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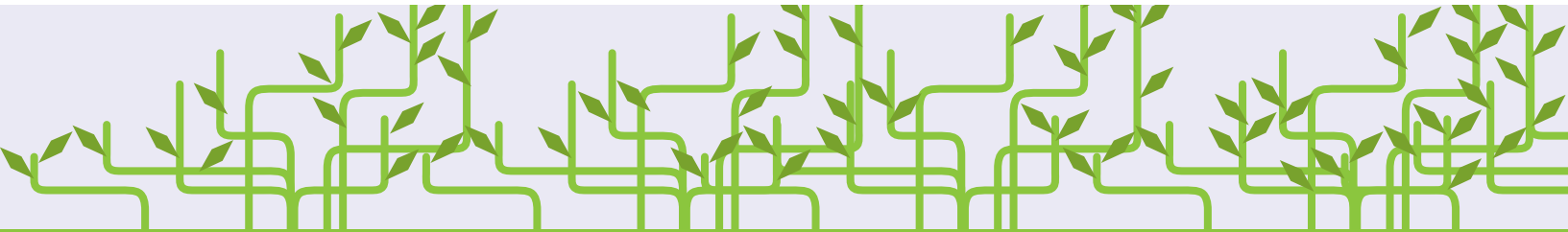
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Africa Human Development Report **2012**

Towards a Food Secure Future



*Empowered lives.
Resilient nations.*



Africa Human Development Report 2012

Towards a Food Secure Future

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Africa Human Development Report 2012

Towards a Food Secure Future



United Nations
Development
Programme
(UNDP)

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Resilient nations.*



Foreword

Africa has seen an extraordinary rebound in economic growth over the past decade. Some of the world's fastest growing economies are in Africa, and they have expanded even during the ongoing uncertainty in the global economy. This has brought a much-needed reduction in poverty in the region and a renewed sense of optimism about its future. There is no doubt that economic growth is critical for human development, and it is imperative that growth be sustained. But growth per se is not enough. As this first United Nations Development Programme (UNDP) *Africa Human Development Report* shows, rapid economic progress in Africa has not brought food security for the substantial proportion of the population still gripped by hunger. The importance of an approach to development that includes economic growth but also goes beyond it—and that puts people firmly at the centre of development—has been a key message of UNDP's *Human Development Reports* since their inception in 1990.

Since 2000 Africa has experienced several episodes of acute food insecurity, with immense loss of lives and livelihoods. This Report comes at a time when yet another severe food crisis is affecting the Sahel region of West Africa. In 2011 alone, millions of people on the other side of the continent, in the Horn of Africa, were similarly struck with famine eventuating in parts of Somalia. Droughts, crop failures and other disasters often trigger these crises. But the real causes go deeper.

As the Report shows, crop failure and a lack of food are not the only causes of famine and hunger. More often, the challenge is uneven access to food, which occurs when people lack the means to acquire it. This uneven access is thus a symptom of the low incomes and high levels of vulnerability that still affect many Africans. While famines grab headlines and periodically jolt national authorities and aid agencies into action, the silent crises of chronic malnourishment and seasonal hunger do not receive nearly enough attention. The effects, however, will be felt by generations of Africans, robbing children of their future and parents of their dignity and holding back advances in human development even amid Africa's newfound economic vitality.

Building a food secure future for all Africans requires focus and action in critical areas—from increasing the productivity of smallholder farmers to advancing nutrition among children, building resilient communities and sustainable food systems, and empowering women and the rural poor. Success in these areas will come only if we view food security as a challenge that extends beyond sectoral mandates and reaches across the national development agenda and if we better integrate humanitarian and development work to strengthen the resilience of people and their communities to even the most severe crisis.

This imperative is a driving force behind implementation of the Millennium Development Goals Acceleration Framework in four countries in the Sahel. The framework seeks to speed progress by identifying the bottlenecks and constraints to achieving the targets on food security and nutrition under Millennium Development Goal 1—and by strengthening coordination (including on funding) among national governments, the UN system and other partners. UNDP is committed to such joint and cross-cutting efforts, which we see as even more important in the context of the challenges of feeding growing populations, avoiding environmental degradation and mitigating the impacts of climate change.

The analysis and recommendations in this Report result from extensive consultation with academics, researchers, policy-makers and development practitioners—in Africa and beyond. This is another feature of *Human Development Reports*: they provide a platform for independent and rigorous analysis and for open discussion about critical challenges to development. It is my hope that this first *Africa Human Development Report* will energize the debate on how to strengthen food security and accelerate human development in Africa and will lead to more decisive action. Let us eradicate food insecurity and hunger in Africa for all time.

Helen Clark

Administrator
United Nations Development Programme

Preface

Had African governments over the last 30 years met their people's aspirations, this Report would not be necessary. One quarter of the people in sub-Saharan Africa would not be undernourished, and one third of African children would not be stunted. Nor would so many African farmers have to eke out meagre livelihoods on tiny plots of depleted soil. The region would be food secure, and the gap between its human development and that of more successful regions would be closing rapidly.

Chronic food insecurity in sub-Saharan Africa stems from decades of poor governance. Regimes bent on amassing wealth absorbed the region's resources into patrimonial power structures. Self-serving elites, quick to profit from graft and patronage, have stood between leaders and the people, monopolized state revenues and emptied the countryside, but they have provided neither employment nor industry. Across sub-Saharan Africa rural infrastructure has deteriorated, farming has languished, gender and other inequalities have deepened and food systems have stagnated. Smallholder farmers, on whose shoulders the recovery of its agriculture rests, have long been pinned between a rock and hard place. Rebuilding food security starts with liberating them from this predicament and unleashing their potential.

The international community's record in this misfortune hardly shines. Developed countries maintain agricultural subsidies that benefit their rich producers while pushing sub-Saharan Africa's impoverished smallholder farmers to the margins. For many years externally inspired adjustment programmes weakened state capacity and encouraged African governments to repay ballooning debts by diverting resources from food production to cash crop exports. One by one countries fell victim to falling commodity prices and increasingly volatile and costly imports. The indifference of some development partners to sub-Saharan Africa's agriculture sector mirrored government neglect, often leaving food growers at the mercy of aid tied to counter-productive conditions.

It is a harsh paradox that in a world of food surpluses, hunger and malnutrition remain pervasive on a continent with ample agricultural

endowments. Fundamental change is imperative. Notwithstanding the last decade's impressive economic growth and the turnaround in some human development indicators, sub-Saharan Africa remains the world's most food insecure region. The spectre of famine, all but gone elsewhere, continues to haunt millions in the region. Yet another famine occurred in Somalia in 2011, and the Sahel is again at risk in 2012.

But history is not destiny. Africans are not fated to starve—provided that governments move decisively to put in place appropriate policies and support mechanisms. Famine, starvation and food insecurity are preventable. The shameful scenes of feeding tents and starving children that have been associated with sub-Saharan Africa for far too long can be eliminated once and for all.

In addition to tackling challenges embedded in the African context, food security strategies will need to respond to major changes in the global food system. New factors are reshaping the way food is produced and consumed: demographic pressures, dwindling natural resources (particularly water and soil nutrients) and a progressive shift towards meat-based diets (which demand large quantities of grain and water) by the new middle classes of emerging countries. International food prices are volatile, driven by surging demand for food and disruptions in its supply, in turn linked to climate change and fluctuating prices of agricultural inputs, such as fertilizer and oil.

These challenges will be magnified by a growing and more affluent population in sub-Saharan Africa. The region will need to produce substantially more food in the next half century to feed its people, while mitigating stresses that agricultural production places on the environment.

Half a century ago, green revolutions in Asia and Latin America ushered in a steady flow of scientific and technological breakthroughs that ultimately conquered famine in those regions. Millions of lives were saved as these changes rolled across Asia. Basket cases became bread baskets. Why should sub-Saharan Africa be different?

Africa has the knowledge, the technology and the means to end hunger and food insecurity. But still missing have been the political will and dedication.



Africa must stop begging for food. That is an affront to both its dignity and its potential. If some African countries can acquire and deploy jet fighters, tanks, artillery and other advanced means of destruction, why should they not be able to master agricultural know-how? Why should Africans be unable to afford the technology, tractors, irrigation, seed varieties and training needed to be food secure?

This Report argues that sub-Saharan Africa can extricate itself from pervasive food insecurity by acting on four critical drivers of change: greater agricultural productivity of smallholder farmers; more effective nutrition policies, especially for children; greater community and household resilience to cope with shocks; and wider popular participation and empowerment, especially of women and the rural poor. These drivers of change, by ending

the ravages of hunger and malnourishment, will nurture capabilities and conditions for human development. A well-nourished and empowered population, in turn, is more likely to seek education, participate in society and expand its productive and human potential. With the right policies and institutions Africa can sustain this virtuous cycle of higher human development and enhanced food security.

Tegegnework Gettu

Assistant Secretary-General and Regional Director
Regional Bureau for Africa
United Nations Development Programme

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Overview

Hunger and starvation in sub-Saharan Africa have lasted too long. But Africans are not consigned to a lifetime of food insecurity. The knowledge, technology and resources for closing the food security deficit are available today, and breakthroughs will continue to emerge from research and development. But no one believes it is possible simply to distribute better seeds and more fertilizer to African farmers and then to walk away. Nor will economic growth alone solve the problem. The failures that add up to food insecurity are pervasive, from agricultural, health, education and nutrition policies to research, extension services, sanitation, local government, commerce and transport. An effective response to a challenge this broad cannot be narrowed to a single intervention, discipline or institutional mandate. It will take a coordinated response across sectors.

This *Africa Human Development Report*, the first, argues that sustainable increases in agricultural productivity protect food entitlements—the ability of people to access food. Furthering human development requires nutrition policies that unleash the potential of today's and future generations. Also, communities must be resilient enough to absorb shocks and have the power to make decisions about their own lives.

Food security for human development

For too long the face of sub-Saharan Africa has been one of dehumanizing hunger. More than one in four Africans is undernourished, and food insecurity—the inability to consistently acquire enough calories and nutrients for a healthy and productive life—is pervasive. The spectre of famine, which has virtually disappeared elsewhere in the world, continues to haunt parts of sub-Saharan Africa. Famines grab headlines, but chronic food insecurity and malnutrition are more insidious, often silent, daily calamities for millions of Africans.

Yet sub-Saharan Africa has ample agricultural land, plenty of water and a generally favourable climate for growing food. And in the last 10 years many African countries posted world-beating economic growth rates and became among the fastest movers on the Human Development Index. With these endowments and important economic and social achievements, why is the region still food insecure?

These two jarring paradoxes are the point of departure for this Report.

The Report argues that sustainable increases in agricultural productivity and better nutrition are the drivers of food-secure growth and human development. The argument is straightforward: more productive agriculture will build food security by increasing food availability and lowering food prices, thus improving access. Higher productivity can also raise the incomes of millions of small-holder farmers, elevating living standards and improving health and education, thus expanding people's capabilities. Through science, technology and the diffusion of innovation greater agricultural productivity can also enable better stewardship of the environment. Sound nutrition links food security to human development. Well-nourished people exercise their freedoms and capabilities in different domains—the essence of human development—and, completing the cycle, will be inclined to demand food security from their leaders.

The human development approach focuses on entitlements and capabilities. Food security should thus be leveraged by empowering people to make their own choices and by building resilience in the face of shocks. That means preserving people's food entitlements—the income, market structures, institutional rules and governance that enable the poor to buy and trade food in fair markets. It also means reinforcing essential human capabilities in health and education.

Focusing policies on these four areas—agricultural productivity, nutrition, resilience and empowerment—can unleash a dynamic virtuous cycle of food security and human development.

Sub-Saharan Africa still trails the world in human development, but the quickening pace of change and the new economic vitality in the region offer grounds for renewed (if guarded) optimism.

Conditions in sub-Saharan Africa today

Sub-Saharan Africa has abundant agricultural resources. But shamefully, in all corners of the region, millions of people remain hungry and malnourished—the result of glaringly uneven local food production and distribution and chronically deficient diets, especially among the poorest. This is a daily violation of people's dignity, with many governments not fulfilling their basic responsibility of protecting their citizens from hunger.

The chain of food security that runs from availability through access to use comes under constant stress in a region vulnerable to the impacts of erratic weather, volatile food prices, and conflict and violence. Agricultural productivity remains low—much lower than in other regions. Many sub-Saharan African countries are net food importers and even depend on food aid during all-too-frequent humanitarian crises. Where food is available, millions cannot afford it or are prevented from buying or trading it by underdeveloped markets, poor roads, long distances to markets and high transport costs.

Important as food availability and access are, food security is about still more. Proper use of food and good nutrition determine whether food security sustains human development. Malnutrition leads to illness and death—as insufficient access to safe water, energy and sanitation combine with diseases such as HIV/AIDS and malaria in a lethal mix that perpetuates the problem.

Hunger exacts a crippling toll on individuals and society alike. Poorly nourished children have weakened immune systems and die from communicable diseases that are ordinarily curable. Malnourishment in the first 1,000 days after conception can lead to irreparable damage to children's physical and mental development. Malnourished mothers are at greater risk of dying during childbirth or of delivering low-birthweight babies who do not survive infancy.

Infants that make it through childhood are more likely to suffer stunting that shortens their lives and to perpetuate the cycle of deprivation when those children in turn produce low-birthweight babies.

Africans have been trapped by hunger for decades, with millions consuming staple foods deficient in the micronutrients needed to sustain child growth and adult productivity. Hunger also eviscerates society by increasing disease, mortality and disability. It inflates healthcare costs, reduces worker productivity and diminishes social and economic returns to education. It violates basic human dignity and damages self-esteem.

Persistent challenges and emerging threats

Misguided policies, weak institutions and failing markets are the deeper causes of sub-Saharan Africa's food insecurity. This tainted inheritance is most evident in households and communities, where unequal power relations trap vulnerable groups—subsistence farmers, the landless poor, many women and children—in a vicious cycle of deprivation, food insecurity and low human development.

For decades the policies of national governments and international institutions neglected sub-Saharan Africa's rural and agricultural development in favour of urban populations. Their damaging legacies include ineffective postcolonial industrialization plans that exhausted development resources, leaving agriculture behind. Structural adjustment programmes aimed to close budget gaps but instead created large human development deficits, especially among the vulnerable poor, and skewed allocations of national revenue and foreign aid that overlooked agriculture and nutrition.

Despite some improvements since the mid-1990s, many African governments continue to burden domestic agriculture with high, arbitrary taxes while bestowing subsidies, incentives and macro-economic support on other sectors. Meanwhile, many developed countries have moved the other way, heavily subsidizing agriculture long after its role as a development driver has passed, giving their farmers a tremendous advantage in international trade. Sub-Saharan Africa's smallholder farmers, sidelined by biased policies and squeezed by failing markets, long ago gave up struggling to



compete against the world's most formidable agricultural systems.

Breaking with the past, standing up to the vested interests of the privileged few and building institutions that rebalance power relations at all levels of society will require courageous citizens and dedicated leaders. Taking these steps is all the more pressing as new threats to the sustainability of sub-Saharan Africa's food systems have emerged. Demographic change, environmental pressure, and global and local climate change are profoundly reconfiguring the region's development options.

These new challenges will be magnified by sub-Saharan Africa's rising population, almost 2 billion by 2050. Meeting the increasing demand for food will require substantially boosting food crop yields over the next half century and mitigating stresses put on agricultural production by climate change and current agricultural practices. Only sharp and sustainable increases in agricultural productivity will enable food production, incomes and livelihoods to keep pace with these developments.

Raising agricultural productivity

Local agricultural capacity is the bedrock of food security in sub-Saharan Africa, a truth so apparent it would hardly require stating had it not been so consistently slighted. Agriculture determines the availability of food, the first link in the chain of food security. For most Africans, especially the poor, agriculture is also the wellspring of income and work, core elements of human development. In turn, earnings and employment bolster food security by enabling access to sufficient quantities of nutritious food. Beyond these crucial and mutually reinforcing effects, agriculture also shapes how—and how sustainably—the region uses much of its land and water.

Despite agriculture's importance, it has performed below its potential for generations in sub-Saharan Africa, neglected by government policies and held back by low farm productivity. Following age-old practices, African smallholder farmers have long survived by growing crops on reclaimed forest and grazing land or by recycling plots without replenishing their nutrients. Production increases have come from expanding cultivated land area, not from making farming more efficient. The scope

for further area expansion is diminishing, and farmers now need to produce more food for each unit of land, with the help of modern technology. Productivity increases will generate farm employment; decent wages, including those for unskilled labour; and income for rural communities.

Boosting productivity requires more fertilizers and seeds, stronger research and development, and a more coordinated and responsive extension system staffed by experts versed in the behaviours and habitats of local farming communities. "Smart subsidies," which encourage smallholder farmers to shift to high-yield crop varieties without saddling the state with long-term costs, can energize food production and markets. Research that embraces local farmers' knowledge as part of the technology for improving yields can deliver results where blinkered laboratory designs have failed. Encouraging smallholder farmers to adopt new inputs begins with understanding their resistance to change.

Policy-making and institutional research should focus on varietal options for health and nutrition. Multidisciplinary knowledge is required to develop environmentally sustainable farm technologies. Modern agricultural technology can deliver solutions that not only boost yields but also economize on inputs, making fertilizer and water use more environment friendly. Creating and diffusing science and innovation require more collaboration among breeders, researchers and farmers.

Irrigation presents a long-term challenge for sub-Saharan Africa. Most countries have to make large investments in irrigation methods designed for sustainable and employment-intensive water management. But not all parts of the region need irrigation. Many semihumid and humid zones have enough moisture to make other means of water control feasible.

Better market access can also boost yields. When farmers can transport their surpluses quickly and cheaply to points of sale or storage, they have incentives to increase production. This will take market development policies, transport regulation reforms to introduce competition, and substantial investment in rural roads, information technology, railways and warehouses. Access to credit and insurance through innovative schemes can lower the risks of adopting new inputs and motivate farmers to experiment with new varieties.

Attracting young Africans to participate in agriculture will bring new energy and ideas into its development. Technology and innovation can create enticing and profitable openings, enterprises and occupations along the value chain of a sector that young people have come to denigrate as a backwater. Connecting three assets—a bulging youth population, advances in innovation and the promise of agricultural development—is a natural way forward for many countries.

Higher agricultural productivity can deliver a triple dividend—sustained food security, higher human development and lower pressure on land and water. But governments will have to rethink their priorities in order to pay for the required investments. Self-defeating policies that put guns before bread, cities before farms and fatty foods before nutrition will not measure up. Adequate funding for agricultural research and development and for effective regional collaboration on big-ticket investments in land and water control will yield a richer harvest for sub-Saharan Africa than will sowing conflicts with bullets or converting continental breadbaskets into fuel tanks.

From food security to human development through nutrition

Too often the news from sub-Saharan Africa is easy to predict: famine and humanitarian food crises on the front page, volatile international food prices in the business section and numbing images of emaciated children in the magazine supplement. But while hunger dominates the African narrative, malnutrition—its silent accomplice—seldom makes headlines. Malnutrition is an obstacle to human development, inflicting irreversible damage on individuals early in life and imposing large economic and social losses on countries for years to come.

Malnutrition is a plague on childhood. It can span generations in the form of hidden hunger, a life-sapping inheritance of nutrient deficiency resulting from past practices of eating low-quality foods. But fortifying these staples can preserve their place in traditional diets. Improving micronutrient intake is among the most effective—and cost-effective—ways to combat malnutrition. Concentrating on a handful of nutrients (vitamin A, iodine, iron

and zinc) can leverage large human development returns from a small input—one of society's most efficient development investments.

Many of the most critical and cost-effective nutrition interventions are not expensive. One is empowering women, a far-reaching way to help households break the cycle of intergenerational deprivation. When women have less say in decisions than men do, nutrition suffers, household food security deteriorates and access to healthcare lags. When women have more influence on household choices, child nutrition often prospers.

Well-nourished people are more productive and more receptive to learning. Well-nourished children learn better and are more likely to live lives they value. Indeed, the importance of nutrition begins even before children are born: nutrition during gestation has long-term benefits for children's ability to learn and grow.

Food science is uncovering new ways to improve the diets of the poor. Research on biofortification—breeding nutrients into crops—holds great promise because it focuses on the unprocessed food staples that poor people eat in large quantities every day. Biofortification implicitly targets its nutrient enrichment to low-income households that do not consume commercially fortified processed foods. While the technology has limits, it could give traditional African diets a major nutrition boost.

Nutrition is affected by a range of circumstances—from the political economy and seasonal and climate conditions to cultural and religious customs, the availability of health services and the level of household education, including knowledge of sound eating and health practices. Also in play are agricultural production and income, access to varied and nutritious foods, a sanitary environment and sufficient safe water and cooking fuel.

A multidimensional challenge of this order demands a multisectoral nutrition strategy—one with high-level government commitment, adequate resources and nutrition-sensitive interventions by the state, civil society, the private sector and the international community. Nutrition has to move up the policy agenda and down to households. Otherwise, sub-Saharan Africa will continue to incur the high costs to its citizens and societies of one of the region's most disabling deficits.



Building resilience

From field to table the supply of food in sub-Saharan Africa is fraught with risk. Shocks, cycles and trends threaten food security and livelihoods. Conflict, droughts, floods, food price spikes and other shocks inflict immediate hardship on the poorest and most vulnerable households and constrain future human development. And too often the damage is permanent. Cyclical or longer term stresses—such as seasonal harvesting patterns that result in long “hungry seasons” between harvests, or creeping environmental degradation—are slower moving and more predictable. But they devastate communities all the same—especially those that cannot manage their exposure to hazards and protect their livelihoods. Stresses from population pressure are pervasive and growing.

Preventing or relieving stresses before they undermine food systems requires action across multiple fronts—from the environment to conflict resolution, market stability and women’s empowerment. Long-term thinking requires lowering agriculture’s contribution to climate change through policies that emphasize climate-smart practices. Ensuring that techniques to boost agricultural productivity are sustainable will allow farmers to adapt to climate change and to reap the benefits of nutrient-enriched soils today without adding to environmental stress.

Action to curb conflicts in the region would reduce the frequency of food system collapses. Dampening the volatility of global food prices is a collective endeavour for the international community. But African countries have a large stake in backing a new global architecture for agriculture and food security based on better market access for food importers, fewer restrictions on exporters and less distortion in biofuel markets. Effective responses to rising demographic pressures on the food supply start with enlarging women’s capabilities by improving their access to education, earnings and effective family planning services.

Forward-looking measures can buffer food systems from stress—or at least reduce the frequency and intensity of the most damaging strains. But crises happen, and poor communities must be ready to manage risks and cope with shocks. Social protection—such as insurance, employment protection, food and cash-for-work programmes,

food assistance, subsidies and social transfers—can determine whether crisis-struck households survive or succumb.

However, avoiding deterioration in food systems and mitigating the impacts of breakdowns are hardly progress. The most effective social protection policies raise returns to core productive assets—in sub-Saharan Africa, labour and land—and lift people out of poverty, reducing their need for social support and building their capacity to withstand recurring shocks. Linking social protection to measures that enhance farmers’ access to technology, stabilize rural markets and commodity prices, and build up rural infrastructure can make farmers, households and markets more resilient.

Empowerment, social justice and gender

This Report shows that the basic right to food—and the right to life itself—is being violated in sub-Saharan Africa to an intolerable degree. Building a food secure continent requires transformative change—change that will be most effective if accompanied by a shift of resources, capacities and decisions to smallholder farmers, poor communities and women. When women and other vulnerable groups gain a voice in the decisions affecting their lives and livelihoods, their capacity to produce, trade and use food is materially enhanced.

Knowledge and organization are the keys to opening the public space. Information technology can put up-to-the-minute knowledge about market prices and conditions at farmers’ fingertips, increasing their leverage, while cooperatives and producer associations can provide platforms for collective bargaining. When food market actors—farmers, transporters, sellers and buyers—communicate regularly and quickly, costs and transaction times fall and farmers’ incomes tend to rise. High connectivity can make farmers better traders and markets more transparent.

New inputs and farming techniques can liberate farmers from cycles of low productivity and poverty. But technology is double-edged. Misapplied, it dispossesses or marginalizes smallholder farmers. Science conducted far from where its results are used, and compartmentalized in water-tight

disciplines, can lead to designs poorly suited to smallholder farms and local habitats.

Participation and voice grow stronger when political, economic and social power is widely dispersed. Locally determined solutions are usually more sustainable than top-down decisions. Producer organizations amplify the political voice of farmers, reduce the costs of marketing inputs and outputs and provide a meeting point for collective approaches. Community-based targeting can prevent elites from capturing social transfers, drawing on local knowledge to identify people most eligible for social protection.

African farmers have found vocal allies in autonomous civil society organizations, which can mobilize public interest around issues, monitor the performance of governments and lobby them to act in line with basic human rights. In addition to rights-based organizations, a range of development-based civil society organizations focused on charity, recovery and relief undertake food security interventions. But African civil society is still evolving, so its role in delivering food security can be neither discounted nor relied on completely.

Accountability is the necessary counterpart to voice. When accountable authorities answer to engaged communities, social justice is served. In the short run community organization and civic engagement will have to fill many gaps. Community-based social audits to monitor delivery of social protection programmes and other public services—and rights-based (rather than discretionary) approaches that elevate interventions to the status of citizens' rights—can strengthen the social contract between people and their government.

