceful countries. Tackling the global malnutrition problem is largely an economic issue. It can be solved only if the private sector, along with governments, works toward building supply chains for nutritious foods with more protein and micronutrients (such as iron) and less concentrated sugars and fats. Food systems, which stretch from the provision of seeds to processing to sales in retail markets, should serve all consumers—rich and poor, rural and urban—with nutritious foods. The private sector also plays critical

roles in providing employment and economic access to food, and in contributing to humanitarian relief efforts.

The political and military dimensions of global food security are multifaceted and arguably more contentious. Armed conflicts often involve tension between humanitarian and military objectives at a local level. The internationalization of civil conflicts means that third-party countries, such as the United States, may be providing humanitarian aid to civilian victims even while supporting military coalitions that obstruct the distribution of food aid. In these cases, food must not become an instrument of war.

At a regional level, the growing refugee crisis, coupled with public confusion over the distinctions among migrants, refugees, and suspected terrorists, is fueling populist movements and exclusionary policies in a number of European countries and in the United States. The spread of populism in these countries could dampen global trade, which has contributed to rising incomes and improved food security in developing nations.

At the global level, the politics surrounding climate change and population control remain unsettled and contentious. Climate change is a long-term problem with long-term consequences. Yet it must be acted on immediately and collectively by countries with the largest greenhouse gas emissions, lest the pursuit of global food security become entirely futile.

Controlling population growth and per capita consumption are issues that have virtually disappeared from international policy discussions, but they need to be taken up again before 2 billion more people are added to the planet by 2050 (as the Population Reference Bureau projects). Africa will be home to the majority of this added population over the course of the twenty-first century. As in all regions with population growth, it will be difficult to feed, house, employ, and govern these multitudes without compounding the risks of climate change and conflict. To ignore the population question is especially unfair to women throughout the world who desire family planning services and improved reproductive health care.

Ending global hunger and malnutrition are nondeferrable goals. They are also achievable objectives. The real question is whether the world cares enough to make these goals a priority. ■