

Why and How the United States Must Invest in Food and Nutrition Security in Africa¹

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The world faces multiple food-related crises right now, leading some experts to label this an emergent ‘poly-crisis’. Global headline, food-related crises include:

- 700-800 million people around the world – more than twice the US population – go hungry today. After 50 years of continuous progress in reducing the number of undernourished people globally, we have backslid for 10 years.
- More than 3.1 billion people cannot afford a healthy diet. Consumer food prices rose quickly during the pandemic due to supply chain disruptions, remain at high levels, and continue rising quickly. As bad as food price inflation has been in the U.S., it is worse abroad as the strong dollar makes everything from fuel to fertilizer to imported grains more expensive.
- Since the 2008 global food price crisis, we have witnessed recurring episodes of sociopolitical unrest and violent conflict driven partly by food insecurity. Rising food insecurity highlights a government’s failure to safeguard its constituents’ ability to feed their family, sowing support for insurgents. It makes land and water more valuable resources over which groups become more likely to fight. A hungrier world is a more dangerous world.
- High food prices arise in part from rising concentration upstream – in seed and agrochemicals sectors – and downstream – especially in meat processing and grain trading. This squeezes both consumers and family farms. Most agricultural households – including in the U.S. – lose money on farming, reinforcing a rural youth exodus and rising median age of farmers (>57 in the U.S.).
- Healthcare cost increases arise primarily due to diet-related illnesses, stressing government budgets and slowing economic growth. Diet-related health problems arise mainly due to mineral and vitamin deficiencies and/or obesity caused by dietary imbalances that have complex origins, not undernourishment (i.e., insufficient intake of calories and protein, or hunger). Dietary imbalances are partly a product of relatively higher prices for healthier foods than for unhealthy ones and from commercial promotion of profitable but unhealthful foods.
- Outright hunger or undernourishment has been rising globally, but mainly because violent conflict disrupts agriculture and commerce and forces people to flee. UNHCR reports that as of May 2023 a record 110 million individuals were

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forcibly displaced and in need of humanitarian food assistance, which is far more expensive to deliver than food assistance provided to people who remain home.

- Agrifood systems are the source of most zoonoses emergent in humans since World War II. Plausibly COVID-19, and certainly Ebola, bird flu, swine flu, plague, and other zoonoses arise largely due to agricultural expansion into wildlands.
- We face a looming antimicrobial resistance crisis due in part to the rapidly rising use of (poorly managed) antibacterial agents in livestock and aquaculture production to meet the growing demand for animal-source foods.
- Agriculture is the world's and the U.S.' primary source of fine particulate (PM_{2.5}) air pollution, a leading cause of premature death. The main sources are biomass burning and the fumes emitted by nitrogen-rich fertilizers and livestock waste.
- Agrifood systems account for 25-35% of greenhouse gas emissions globally, especially methane (from rice and ruminant livestock), feeding the climate crisis.
- Agricultural expansion is the main driver of habitat loss that drives biodiversity loss and wild species extinction.
- Agricultural non-point source pollution is a major contributor to water pollution and harmful algal blooms – the dead zone in the Gulf of Mexico, HABs in the Great Lakes of North America and Africa.

Clearly, food issues are not just agricultural or humanitarian issues. The agrifood system is the only economic sector that touches every human each day. And a plurality of people live in households that work at least part-time in the agrifood system. Food issues transcend agriculture, with deep connections to broader economic, national security, environment, climate, and rural issues. We need to invest accordingly and do so now, at scale. Tackling the global agrifood systems poly-crisis is a high policy priority.

Why Africa Matters

These issues are especially pressing in Africa. Africa's 1.4 billion people today represent roughly 18% of humanity. Given Africa's low median age of just 19 years, it is the only major world region poised for significant population growth, to a projected 3.5 billion by 2100. Feeding an extra 2+ billion Africans will be a massive challenge because African farmers suffer the world's lowest agricultural productivity and the vast majority of the supply needed to meet that new demand must be produced in Africa, not imported from abroad. Roughly 60% of the world's remaining arable land is in Africa and >70% of food consumption occurs in the same country that grew the underlying commodity(ies), even more in poorer, land-locked countries.

Low agricultural productivity and limited import capacity, combined with pockets of recurring conflict, conspire to make Africa home to almost 40% of the world's hungry people. Africans are disproportionately unlikely to afford a nutritious diet, causing high rates of child stunting and diet-related diseases, especially those related to mineral and vitamin deficiencies. Children who suffer undernutrition early in life (especially before

their 2nd birthday) run a high risk of irreversible loss of adult physical and neurocognitive function, as well as increased morbidity and mortality.