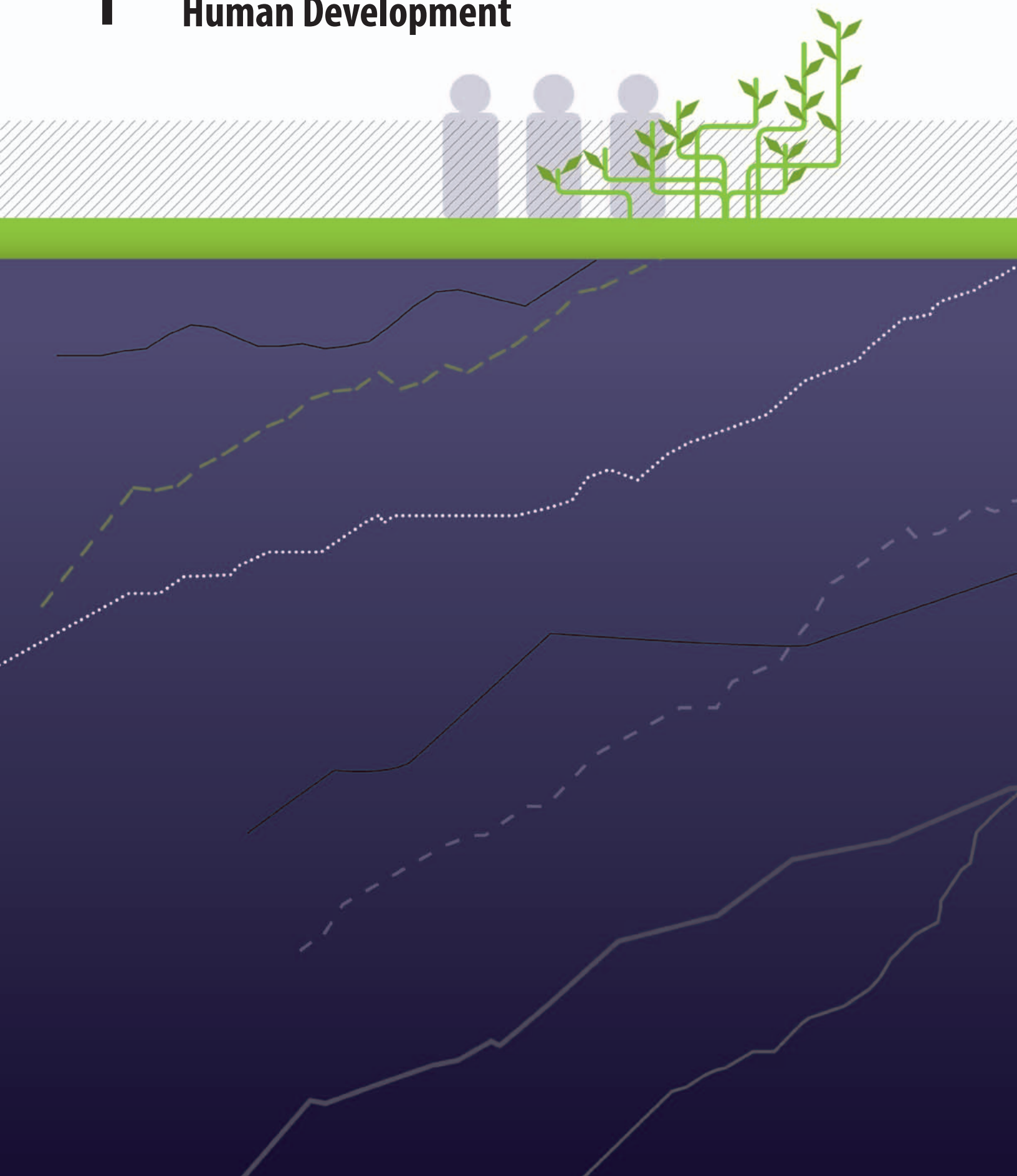
Control over land is crucial for smallholder farmers. In sub-Saharan Africa family holdings pass from one generation to the next with ill-defined rights of tenure, leaving smallholder farmers vulnerable to dispossession and exploitation.

A new development that risks aggravating these insecurities is the recent international scramble for land in sub-Saharan Africa. One danger is that large-scale investments may displace people without consultation or adequate compensation. In countries where many people work in agriculture, separating them from their land without first creating opportunities in nonfarm sectors is likely to increase poverty, unemployment and food insecurity.

There are strong and mutually reinforcing links between expanding women's capabilities—through better education, more direct control over resources and a more decisive voice in decision-making—and enhancing food security. Empowering women, who make up almost half the agricultural labour force in sub-Saharan Africa, is a highly efficient way to achieve progress across the multiple dimensions of food security. But even beyond such instrumental qualities and possible gains in efficiency, women's empowerment must remain a central policy priority because equality and nondiscrimination are of intrinsic value. As human rights, women's rights deserve to be promoted for that reason alone. Yet women in sub-Saharan Africa have less control than men do over productive resources such as assets, land and credit; their time is often devoted to activities that are nonmarketed and undervalued; and their access to key institutions such as courts and markets is curtailed.

Famines and food crises continue to plague the region as nowhere else. The cycles of hunger and despair with which so many Africans struggle and "cope," and which too often trap them, show no signs of letting go. Responsibility for these appalling conditions is shared among governments, institutions and markets in the region and abroad. The challenge of food security in sub-Saharan Africa is formidable, the timeframe for action is tight and the investment required is substantial. But the potential gains for human development are immense.

1 From Hunger to Human Development





CHAPTER 1

From Hunger to Human Development

For too long the face of sub-Saharan Africa has been one of dehumanizing hunger. If African countries are to realize their potential, they will need to overcome the under-nourishment that afflicts more than a quarter of their people. Food security is a precondition for sustained human development, but neither goal can be met through economic growth alone. The character of growth matters as well. For growth to be effective, agricultural productivity and nutrition policies need to improve. Because food security for human development requires that individuals be the subjects and agents of their own well-being, these policies must be leveraged through actions that build resilience and empower people, especially women. Africa still trails the world in human development, but the quickening pace of change and the new economic vitality on the continent offer grounds for renewed, if guarded, optimism. Food security for human development can accelerate and help sustain the promise of these new trends and prevent reversals.

Why dedicate the first *Africa Human Development Report* to food security? Because without food security, sustained improvement in human development will remain an unattainable goal. Just as food is necessary for life, so is food security a prerequisite for human development. Across sub-Saharan Africa¹ hunger prevalence is the highest in the world. More than one in four Africans—close to 218 million people in 2006–2008²—are under-nourished,³ and food security is precarious. Until the situation improves, the lives, livelihoods and human development prospects of millions of Africans will remain at risk.⁴ This chapter explores the links between food security and human development, surveys trends in both of them and introduces a set of policy guidelines to end hunger and foster human development in sub-Saharan Africa.

From food security to human development

People are considered well-fed and well-nourished when they can obtain safe food of sufficient quantity, variety and quality to sustain their lives. They need food that provides energy for growth, physical activity and basic human functions, from breathing and thinking to circulation and digestion. When starvation terminates these vital functions, people

die. But when poor nutrition insidiously compromises these functions every day, it is the future that is silently forfeited. Children, their development arrested, are denied the realization of their full potential.⁵ Malnourished adults fail to develop the full range of their capabilities and are unable to function at their best. And the human capital of nations erodes inexorably.

Food security can be defined as “[the condition] when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food [to meet] their dietary needs and food preferences for an active and healthy life.”⁶

It thus encompasses the *availability* of food, people’s *access* to food and their *use* of food, as well as the *stability* of all three components. This definition includes the qualitative dimensions of safety and nutrition, linking food security to people’s energy, protein and nutrient needs for life, activity, pregnancy and growth.⁷ It also points to a horizon beyond food security, the potential for a full and active life.

Human development is the expansion of capabilities: the freedoms that people have to lead lives they value. Being well-nourished at all times without the threat of hunger is an important capability. The human development approach overlaps with the right to food through its focus on people’s dignity and freedoms.⁸

Hunger and malnutrition—direct outcomes of food insecurity—intercept human development on a basic level. These two scourges restrict vital human functions, threaten the right to life and block opportunities for developing capabilities. They foreclose people's choices by impairing physical and cognitive growth, increasing vulnerability to disease and shrinking people's scope in life to mere survival. Millions of Africans have suffered this plight of hunger and malnutrition for far too long.

How food security and human development intersect

The perverse dynamic between food insecurity and poor education, bad health and poverty can last generations. Hungry children with weakened immune systems die prematurely from communicable diseases such as dysentery, malaria and respiratory infections that are ordinarily preventable and treatable.⁹ They start school late, learn less and drop out early. Malnourished mothers are at greater risk of dying in childbirth and of delivering low-birthweight babies who fail to survive infancy. Undernourished babies who make it through infancy often suffer stunting that cripples and shortens their lives.¹⁰ As adults they are likely to give birth to another generation of low-birthweight babies, perpetuating the vicious cycle of low human development and destitution.¹¹

Because of the often irremediable consequences of food insecurity, once a household falls into this cycle, its descendants may not emerge from it, even in a thriving economy. Those who do break out must exert much greater than normal effort to make up deficits. In adulthood being well-fed is an important but short-lived investment: the food consumed today supports productivity tomorrow. In childhood, however, the investment is long lived. And the benefits go well beyond the households immediately affected: stronger economic growth and higher human development for the entire society.¹²

Food insecurity debilitates society by increasing mortality, disease and disability. They inflate the direct economic costs of coping with health impacts. And they inflict on economies the indirect costs of diminished worker productivity, absenteeism and lowered returns on education. In extreme cases

mass hunger becomes a powder keg that can bring down an entire political and economic order. None of this is conducive to human development.

In contrast, the premise of this Report is that food security, by preventing the ravages of hunger, fosters capabilities and the conditions for human development. Well-fed and well-nourished people are more likely to be educated, engage with society and realize their productive and human potential. In turn, higher human development leads to improved food security, creating a virtuous cycle.

Conceptually, food security and human development are reinforcing, with nutrition outcomes at their intersection (figure 1.1). This two-way relationship starts with the availability of, access to and proper use of food, the core conditions for food security. A fourth condition—stability—ensures the strength of the other three. When the core conditions for food security are dependably in place, nutrition outcomes are positive. But when the conditions for food security are disrupted, the result is malnutrition, which effectively blocks the channel to human development.

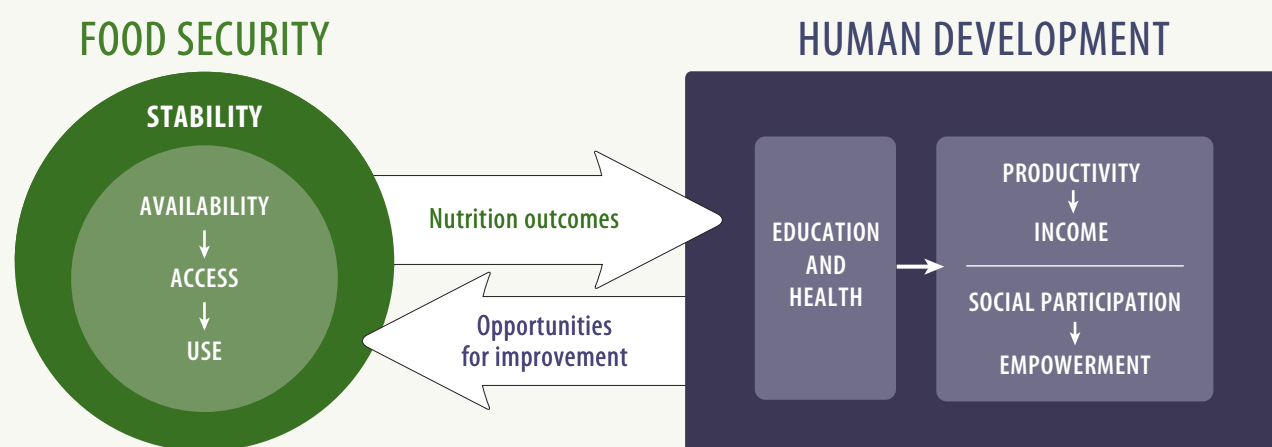
Human development, in turn, improves food security. Education and health are important both intrinsically (people value being educated and healthy) and productively (as the main constituents of human capital). Education enables farmers to become more productive through better use of agricultural technologies, which leads to higher income for rural workers, as explored in chapter 4. Enhancing capabilities in education and health also promotes better use of food by communities, and healthier workers are more productive. These effects are explored in chapter 5.

Higher human development also builds resilience. For example, droughts happen in many places, but where human development is high, they do not lead to famine. Resilience in turn protects human development. Children who can stay in school, even during a drought, avoid setbacks in human development, as argued in chapter 6.

Because educated people are typically better informed and have greater access to media and technology, they also tend to be more engaged in their communities and in political activities, as discussed in chapter 7. Productive and socially and politically engaged people, enjoying better education and health, will be empowered to improve their well-being. Civic education and social participation



FIGURE 1.1 NUTRITION OUTCOMES ARE AT THE INTERSECTION OF FOOD SECURITY AND HUMAN DEVELOPMENT



Source: Based on analysis described in the Report.

can increase voter turnout, build more informed constituencies and increase the accountability of local authorities.¹³

The elaboration of the reciprocal relationship between food security and human development in this Report is based on two established ways of thinking about human development: entitlements and capabilities. Entitlements undergird the ability to access food, while capabilities form the basis of human choice.

Entitlements: the ability to produce, buy or trade food

Since 1981, when Amartya Sen published his seminal work, *Poverty and Famines*, the entitlement approach has expanded understanding of hunger and poverty and the policies to address them.¹⁴ Replacing the dominant notion that famines are caused by a decline in the food supply, Sen argued that hunger is a consequence of “entitlement failure,” or the inability to access food through legal means (whether through the market, barter or government distribution). Sen’s entitlement framework suggests that food security results less from a lack of supply than from a lack of effective demand arising from restricted access, nonfunctioning or nonexistent institutions and absence of rule of law.

People with limited access to markets or deteriorating purchasing power can become food insecure as their inability to acquire food makes them vulnerable to hunger.

Faced with declines in entitlements, people are forced to reduce their demand for food or to buy less expensive, lower quality varieties. A drought in Namibia in the early 1990s dramatically damaged agricultural livelihoods. Even when food was available in the country, through commercial imports and food assistance, affected groups suffered from hunger and malnutrition as their entitlements collapsed.¹⁵ The situation was little changed almost two decades later in 2008, when floods and droughts caused severe food insecurity among poor subsistence farmers, while highly mechanized commercial farmers reaped bumper harvests.¹⁶

During the recent drought in the Horn of Africa shrinking entitlements devastated livelihoods among pastoralists in Kenya. A measure of this entitlement collapse is illustrated by the cumulative effect of the increase in the prices of food and the fall in the value of assets in Mandera Province of Kenya: between March 2010 and March 2011 the price of 1 kilogram of white maize rose 53%, while the price of one live mature animal fell 5%.¹⁷

The entitlement approach draws attention to market structures, institutional rules, discriminatory practices and power relations that can erode the food security of poor people. It highlights the unequal access to food or to the resources needed to produce it—reflected in inequality in income, land, and other assets and political representation. The entitlement approach also underlines the importance of access to nutritious food. Poor people often rely on weak markets without product diversity, to the detriment of good nutrition. A subtle variant of the approach recognizes that people also require a supportive natural environment. Farmers and other rural workers whose livelihoods depend on land, soil, water and cattle can become food insecure if their natural resource base is altered through climate change or environmental degradation, reducing yields and increasing labour requirements.

The policy implications of the entitlement approach should thus be high on any food security agenda: access to land, resources and supplies; fair and efficient formal and informal institutions; equitable terms of trade; environmental safeguards; and the rule of law are all central. The approach also emphasizes how social programmes and direct transfers in cash or in kind can protect entitlements against shocks. The Livelihood Empowerment against Poverty programme in Ghana, for example, provides a small cash grant to poor households.¹⁸ The Productive Safety Net Programme in Ethiopia takes a slightly different approach as a public works scheme for households that have able-bodied members who can work and as a direct transfer system for households that do not (box 1.1). Without such programmes poor people have to rely on coping mechanisms that are often insufficient.

BOX 1.1 ETHIOPIA: PRODUCTIVE SAFETY NET PROGRAMME

Ethiopia launched the Productive Safety Net Programme (PSNP) in 2005 to provide transfers to people in the country's food insecure administrative divisions. The largest social safety net programme in sub-Saharan Africa outside South Africa, it reaches more than 7 million people at an annual cost of about \$500 million. The programme aims to provide predictable transfers to meet expected needs to bridge annual food consumption gaps and protect household assets from distress sales. The programme is part of the government's larger Food Security Programme, which also incorporates a package of Other Food Security Programmes (OFSP) that includes credit and subsidized inputs.

PSNP has a public works component (84% of 2008 participants) and a direct support component for households with no able-bodied members (16%). The public works component employs people for up to five days a month for six months, targeting the months when agricultural activities are slowest. Beneficiaries receive cash or food. Transfers are not automatically adjusted for inflation, but they were increased in 2008 in response to rising food prices.

One study of beneficiaries in public works projects found that people who participated in both the PSNP and OFSP were "more likely to be food secure, and more likely to borrow for productive purposes, use improved agricultural technologies, and operate their own non-farm business activities."

A later study found a positive effect on income growth and food security, especially for people who received food only and mixed (cash plus food) payments. Price inflation reduced the benefits to households receiving only unindexed cash transfers. PSNP and OFSP show that government social programmes can protect entitlements and improve food security. The study also highlighted the challenges that beset such programmes—from the institutional complexity of cash transfers and credit access components to the difficulty of coping with food price volatility.

Source: Gilligan, Hoddinott, and Taffesse 2009; Sabates-Wheeler and Devereux 2010.

Capabilities: the basis of human choice

The entitlement approach has been valuable for illuminating the links between poverty and exclusion and hunger. But by focusing almost completely on command over food, it speaks to only one side of food security for human development. Human development transcends command over income and commodities to focus on enlarging human choices, which implies increasing people's capabilities: their freedoms to be and do what they value. Similarly, avoiding malnutrition and destitution is about more than food availability or intake. Transforming food into human well-being requires healthcare, clean drinking water, improved sanitation and education.¹⁹

From a human development perspective food security is multidimensional and people-centred (box 1.2). A human development perspective shifts attention from the aggregate level to households and individuals. Human development asks how people ultimately use income to become food secure, considers individual behaviours and food preferences and weighs external circumstances, such as prices, food choices and institutional arrangements. It looks at food security as a question of quality, use and cultural acceptability as well as quantity. It values education and health—other dimensions of human development—and their interactions with food security.²⁰

The ability of people to shape the process leading to food security is central. People can improve



BOX 1.2 A PRACTICAL APPROACH TO EVALUATING FOOD SECURITY FOR HUMAN DEVELOPMENT

How can countries evaluate food security from a human development perspective? Research for this Report suggests a practical approach that can provide a detailed analysis of food security in three stages: food entitlements, basic capabilities for food security and the capability to be food secure (see table).

Food entitlements. In stage 1 food entitlements are assessed using data on endowments (people's wealth), exchange conditions (relative prices) and production possibilities (technology). People's endowments are detailed through data on employment, assets, savings, and claims on the state or other local institutions for cash transfers or food assistance. Exchange conditions are identified through information on the prices of goods and services. Production possibilities are illuminated through information on people's skills and professional knowledge. To assess people's current and near-term access to food, this information is combined with information on how these elements have changed over time.

Basic capabilities. In stage 2 basic capabilities are examined, including the institutional and environmental conditions that allow

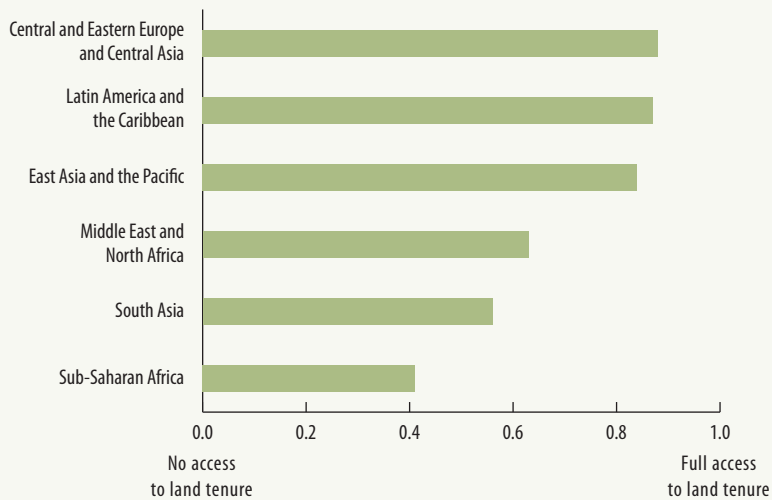
converting inputs (income, labour) into food. If, for example, society does not accept women going to the market alone, a woman will not be able to purchase food even if she can afford it because cultural norms limit her capabilities. Environmental conditions also matter. A drought changes the amount of subsistence food farmers can grow or the income they can earn from cash crops. Relevant, too, is information on education, health and the ability to participate in household decision-making and community life.

Capability to be food secure. In stage 3 the capability to be food secure—to be well-nourished—depends on interactions among basic capabilities. An important analytic link is missing, however. Enjoying basic capabilities is necessary but not sufficient to be food secure. Also needed is knowledge of the quality and diversity of the diet and possibly of hygiene and cooking practices. Obtaining enough calories is not necessarily the same as being food secure if the calories come from a single type of food, from food of low nutritional content or from food that does not conform to people's cultural or religious norms.

STAGE	WHAT IS MEASURED	FOOD SECURITY DIMENSION	INFORMATIONAL BASIS	VARIABLE
1	Food entitlements	Access to food + Stability	<i>Endowments:</i> labour force, productive assets, wealth (nonproductive assets, savings, others), nontangible resources	Employment status, type of employment, large set of assets (mainly livestock, land and house-related assets), right/legal claim to public provision of food or income transfer from the state. For the stability dimension: variation of endowments and strategies (coping strategies, adaptation)
			<i>Exchange conditions:</i> prices of food items, wages, prices of other nonfood goods and services	Wages from primary and secondary income-generating activities, price of different food items, prices of other goods and services
			<i>Production possibilities:</i> skills, technology	Professional skills
2	Basic capabilities	Access to food and other aspects of food security + Stability	<i>Being free from hunger</i> (following Sen, having enough calories for survival). This depends on another set of variables: <i>personal conversion factors</i> (age, sex, metabolism, others), <i>institutional conversion factors</i> and <i>environmental conversion factors</i>	Quantity of food, food groups, calorie intake, sex, age, law, rules, norms, climate, frequency of natural disasters
			<i>Being educated</i> (basic education, which depends on availability and accessibility of formal and nonformal training)	School enrolment, educational achievement, literacy, participation in adult literacy courses, other nonformal education programmes
			<i>Being in good health</i> (depends, among other things, on healthcare)	Access to health services, sanitation, resistance to main diseases and self-reported health status
			<i>Being able to take part in household decision-making and community life</i>	Participation in household decision-making and participation in community life (questionnaire)
3	Capability to be food secure	Access to food and other aspects of food security + Stability + Use	Access results from the <i>interaction</i> between the capability "being free from hunger" and the capabilities "being in good health" and "being educated." In addition, it depends on food use and cultural/social acceptability	Diet quality, diet diversification, nutrition knowledge (through questionnaire focusing on micronutrients) and hygiene practices, cultural and religious beliefs about food products

Source: Burchi and De Muro 2012; Drèze and Sen 1989.

FIGURE 1.2 WOMEN HAVE LESS CONTROL OF LAND IN SUB-SAHARAN AFRICA THAN ANYWHERE ELSE, 2009



Note: Regions are those defined by UN Women.
Source: UN Women 2011, map 1.1, p. 40.

their food security through their own initiative and actions—what Sen refers to as “agency”²¹—as long as enabling formal and informal power structures are in place. One glaring example of how power structures hold back agency and thus food security is the inequality between men and women in control over land use in many African countries (figure 1.2; also see figure 3.2 and further discussion in chapter 3). Because women have a major role in agriculture and household consumption in Africa, their empowerment is central to advancing food security for human development (chapter 7).

The right to food: bringing entitlements alive

Food was identified as a human right in the 1948 Universal Declaration of Human Rights.²² That view gained strength over the 1990s within a broader rights-based movement seeking a new framework for international relations after the collapse of cold war ideologies and rivalries. General Comment 12 of the International Covenant on Economic, Social and Cultural Rights defines the right to food as “[the right of everyone to have] physical and economic access at all times to . . . food [in adequate quantity and quality] or [to the] means of its procurement.”²³

Differentiating food security and the right to food

Food security and the right to food, though originating in different conceptual realms, are closely related through a common focus on the individual. But there are substantive differences.

Food security is a policy objective and thus a means to an end. It is open to redefinition by governments, and actions to achieve it are discretionary. In international law the concept appears only in nonbinding instruments such as the World Food Summit declarations and similar texts. The right to food, like all human rights embodied in international treaties, is a binding goal that entails correlate obligations of the government and other actors. A normative concept, it gives legal effect to an ethical imperative, committing states to the progressive realization of the right for all citizens.

The right to food acknowledges individual dignity and people as rights holders and subjects and agents of change. It shifts policy attention from basic needs to rights and from beneficiaries to claimants. And it requires a corollary framework based on accountability, empowerment and participation to activate its principles. It thus draws attention to the relationship between the state and its citizens and the balance and exercise of power.²⁴

States have the primary responsibility to use all possible instruments to protect people’s right to food along three categorical lines: the obligation *to respect*, by not arbitrarily depriving citizens of their right to access food; the obligation *to protect*, by enforcing laws that prevent nonstate actors, including corporations, from violating an individual’s right to food; and the obligation *to fulfil*, by strengthening people’s access to and use of resources that enable them to feed themselves.²⁵ Meeting these obligations requires governments to adopt inclusive strategies that involve and empower the most vulnerable people, whose entitlement failures frequently violate their right to food.²⁶

The right to food in sub-Saharan Africa

Despite growing attention in international discussions, translating the right to food into national legislation is moving slowly across Africa (box 1.3).

South Africa has ratified many core international human rights instruments, among them Article 25 of the Universal Declaration of Human Rights, which calls for an adequate standard of living for all, including adequate food. Although the



country has not ratified the International Covenant on Economic, Social and Cultural Rights (ICESCR),²⁷ its constitution guarantees the right to food. While other African governments lag in legislating the right to food, Malawi and Mozambique have taken steps towards drafting a framework law with wide civic engagement. Despite the absence of higher legislation, some countries have achieved partial enforcement of the right through individual policy measures. Benin, a party to the ICESCR, regulates the availability and accessibility of food under Act 2007-21 on consumer protection.²⁸

Certain groups in sub-Saharan Africa are particularly vulnerable in the absence of legally binding action on the right to food. Among them are smallholder farmers, other self-employed food producers (such as pastoralists, fisherfolk and people living off forest products), landless agricultural workers and the urban poor—groups that are also the least empowered politically and economically. Within these groups, children and women are disproportionately affected (chapters 3 and 7). Access to food of adequate quantity and quality is often blocked by biological, economic and sociocultural obstacles, including discrimination and stigma. Inequitable land and resource distribution along ethnic and gender lines remains pervasive.