African food and nutrition security is strategically important to the U.S. for multiple reasons. First, the continent will account for most human population growth globally over the rest of this century. As the U.S. population ages, and soon begins to shrink, Africa will become a crucial source of working age adults, especially in high-demand sectors like health care and information technology, in which U.S. businesses and non-profits already struggle to find qualified workers. Investments in African children today help ensure a high quality U.S. workforce of the future.

Second, although Africa today accounts for less than ten percent of a roughly US\$8 trillion global food market, that will change dramatically in the coming decades. Africa is the only world region where the market for food products will grow substantially in the years ahead. Africa will lead the world in population growth, and likely also in income growth rate, making it the fastest growing consumer goods market in the world. And because Africa is the poorest continent, the share of that income growth that converts into food demand (what economists call the “income elasticity of demand for food”) is also higher than elsewhere. As a result, 50-75 percent of global food demand growth to 2100 will occur in Africa, at least tripling the region’s global market share and making it an increasingly important market for U.S. farmers and food-related businesses. As African agricultural productivity grows, incomes rise and demand for U.S. products does as well. This trend is already evident. Inflation-adjusted annual revenue growth in Africa’s food retail and food service sectors far outpaced that of any other world region over the past decade, more than five times the U.S. growth rate.

Third, Africa is increasingly a locus of U.S.-China competition for global influence. China’s lending to African nations – and the resulting sovereign debt management issues – have received considerable attention. But the longer-term impacts will likely come from China hosting more than twice as many African university students as the U.S. (or Europe), building business, cultural, and political ties. A large share of those future leaders study agricultural and food issues in China, although the U.S. Land Grant University system remains the world’s finest.

Fourth, the cross-border flow of infectious disease, antimicrobial resistant bacteria, and violence is increasingly hard to stop as advances in communications and transport technologies steadily increase connectivity. The 2014 Ebola scare and the 2020 COVID-19 pandemic underscore how quickly local problems can spread, with calamitous consequences. We can and must preempt pandemics that arise from agrifood systems by identifying and stopping them at their point of origination.

Finally, Africa is home to a disproportionate share of the world’s remaining biodiversity and carbon-sequestering forests, making Africa central to global efforts to safeguard the planet. Future U.S. expenditures combatting sea level rise and extreme weather events at home depend partly on today’s investments in Africa’s agrifood systems.

The bottom line is that we cannot solve the world’s nor the U.S.’ food-related poly-crisis without devoting serious attention to Africa.

What To Do?

Today's food-related crises have a common structural cause: the slowdown since 2000 in agrifood system productivity growth in the face of rising food, fuel, fiber, and feed demand. This imbalance causes rising prices and lower stocks-to-use ratios, leaving us more vulnerable to price spikes due to disruptions from war, massive flooding or drought in a key producing region, an El Nino event, supply chain bottlenecks, etc. Higher prices drive poor and working-class people into food and nutrition insecurity and induce consumer and producer choices with adverse effects on environment, health, and military readiness. High prices also foster winner-take-all economic competitions that marginalize many while richly rewarding very few companies and individuals.

We must confront the structural causes, not the symptoms that manifest as crises, lest we get trapped in an expensive whack-a-mole game, knocking down one problem only to cause another one to rise more prominently. The structural solution to the food-related poly-crisis is science-driven agrifood systems transformation. But because that takes time, we must simultaneously provide shorter-term humanitarian assistance. That is especially true in Africa.

The highest single priority is to sustainably boost healthy food productivity growth. That requires investing more and differently. U.S. public agricultural research, development and extension (R&D&E) investment has fallen by one-third in 20 years and remains trapped in turn-of-the-millennium designs. The same is true of CGIAR, the international network of agricultural research centers that birthed the Green Revolution that rescued humanity from the last food-related poly-crisis, in the late 1960s and early 1970s, earning a plant breeder, Norman Borlaug, the 1970 Nobel Peace Prize. The returns to CGIAR research historically have been extremely high. But CGIAR funding and science have stagnated. There is a direct link from reduced and outdated R&D&E to poly-crisis.

Much of that R&D&E investment needs to occur in Africa because technological advances developed for U.S. agrifood systems do not translate well to radically different agroecosystems. Crop varieties developed for the U.S. lose ~80% of gains when used in Africa. African agricultural research and extension systems presently lack the scale and expertise to adapt, translate, and extend new agrifood systems discoveries. African farmers are not our competitors so much as they can be our customers and partners.

Five principles should guide policy design and implementation:

1) Move beyond staple crops. The U.S. should maintain R&D&E on calorie-rich staple grains, roots, and tubers, which get the lion's share of agricultural R&D&E funding now. But the U.S. should sharply expand R&D&E on micronutrient-rich foods to address diet-related health problems as well as farm profitability issues. There is tremendous promise in so-called 'specialty crops' – fruits, nuts, and vegetables – and many neglected – or 'orphan' – crops in Africa. Also, novel foods based on synthetic biology or chemosynthetic processes reduce reliance on conventional agriculture. Genetic advances to biofortify staple crops with essential micronutrients can address nutrient-deficient diets. Meanwhile, improved animal nutrition and genetics to reduce methane emissions and antibiotic resistance, and circular systems that recycle waste products into fertilizers and livestock feed can accommodate rising animal-source food consumption within planetary boundaries.

2) Focus on reducing water, land, antibiotics, and agrochemicals use. Nature and human health cannot endure expanded use of those and feedback – e.g., from climate change or soil nutrient loss – wipes out productivity gains. Novel production processes for familiar foods – e.g., cultivated proteins, vertical farming – as well as novel foods – including many ‘alternative proteins’ – are especially helpful here, complementing advances based on crop and livestock genetics accelerated by new genomic techniques such as those involving gene editing.

3) Look beyond the farm. Three-quarters of the value of global consumer food expenditures accrues to firms beyond the farmgate, such as processors, manufacturers, retailers, and restaurants. These are the most concentrated parts of agrifood value chains. Enforce competition policy, set clear, science-based standards for food manufacturing, retail, and wholesale – for example, around nutrient fortification and unhealthy ultra-processing – and use public food procurement policies to induce a race to the top, not the bottom, among food producers, processors, and wholesalers. Improved practices in the U.S. spill over into other markets, including Africa’s.

4) Leverage private sector financing. The public sector cannot and should not foot the R&D&E bill. An extra \$5 billion for public agricultural R&D&E is a heavy lift for the U.S. government, and especially for African ones. But it is pocket change for corporate America. We can better leverage taxpayers’ and philanthropists’ current investments by using policy tools that attract significant private agrifood systems R&D&E and disaster finance.

5) Respond promptly, generously, and cost-effectively to crises as they emerge. Humanitarian response has become considerably more cost-effective over the past generation, boosting the payoffs to modern emergency food assistance. Yet the U.S. – and especially other rich countries – respond inadequately, especially in Africa. Three of the four nations with the largest populations at risk (≥ 20 million each) are African: DR Congo, Ethiopia, and Sudan (Afghanistan is the fourth). In 2023, humanitarian assistance to those three countries covered only 34-43% of assessed needs. This is a penny-wise, pound-foolish policy. The costs of addressing food emergencies only rise the longer one waits. As children’s malnutrition intensifies, the cost per child increases dramatically, with irreversible cognitive and physical developmental impacts if response is too little or too late. Desperate families risk dangerous migrations to high-income countries, including the U.S., and serving displaced persons, much less refugees, is far more expensive than supporting them in their homes. Radical groups prey on the fears and needs of food-insecure people to sow sociopolitical instability.

What specific steps can the U.S. government, specifically Congress, take, based on those five guiding principles?

A. Set explicit productivity growth targets: 1.5-2.5% per annum growth in agrifood system total factor productivity (that is, the value of output divided by the value of all inputs), domestically and globally. Globally, we have dipped to about 1.1% annually, and essentially no growth in the U.S. and in Africa. Moreover, set targets in terms of essential nutrients (e.g., iron, calcium, vitamin A), not just in monetary value terms. We can and should grow the supply of essential nutrients by 3-4% per year. Add targets for reduced deforestation, agrochemicals, and water use. Then hold federal agencies – U.S. Environmental Protection Agency (EPA),

Millennium Challenge Corporation (MCC), U.S. Department of Agriculture (USDA), U.S. Agency for International Development (USAID) – and international partners – the World Bank, Constructive Group on International Agricultural Research (CGIAR), Food and Agriculture Organization of the UN (FAO) – to those targets. Let agency leadership and their technical experts develop and implement strategies to deliver those results.