The right to food offers a framework for holding governments and corporations accountable for a range of safeguards: affordable food prices, mechanisms for social protection, stabilizing measures that protect producer incomes against seasonal price volatility and during emergencies, and access to land and inputs. In practice, however, rights are seldom fully activated until they are claimed. In sub-Saharan Africa national legislation on food rights is in its infancy, and few courts are equipped for enforcement. Thus food security will need to be buttressed in the short term through policy measures rather than through litigation and legal remedies. Donors, civil society and local actors can join in lobbying governments to adopt enabling policies, while civic education can encourage people to participate in decisions about food production and distribution.

* * *

Having laid out the conceptual basis for the Report, we now turn to how sub-Saharan Africa has performed on food security and human development over the past three decades.

BOX 1.3 THE RIGHT TO FOOD: SOME EXAMPLES FROM SUB-SAHARAN AFRICA AND AROUND THE WORLD

Sub-Saharan Africa

- 1996 South Africa includes the right to food in its constitution.
- 2006 Mali adopts its Agricultural Policy Act.
- 2007 South Africa's Equality Court demands that the fishery policy be amended to comply with the right to food.
- 2009 Malawi finalizes its draft Right to Food Bill.
- 2009 Mozambique establishes a drafting committee to elaborate a right to food framework law.

International

- 1948 UN General Assembly adopts the Universal Declaration on Human Rights (Art. 25).
- 1974 UN World Food Conference adopts the Universal Declaration on the Eradication of Hunger and Malnutrition.
- 1976 The International Covenant on Economic, Social and Cultural Rights (ICESCR) enters into force, including Art. 11 on the right to adequate food.
- 1987 The United Nations Economic and Social Council establishes the Committee on Economic, Social and Cultural Rights to monitor implementation of the ICESCR, marking the beginning of a more precise legal interpretation of economic, social and cultural rights.
- 1988 The States Parties to the American Convention on Human Rights adopt the Additional Protocol in the Area of Economic, Social and Cultural Rights (the "Protocol of San Salvador"), including the Right to Food (Art.12).
- 1996 The Food and Agriculture Organization of the United Nations (FAO) World Food Summit announces the Rome Declaration on World Food Security, the first coherent plan to make the right to food a reality.
- 1999 The Committee on Economic, Social and Cultural Rights adopts General Comment No. 12, the Right to Adequate Food, describing state obligations derived from the ICESCR regarding the right to food.
- 2000 The Commission on Human Rights establishes a special rapporteur on the right to food.
- 2000 The Millennium Development Goals, arising from the UN General Assembly Millennium Declaration, includes Goal 1 to eradicate extreme poverty and hunger by 2015.
- 2002 The Rome Declaration at the World Food Summit calls for establishing an intergovernmental working group to develop voluntary guidelines for the progressive realization of the right to food.
- 2004 The FAO adopts the Voluntary Guidelines on the Right to Food, which offer guidance to states on how to implement their obligations on the right to food.
- 2009 The UN General Assembly adopts the Optional Protocol to the ICESCR, making the right to food justiciable at the international level.

Source: Based on De Schutter (2010, p. 4).

Human development trends in sub-Saharan Africa and the paradox of food insecure growth

How does food security fit into larger patterns of human development in sub-Saharan Africa? Food security, economic growth and human development have the potential to form a virtuous cycle of mutually reinforcing development. But if the association among these is weak, that implies that some important policy links are still missing and that some rooted constraints remain.

The Human Development Index (HDI)²⁹ is an informative measure—if rough and incomplete—for describing human development in African countries and for comparing trends there with those in other regions. When the HDI is combined with other measures of human capabilities, a regional picture emerges

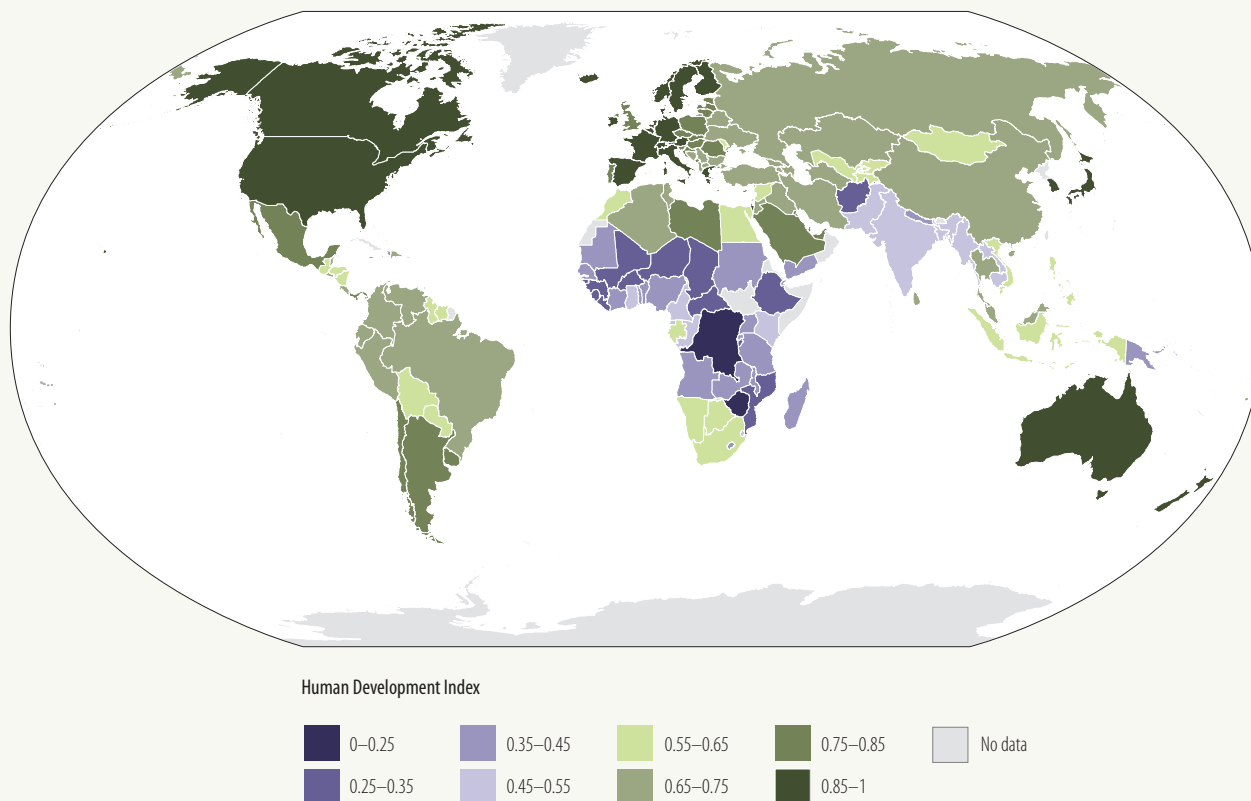
of entrenched challenges and slow progress until the last decade, when the overall HDI in sub-Saharan Africa began a rapid ascent, albeit from a low base.

The Human Development Index—sub-Saharan Africa still on the bottom rung

Despite recent progress, most African countries have low HDIs. Of the 187 countries with an HDI for 2011, the 15 lowest ranked are in sub-Saharan Africa (map 1.1). Among the 30 countries ranked at the bottom, only Afghanistan and Haiti are outside the region. Of 46 sub-Saharan African countries, only two (Mauritius and Seychelles) are in the high HDI category, and only nine (Botswana, Cape Verde, Congo, Equatorial Guinea, Gabon, Ghana, Namibia, South Africa and Swaziland) are in the medium HDI category. These low levels of achievement were registered in all three dimensions of the HDI—health, education and income (figure 1.3).

MAP 1.1

THE STATUS OF HUMAN DEVELOPMENT AROUND THE WORLD, 2011



Source: Based on UNDP (2012).



Consider life expectancy at birth, a proxy for health. Japan performs best, at more than 83 years; Sierra Leone, at barely 48 years, has the lowest rank. Or consider expected years of schooling.³⁰ It is 18 years in Australia, Iceland, Ireland and New Zealand but just 2.4 years in Somalia, the lowest ranked country. In 2011 the income of the average person in a very high HDI country was almost 17 times that of the average person in sub-Saharan Africa. On all three HDI dimensions, the gap between Africa and developed countries remains vast. Like the Arab States and South Asia, sub-Saharan Africa has an average HDI below the world average. In 2011 the HDI for sub-Saharan Africa was a third below the global HDI.³¹

Sub-Saharan Africa's human development has also remained far behind that in other developing regions (figure 1.4). Compared with South Asia, the trend in aggregate HDI in sub-Saharan Africa is revealing. In 1980 sub-Saharan Africa's HDI was 3% higher than South Asia's; by 2011 the situation was reversed, and sub-Saharan Africa's HDI was 16% lower.³²

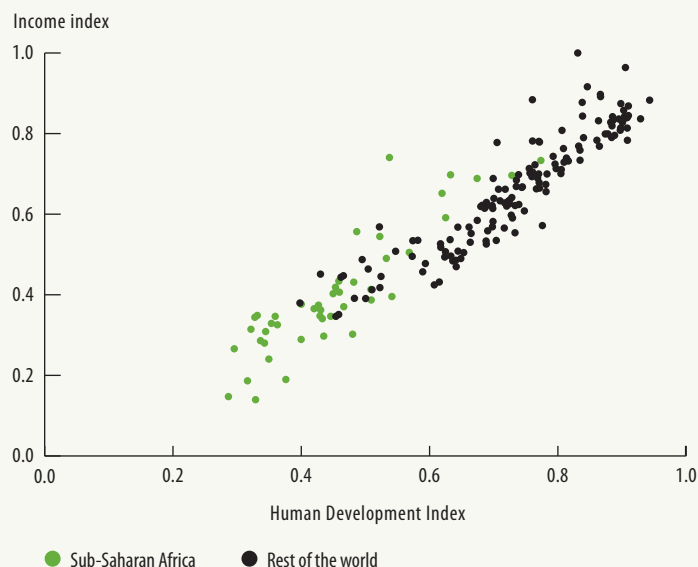
Indeed, from 1980 through the 1990s the pattern of human development in sub-Saharan Africa was one of sluggish progress and reversals in some countries. The 1990s were a lost decade for the region—the result of stagnant economies, the devastating effects of HIV/AIDS on life expectancy and the impact of numerous armed conflicts in the region, among other factors.

The last 10 years—a turning point

The performance of many African countries over the last 10 years offers grounds for renewed hope. In an extraordinary turnaround African countries have pulled back from the brink of collapse to stage a rebound. Nine of the ten countries with the largest gains in HDI are in sub-Saharan Africa (table 1.1). In economic growth the region has been converging with the world over the last decade. And while its growth performance has been impressive, the region has shown the strongest rates of positive change in the nonincome dimensions of the HDI—education and health—with 8 of the top 10 global performers on these indicators in sub-Saharan Africa.

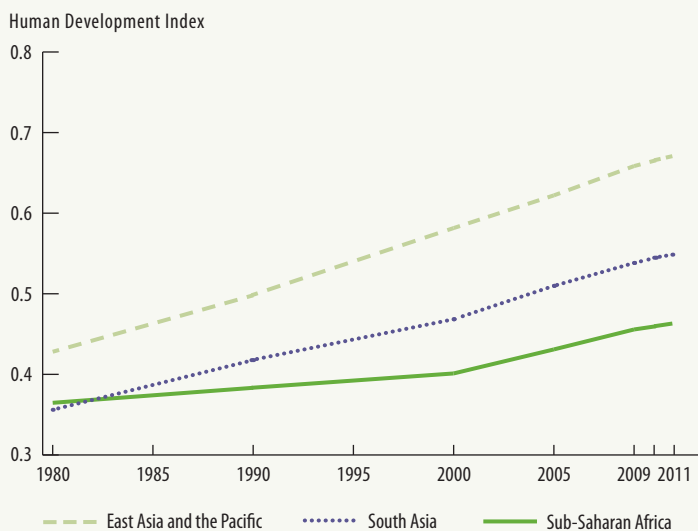
Economic growth has resumed against a backdrop of sustained economic reforms and better terms of trade. Between 2004 and 2008 African economies grew an average of 6.5% a year, only slowing to 2.7% in 2009 in the wake of the global financial and

FIGURE 1.3 SUB-SAHARAN AFRICA TRAILS THE WORLD ON THE HUMAN DEVELOPMENT INDEX AND INCOME, 2011



Source: UNDP 2012.

FIGURE 1.4 SLOW PROGRESS AND LOST YEARS IN SUB-SAHARAN AFRICA



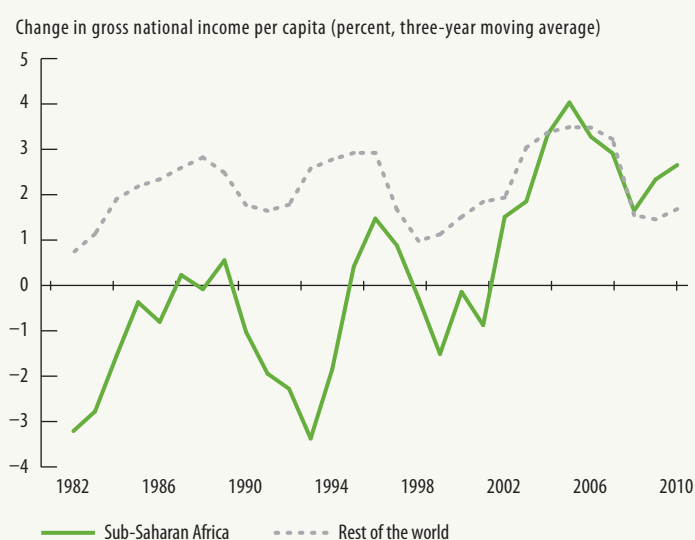
Source: UNDP 2012.

TABLE 1.1 SUB-SAHARAN AFRICAN COUNTRIES ARE TOP MOVERS ON THE HUMAN DEVELOPMENT INDEX, 2000–2011

GLOBAL RANK	HDI	GLOBAL RANK	NONINCOME HDI
2	Rwanda	2	Rwanda
3	Sierra Leone	3	Niger
4	Ethiopia	4	Burundi
5	Mozambique	5	Mali
6	Mali	7	Tanzania
7	Burundi	8	Ethiopia
8	Niger	9	Sierra Leone
9	Tanzania	10	Mozambique
10	Congo, Dem. Rep. of the	11	Angola
12	Angola	12	Liberia

Note: The table reflects improvements as measured by average annual change in HDI and nonincome HDI. Source: Calculations based on UNDP (2012).

FIGURE 1.5 SUB-SAHARAN AFRICA'S GROWTH IS ACCELERATING



Note: Rest of the world excludes China and India. Changes are calculated based on gross national income expressed in 2008 purchasing power parity dollars. Source: Calculations based on UNDP (2012).

economic crisis.³³ Sub-Saharan Africa rebounded in 2010, regaining its high growth rates (5.4% in 2010 and 5.2% in 2011), and is expected to continue to grow at more than 5% in 2012—among the regions tracked by the International Monetary Fund,³⁴ only developing Asia is projected to grow faster. Growth rates remain strong even after accounting for population growth. Per capita income growth has steadily converged with growth rates elsewhere in the world and has recently overtaken them (figure 1.5).

Booming commodity prices explain only part of the rise. Performance has been remarkable not only in resource-rich countries such as Angola, Equatorial Guinea and Sierra Leone but also in Ethiopia, Mauritius, Tanzania and Uganda, where other sectors drive the economy.

There have also been perceptible improvements in educational attainment. Between 2000 and 2010 expected years of schooling increased by almost five years in Burundi and Rwanda, with smaller improvements registered in many other countries.³⁵ Gains in health have been similarly encouraging. Sub-Saharan Africa has seen the biggest improvements in international comparisons of life expectancy at birth, which increased almost five years between 2000 and 2011.³⁶ In countries plagued by HIV/AIDS, life expectancy is rising again—a result of programmes to prevent new infections and provide life-prolonging antiretroviral treatment.

In short, sub-Saharan Africa has been labouring to make up its losses. Encouragingly, progress has been broad-based in both the number of countries and the underlying indicators. Expectations are that progress will continue. Private investors are increasingly bullish on the opportunities for growth and business on the continent. By some measures the rate of return on foreign investments is higher in sub-Saharan Africa than in other developing regions.³⁷ In recent years the region has made substantial progress in improving the business environment, with Rwanda claiming the “world’s top reformer” position in 2009.³⁸

Food security improvements have not been commensurate with economic growth

For two of the last three decades, human development in sub-Saharan Africa faltered. If the region is to make up for lost time, progress needs to be accelerated and sustained. Its recent economic surge is an opportunity to leverage growth into broader



development gains—especially food security and poverty reduction.

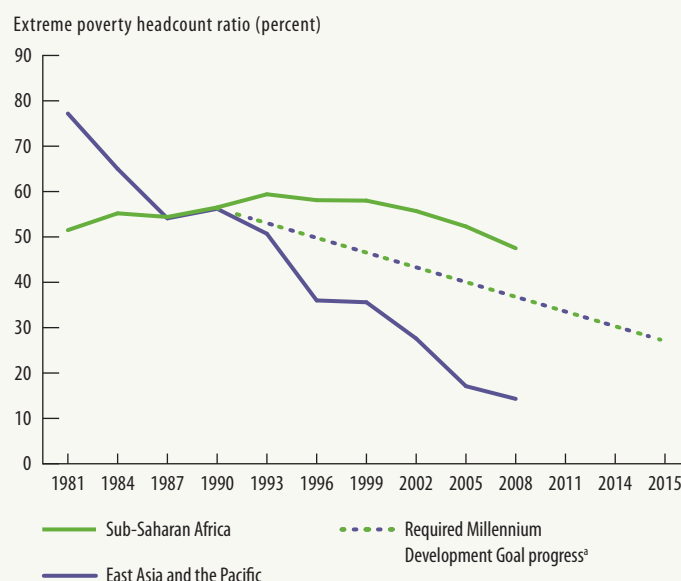
The share of the population living in extreme poverty in sub-Saharan Africa increased 6 percentage points to 58% from 1981 to 1999 before declining more than 10 percentage points to 48% in 2008.³⁹ Although this recent pace of poverty reduction is consistent with the pace needed to meet the Millennium Development Goal of halving poverty by 2015, the lack of progress in the 1990s implies a need to accelerate poverty reduction to meet the goal in sub-Saharan Africa. Contrast this record with the remarkable rate of poverty reduction in East Asia and the Pacific since the early 1980s, where the extreme poverty rate fell from 77% in 1988 to 14% in 2008 (figure 1.6). Sustaining high growth rates was important in Asia, but it was not enough. The character of growth, not just its rate, matters for lowering the poverty rate. In sub-Saharan Africa, even for the same rate of growth, there is historical evidence that growth has not been converted into poverty reduction as effectively as in other developing regions.⁴⁰

The real paradox of sub-Saharan Africa's growth and human development sprint in the last decade, however, is that neither has produced commensurate progress in nutrition outcomes—a proxy for food security (box 1.4 and figure 1.7). Although its development path in the past decade has been more hopeful, the region remains food insecure, a precarious condition that threatens its new-found gains and exposes it to sudden reversals.

Sub-Saharan Africa is plagued by intolerable levels of malnutrition. Left unchanged, this could result in irreversible mental and physical disabilities in this and future generations. Chronic malnutrition, measured by the share of preschool children who are stunted, is estimated to have fallen only 2 percentage points (from 43% to 41%) between 1990 and 2010 and is projected to fall just 1 percentage point over the next decade (table 1.2). For children who are underweight, a measure that also captures acute malnutrition, the picture is similarly grim.

For both measures the absolute number of malnourished children has risen over the past two decades and is expected to continue to rise to 2020. The situation is particularly worrisome in East and West Africa, home to three of every four of the continent's malnourished children in 2010. All African subregions now have a higher prevalence of stunting than do Asia and South America. However,

FIGURE 1.6 POVERTY REDUCTION LAGS IN SUB-SAHARAN AFRICA



Note: Progress is measured relative to the global target of halving the 1990 poverty rate by 2015.

a. Progress required to meet the Millennium Development Goal for poverty reduction is the same for both sub-Saharan Africa and East Asia and the Pacific.

Source: World Bank 2012.

noticeable differences in levels of malnutrition and rates of improvement reveal the range of food security challenges on the continent. These variations affect how the challenge is addressed in different parts of sub-Saharan Africa.

These bleak figures stand in stark contrast to the improvements in other parts of the world. In Asia the prevalence of stunted children dropped from 49% in 1990 to 28% in 2010 and is expected to fall to 19% by 2020. As a result, there were 90 million fewer chronically malnourished children in Asia in 2010 than two decades earlier. South America has also made great strides, more than halving the prevalence of underweight children between 1990 and 2010, and progress is continuing.

As these numbers imply, the association between improvements in the HDI and reductions in malnutrition has been much weaker in sub-Saharan Africa than elsewhere. From 2000 to 2010 the HDI increased more than 15% in sub-Saharan Africa, faster than Asia's increases of more than 10% over the same period and in the 1990s. Yet the improvements in malnutrition

BOX 1.4 THE IMPACT OF INCOME GROWTH ON FOOD SECURITY IN SUB-SAHARAN AFRICA

Nationally representative Demographic and Health Survey data sets were analysed for this Report to disentangle the determinants of undernutrition in children, particularly income growth.

Using pooled data for 1991–2009 on 420,000 children born in 30 African countries between 1986 and 2009 and controlling for individual, household and socioeconomic characteristics, the analysis shows that GDP growth reduces undernutrition but that the effect is small and often inconclusive. More important determinants are mother's education, socioeconomic position and nutrition status. Lack of progress in these areas appears to be retarding progress in reducing undernutrition in sub-Saharan Africa.

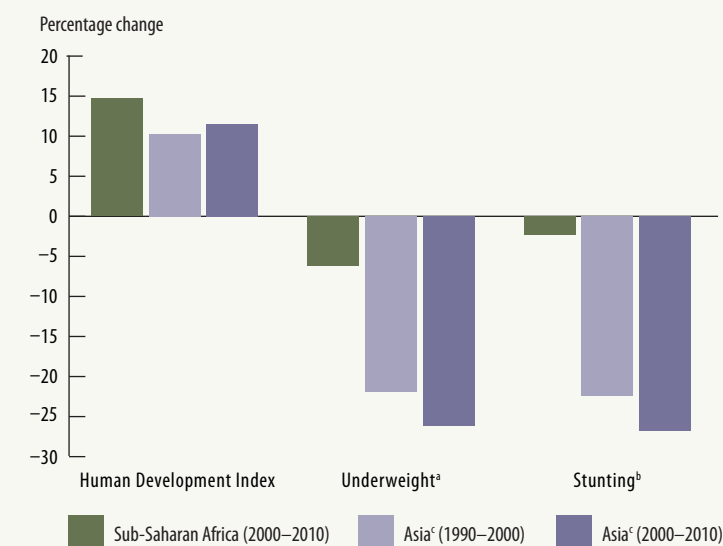
Although GDP has been rising, especially since 2000, there is no clear parallel trend for child nutrition. Child undernutrition is highest in Madagascar and Niger, where almost half of children are stunted, wasting or underweight. Zimbabwe, among the poorest countries in the sample, has one of the lowest levels of child undernutrition.

Other findings:

- Children in urban households are 14% less likely to be underweight than are children in rural households.
- The probability of being underweight rises 0.7%–1.5% for each additional child in a household.
- Children are 4%–10% more likely to be underweight in male-headed households than in female-headed households.
- Children are 11%–32% less likely to be undernourished in households whose head has a primary or higher education than in households whose head has no education.
- If a pregnant woman is undernourished, her child is 32%–38% more likely to be underweight; if a breastfeeding woman is undernourished, the likelihood is 12% greater.
- Boys are about 9.5% more likely than girls to be underweight, and twins are twice as likely as singletons to be underweight.

Source: Harttgen, Klasen, and Vollmer 2012.

FIGURE 1.7 LESS SUCCESS IN REDUCING MALNUTRITION IN SUB-SAHARAN AFRICA THAN IN ASIA



a. Low weight for age.

b. Low height for age.

c. Excludes Japan.

Source: Calculations based on WHO (2011a) and UNDP (2012).

Guiding policies

How can African countries use this conceptual framework linking food security and human development to fight hunger and starvation and to advance human development?

Moving from concept to action requires establishing a path from the elements of human development to the determinants of food security and to concrete policy actions (table 1.3). Food security for human development requires ensuring food entitlements (including endowments, exchange conditions and production possibilities); enlarging basic capabilities for food security (assuming power over decisions, dealing with uncertainty and institutional conditions); and securing the capability to be food secure (related to being well-nourished).

The proximate determinants that connect these elements to action relate to the physical availability of food (nationally and locally); economic, physical and social access to food; stability in availability and access; and food quality and effective use. Agricultural productivity conditions food availability and economic access (by increasing supply and bolstering the incomes and purchasing power of food insecure people). Empowerment affects access to food (through access to information and markets and more equitable allocations of food and resources within families and across communities).

were much greater in Asia than in sub-Saharan Africa despite differences across Asia, with South Asia especially facing challenges (see figure 1.7).

**TABLE 1.2 NUTRITION INDICATORS FOR SUB-SAHARAN AFRICA AND OTHER REGIONS**

Malnutrition in children under age five

INDICATOR	NUMBER (MILLIONS)				PREVALENCE (PERCENT)			
	1990	2000	2010	2020	1990	2000	2010	2020
<i>Stunted</i>								
Sub-Saharan Africa	38.1	45.7	54.8	59.6	43.1	42.1	41.1	40.1
East Africa	17.1	20.6	24.9	27.5	48.1	46.7	45.3	43.9
Central Africa	6.3	7.6	8.7	9.3	45.3	42.3	39.4	36.5
Southern Africa	2.1	2.0	2.0	1.9	35.4	34.1	32.9	31.7
West Africa	12.6	15.5	19.2	20.9	38.1	38.1	38.2	38.2
Asia ^a	189.9	138	99.5	68.4	48.6	37.7	27.6	19.0
South America	7.5	5.8	4.1	2.8	20.9	16.0	12.0	8.9
World	253	203.8	171.4	142	39.7	32.9	26.7	21.8
<i>Underweight</i>								
Sub-Saharan Africa	21.5	24.8	28.3	29.5	24.3	22.7	21.3	19.8
East Africa	9.1	10.4	11.9	12.5	25.6	23.6	21.8	20.0
Central Africa	3.4	4.0	4.5	4.8	24.3	22.3	20.5	18.8
Southern Africa	0.7	0.8	0.8	0.9	11.7	12.5	13.5	14.5
West Africa	8.3	9.6	11.1	11.3	25.1	23.6	22.1	20.6
Asia ^a	132	96.5	70.5	49.3	33.8	26.4	19.5	13.7
South America	2.2	1.5	1.0	0.6	6.1	4.2	2.8	1.9
World	161.8	127.4	103.7	82.5	25.4	20.5	16.2	12.7

a. Excludes Japan.

Source: Calculations based on WHO (2011a).

Resilience protects access to food during shocks and cyclical changes to food systems. And, finally, nutrition policies set the conditions people need in order to absorb and use calories and nutrients properly.

Of course, a report with a regional focus cannot offer detailed policy recommendations for individual countries. Such policies should be determined by national and local stakeholders and tailored to country circumstances. Differences in the levels and changes in the indicators of malnutrition across sub-Saharan African subregions reveal considerable diversity in the food security challenges (see table 1.2) and substantively affect how the

challenge should be addressed. But the levers of action identified in table 1.3 suggest four pivotal policy areas: increasing agricultural productivity, especially for smallholder farmers; strengthening nutrition, especially for women and children; building resilience for people and their communities; and promoting empowerment, especially among rural women and marginalized groups.

Decisive action in these four areas, adapted to local settings, could break the vicious cycle of low human development and food insecurity that traps sub-Saharan Africa today, enhancing people's food entitlements and basic capabilities and strengthening their food security. Together, such policies could

TABLE 1.3 FROM CONCEPT TO ACTION—ACHIEVING FOOD SECURITY FOR HUMAN DEVELOPMENT

CONCEPTUAL ELEMENT	COMPONENT AND SPECIFIC DETERMINANTS OF FOOD SECURITY	LEVER OF ACTION
Food entitlements	<i>Physical availability at national level:</i> Is there potentially enough food at the national level to feed everyone?	Agricultural productivity
	<i>Physical availability at local level:</i> Is there food in local markets or in local fields?	Agricultural productivity
	<i>Economic access:</i> Does the household generate enough income to purchase food or produce enough diversified food to meet their requirements?	Agricultural productivity and empowerment
	<i>Physical access:</i> Does the household have information about food and input markets and affordable transportation?	Empowerment
Basic capabilities	<i>Social access:</i> Do all household members have equal access to food?	Empowerment
	<i>Risk of loss of access:</i> How sensitive to shocks and cycles (seasonality, droughts, conflict) are production and access to markets?	Resilience
Capability to be food secure	<i>Food quality and safety:</i> Is food sufficiently diverse and safe to promote good health?	Nutrition
	<i>Physiological use:</i> Are healthcare, sanitation and drinking water good enough that nutritious food can be absorbed and contribute to growth and development?	Nutrition

Source: Based on Haddad (2001); Burchi and De Muro (2012); and InterAcademy Council (2004).

unleash a virtuous cycle of improvements in food security and human development too long denied to Africa's people (figure 1.8).

Raising agricultural yields is the key to boosting food, incomes and jobs

Increasing agricultural productivity is vital. As elaborated in chapter 4, higher productivity, especially in food staples and on smallholder farms, builds food security by increasing food availability and lowering the price of staple foods, thus improving access. It also boosts the incomes of millions of smallholder farmers, raising living standards and thus enlarging people's capabilities and knowledge. This strengthens both food security and human development. Well-nourished people are able to exercise their freedoms in multiple domains—the essence of human development—and, closing the circle, are more likely to demand food security from their leaders.

Agricultural productivity has to grow faster than food prices fall as production rises if production gains are to benefit both food producers and net food consumers, including the urban poor. Productivity gains of this kind will spell higher incomes and purchasing power for smallholder

farmers and better living standards for the rural and urban poor. That was the great accomplishment of the Asian green revolution.⁴¹ Where land is a constraint, yields will have to grow faster than labour productivity to ensure that employment is created (see chapter 4).⁴²

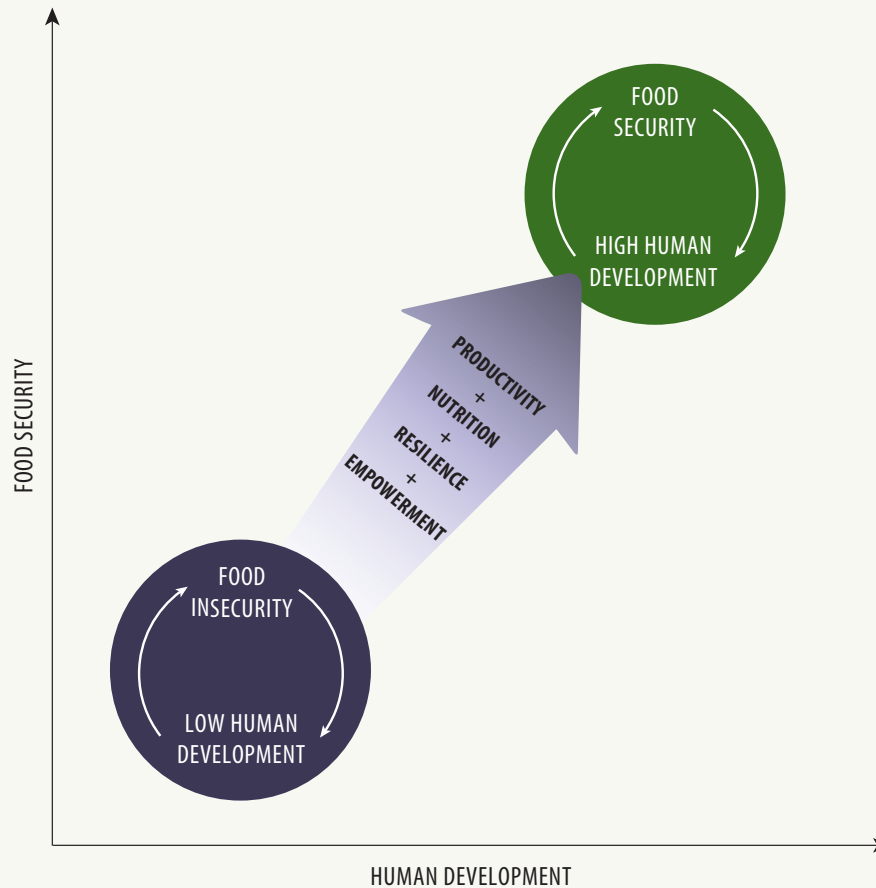
Why agriculture?

But why would greater productivity and farm output reduce African poverty more than a similar increase in value added outside farming? There are three main reasons for giving farmers priority.

First, as just noted, increasing farm output could reduce the price and increase the availability of staples, which account for a large share of the budget of the poor. In addition, smallholder farmers also grow cash crops, and more cash sales will provide more income to buy staple foods. Second, across the continent, land—the main asset in farming—is usually much more evenly distributed than capital. Efficiency gains from land will leverage wider benefits for more people. Third, in many parts of sub-Saharan Africa, people farm with labour-intensive rather than capital-intensive technologies, a pattern that benefits rural labour. Raising yields from this type of farming will increase jobs and wages,



FIGURE 1.8 POLICIES TARGETING FOOD SECURITY FOR HUMAN DEVELOPMENT



Source: Based on analysis described in the Report

while creating important ripple effects when extra farm income is spent on locally made nonfarm goods (see chapter 4).⁴³ For these reasons, for most of sub-Saharan Africa the effect on poverty of growth in the agricultural sector is estimated at up to four times the effect of growth in nonagricultural sectors.⁴⁴

Increasing yields in sub-Saharan Africa can have large multiplier effects for human development, especially if there is a focus on women. The share of women employed in agriculture is higher in sub-Saharan Africa than in most other developing regions.⁴⁵ Increasing yields can reduce poverty and empower women. Women who are food secure, healthy and well-educated have greater influence over decisions that affect household

well-being. When women control household resources, spending on food, health and education is higher.⁴⁶ Improvements in their status often result in advances in children's education and health, lower fertility and better financial management. If women had the same level of education and the same experience and access to farm inputs as the average male farmer, yields of basic staples could rise substantially.⁴⁷

What it will take

Converting gains in farm output into greater well-being for African farmers requires radical changes in agricultural practices. Area expansion rather than higher yields has accounted for most of the increase in sub-Saharan Africa's agricultural output over the

last 50 years (chapter 2). Output per worker remains low—or lower than in other regions, partly accounting for the persistence of poverty (chapter 2).

On the bright side, this means that if African governments can spur a high-yield green revolution on the continent, many Africans will leave poverty behind. This implies reaching the frontier of agricultural productivity by creating and applying local knowledge and by supporting more efficient and sustainable use of agricultural inputs (fertilizer, water management). Agricultural innovation could also help bring young people back to agriculture. Making it worthwhile for farmers to use inputs requires policies that make inputs affordable through well-designed subsidies, infrastructure, finance and extension services.

Why nutrition outcomes are a neglected area of public policy

Despite the immensity of the problem and the large potential returns to human development and economic growth, nutrition has not received sufficient policy attention in sub-Saharan Africa. As explored in chapter 5, this results in part from the absence of clearly visible benefits—malnutrition is striking only in its most extreme forms. Other reasons for the neglect are decision-makers' incomplete understanding of the extent and causes of the problem, the absence of a civil and political constituency demanding intervention, the compound nature of the challenge and the need to reach down to the household level with interventions, a demanding undertaking.⁴⁸

Malnutrition is a menace with many faces: hunger, under- and over-nutrition and micronutrient deficiency. It appears when diets lack adequate calories, protein and micronutrients; when illness or lack of clean water impedes proper use of food; and when poor diets and unhealthy lifestyles lead to overweight and obesity. The unavailability of essential vitamins and minerals—essential micronutrients—results in “hidden hunger,” whose signs are less immediately visible but no less injurious.⁴⁹

Large-scale and persistent malnutrition imposes large costs to society in compromised human development. Borne over the long run, these costs tend to elicit only a weak policy response.⁵⁰ Yet, there are options for tackling hidden hunger that draw on the potential of biofortified food crops (crops enriched

with micronutrients), as well as food fortification and other direct supplementation of diets.

Nutrition outcomes tend to improve with economic growth and, in turn, to contribute to the enabling conditions for economic development. But growth alone does not necessarily result in improved nutrition, because malnutrition has other determinants than income. Each requires its own strategy. Diets, cultural norms and access to basic public services play a role. Mother's education is widely regarded as the most important factor explaining a child's nutrition. Malnutrition also directly impedes human development by increasing the incidence of illness and death⁵¹ and raising healthcare costs. Nutrient deficiency weakens immune function, increasing susceptibility to infection—especially during childhood, when parasitic infections peak. Malnourished women are more at risk during pregnancy and childbirth—and their children are more likely to suffer from foetal retardation and disease.

In light of the critical role of nutrition in linking food security and human development, this Report argues that nutrition policies have to be at the centre of the national and international development debate. The time has long come to undertake policies to improve nutrition outcomes.

Enablers of food security: resilience and empowerment

Strengthening food security will require more resilient societies and more empowered populations. Fostering resilience through improved systems of social protection and advancing empowerment through better access to assets and opportunities, especially for women, will allow people to make better decisions and participate more fully in markets and society. But institutional and other structural constraints obstruct the channel between food security and human development. These constraints threaten the sustained achievement of food security for human development in sub-Saharan Africa and need to be addressed vigorously.

Resilience: relieving pressures on food systems, managing risks and advancing social protection

Year in and year out, Africans face instability in their food security, ranging from unforeseeable



events—such as natural disasters and violent conflicts—to seasonal patterns of production. As explored in chapter 6, managing this instability means alleviating both chronic and temporary bouts of food insecurity. Disruptions to the supply and affordability of food inflict immediate damage but can also harm human development in the long term. People are forced to make difficult choices, such as reducing their food intake, disposing of their productive assets at fire-sale prices and taking their children out of school. Such actions can lock households into enduring patterns of deprivation. Even the possibility of disasters and the pervasive uncertainty experienced by vulnerable groups can lead to losses. That could happen if, for instance, rather than plant riskier high-yield varieties farmers opt to plant low-yield crops that can survive without inputs in order to ensure at least a minimal level of food production.

Shocks cannot be entirely avoided, and even well-prepared households and communities suffer when they occur. But risk can be managed. Policy responses should aim to protect human capabilities and increase the resilience of food systems, to help people maintain food consumption, protect their health and access basic social services.

To build resilience around food systems in Africa, policies should address the sources of instability, including population growth, environmental degradation and climate change. A comprehensive strategy to enhance resilience should include policies for managing risks, strengthening social protection and enhancing the capabilities of everyone, especially people facing persistent deprivations. Social protection requires unified policies on employment, income, healthcare, water and sanitation, food price stability and rehabilitation of the rural economy.

The challenges in designing efficient and effective social protection policies for sub-Saharan Africa are great because of the diversity in occupations, patterns of intrafamily resource allocation, market structures, the nature of community institutions for dealing with risks and the budgetary constraints

that many governments face. But the risks to development from not acting are greater still.

Empowerment and social justice: broadening the base of food security

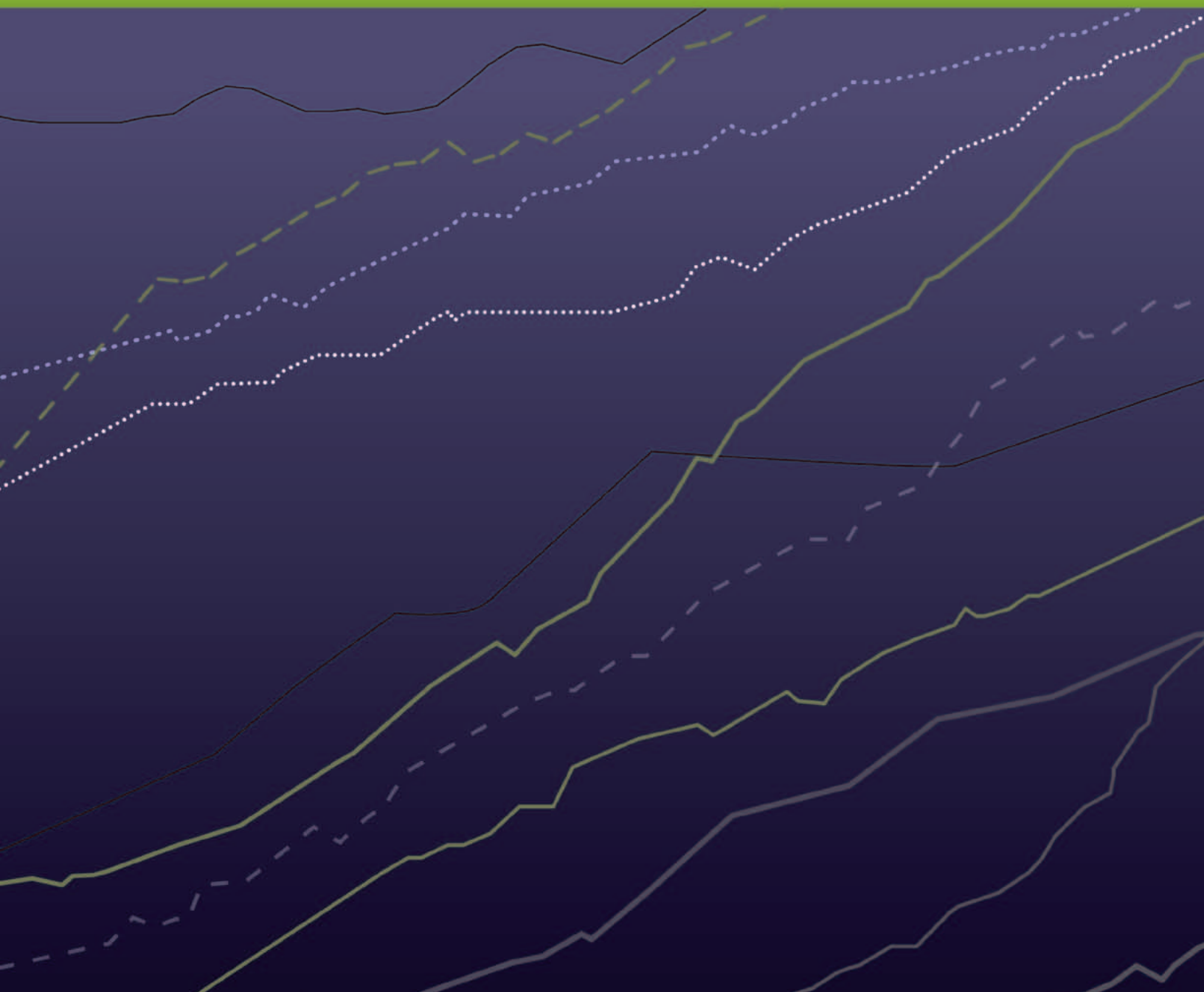
Human development is about enlarging people's freedom to choose lives they value, but in reality some people have more freedoms than others. Inequities in human development are often the result of uneven resource distribution and marginalization of groups because of gender, place of residence or ethnicity. Some groups have more control than others do over productive resources such as land and water. Some have better access to information and markets, increasing their bargaining power. Some are favoured by law and customs. And some have more influence over policy. These and other inequities limit progress towards food security in Africa, as explored in chapter 7.

Relaxing these constraints on achieving food security for human development requires empowering disenfranchised groups. Removing entrenched disparities is crucial. Doing so will improve access to food for disadvantaged groups and, in the long run, should give people more say in how public institutions function and increase the accountability of those in power. Enlarging people's ability to make their own decisions and participate freely in society and markets should boost agricultural productivity, food distribution and access and could reduce the volatility of prices.

Increasing voice and participation requires institutional development and better governance, to allow farmer organizations and other citizen groups to participate actively in decisions on agricultural investments and nutrition policies. Bringing more people into the public debate will improve governance, increasing the chances of achieving change. A strong drive for social justice, especially with respect to control over land, is needed to empower the rural poor, particularly women, who hold the key to greater food security and human development in Africa. That is why this Report considers empowerment as an enabler of food security for human development.

2

How Food Insecurity Persists amid Abundant Resources





CHAPTER 2

How Food Insecurity Persists amid Abundant Resources

Sub-Saharan Africa is rich in land and water resources, yet hunger and starvation are widespread. This contradiction stems less from the continental availability of food and more from glaringly uneven local production and access and chronically deficient nutrition, especially among the poorest. Undermining the interrelated components of food security (availability, access and use) are unstable food systems in a region vulnerable to the effects of erratic weather, volatile food prices, and conflict and violence. Measured by agricultural production, food availability has gradually improved, but agricultural productivity remains low—much lower than in other regions. Most sub-Saharan African countries are net food importers, and many depend on food aid during all too frequent humanitarian crises. Even where food is available, millions cannot afford it or cannot acquire it because of underdeveloped markets and weak physical infrastructure. But food security goes beyond availability and access. Proper use of food determines whether food security sustains human development. Insufficient access to safe water, energy and sanitation conspires with diseases such as HIV/AIDS and malaria to perpetuate food insecurity in sub-Saharan Africa.

Chapter 1 identified a jarring paradox in sub-Saharan Africa: progress in human development and economic growth over the past decade have had little impact on hunger and malnutrition. This chapter identifies a second: sub-Saharan Africa lacks food security despite having substantial natural resources—including large areas of cultivable land in some countries and ample, if unevenly distributed, water resources.

This chapter looks at the factors behind this second paradox. It focuses on the challenges affecting the core components of sub-Saharan Africa's food security (availability, access and use) and on the factors that aggravate the challenges, including instability in food systems and in the environment in which these systems function.¹ The chapter surveys the many manifestations of sub-Saharan Africa's food insecurity, outlines trends in the core components of food security and explores why the region struggles to achieve it. Chapter 3 elaborates on deeper causes and emerging threats to food security with a focus on government policies and actions. Chapters 4–7 examine how sub-Saharan Africa can resolve the paradoxes of

the past by unleashing a virtuous cycle of advances in food security and human development.

Availability of food

If the food available in sub-Saharan Africa were evenly distributed, all Africans could consume enough calories for their basic functioning. But two challenges prevent this. First, food is not produced in some of the places where it is most needed: local production of food staples largely determines the availability and security of dietary energy in sub-Saharan Africa.² Second, as discussed in chapters 1 and 4, increases in food production driven by land expansion rather than by increases in land and labour productivity (especially of smallholder farmers) are unlikely to generate the inclusive social and economic progress essential for food security and human development. Thus, patterns of production also matter.

Food availability, as measured in flows, has two main components:³

- Food production, a result of input availability (labour, land, water, seeds, fertilizer) and patterns of

agricultural production (including farmers' ability to get, use and improve inputs and agricultural technology).⁴

- Net trade—to supplement domestic availability through commercial imports or to export excess domestic production—and food aid.

Understanding patterns of food production in sub-Saharan Africa

Reflecting sub-Saharan Africa's uneven availability of land and water and its varying characteristics of soil, landform and climate (agroecological conditions), its agriculture has widely diverse systems for crops, livestock, fishing and forestry.⁵ Most farms follow mixed-cropping practices, in some cases integrating livestock.⁶ On a single farm smallholder

farmers⁷ typically cultivate more than 10 crops (staples for personal and local consumption as well as cash crops).⁸

In addition to being diverse, African agriculture is predominantly rainfed, with low and slow-growing land and labour productivity, minimal mechanization, weathered soils with poor fertility, weak land tenure systems and poorly functioning markets for inputs and outputs.⁹ Though challenging, these characteristics also present opportunities—in the form of unused and underused arable land¹⁰ and in the potential to boost agricultural productivity (chapter 4).

Quantifying unused and available land is difficult in part because there is no agreed definition of "available" and because there are competing claims over land and its uses. Historical settlement patterns were often driven by disease pressure and transportation costs, so improvements in public health and infrastructure can make sparsely populated areas newly attractive for farming. Some 1 billion hectares in sub-Saharan Africa are considered suitable for rainfed cultivation of at least one crop, but just a little more than 200 million hectares are in use, leaving four-fifths unused.¹¹ Excluding protected areas, land covered by forests and regions already settled, and limiting the definition of suitability to five crops, the balance of suitable unused agricultural land is about 200 million hectares, which, if brought into production, would double the amount of cultivated land in sub-Saharan Africa.¹²

The Guinea Savannah—similar to the Cerrado in Brazil, a global agricultural powerhouse—has great potential for agriculture.¹³ But the suitable land available is not evenly distributed.¹⁴ Sub-Saharan Africa is also well endowed with water, with 17 major rivers and 160 lakes. But as with land, water is distributed unevenly, with more than a third of the region's rain falling in the Congo Basin (which has less than 10% of the region's population).¹⁵ Water stress is a perennial challenge in the semiarid Sahel, the Horn of Africa and Southern Africa, with its high dependence on groundwater.

Agroecological conditions determine the patterns of food production. Cereals, together with roots and tubers, are the main food staples in sub-Saharan Africa (table 2.1).¹⁶ While most other crops are sold for cash, these crops are grown primarily for family and local consumption.¹⁷ Roots and tubers, though important (except in Southern Africa), take

TABLE 2.1 HARVESTED AREA FOR MAIN CROP GROUPS IN SUB-SAHARAN AFRICA, 2008–2010 AVERAGE

CROP	SUB-SAHARAN AFRICA	EAST AFRICA	WEST AFRICA	CENTRAL AFRICA	SOUTHERN AFRICA
<i>Area harvested (millions of hectares)</i>					
Cereals	83	29	43	8	4
Oilcrops, primary	25	7	14	3	1
Roots and tubers	23	7	12	4	<1
Pulses	20	7	11	2	<1
Fibre crops, primary	4	2	2	<1	<1
Fruit	9	4	3	1	<1
Vegetables ^a	5	2	2	1	<1
<i>Hectares harvested per 100 hectares of cereal</i>					
Cereals	100	100	100	100	100
Oilcrops, primary	30	24	34	39	22
Roots and tubers	28	23	28	55	4
Pulses	24	26	25	21	3
Fruit	11	14	8	13	8
Vegetables ^a	6	5	6	8	4
Fibre crops, primary	5	6	4	5	<1

a. Includes melons.

Source: Calculation based on FAO (2012c).



up less than a third of the acreage devoted to cereals, except in Central Africa, where their share is a little over half.

The analysis here focuses on cereals and compares the evolution of food production in sub-Saharan Africa with that in other regions and over time.¹⁸ Cereal production in sub-Saharan Africa has tripled since the early 1960s, rising from 38 million tonnes in 1961–1963 to 116 million tonnes in 2008–2010. Over that period production increased 3.4 times in Asia and 3.8 times in South America.¹⁹ But cereal output per capita fell 13% in sub-Saharan Africa while increasing 44% in Asia and 48% in South America (figure 2.1).

A similar picture emerges for other food groups. Livestock production has more than doubled in most African subregions, but only in West Africa has production per capita risen (figure 2.2). And the continent's fish production per capita is stagnant and much lower than in other regions (figure 2.3).