- B. Give agencies the resources to meet those targets.** Double federal agrifood systems R&D&E budgets, by at least \$5 billion/year. Agricultural R&D&E is one of the very highest return public investments in the federal budget, with an average benefit/cost above 20! Yet U.S. public agricultural R&D&E has fallen by one-third over the past two decades. China has overtaken the U.S.; soon Brazil and India will too. Double USAID's budget for CGIAR and the Feed the Future Innovation Labs that put the best US science to work in service of the sorts of targets advanced above. Direct the US Executive Directors of the World Bank and the regional development banks to prioritize those same targets in their institutions' grant and loan portfolios.
- C. Prioritize African-led agricultural R&D&E for Africa.** Africa outsources much of its agrifood systems R&D&E because it lacks adequate institutional capacity to reap the economies of scale and scope that drive much of the return on such investments. The high returns on U.S. and CGIAR R&D&E would rise considerably if complemented by African R&D&E institutions with the scale, scope, and scientists to do the adaptive research and extension needed to promote commercial distribution of improved genetic and other inputs and practices. U.S. matching funding, directly and through the multilateral development banks, can induce greater, concerted investment by African governments in multi-national regional programs organized around agroecological zones common to many countries, possibly under the direction of the Forum for Agricultural Research in Africa. Resolving the technology mismatch problem that plagues African agricultural R&D&E requires adequate funding for vibrant, problem-oriented science led by and serving Africans.
- D. Focus increased public agrifood systems R&D&E on healthier, more resilient, sustainable products and methods,** not on conventional crops and methods. Do this via both guidance in Farm Bill Title VII (Research) and various foreign affairs appropriations (e.g., Feed the Future, Global Food Security Act (GFSA), CGIAR via USAID) as well as through directives to U.S. Government representatives in multilateral organizations.
- E. Leverage the private sector better.** Public and philanthropic R&D&E investments can be multiplied many times over by policies that incentivize private firms appropriately. Advanced market commitments – like those used to accelerate investment in and discovery and delivery of COVID-19 and pneumococcal vaccines – can be used in the agrifood space. For example, direct VA hospitals to commit to purchasing antibiotic-free alternative proteins with attractive nutrient profiles at the prevailing price of conventional protein sources. That ensures a profitable market for a high-quality product, eliciting private investment and accelerated R&D&E. Use benevolent patent extensions to induce cash-rich firms with expiring patents to support CGIAR or Africa-based laboratories presently starved for funding. Use

modern financial tools – such as catastrophic drought insurance – that have proved highly impactful and more cost-effective than many cash transfer programs.

- F. Expand federal investment in renewable energy** in rural and small-town America (like the Rural Energy America Program - REAP) and in African development projects. Help farmers harness sunlight, methane from manure lagoons, wind, and geothermal energy to boost post-harvest processing, reduce food loss and waste, and stimulate job creation and economic growth to reduce hunger. Enable small cities and towns to convert vacant factory, military, and warehouse space to controlled environment agriculture and novel feeds/foods production, which can restore high quality jobs to rural areas while reducing the use of land, water, antibiotics, and toxic chemicals as well as crop loss to pathogens and pests.
- G. Support safety nets.** For generations, the United States has been the world's most generous humanitarian donor. That must continue and our diplomats must push others to offer their fair share of support, too. That support needs to heed the evidence of the past twenty years, using the most flexible, cost-effective, contextually appropriate policy instruments in emergency and non-emergency food assistance. Safety nets to protect lives and livelihoods during emergencies are an essential complement to technological advances. R&D&E inevitably causes 'creative destruction' and people who might otherwise be casualties of broader progress commonly need transitional help. Bundling safety nets with technological innovation was central to the remarkable recovery of the U.S. Midwest from the Dust Bowl and Depression of the 1930s and to Asia's Green Revolution successes in the 1960s-80s. Effective safety nets for Africa must be a priority.
- H. Stand firm against anti-science,** wherever and whenever it appears. Humankind has flourished due to crop and livestock genetic modification, which has proved the most reliable source of sustainable agricultural intensification. New genomic techniques enable rapid, precise adaptation of organisms to today's evolutionarily-unprecedented rate of climate and environmental toxicological change. New genomic techniques enable progress far faster than was ever feasible with slow, random natural selection or traditional plant and livestock breeding methods (often using harmful irradiation). Europe has suffered from its resistance to transgenic plant varieties and now to the use of gene editing. In the midst of a poly-crisis, the accelerated discoveries enabled by modern scientific methods are essential to finding solutions. Call out privileged anti-scientists whose fear-mongering misinformation hurts not just their own communities but also Africa's hungry youth and America's future.

Producing affordable, healthy food in Africa using environmentally sustainable practices will be the biggest social, environmental, technical, and humanitarian challenge the world faces in the final two-thirds of the 21st century. Directing public investment, diplomatic efforts, and private sector activity towards meeting this challenge promises enormous national security, diplomatic, and economic gains in the coming decades.

Further Reading

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