Sub-Saharan Africa's lagging yields

The increase in food production in sub-Saharan Africa has been driven more by an expansion in area harvested than by growth in agricultural yields (figure 2.4). The exclusive contribution of higher yields was about one-third of the increase in production over the past four decades, much lower than the three-quarters in Asia and the nine-tenths globally. The exclusive contribution from increases in harvested area is more than four times greater in sub-Saharan Africa than in Asia.²⁰

In the early 1960s, 1 hectare yielded about half a tonne more cereal in Asia than in sub-Saharan Africa. Asia soon entered its green revolution, and by 2008–2010 the gap had widened to more than 2 tonnes (figure 2.5). Yield growth collapsed in sub-Saharan Africa in the 1980s. It then began to turn around in the 1990s and especially after 2000, though the pace remains much slower than in Asia and Latin America. Chapter 3 analyses the underlying causes of this shortfall, but a comparison here with Asia illustrates some of the proximate causes.²¹

In sub-Saharan Africa very little of the area under cultivation is fertilized, unlike in Asia, where fertilizer use has long been the norm (figure 2.6). Water management is another key difference. Farmers in sub-Saharan Africa (except those in Southern Africa) seldom use irrigation, whether the traditional methods common in Asia and North Africa (such as

FIGURE 2.1 CEREAL PRODUCTION PER CAPITA HAS BEEN DECLINING IN SUB-SAHARAN AFRICA WHILE RISING IN ASIA AND SOUTH AMERICA

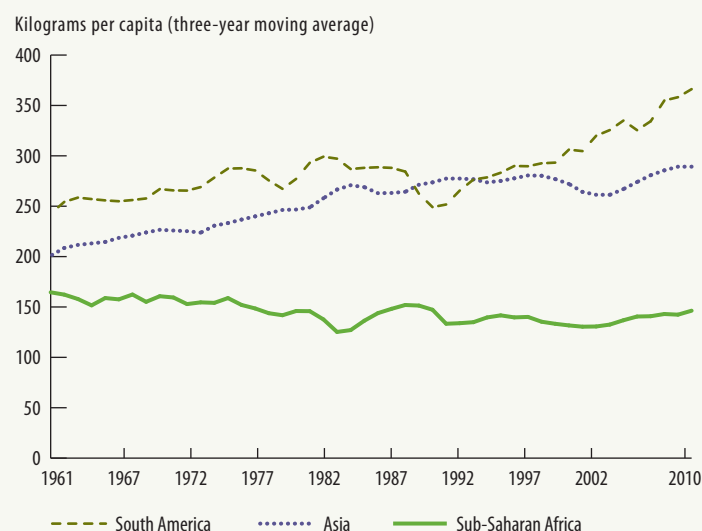


FIGURE 2.2 PRODUCTION OF LIVESTOCK IN SUB-SAHARAN AFRICA MORE THAN DOUBLED, BUT PRODUCTION PER CAPITA STALLED

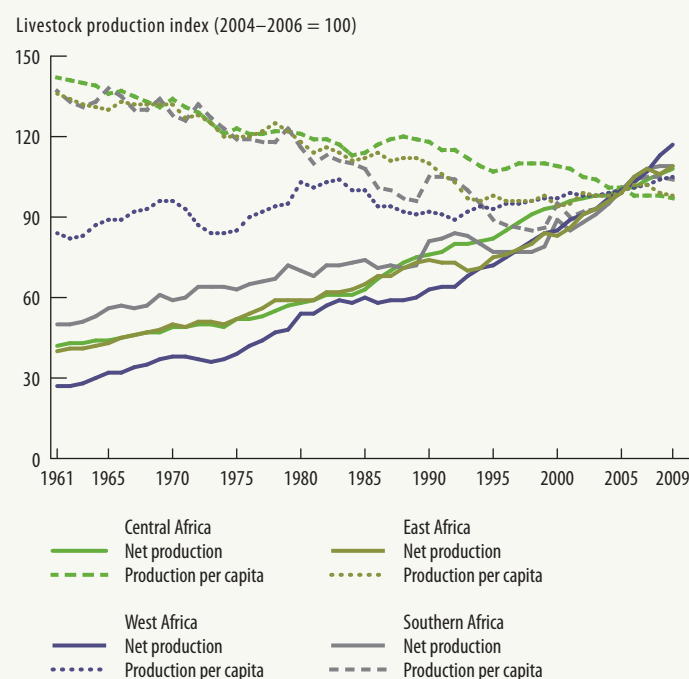
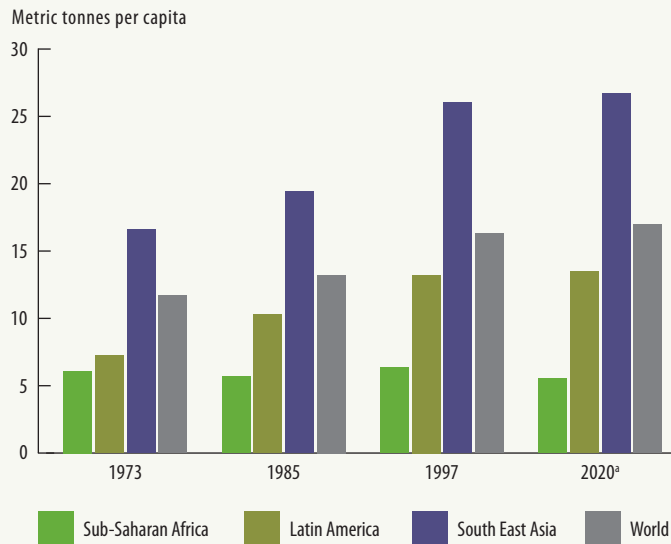
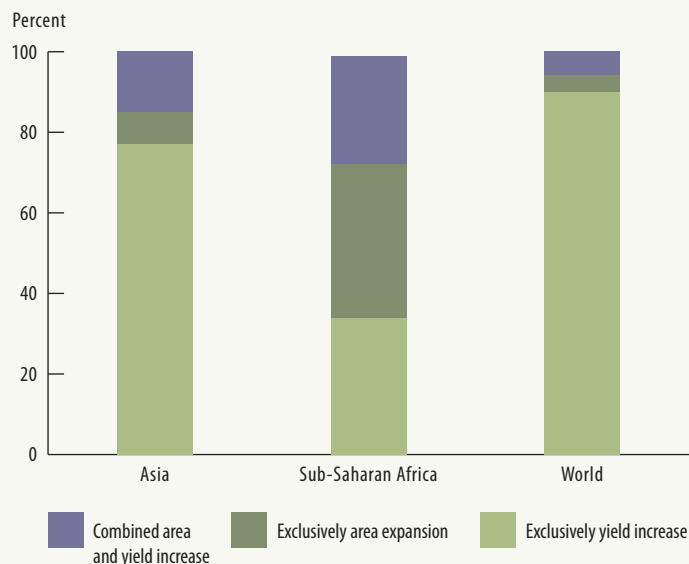


FIGURE 2.3 FISH PRODUCTION PER CAPITA IS STAGNANT IN SUB-SAHARAN AFRICA, SELECTED YEARS, 1973–2020



a. Projected.
Source: Calculations based on UNDESA (2009b); Delgado and others (2003).

FIGURE 2.4 INCREASES IN CEREAL PRODUCTION IN SUB-SAHARAN AFRICA COME MORE FROM EXPANDING HARVESTED AREA THAN FROM BOOSTING YIELDS, 1961–1963 TO 2008–2010



Source: Calculations based on FAO (2012c).

hand-pumped groundwater and animal-lifted surface water) or modern forms. As a result, sub-Saharan Africa uses about a quarter as much irrigation water for agriculture as East Asia and Latin America do. Cultivation technologies differ as well. For centuries most African farms have been tilled by hoe, with little animal ploughing. Shifting cultivation or ley systems, in which cropping or grazing alternates with fallow of a year or longer, are widely used in sub-Saharan Africa. Intercropping, also much more widespread than elsewhere, is for most farmers the main way of reducing weeds and insect pests.²²

African agriculture relies heavily on mixed crop varieties, usually landraces (local varieties that have developed largely by natural processes) rather than formally identified varieties (selectively bred to conform to a standard of traits). Farmers in most of sub-Saharan Africa have long had high proportions of acreage and crop value in staple crops, noncereal staples (cassava, banana and the like), crops consumed locally rather than sold in urban markets or exported, and local crops such as enset and tef in Ethiopia, cocoyams in West Africa, and various fonio millets and minor vegetables. These crops have largely been ignored by food scientists and big seed companies.

African farming thus contrasts with the Asian norm of cultivating mainstream staples and cash crops, fertilized and often irrigated, unmixed in a single field on fully settled farms under individual tenure. In sub-Saharan Africa reliance on many crops and traditional farming practices has resulted in less research and extension (per unit of output and per hectare) than in Asia. More fundamentally, sub-Saharan Africa has not benefited from the farm science-based, input-responsive boost in agricultural productivity that occurred in Asia, as is explored in chapter 4.

How food trade and aid affect food availability

When international and national markets work, the gap between domestic demand and supply can be closed through imports. However, this is often not the case. Moreover, the 2008 spike in food prices was exacerbated by national trade restrictions, especially for rice.²³ Given sub-Saharan Africa's great reliance on imports, especially for cereals (figure 2.7), making global markets more fair and efficient is becoming ever more relevant.



Food production in sub-Saharan Africa has risen, but consumption has risen faster, largely because of population growth. Most countries in sub-Saharan Africa are net importers of “raw foods,” a category that consists mainly of cereals, meat and dairy products.²⁴ But under a broader definition of agricultural products that includes coffee, tea and cotton, the picture changes entirely: a majority of countries are net exporters of agricultural products.²⁵ The implication: in most sub-Saharan African countries agricultural productivity growth could not only boost food availability and replace imports, but could also provide nonfood exports to earn foreign exchange. The two kinds of agricultural production typically complement each other, as revenue from cash crops finances rural investments that help increase food crop production as well. Whether this is viable, or even desirable, is discussed in chapter 4.

A measure of sub-Saharan Africa’s inability to feed itself is its reliance on emergency food aid from abroad. Over the past two decades an average of 32 countries in sub-Saharan Africa received emergency food aid each year. The numbers ranged from 22 countries in 1990 to 38 in 2009.²⁶

Characterizing sub-Saharan Africa’s food security challenges

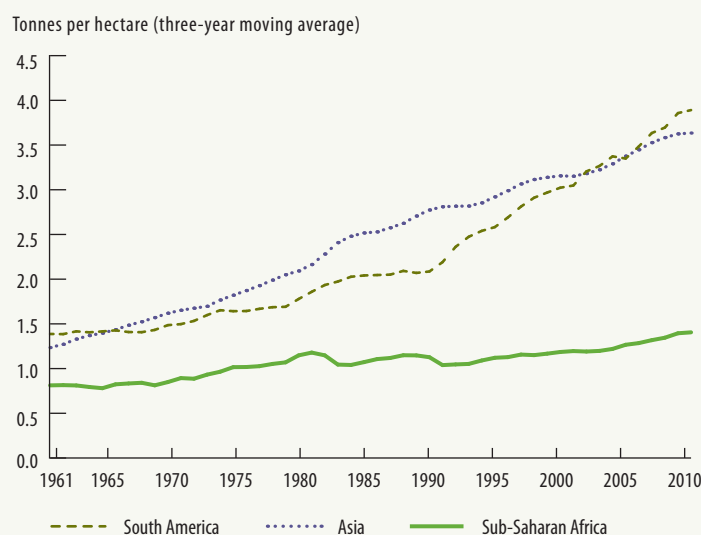
Despite sub-Saharan Africa’s low yields, food supply has increased steadily. Food supply per capita rose from a little more than 2,000 kilocalories per capita per day in the early 1960s to almost 2,300 in recent years. Taking 2,100 kilocalories per person per day as a guideline for the basic minimum nutritional requirement,²⁷ sub-Saharan Africa did not meet this threshold until 1990, more than a decade after Asia did (figure 2.8).

Individual sub-Saharan African countries still experience calorie deficits, and even within countries with enough aggregate calories, large population groups can suffer chronic or transitory hunger. A distinctive food security challenge in the region is ensuring that food is accessible where and when it is needed and that food is used properly, especially by the poor. The next sections explore these issues.

Access to food

Being able to access food is central to food security. As Amartya Sen observed in his classic work on famines and poverty: “Starvation is the characteristic of

FIGURE 2.5 CEREAL YIELDS STAGNATED FOR DECADES IN SUB-SAHARAN AFRICA



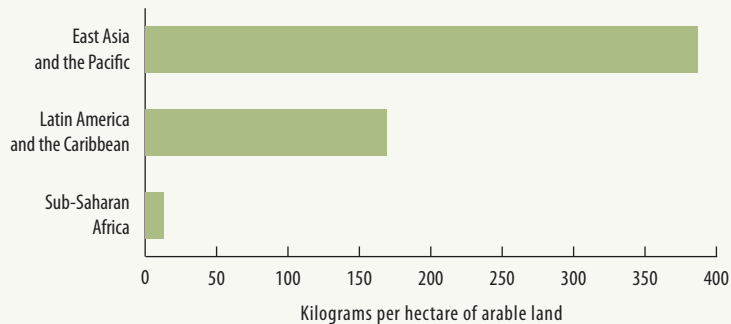
Source: Calculations based on FAO (2012c).

some people not *having* enough food to eat. It is not the characteristic of there *being* not enough food to eat.”²⁸ When people go hungry, it is typically not because food is unavailable but because people are too poor to acquire it. In Sen’s words their “exchange entitlements” are insufficient. Common reasons include limited purchasing power, erratic prices and high levels of poverty; the gradual erosion of informal safety nets and the immaturity of formal mechanisms for social protection; delays and other challenges in implementing humanitarian assistance; and weak physical infrastructure.

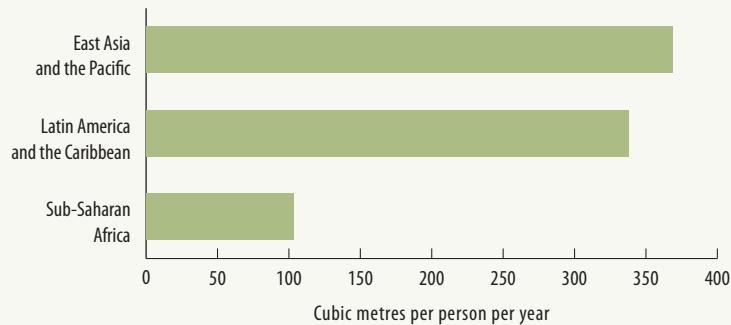
Niger’s experience in 2005 illustrates how entitlement failure can drive food crises. Total food availability that year was only 7.5% below national food needs. Similar shortfalls were recorded across the Sahel, but only Niger experienced a severe crisis.²⁹ The key difference was the gradual erosion in purchasing power among pastoralists and wage earners in Niger in preceding years (figure 2.9) and the inadequate response of the government and the international community. By August 2005 the relative value of livestock to millet had fallen to a third of its October 2003 value. Rural wages saw a similar decline over the period. Even during the crisis Niger exported food to countries with higher purchasing

FIGURE 2.6 FARMERS USE MUCH LESS FERTILIZER AND IRRIGATION WATER IN SUB-SAHARAN AFRICA THAN IN ASIA AND LATIN AMERICA

Fertilizer consumption, 2008



Agricultural water withdrawal, 2000 or later



Note: Regional averages are population weighted.
Source: Calculations based on data from FAO (2012a,c).

power, while high transport costs and low incomes discouraged traders from moving food into food-deficit domestic areas.³⁰

Weak purchasing power and pervasive poverty

As discussed in chapter 1, despite poverty declines in the 2000s, almost half of sub-Saharan Africans still live in extreme poverty. Accelerated economic growth in sub-Saharan Africa in the past decade has not translated into strong gains in employment; in several more urbanized countries with higher dependence on formal sector employment, such as Lesotho, Namibia and South Africa, the unemployment rate is 25% or higher.³¹ In countries where most of the labour force is engaged in low productivity agriculture, formal rates of unemployment may be lower, but underemployment is pervasive.

Across sub-Saharan Africa limited opportunities for salaried employment at decent wages impede people's ability to acquire food. But even in poor households that depend on salaries and wages as a critical source of income, wages are no guarantee of a life without poverty and hunger. Low-wage casual workers, who spend a larger than average share of their income on food and whose weak bargaining power makes them less likely to receive inflation adjustments to their income, can suffer sharp losses in purchasing power.³² Despite some recent improvements, the region's share of employed people living below the poverty line (the "working poor") remains the highest in the world.³³

The erosion of the purchasing power of the poor can be severe during spikes in food prices because poor people devote a larger share of their total consumption to food than do wealthier people—a relationship observable at household (figure 2.10) and country levels (figure 2.11). Households that are net food buyers are hit hardest by rising prices. In other regions net food buyers are mostly higher income urban residents, but in sub-Saharan Africa they include not only the entire nonfarm population but also a majority of rural people. Smallholder farmers devote most of their resources to growing food, but their farm productivity is too low to meet all their food needs, so much of their cash income goes towards more food rather than towards other goods.³⁴

Protecting food entitlements

African communities have a variety of informal mechanisms to protect their food entitlements. These include the extended family system and gifts, shared food and other necessities, and interest-free loans from relatives and neighbours. Remittances from family members living abroad or in another part of the country also help households acquire food. In the 1990s and early 2000s almost a quarter of urban household incomes in Chad and Tanzania came from transfers or remittances.³⁵ In Mali transfers grew more than 40% from 1994 to 2006, almost doubling in urban areas. In Ghana the share of transfers in total income more than doubled in rural areas in the decade before 2008.³⁶ Informal arrangements like these promote resilience to shocks and mitigate their negative impact (explored further in chapter 6). However, where extreme poverty is widespread, there is less to share,



and the informal system can break down when a shock (such as drought or floods or the outbreak of a major epidemic) affects all or most people in a community.

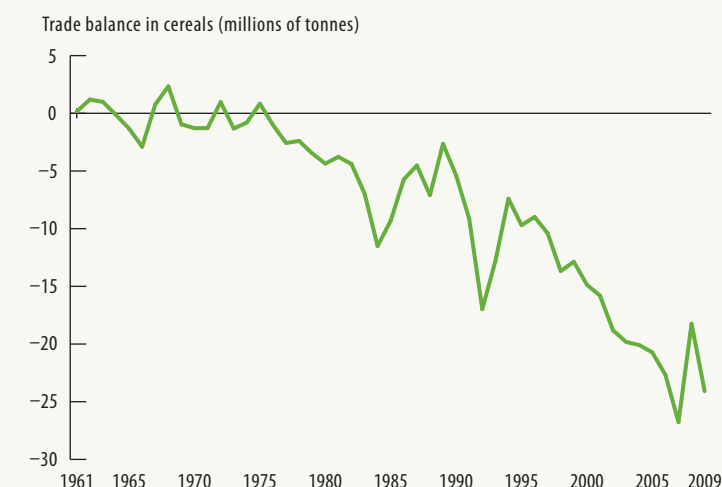
These informal mechanisms are complemented by formal measures. Many sub-Saharan African countries have recently introduced policies to protect the most vulnerable groups from price and income shocks.³⁷ A recent survey identified 123 cash transfer programmes since 2000 in 39 sub-Saharan African countries.³⁸ Typically designed for children and the elderly, some of these programmes had an estimated annual project cost of \$10 million or less. Most of the surveyed programmes began after 2004, with many implemented as pilots, and are expected to expand nationally or into large-scale programmes. Food aid, especially during humanitarian crises, is another way of strengthening people's command over food.

Weak infrastructure raises costs and restricts access

Complicating access to food are several physical and economic features in sub-Saharan Africa: low population density, a large number of landlocked countries, long distances to food markets, poor infrastructure and limited competition in transport and related sectors. Sub-Saharan Africa trails other regions in nearly all aspects of physical infrastructure (table 2.2). The share of people with access to electricity is much lower in sub-Saharan Africa than in other regions, and in rural areas access to safe water and improved sanitation, critical for using food (see next section), is also lower. The share of paved roads is 18% in sub-Saharan Africa, compared with 33% in Latin America and 59% in South Asia. Moreover, only 30% of the rural population in sub-Saharan Africa lives within 2 kilometres of an all-season road, which is just over half the shares for Latin America and the Caribbean (54%) and South Asia (58%).³⁹ Another way of looking at sub-Saharan Africa's infrastructure needs is to estimate the cost of closing its infrastructure deficit. It will cost an estimated \$93 billion every year till 2015 to improve, among other needs, access to roads in areas with high-value agriculture, to expand irrigation and to improve storage capacity.⁴⁰

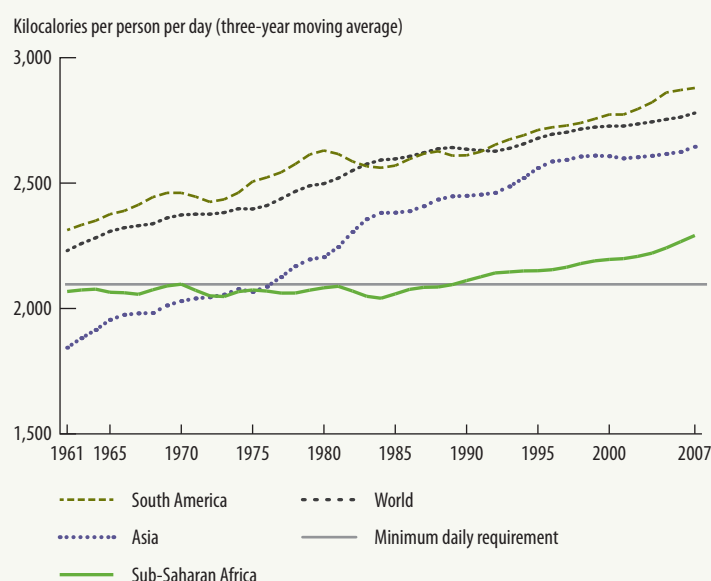
Agricultural output and adoption of high-yield technologies have been found to be inversely correlated with proximity to urban markets as measured

FIGURE 2.7 THE TRADE DEFICIT IN CEREALS HAS WIDENED FOR SUB-SAHARAN AFRICA OVER THE PAST FOUR DECADES



Source: Calculations based on FAO (2012c).

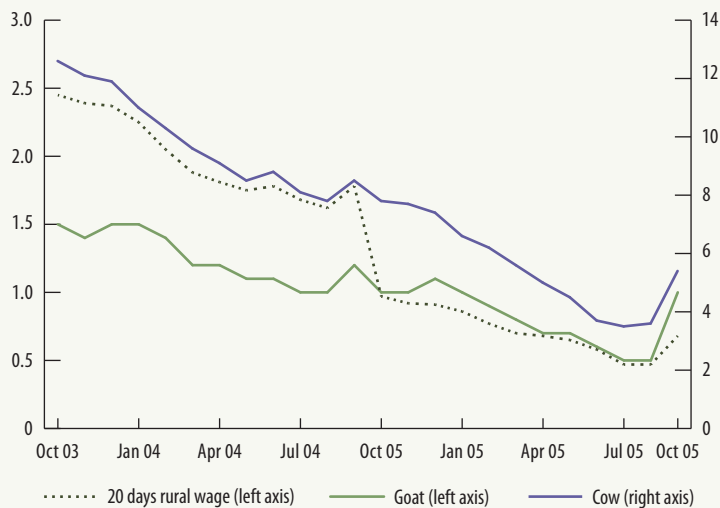
FIGURE 2.8 FOOD SUPPLY HAS RISEN IN SUB-SAHARAN AFRICA, BUT UNEVENLY, 1961–2007



Source: Calculations based on FAO (2012c).

FIGURE 2.9 NIGER'S FOOD CRISIS LED TO AN EROSION IN ENTITLEMENTS

Number of quintals of millet that livestock or labour can buy



Note: The terms of trade are expressed as the number of 100-kilogram sacks of millet per head of livestock (cow or goat) or 20 days of agricultural work. EPAD-Niger suggests a stable daily wage of CFAF 625 for 2004–2005 and CFAF 1,125 for 2003–2004.
Source: Cornia, Deotti, and Sassi 2012.

by travel time (figure 2.12). Improvements in rural roads lower transaction costs associated with agricultural activities and can reduce the costs of inputs, increase the prices that farmers receive and facilitate diversification into new and more profitable activities. These impacts in turn improve people's earnings, entitlements and ability to produce food for their own consumption. A study of 15 rural villages in Ethiopia found that access to all-weather roads was associated with an average 16% increase in household consumption and a 7% decrease in poverty.⁴¹ Where rural infrastructure, storage facilities and financial services are underdeveloped, farmers often have to sell low at harvest time and buy high during the lean season to smooth their consumption.⁴² This tends to intensify their vulnerability to food price volatility.

Postharvest losses also affect access to food. These losses are attributable to harvesting methods; handling procedures; storage facilities and marketing practices; decay and infestation by pests, fungi and microbes; and general mismanagement of grain stocks. Food losses contribute to high food prices by reducing supplies. Losses also harm the

environment and waste valuable resources, since land, water, fertilizer and energy are used to produce, process, handle and transport food that no one consumes.⁴³

Use of food

Even when food is readily available and accessible, good nutrition and human development do not follow automatically. Food security also depends on using food properly, which includes eating a diverse diet; avoiding nutrient losses during food preparation; having clean water and adequate sanitation and energy to ensure basic hygiene for food preparation, storage and consumption; and ensuring basic capabilities in health and education. A shortfall in any area can lead to malnutrition.⁴⁴

Beyond food: living conditions and other factors affecting nutrition

Malnutrition leaves people more susceptible to infections and slows or prevents recovery. Thus malnutrition undermines household food entitlements by reducing productivity and increasing spending on healthcare.

The burden of infectious diseases is heavy in sub-Saharan Africa and made worse by weak health systems. The region is home to 92% of the children under age 14, 76% of the women over age 15 and 68% of the people with HIV/AIDS.⁴⁵ Most of the estimated 655,000 people globally who died of malaria in 2010 were sub-Saharan African children.⁴⁶ Underweight children are more susceptible to malaria, primarily because their immune systems are impaired.⁴⁷ In malaria-endemic regions the disease is a leading cause of death in children.⁴⁸ The pernicious interaction between malnutrition and HIV/AIDS, combined with the increased burden of care, has reduced the viability of farming as a livelihood, severely increasing the vulnerability of rural communities to a "new-variant famine."⁴⁹

Effective health service delivery is critical for advancing human capabilities and improving food security. But sub-Saharan Africa's health systems are among the weakest in the world. On average, the region has 1 doctor per 5,300 people, less than a seventh of the world average. In Liberia, Malawi, Niger and Tanzania the ratio is much worse—a staggering 1 doctor per 50,000 or more people.⁵⁰



Other indicators of health access, such as child immunization rates, reveal the same bleak picture. And not surprisingly, health outcomes are grim.

Unsafe water and poor sanitation and hygiene reinforce the links between food security, nutrition and health. People with diarrhoea cannot adequately absorb nutrients, leaving them more susceptible to infectious diseases and less able to recover.

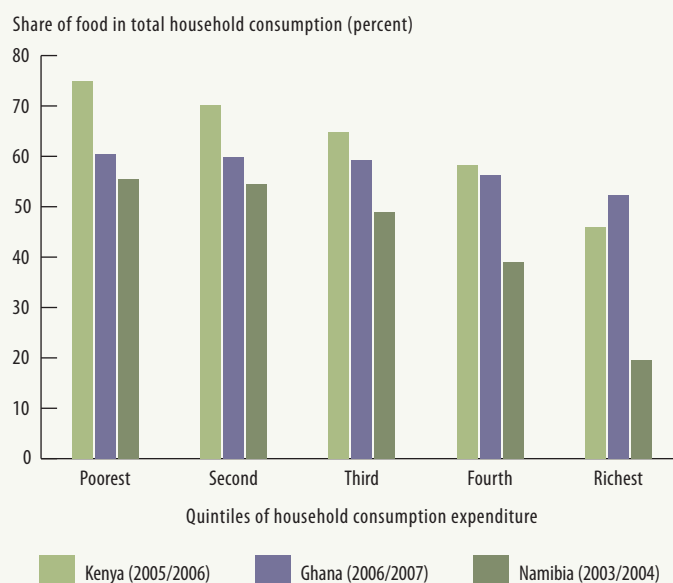
Almost 40% of sub-Saharan Africa's population has no access to safe water, more than twice the share in other regions. That share rises to more than 50% in the Democratic Republic of the Congo, Ethiopia, Madagascar and Mozambique.⁵¹ Access to adequate sanitation is even worse. Only 30% of Africans live in households with access to improved sanitation, a share that inched up just 2 percentage points over 1990–2010, a far cry from the 56% average for developing countries.⁵² And still worse is access to electricity, important for hygiene and food storage: 70% of Africans lack electricity, almost twice the share in South Asia (including India) and more than seven times that in East Asia and the Pacific.⁵³ Heavy reliance on solid fuels for cooking, a key cause of indoor air pollution leading to respiratory diseases, is yet another contributor to the malnutrition–poor health nexus. Girls and young women, responsible for most food preparation, are harmed the most.⁵⁴

Capabilities other than health also affect nutrition. There is considerable evidence from both developing and developed countries that children's nutrition is influenced by the education of their parents, especially mothers. Educated mothers, better informed about caring for children, are more likely to allocate scarce household resources to nutrition and healthcare. Data for Burkina Faso, Ethiopia and Mozambique show a negative association between mother's education and malnutrition in preschoolers (figure 2.13) and between wealth and malnutrition (figure 2.14), with most of the wealth effect at the high end of the distribution.

The value of micronutrients for human development

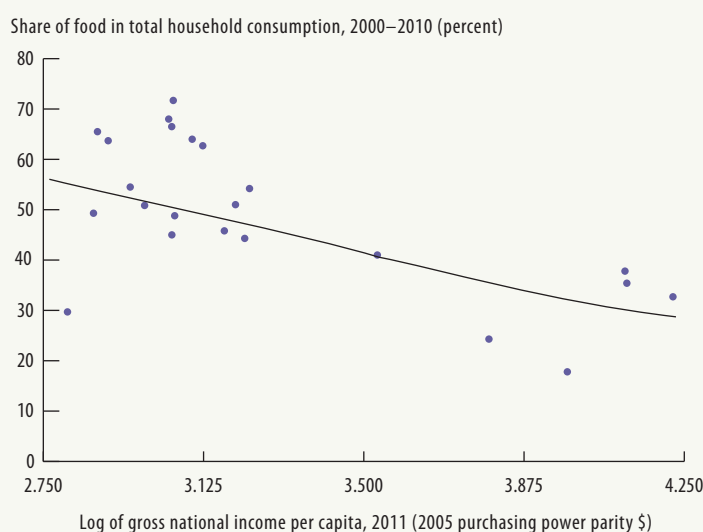
The link between micronutrient deficiency and food security illustrates the challenges in using food properly. In many sub-Saharan African countries diets lack diversity (figure 2.15).⁵⁵ Traditional African diets consist mainly of cereal or root staples,

FIGURE 2.10 FOOD SHARES FALL AS INCOMES RISE AMONG HOUSEHOLDS ...



Source: Calculations based on household survey data from national statistics offices.

FIGURE 2.11 ... AND ACROSS SUB-SAHARAN AFRICAN COUNTRIES



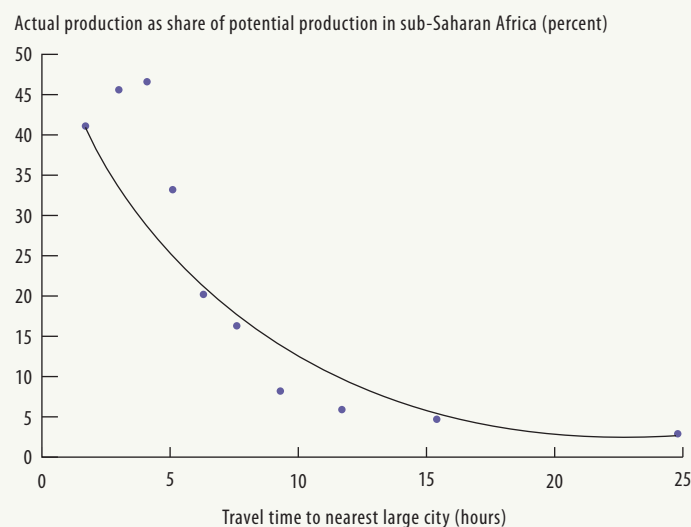
Note: Line represents an exponential fit.

Source: Calculations based on statistical tables 1 and 5 in this Report.

TABLE 2.2 SUB-SAHARAN AFRICA'S INFRASTRUCTURE DEFICIT, 2008–2010

INFRASTRUCTURE	LATIN AMERICA AND THE CARIBBEAN	SOUTH ASIA	SUB-SAHARAN AFRICA	OECD COUNTRIES
Access to electricity (percent of population)	93	62	33	..
Improved water source in rural areas (percent of rural population with access)	80	83	47	97
Improved sanitation facilities in rural areas (percent of rural population with access)	55	26	24	93
Roads, paved (percent of total roads)	33	59	18	87
Mobile cellular subscriptions (per 100 people)	98	61	45	102
Internet users (per 100 people)	34	8	11	70

.. is not available; OECD is Organisation for Economic Co-operation and Development.
Source: World Bank 2011b.

FIGURE 2.12 LIMITED ACCESS TO MARKETS HURTS AGRICULTURAL PRODUCTION, 2000

Note: Each observation represents travel time deciles based on estimated time to the nearest city with 100,000 or more people. Line represents an exponential fit.
Source: Dorosh and others 2012, table 2, p. 92.

with very little micronutrient-rich animal-source proteins, vegetables and fruits.

Four micronutrients are especially vital for good nutrition and human development: vitamin A, iron, iodine and zinc.⁵⁶ Vitamin A deficiency

among preschool-age children, afflicting almost all of sub-Saharan Africa, is a leading cause of preventable blindness in children and increases the risk of severe infections that lead to disease and death (chapter 5). Iron deficiency contributes to the deaths of young women during pregnancy and childbirth and is a leading cause of anaemia: sub-Saharan Africa has the highest prevalence of anaemia among preschool-age children and both pregnant and nonpregnant women.⁵⁷ In many sub-Saharan African countries anaemia prevalence has remained stubbornly unchanged over the last 20 years.⁵⁸ Across sub-Saharan Africa some 58 million children consume less than the recommended amount of iodine.⁵⁹ Iodine deficiency can cause mental retardation in developing fetuses. Zinc deficiency has proven difficult to quantify, and estimates are often vague. But even with incomplete data, sub-Saharan African countries have among the highest risk of zinc deficiency.⁶⁰

Obesity—the double burden of malnutrition

Undernutrition and obesity might appear to be unrelated conditions, but both are a product of uneven access to food and unbalanced diets. Among a sample of recent mothers in 31 sub-Saharan African countries with recent data (2000 and after), more women were overweight or obese than underweight. In 14 countries more than 20% of the



women surveyed were overweight and more than 5% were obese (figure 2.16).

More worrisome, this trend includes children. Estimates suggest that 8.5% of African children under age five were overweight or obese in 2010, more than twice the 4% in 1990.⁶¹ Excessive weight in children is associated with physical and psychological health problems, and excessive weight is difficult to shed.⁶²

The main causes of sub-Saharan Africa's overweight and obesity problem include urbanization, changing lifestyles with reduced physical activity and more sedentary occupations, and diets high in calories and low in nutrients (chapter 5).

Overweight or obese people are more at risk of developing high blood pressure, high blood cholesterol and other lipid disorders, type-2 diabetes, heart disease, stroke and certain cancers. Sub-Saharan Africa's public health systems, already struggling to manage infectious diseases and undernutrition, will increasingly have to deal with obesity and its harmful health consequences. Workforces and economies will also be affected, as obesity is often linked to lower productivity.

Unstable food systems strain food availability, access and use

All three critical links in the chain of food security—availability, access and use—are heavily stressed in sub-Saharan Africa by vulnerability to shocks, price volatility, and violence and conflict. Interruptions in food supplies can be especially damaging to young children, because even short spells of undernutrition at a young age can cause lifelong disabilities. Breakdowns in food systems can push millions into poverty, trigger violence and unrest, and alter farming patterns, with harmful consequences for food production. This section surveys three leading and related sources of instability in sub-Saharan Africa's food security: weather patterns, price volatility and conflict.

Vulnerability to weather patterns

Weather and climate—important determinants of plant growth, water availability and soil replenishment—affect food security in sub-Saharan Africa. The region's agriculture is particularly vulnerable to changes in weather patterns because 93%

FIGURE 2.13 WOMEN'S EDUCATION IS A FORCE FOR FOOD SECURITY ...

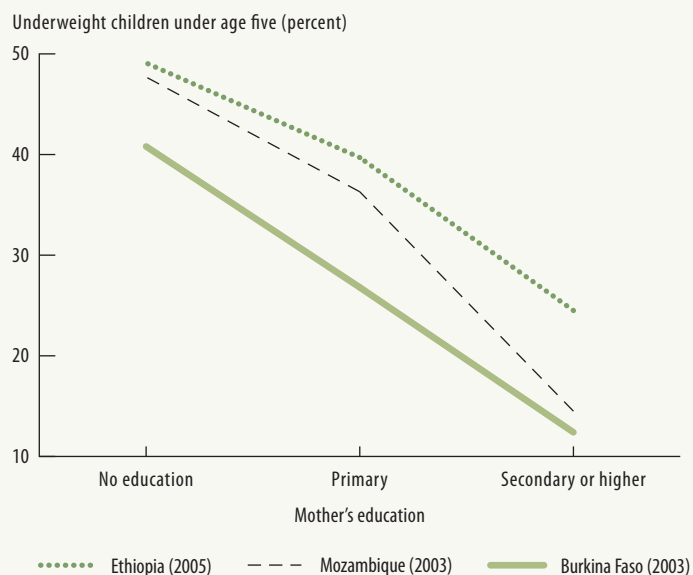


FIGURE 2.14 ... PERHAPS MORE POWERFUL THAN WEALTH

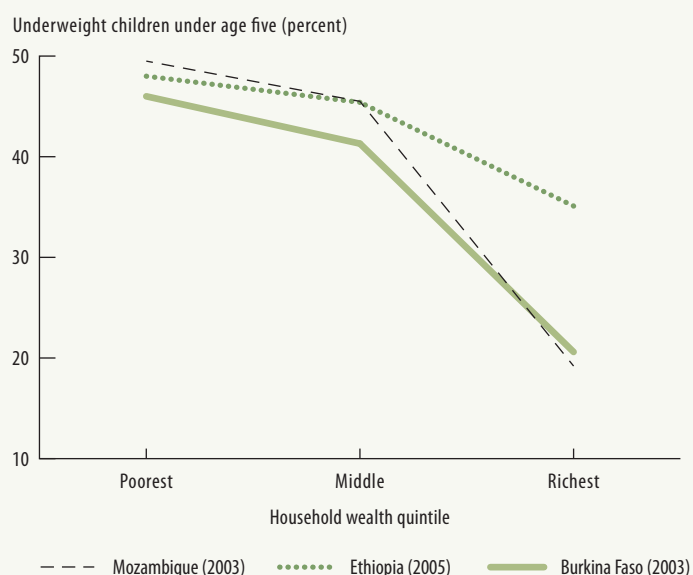
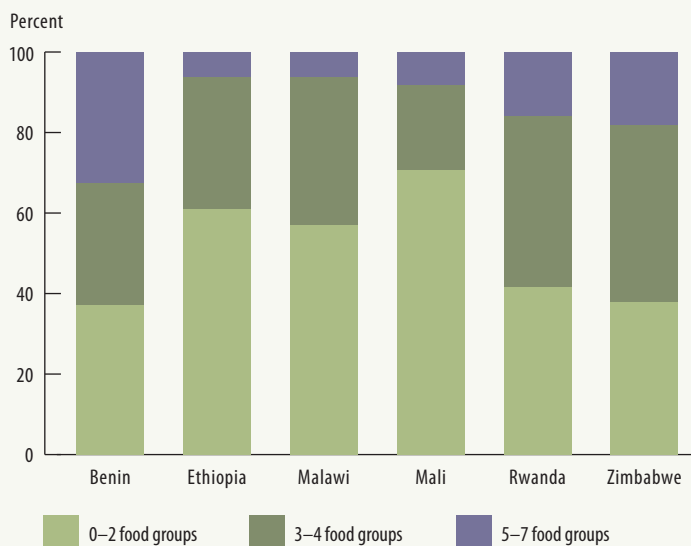


FIGURE 2.15 **DIETARY DIVERSITY IS LACKING IN MANY SUB-SAHARAN AFRICAN COUNTRIES**

Number of food groups consumed in the previous three or more days in the last week by children ages 6–23 months, 1999–2001



Source: Arimond and Ruel 2004, table 2, p. 2582.

of agriculture is rainfed, agricultural infrastructure and input supply chains are weak and soils lose substantial nutrients each year.⁶³

Indicative of the role of weather patterns in sub-Saharan Africa is the changing association between rainfall and economic growth. Until the late 1990s the two were positively related, but since 2000 economic performance has been less correlated with rainfall patterns (figure 2.17).⁶⁴ The same change has occurred elsewhere. The weakening of this association could reflect both a decrease in the importance of agriculture as countries develop and less dependence of agricultural output on rainfall (due to better water management, for example).

Sub-Saharan Africa's sharp decline in rainfall in recent decades—down almost 7 millimetres a month from 1951–1980 to the 2000s—is more than 2.5 times the decline in Asia and more than 10 times that in Latin America and the Caribbean (figure 2.18).

Rainfall volatility is also high in sub-Saharan Africa—much higher than in Latin America and

the Caribbean and comparable to that in East Asia and the Pacific.⁶⁵ High volatility has been associated with declines in land suitability for agriculture, food production and crop yields, threatening food security.⁶⁶

Natural disasters are another weather factor haunting sub-Saharan Africa—both sudden-onset hazards, such as floods and storms, and slower building ones, such as droughts. Although the destructive power of some natural disasters can overwhelm even well-prepared communities, hazards need not turn into full-fledged disasters if a community is prepared to cope with them.⁶⁷ Development is closely linked to better response and coping strategies and social protection.

Sub-Saharan Africa has a large share of natural disasters. It is the world's second-most severely affected region for climatological disasters (extreme temperatures, droughts and wildfires), behind East Asia and the Pacific (figure 2.19). Together, sub-Saharan Africa and East Asia and the Pacific account for three-quarters of the world's drought-affected populations.

Hydrometeorological disasters (floods, storms and mass migrations), though of lower prevalence and impact in sub-Saharan Africa than in other regions, undermine the continent's ability to cope.

With population growth, the number of people affected by drought, extreme heat and wildfires in sub-Saharan Africa doubled over the last 10 years, and the number affected by floods, storms and mass migrations almost tripled. The region has seen the second-fastest rate of increase in hydrometeorological disasters (after East Asia and the Pacific) and the third-fastest in climatological disasters (after East Asia and the Pacific and the Arab States).⁶⁸ Climate change will likely worsen the trend.

Food price volatility

Food systems are especially prone to volatile prices, a major source of instability in food supply and access. Sub-Saharan Africa's trade expansion in recent decades has increased the continent's exposure to fluctuations in international markets.⁶⁹ After several decades of relative stability, global food prices have swung dramatically since 2007 (figure 2.20). Prices surged higher in both 2007/2008 and 2010/2011, responding to adverse weather and poor harvests in some major exporting countries, a rise in oil prices, diversion of crops into biofuels and short-sighted



policy responses. But there are also important differences between the two episodes.

One notable difference is in the commodities affected. The 2010/2011 price hikes were led by maize, wheat, oil and sugar. Rice, an import for many sub-Saharan African countries, spiked in 2007/2008 but was less affected in the later episode because of good harvests in Asia, the main global supplier.

A second difference is that the pass-through of global prices to local African markets, strong in 2007/2008, was weaker in 2010/2011.⁷⁰ Prices even fell for some commodities less traded in international markets, such as millet and cassava. Price responses for tradables, such as maize and wheat, were muted in many places, due largely to strong agricultural performance. Overall, cereal production between 2009 and 2010 rose 10% in sub-Saharan Africa—14% in East Africa and 11% in West Africa.⁷¹

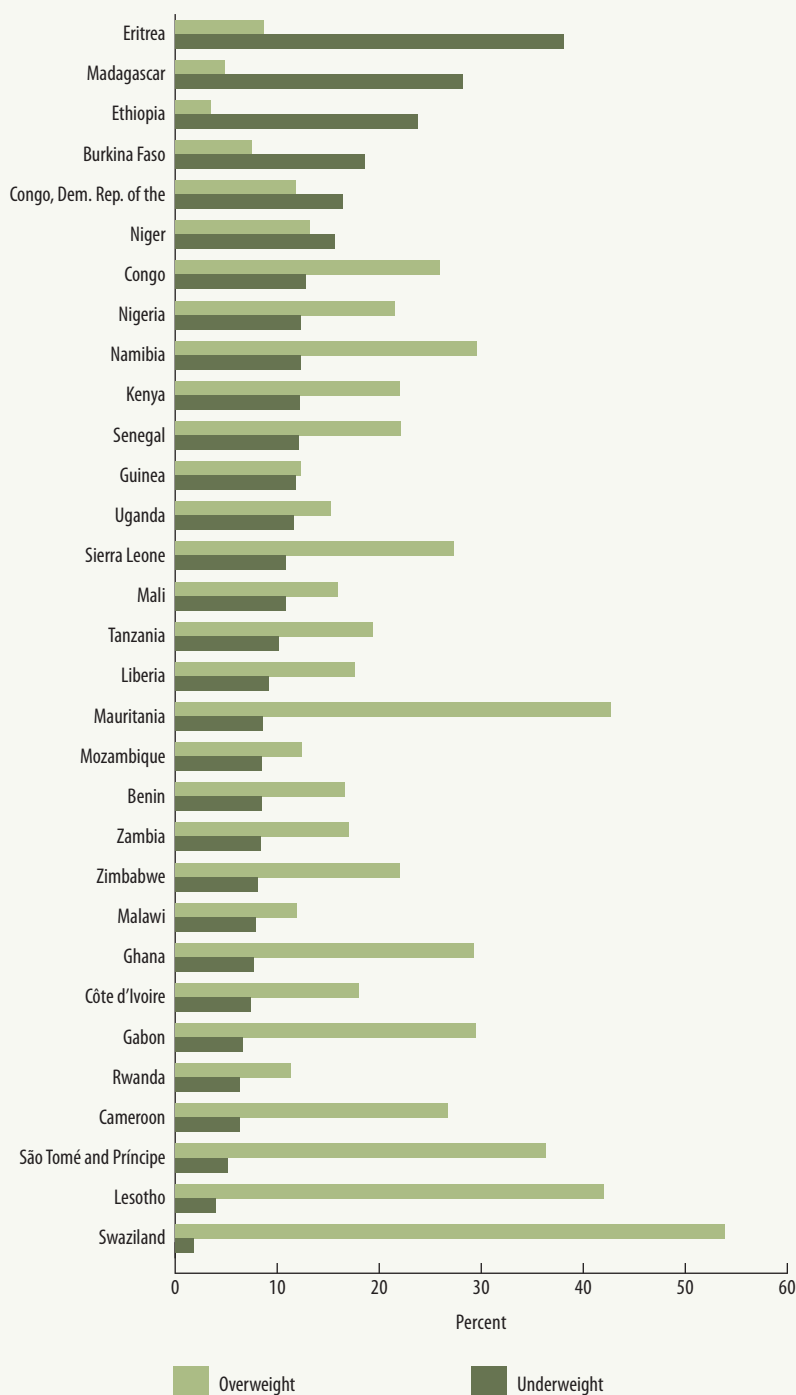
A third difference lies in policy responses, which were more subdued in 2010/2011 than in 2007/2008. The restraint reflected the narrower space for policy action as a result of interventions in the early period and the growing impact of the global financial crisis. However, both the impacts and the responses have differed greatly across countries, a reflection of varying net trade positions, exchange rate and monetary regimes, substitution possibilities and responses from markets and policy-makers.

Countries that import their main staples, such as Liberia and Sierra Leone, felt the more recent global price effects more than did countries where staples are supplied by local farmers, as in Malawi and Uganda. In Southern Africa good maize harvests held down food prices, and in Namibia and Zambia food price inflation was lower than overall inflation. Weather events pushed up prices in some countries (floods in Benin and drought in Kenya), and food markets were affected by political instability in others (Côte d'Ivoire and Madagascar). Impacts have also varied within countries because of local differences in exposure, vulnerability and coping strategies.⁷²

On the surface the poverty impacts of the price spikes appear more limited in 2010/2011 than in 2007/2008. Rising prices in 2007/2008 may have led to a short-term surge of 105 million more extremely poor people.⁷³ An updated analysis suggests that the comparable price rise in the second half of 2010 led to 44 million more poor people.⁷⁴ These

FIGURE 2.16 THE DOUBLE BURDEN OF UNDERNUTRITION AND OVERWEIGHT IN SUB-SAHARAN AFRICA

Share of recent mothers who are underweight and overweight, most recent data available since 2000



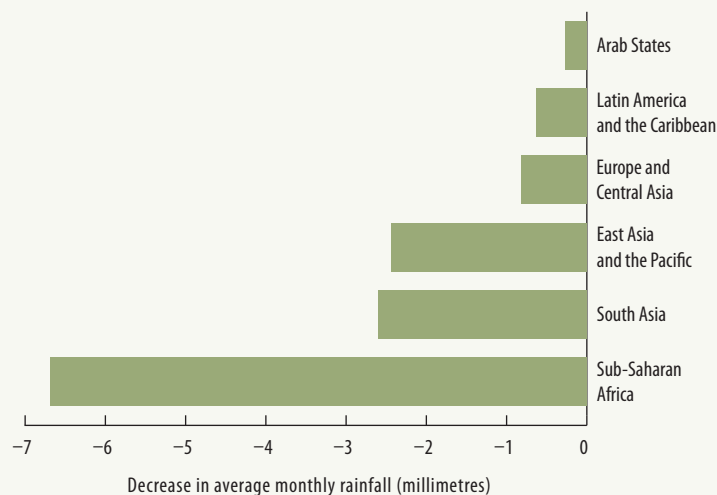
Note: Underweight is defined as a body mass index of less than 18.5; overweight, as a body mass index of more than 25.
Source: MEASURE DHS, ICF International 2012.

FIGURE 2.17 ECONOMIC GROWTH IN SUB-SAHARAN AFRICA TRACKED RAINFALL FROM 1981 UNTIL THE LATE 1990s



Note: Change in GDP and precipitation values are population-weighted averages for 35 sub-Saharan African countries with data for all years.
Source: Calculations based on NOAA (n.d.) and World Bank (2011b).

FIGURE 2.18 RAINFALL HAS DECLINED MOST IN SUB-SAHARAN AFRICA, 1951–1980 TO THE 2000s



Note: Regions are those defined by the United Nations Development Programme's regional bureaux. The regional averages are weighted, based on the average population for 1950–2008.
Source: Calculations based on NOAA (n.d.).

analyses also included country-level simulations showing estimated poverty increases of 4 percentage points in 2007/2008 but only 1 percentage point in 2010 in Malawi and almost 5 percentage points in 2007/2008 but just 0.27 percentage point in 2010 in Zambia.⁷⁵

While volatile international food markets continue to affect sub-Saharan Africa's food systems, the seasonal ups and downs in local food prices probably have a greater impact.⁷⁶ These seasonal cycles, too often unnoticed, have major implications for Africans' well-being. Across the region smallholder farmers sell part of their food output immediately after harvest, when prices are lowest, to cover expenses and repay debts incurred during the lean season. Some six to eight months later, after exhausting their food stocks, farmers start buying food supplies just when prices are highest, using money obtained by borrowing, selling small animals, doing casual work or enrolling in food aid programmes. The consequences are seasonal fluctuations in food prices and bouts of malnutrition.

The impacts of seasonal fluctuations on human development are striking and entirely predictable and thus should be easier to address than the impacts of weather shocks. In Ethiopia's preharvest season of 1994 about a third of the population was living in poverty. That number dropped to 27% around harvest time but bounced back to 35% during the preharvest months of 1995.⁷⁷ In Malawi seasonal changes in food prices are followed closely by rising numbers of children admitted to nutrition and rehabilitation units (figure 2.21). The effect can be large: between September 2004 and January 2005 maize prices increased sharply in central Malawi, and admissions to nutrition and rehabilitation units shot up almost fourfold.⁷⁸ The same impacts have been documented in Ethiopia, Ghana and Namibia.⁷⁹

Violence and conflict

Food insecurity is both a cause and an effect of violence and conflict. Fluctuations in agricultural production and access to food can be a source of social upheaval, violent attacks or even war. And the resulting disruptions can create instability in food availability and access.

Not surprising, food production falls during conflict. With each shock to the food supply, prices



inch up. If local markets can receive supplies from markets farther away, the upward price pressure eases. But that depends on the type of conflict and transport infrastructure. When the warring parties cut local communities off from supplies from other areas, local food insecurity intensifies.⁸⁰

Conflict also disrupts food production, often blocking cultivation directly, sharply curtailing access to food. Farmers who grow food for their own consumption are usually the most affected, as they abandon their farms and take refuge elsewhere. Even when smallholder farmers are not displaced or when their village is spared direct fighting, production can still be imperilled by land mines or the wanton destruction of plots and crops.⁸¹

Violent conflict often disrupts transport and market transactions, resulting in the collapse of food markets. Farm households become food insecure—unable to buy or sell food. Even when warring parties allow exchanges, farmers and traders might hesitate, fearing confiscation, theft or taxes (often in the form of the forced supply of food to the more powerful warring side). During Mozambique's civil war, for instance, smallholder farmers retreated into subsistence farming.⁸²

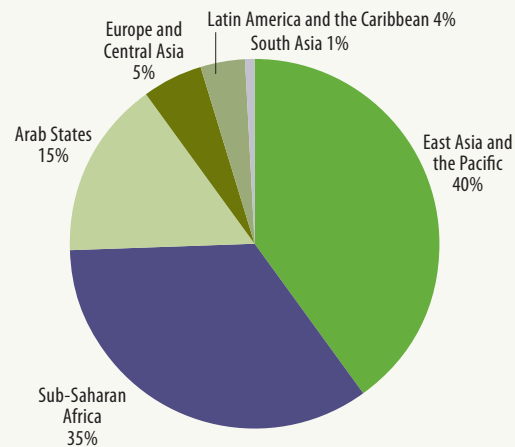
Household assets are often stolen or destroyed during conflict, or sold at prices below their ordinary value to prevent hunger and starvation in the aftermath of violence. Livestock are a valuable asset that can provide manure for the farm and can be sold in times of distress. Conflict can interfere with these productive and insurance functions. Livestock may be stolen or killed during violent conflict. In times of distress the price of livestock collapses as many farmers in an area try to sell at the same time. The loss of this key asset can push households into low-risk, low-return economic activities, setting a poverty trap.⁸³ Where conflict involves cultivators challenging pastoralists, especially over scarce land, entire livelihoods can be put in jeopardy.

Instability in agricultural production can have wider destabilizing effects. Smaller and fewer crops are produced in drier and warmer years, increasing the risk of violent conflict as discontent with the status quo builds and rebel movements emerge or grow stronger.⁸⁴ In such hard economic times competition for scarce agricultural resources also increases, fuelling social, cultural and ethnic tensions that spur sporadic violence and conflict.

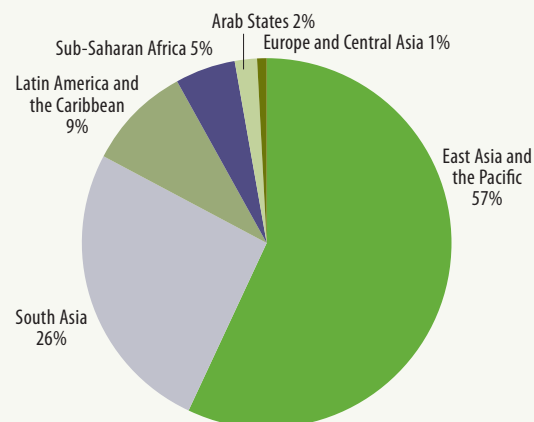
FIGURE 2.19 MORE THAN A THIRD OF CLIMATOLOGICAL DISASTERS AFFECT SUB-SAHARAN AFRICA

Share of natural disasters, by region, 2005–2010

Climatological disasters



Hydrometeorological disasters

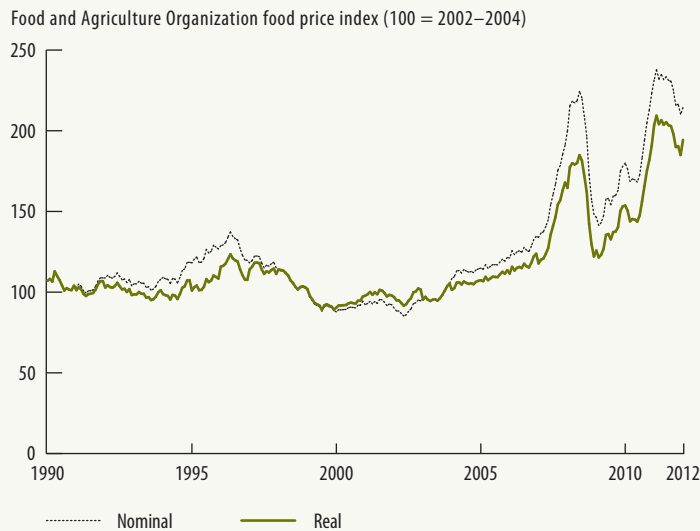


Note: Climatological disasters comprise extreme temperatures, droughts and wildfires. Hydrometeorological disasters comprise floods, storms and mass migrations. Regions are those defined by the United Nations Development Programme's regional bureaux.

Source: Calculations based on data from CRED (2012).

When food prices soar, social tensions can flare into violence. Food riots in urban areas show how powerless citizens can react to a perceived injustice. Recent hikes in food prices sparked demonstrations and riots in Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mozambique, Senegal and Uganda, with thousands taking to the streets. Studies show a positive long-term correlation between international food prices

FIGURE 2.20 GLOBAL FOOD PRICES SPIKED TWICE IN THE 2000s

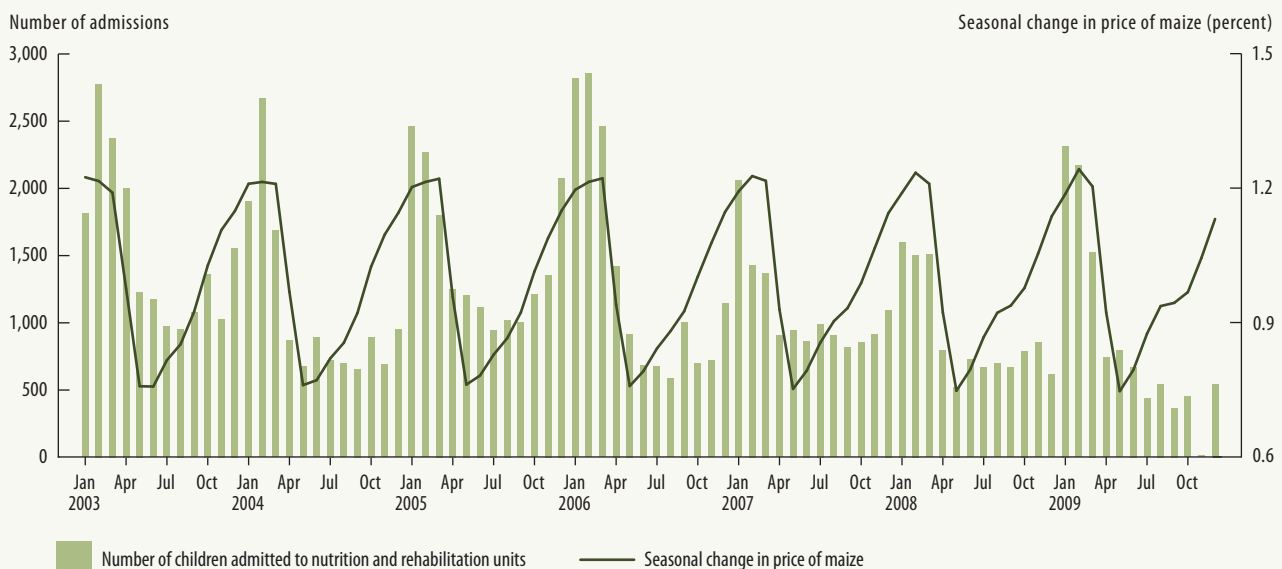


Source: FAO 2012b.

and antigovernment protests and civil conflict in low-income countries.⁸⁵ The phenomenon is not new. Liberia was fairly calm until 1980, when its people ousted the president in the wake of food price riots. The coup heralded a period of chronic instability.⁸⁶

Conflict, food price volatility and vulnerability to erratic weather are among the proximate drivers of the instability in sub-Saharan Africa's food systems. Concerns over these sources of instability have quieted over the last decade with the reduction in outbreaks and recurrences of conflict in sub-Saharan Africa.⁸⁷ But emerging challenges posed by population growth, environmental degradation and climate change are adding new pressures and increasing the instability of food systems, as discussed in the next chapter.

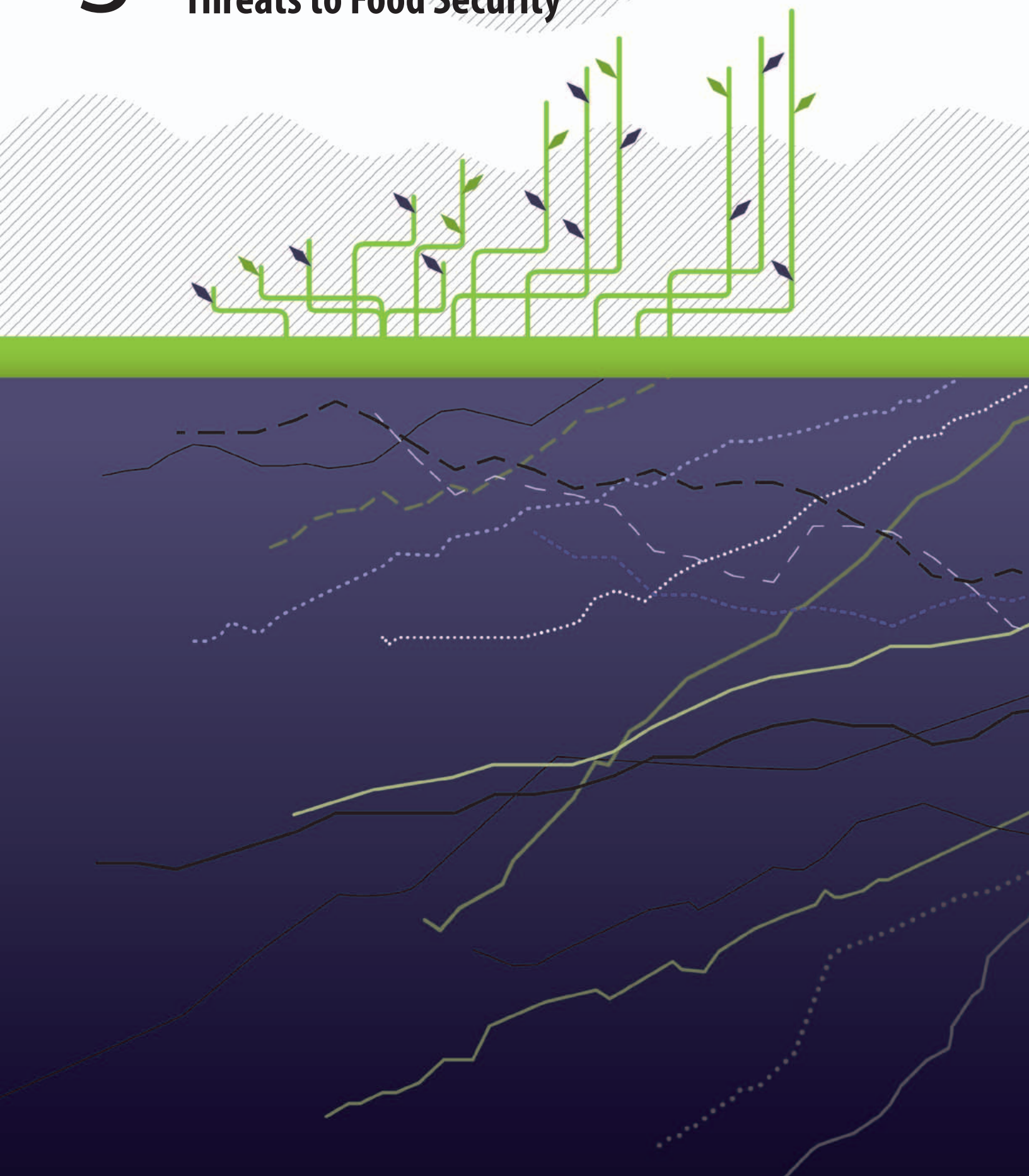
FIGURE 2.21 SEASONAL CHANGES IN FOOD PRICES ARE FOLLOWED CLOSELY BY RISING NUMBERS OF CHILDREN ADMITTED TO NUTRITION AND REHABILITATION UNITS IN MALAWI



Source: Cornia, Deotti, and Sassi 2012.

3

Persistent Challenges and Emerging Threats to Food Security





CHAPTER 3

Persistent Challenges and Emerging Threats to Food Security

Misguided policies, weak institutions and failing markets are the roots of sub-Saharan Africa's food insecurity. Their influence is clearest at the household and community levels, where unequal power relations trap vulnerable people—subsistence farmers, the landless poor, many women and children—in a vicious cycle of deprivation, food insecurity and low human development. For decades the policies of national governments and international institutions neglected sub-Saharan Africa's rural and agricultural development. Their damaging legacies include ineffective postcolonial industrialization plans that soaked up development resources, leaving agriculture a second-tier priority with little localized crop science and technology appropriate for poor farmers; structural adjustment programmes that aimed to close budget gaps but created large human development deficits, especially among the vulnerable poor; and skewed allocations of national revenue and foreign aid that neglected agriculture and nutrition. Despite some improvements since the mid-1990s many African governments continue to saddle domestic agricultural markets with high arbitrary taxes while bestowing incentives and macroeconomic support on other sectors. Meanwhile, many developed countries are heavily subsidizing agriculture long after its role as a development driver has passed. African farmers, sidelined by biased policies and squeezed by unfair markets, struggle to compete against these formidable odds.

Breaking with the past, standing up to the vested interests of the privileged few and building institutions that rebalance power relations at all levels of society will require courageous citizens and dedicated leaders. Taking these steps is all the more pressing as new threats are emerging to the sustainability of sub-Saharan Africa's food systems. Demographic change, environmental pressures and climate change are profoundly reconfiguring the region's development options. Several futures are imaginable for sub-Saharan Africa. The brightest, a continent free of hunger and rich in human capabilities, rests on turning food security for human development from aspiration to reality.

Why have improvements in sub-Saharan Africa's food security not been commensurate with recent impressive improvements in economic growth and human development? How, indeed, can hunger threaten sub-Saharan Africa at all, with its land so

fertile and water resources so plentiful? Chapter 2 suggested several reasons. Food production is growing, but yields are low, with limited use of productivity boosters such as irrigation, fertilizer and new technologies. And the little food that people can access is a result of entrenched poverty, low purchasing power and high transport costs that isolate them from food markets. The food that is acquired is often poorly used because of high disease burdens that interfere with nutrient absorption and reduce productivity and because of limited access to essential health and education services. Making matters worse are the lack of resilience in food systems and the vulnerability of poor people to shocks caused by weather, international food price fluctuations and recurring violence and conflict.

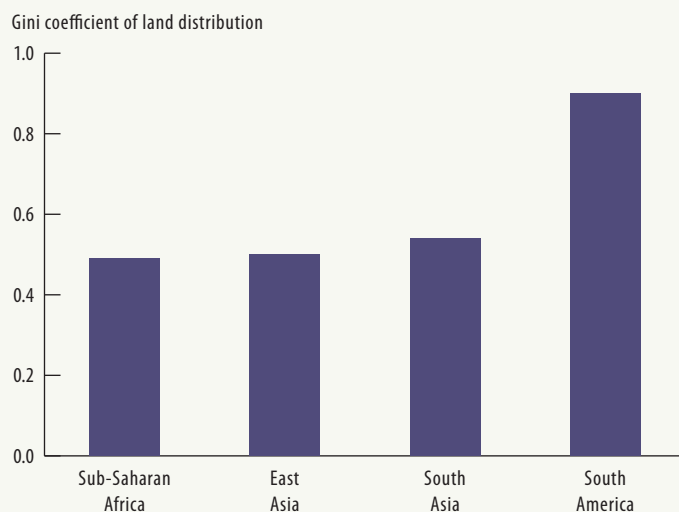
But even these explanations do not fully answer the questions. This chapter digs deeper, to get at the roots of sub-Saharan Africa's food insecurity:

unequal power relations at the household and community levels; a decades-long national policy bias against agriculture, nutrition and rural development; the harsh structural adjustment policies that followed and that diminished the ability of states to function and invest; and the age-old asymmetries in the global food system. The legacy of these developments persists at the same time that sub-Saharan Africa faces a new set of emerging threats to food security: demographic pressure, environmental challenges and climate change.

The deeper causes of food insecurity in sub-Saharan Africa

Policies guide development, while institutions—both formal and informal—shape the incentives and constraints that determine the choices and actions taken and the services received. Well-functioning markets signal scarcities, strengthen value chains and enable farmers to manage risk, access credit and exchange information. But for too long, policies, institutions and markets in sub-Saharan Africa have failed to build food security. To the contrary, they have often made matters worse.

FIGURE 3.1 LAND INEQUALITY IN SUB-SAHARAN AFRICA IS THE LOWEST IN THE WORLD, 1970–1990



Source: Eastwood, Lipton, and Newell 2010, table 3, p. 3330.

Skewed resources and opportunities

Food security is hampered by the uneven distribution of resources, income and capabilities.¹ These imbalances ultimately reflect inequities in access to food and labour markets, political and social representation, opportunities and freedom.

Inequality and income gaps

Historically, land inequality has been lower in sub-Saharan Africa than anywhere else (figure 3.1), with exceptions in East and Southern Africa. But entrenched discrimination in ownership and inheritance rights still holds some groups back, and women are systematically worse off than men in most African countries (figure 3.2). Women usually acquire land through relationships with men (marriage or blood ties) and keep them only as long as the relationship lasts. Without strong ownership rights, women's decision-making, productivity and access to credit are all constrained.²

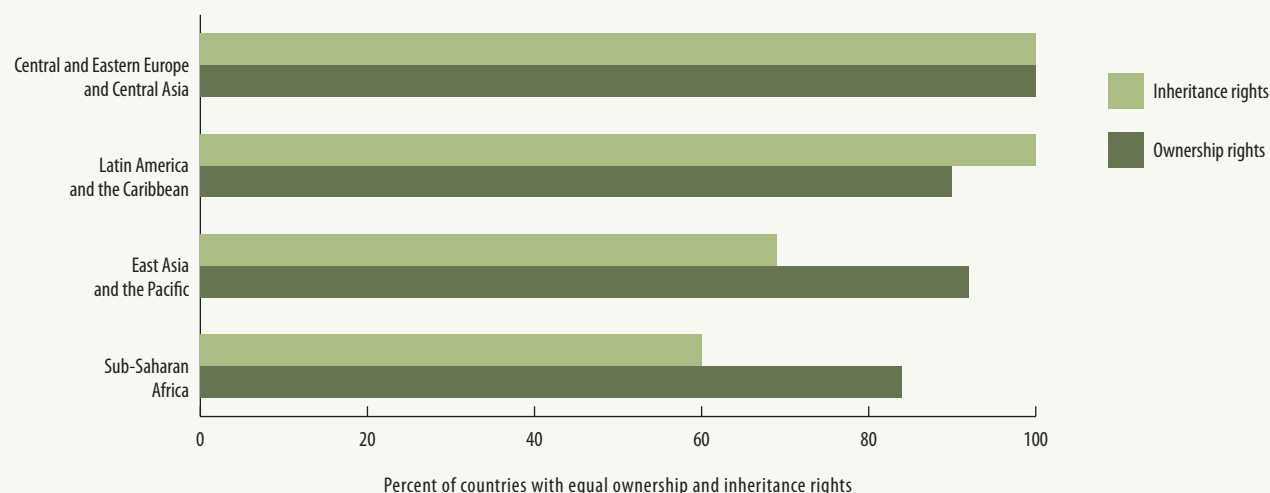
Gender equality strongly affects food security because women in sub-Saharan Africa are vitally important to food production and child nutrition. A study in Kenya found that, with the same access to agricultural inputs afforded men, female farmers are at least as productive as male farmers.³ Other studies have shown that, with the same access to inputs and extension services, female farmers in sub-Saharan Africa generate more output than their male counterparts.⁴ Because of weak land-use rights (usufruct), women are often denied a decision-making voice about food (box 3.1), at the expense of household well-being.

Income inequality, another manifestation of skewed access to resources that bears on food security, remains high in sub-Saharan Africa.⁵ Narrowing the income gap even slightly could leverage major gains in human development.⁶

Inequality impedes food security in part through its effects on broader development. Where institutions and governance are weak, high inequality discourages civic engagement and collective decision-making and biases decisions against policies that promote growth and reduce poverty.⁷ Some studies have shown that high inequality weakens the poverty-reducing impact of economic growth, thus interfering with the translation of higher average income into greater purchasing power for the poor, which affects their ability to



FIGURE 3.2 EQUAL OWNERSHIP AND INHERITANCE RIGHTS FOR MEN AND WOMEN STILL ELUDE MANY COUNTRIES IN SUB-SAHARAN AFRICA, 2010



Note: Regions are those defined by UN Women.
Source: UN Women 2011, figure 1.9, p. 39.

BOX 3.1 GENDER INEQUALITY AND AGRICULTURAL PRODUCTION

Millions of women in sub-Saharan Africa work as farmers, farm labourers and natural resource managers, contributing to national agricultural output, family food security and environmental sustainability. Women also process, purchase and prepare food for their families, despite restrictions on their use of land and inputs, such as improved seeds and fertilizers, and their limited access to information. Across the continent female farmers have shown that they can stand on their own against long odds.

Meeting the growing food needs in sub-Saharan Africa puts a premium on the capabilities and resources of African women. For example, Klasen (2002) reported that the total direct and indirect effects of gender inequality in education account for 0.6 percentage point of the difference in economic growth between sub-Saharan Africa and East Asia from the 1960s through the 1990s.

The Rwandan Agricultural Research Institute and the International Centre for Tropical Agriculture collaborated with local Rwandan female farmers to breed improved bean varieties. The women were invited to grow the varieties they considered most promising among a set that the breeders were testing. Their selections substantially outperformed those of the bean breeders, highlighting women's largely untapped agricultural expertise.

Unequal rights and obligations within the household, as well as limited time and financial resources, also often block women's potential in agriculture. Addressing these disparities can accelerate the productivity gains needed to meet food requirements. Customary and formal tenure systems have marginalized women's rights. For example, even when civil law allows women to inherit land, other factors can overrule it. In sub-Saharan Africa women are often denied formal ownership rights in favour of more limited user rights—and even then often only with the consent of a male relative. Women also tend to be allocated poorer land than men. Some resettlement and irrigation projects have eroded women's rights to land by providing formal titles only to men. This tenure insecurity makes women less likely to invest time and resources in land or adopt environmentally sustainable farming practices.

Fragile tenure arrangements have become even more of a challenge as men have migrated to urban jobs leaving women to lead on agricultural activities. Yet women's land-use rights and participation in local economic decision-making are often marginal. Strengthening gender equality in land rights requires uprooting entrenched sociocultural attitudes and strengthening rights for women under constitutional, family and inheritance law.

Source: Klasen 1999, 2002; UNECA 2004b; Knight 2010; Bomuhangi, Doss, and Meinzen-Dick 2011; FAO 2011b.

buy food.⁸ There is also evidence that inequality affects the rate of economic growth and its impact on poverty, often by interacting with the imperfect markets and underdeveloped institutions common in developing countries.⁹ And some studies have shown that inequality, especially in assets, affects not only growth, but also the quality of institutions and human development outcomes such as health and education.¹⁰ In addition, lower inequality leads to improved social cohesion and reduced risk of conflict¹¹ and to more stable and enduring growth.¹²

Even more effective than reducing the income gap is closing the opportunities and capabilities gaps. Inequality in opportunities is expressed through barriers to entry in labour markets, which prevent people from exercising their capabilities and living a life they value. Inequality in freedoms (from want and hunger, for instance) is the defining metric of the human development paradigm because people's choices are restricted not only by income but also by their social, political and material contexts.¹³

Skewed distribution of capabilities

By some measures sub-Saharan Africa's distribution of capabilities is the worst in the world. The

continent sheds more than a third of the value of its already-low Human Development Index (HDI) when the index is adjusted for inequality (a measure of losses associated with unequal distribution of health, education and income; figure 3.3). The loss in HDI due to inequality is significantly higher for sub-Saharan Africa than for South Asia, the second most unequal region.¹⁴ And despite sub-Saharan Africa's recent progress in advancing human development and accelerating economic growth, efforts to reduce the malnutrition gap (between urban and rural, male and female, rich and poor) have not kept up. Often, the gap has widened (table 3.1). Ghana, Kenya, and Malawi have seen these disparities narrow, but other countries still lag.

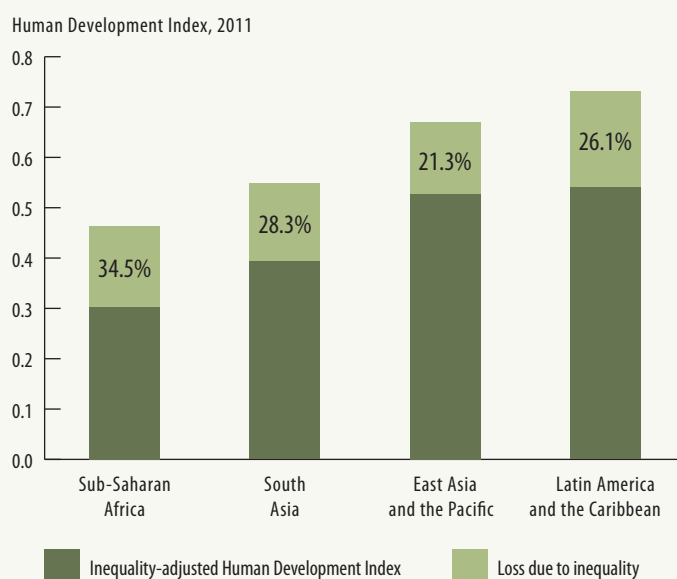
Political marginalization has clear implications for food security. In the worst scenarios ruling groups exploit food distribution as a source of reward and punishment. But even without such crude tactics, patrimonial politics can still determine access to food.

Research for this Report found that the relationship between political marginalization and food security is mediated by transport infrastructure.¹⁵ Economically important areas—often mineral-rich and politically influential—have a higher road density and are thus more food secure. In Benin, Ghana, Mali and Senegal politically marginalized areas were found to have higher numbers of stunted children under age five. While political marginalization is not the only factor determining the location of roads (external funding is another), areas without political clout see little government infrastructure investment. Political marginalization also affects food security through its impact on the quality of transport infrastructure, not just the quantity.

Policy bias and neglect

Following independence in the 1960s economic policies in most African countries sought to extract resources from agriculture to invest in urban areas and industrialization.¹⁶ Countries shifted resources and incentives from agriculture to manufacturing in an attempt to jumpstart modernization and industrialization. The shift followed the development thinking of the time, which viewed agriculture as a backward, subsistence sector yielding only low-value, undifferentiated commodities—and manufacturing as promising higher returns.¹⁷

FIGURE 3.3 SUB-SAHARAN AFRICA LOSES MORE HUMAN DEVELOPMENT GAINS TO INEQUALITY



Source: Calculations based on UNDP (2012).



TABLE 3.1 THE MALNUTRITION GAP IS NOT NARROWING IN ALL AFRICAN COUNTRIES, DESPITE A DECADE OF GAINS IN HUMAN DEVELOPMENT AND ECONOMIC GROWTH

Change in inequality of malnutrition indicators between the 1990s and 2000s

COUNTRY	URBAN/RURAL		MALE/FEMALE		TOP/BOTTOM WEALTH QUINTILE	
	UNDERWEIGHT	STUNTING	UNDERWEIGHT	STUNTING	UNDERWEIGHT	STUNTING
Burkina Faso	Lower	Higher	Lower	Higher	Higher	Lower
Cameroon	Higher	Higher	Lower	Lower	Higher	Higher
Ghana	Lower	Lower	Higher	Lower	Lower	Lower
Kenya	Lower	Lower	Lower	Lower	Higher	Higher
Malawi	Lower	Lower	Higher	Higher	Lower	Lower
Nigeria	Higher	Higher	Higher	Higher	Higher	Lower

Note: Periods differ across countries and groups based on data availability.
Source: Garcia 2012.

Sustaining this perception was a political economy that enabled urban dwellers, employed mostly in manufacturing and services, to capture more influence than the scattered, largely voiceless rural population, even though most people still lived in rural areas.¹⁸

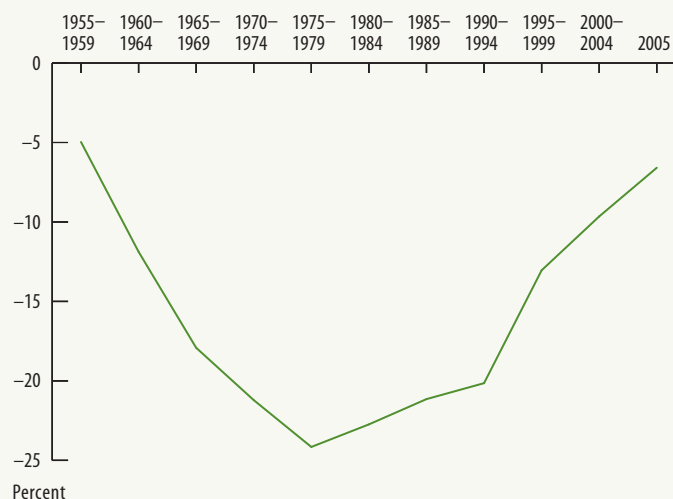
Agriculture languishes

The macroeconomic choices led to overvalued exchange rates, making imports cheaper for domestic urban consumers and agricultural exports less competitive in international markets. Governments also levied heavy direct and indirect taxes on agricultural activities.¹⁹ By one measure of the burden in sub-Saharan Africa, these biased policies increased the combined effective tax rate on agriculture (from industrial protection, direct taxation and exchange rate policies) from 5% in the late 1950s to close to 25% in the late 1970s (figure 3.4). Measures to support agriculture, such as input subsidies and other domestic market interventions, made little headway against these strong antiagricultural policies.²⁰

Taxation was heaviest on cash crops (cocoa, coffee, cotton, tobacco), while import-competing agricultural products received slight protection; most staple crops were neither supported nor taxed.²¹ Markets for food staples came under heavy government control, however. Policies to protect urban industries and the purchasing power of urban

FIGURE 3.4 EFFECTIVE TAXATION OF AGRICULTURE IN SUB-SAHARAN AFRICA SWELLED FROM THE LATE 1950s TO THE LATE 1970s

Nominal rate of assistance to farmers



Note: A negative nominal rate of assistance to farmers is equivalent to a net rate of taxation. Includes all sub-Saharan African countries in the database except South Africa and Nigeria; includes Sudan. Data are five-year averages, except 2005.

Source: Anderson and Valenzuela 2008, based on data from www.worldbank.org/agdistortions.

consumers included fertilizer subsidies and government monopolies and the use of marketing boards to control the prices of food staples. The net effect was to turn relative prices against farmers, who saw

their incentives to produce food and their power to buy it whittled away.²²

By the late 1970s commodity prices were declining, shifting the terms of trade against sub-Saharan Africa. Governments nonetheless persisted in their policies, boosting public spending and incurring heavy losses in state-owned enterprises. Fiscal deficits escalated. As the cumulative effects of the policies mounted, agricultural exports suffered further blows, making it harder to earn foreign exchange and leaving governments little choice but to borrow from international financial institutions.²³

The loans came with conditions requiring governments to curtail public spending. In agriculture that meant eliminating state control over markets, to reduce the bias, unleash markets for agricultural inputs and outputs and raise production. The structural adjustment policies did reverse the policy bias against agriculture (see figure 3.4), but the reforms were implemented quicker for food than for cash crops.²⁴

The lifting of public support to agriculture overshoot its mark. Retrenchment was imposed across the board, without regard to the beneficial effects of some policies, stalling agricultural development even as incentives improved.²⁵ Government support for agriculture was not replaced by less distortive policies.²⁶

Over time economic development and poverty reduction are associated with a progressive reduction in the share of the rural sector in the economy—and concomitant growth in manufacturing and services.²⁷ Done right, this process sustains increases in agricultural productivity, which can generate the food, labour and savings needed to support industrialization.²⁸ In sub-Saharan Africa, however, countries tried from the 1960s through the 1980s to leapfrog this crucial stage, raiding agriculture before the public and private investments for its development were in place.²⁹ Structural adjustment policies pursued through the mid-1990s discouraged public investment and supportive public policies.³⁰

Agriculture still recovering

Sub-Saharan Africa's agriculture is still recovering from this double blow. The antiagriculture bias of the 1960s–1970s and the state retrenchment of the 1980s–1990s disabled the sector as an early driver of growth and retarded the kind of structural transformation needed to increase food security and

reduce poverty. Rising population growth compounded the setback, as the need for food outpaced the continent's capacity to produce it.

Asia's success puts sub-Saharan Africa's experience in sharp contrast. In Asia governments began making food security a higher priority in the mid-1960s.³¹ Policies to stabilize domestic staple food prices (especially rice)³² and to ease rising population pressures and land scarcity shifted support towards agricultural development to ensure food security.³³ These policies enabled Asian farmers to benefit from crop science by applying techniques that tested as highly responsive to inputs, especially fertilizer. In response, Asia's agriculture productivity rose enough to create not only food security (explained further in chapter 4), but also the type of rapid economic growth, poverty reduction and structural transformation that African countries tried to rush in the 1960s.

Sub-Saharan Africa still feels the legacy of its policy neglect of agriculture. Over 2000–2008 African governments, with the exception of Mauritius, spent far more on the military than on agricultural research and development (figure 3.5). In 2008 military spending totalled almost \$15 billion while agricultural research and development spending was less than \$3 billion in the 19 countries in figure 3.5.³⁴

Sub-Saharan Africa's weak institutions hold back its agricultural science. In many countries decades of low, unreliable funding have taught farmers not to expect much from agricultural research. And while research has yielded high economic returns in sub-Saharan Africa, as it has in other regions,³⁵ public funding has fallen short. It will take considerably stronger commitment by African governments to fund agricultural research in order to generate the results necessary to sustain nutrition and human development outcomes.

Governments, academics, and bilateral and multilateral development agencies are all complicit in sub-Saharan Africa's long neglect of agriculture.³⁶ The toll has been high in poverty, food security and human development. In Niger, for instance, food reserves all but disappeared as its structural adjustment programmes were implemented in the late 1980s to mid-1990s, increasing vulnerability to weather shocks. The government's Food Security and Price Stabilization Reserve dwindled from more than 150,000 tonnes in 1983 to 80,000 in 1991 and 12,000–20,000 over 1997–2011 (figure 3.6). Niger



has endured at least two bouts of severe food insecurity in the last decade, but attempts to boost food stocks failed.

The past notwithstanding, sub-Saharan Africa now seems to have developed the momentum for a sustained push that will sharply reduce poverty and food insecurity, thanks to improved governance and institutional arrangements and leaders who are more responsive to the rural majority.³⁷ Some research even suggests a turnaround in agricultural productivity from the mid-1990s, although the data are not conclusive.³⁸ More favourable population dynamics are also in the mix, as dependency ratios have peaked, and a potential demographic dividend is within reach.³⁹

But these conditions will not improve food security outcomes without supportive policies. Across the world a range of policies and institutions with demonstrated positive outcomes for agricultural development and food security offer valuable lessons for an African transition.⁴⁰

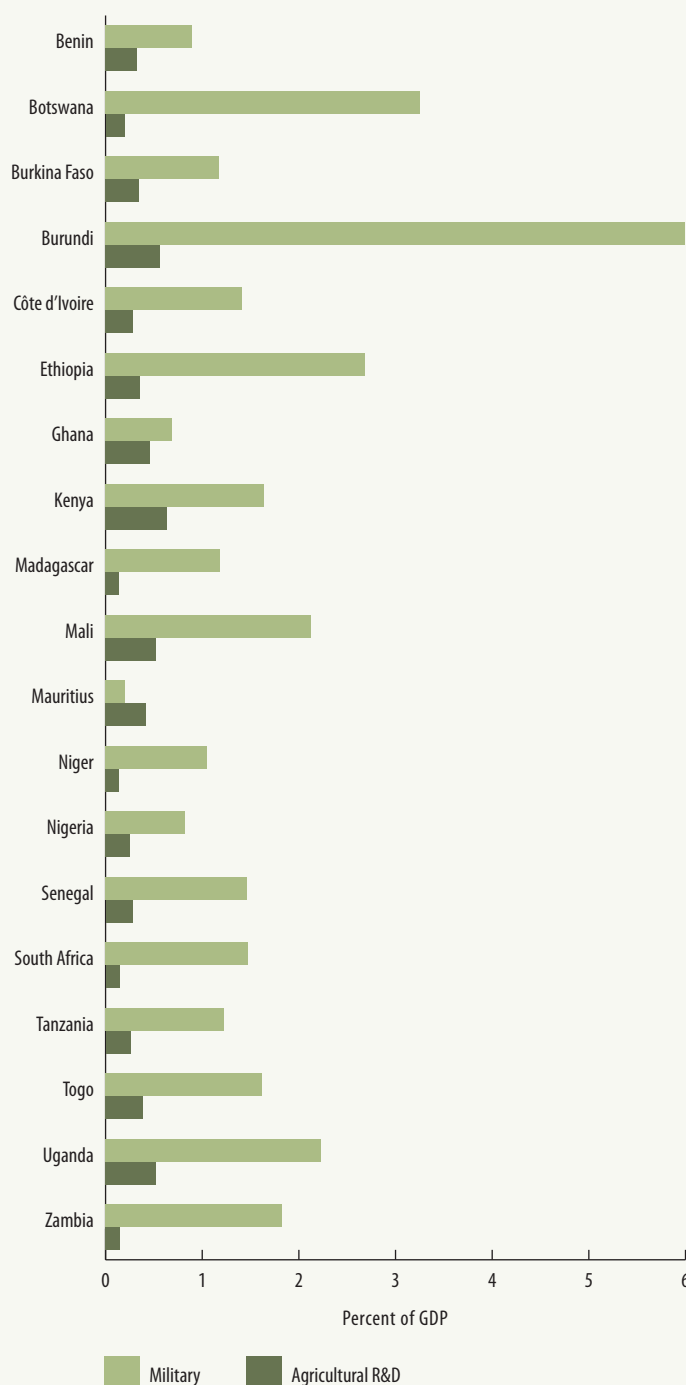
Detrimental international practices

The sharp international increases in food prices in 2007–2008 and 2010–2011, and the global economic downturn that began between them, have moved food security to the top of the global development debate. Add the threat of a changing climate and rising world consumption of grain-intensive animal proteins, plus a sense of urgency about the future of the global food system, and a historic opportunity emerges to accelerate the achievement of food security in sub-Saharan Africa.

The global spotlight on food security exposes the way international distortions assail sub-Saharan Africa's agriculture and food systems. Adding to the obstacles is donor indifference: agriculture's share of official development assistance to the region declined steadily from the mid-1990s until 2003, when it picked up again but at a slower rate (figure 3.7). Multiple biases in international agricultural trade—large subsidies to farmers in high-income countries and to biofuel producers, the decline in assistance to agriculture in sub-Saharan Africa—hamper sub-Saharan Africa's food systems. These external obstacles will not decide sub-Saharan Africa's future, but if high-income countries are serious about their development commitments and partnerships, they will adopt responsible, responsive policies consistent with their stated intentions.

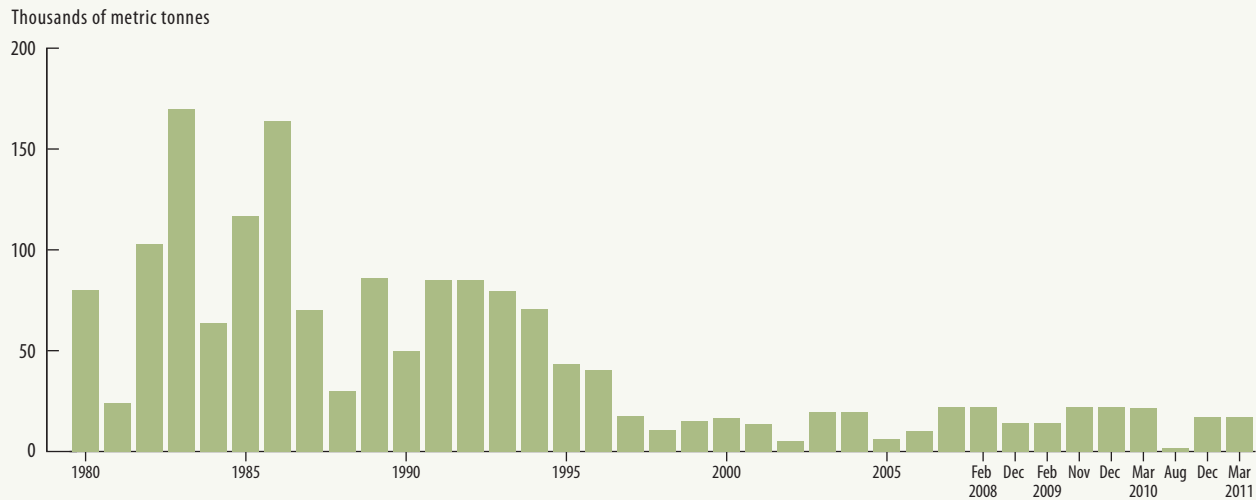
FIGURE 3.5 GOVERNMENT SPENDING PRIORITIES IN SOME AFRICAN COUNTRIES NEED TO SHIFT FROM THE MILITARY TO AGRICULTURE

Cumulative military spending and agricultural research and development (R&D) spending, 2000–2008



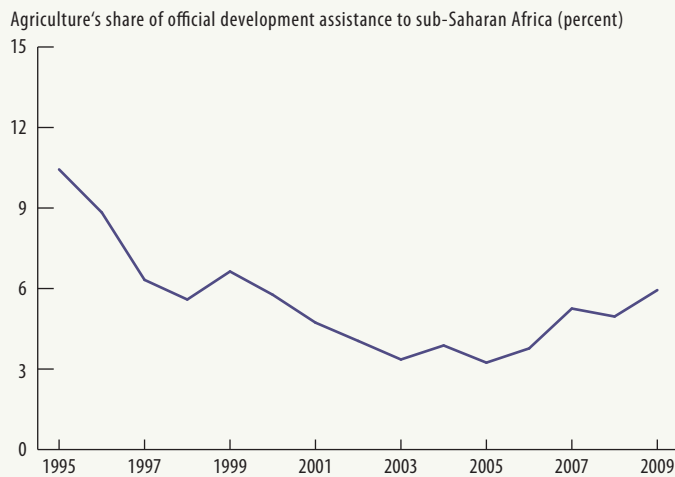
Source: Calculations based on SIPRI (2011) and IFPRI (2011).

FIGURE 3.6 NIGER'S FOOD RESERVES ALL BUT DISAPPEARED AFTER STRUCTURAL ADJUSTMENT IN THE LATE 1980s AND EARLY 1990s



Source: Cornia, Deotti, and Sassi 2012.

FIGURE 3.7 SHORT-CHANGING AGRICULTURE



Source: Calculations based on OECD (n.d.).

For years agriculture has been the centrepiece of largely failing international trade negotiations. The issue is especially relevant for sub-Saharan Africa, as unfair trade practices undermine prospects for food security. Part of the problem is the long-term

subsidies to agriculture in developed countries—and, more recently, the rise of subsidies for biofuel production.

Agricultural subsidies

Agricultural subsidies that benefit the rich in developed countries while hurting the poor in sub-Saharan Africa are one of the most egregious—and persistent—distortions in world trade. As the 2005 global *Human Development Report* put it: “Industrial countries are locked into a system that wastes money at home and destroys livelihoods abroad.”⁴¹

Many developed countries subsidize agriculture, which artificially strengthens the domestic agricultural sector. This partly explains how a few rich countries have dominated world agricultural trade for decades. Though there are claims that agricultural subsidies protect the interests of vulnerable communities in developed countries, in fact the subsidies are largely regressive.

Consider the European Union’s Common Agricultural Policy. Estimates suggest that it costs about €55 billion a year.⁴² One glaring distortion occurred with sugar a few years ago, when domestic prices—aided by import tariffs—were three times the world average, hurting nascent sugar industries in sub-Saharan Africa and other developing



regions.⁴³ Agricultural subsidies provide high levels of support that insulate developed country producers from world price signals, enabling them to expand production regardless of market conditions.

Rising production of biofuels

To this disabling legacy of agricultural subsidies has come a new source of concern: inefficient biofuel production. The increase in biofuel production over the past decade has been driven partly by national policies with targets for the use of “clean” fuels. Biofuel production—mainly ethanol and biodiesel—is considered a means of slowing dangerous climate change, but some biofuels are cleaner than others. Corn-based biofuels have barely reduced emissions.⁴⁴

Biofuel production can affect human development in at least two ways: through higher food prices and through incentives to increase production. Chapters 2 and 6 explore how increased volatility in international energy and food prices affects African living standards and the high degree of correlation between the two.

Even if biofuel production does not drive food prices up (evidence is still contested), rising prices for biofuels create incentives to reallocate resources and search for more land to exploit, the second principal way biofuel production can affect human development. The surge in land acquisition in Africa was driven in part by the promise of biofuels.⁴⁵ However, “biofuels promotion and subsidy policies need to take food-security consequences into account.”⁴⁶

New threats to food systems and sustainable development

If the deeper causes of food insecurity in sub-Saharan Africa are not addressed, its human development will not advance quickly enough to close the wide gap with the rest of the world. Disturbingly, however, other threats to Africa’s human development and the sustainability of its food systems are appearing on the horizon. Over the next several decades demand for food will increase as populations grow and per capita consumption rises among groups with greater purchasing power. At the same time that demand is rising, the natural resources on which food production depends will

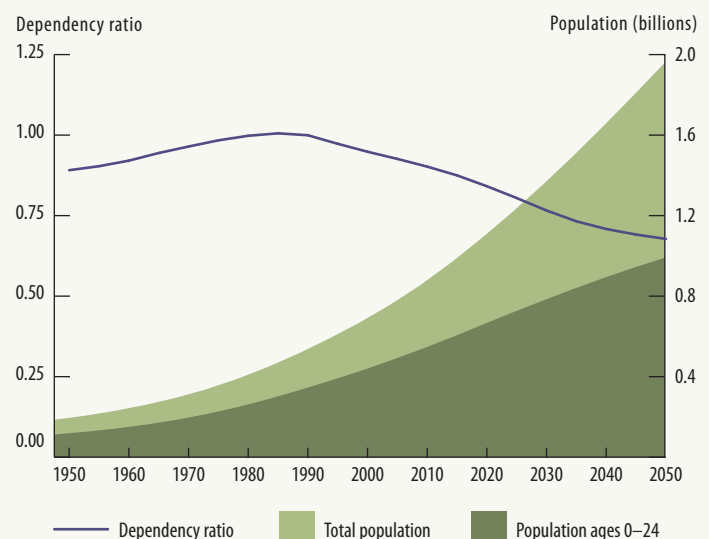
become scarcer, and competition for them will intensify, multiplying the constraints on the food supply. Climate change will advance, and with it will come greater climate variability and more extreme weather events.

The task ahead is as clear as it is daunting: policy-makers concerned with the future of sub-Saharan Africa’s food security will need to make its food systems more sustainable. Sub-Saharan Africa can learn from the green revolutions in other regions, but some agricultural practices associated with those revolutions are unsustainable, a lesson for sub-Saharan Africa to heed for the sake of generations to come.⁴⁷

Changing population dynamics

Sub-Saharan Africa’s profound demographic transition is already severely challenging its food security and human development and will do so for years to come. The continent’s population has expanded at a staggering 2.5% average annual rate for the past six decades, from 186 million people in 1950 to 856 million in 2010 (figure 3.8). While the growth rate has slowed, sub-Saharan Africa will still have the fastest growing population in the world for decades

FIGURE 3.8 POPULATION GROWTH IS EXPECTED TO REMAIN HIGH DURING SUB-SAHARAN AFRICA’S DEMOGRAPHIC TRANSITION



Source: UNDESA 2011c.

to come. In the years after 2050 its population will likely reach 2 billion.⁴⁸ By then, 1 in 5 people on the planet will be African. If sub-Saharan Africa cannot provide food security for its people today, what will it do tomorrow when its population has more than doubled?

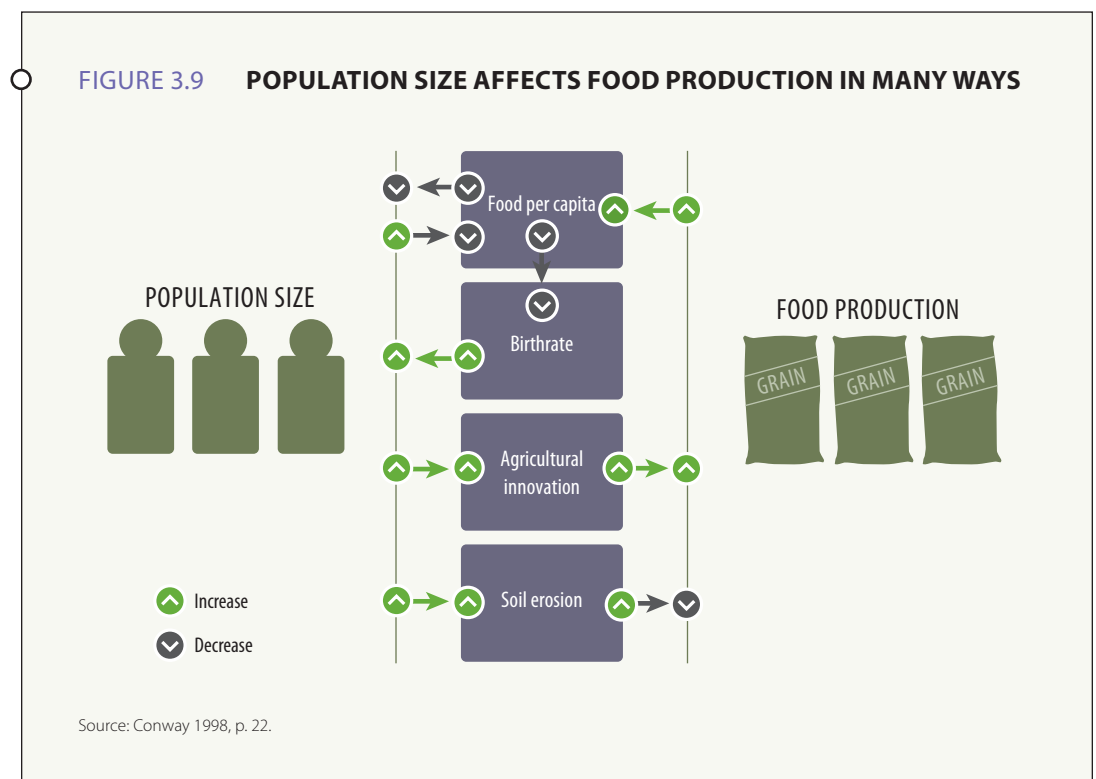
Fertility rates are expected to remain high in sub-Saharan Africa and therefore so will population growth rates. But there is great variation across the continent: over 2010–2050 East and West Africa have the fastest projected population growth, whereas the population in Southern Africa is projected to expand more slowly.

While the food system and population changes are linked in complex ways (figure 3.9), some things are clear. Population growth lowers the availability of food per capita. Income growth will shift diets towards processed food, meat, dairy and fish, putting further pressure on food systems. To keep up with the increased demand that these two trends will create, some estimates suggest that developing countries will need to double their food production over the next four decades.⁴⁹ Other estimates suggest that sub-Saharan Africa will need to accelerate crop production some 2% a year, nearly twice the aggregate annual growth required at the global level.⁵⁰

On a more reassuring note, the projected annual growth rates of crop production needed in sub-Saharan Africa are lower than those it achieved over 1961–2007,⁵¹ suggesting that future demand can be met. New challenges are emerging, however, in the form of climate change and threats to environmental sustainability.

Access to food will remain difficult for the poor and for rural inhabitants, whose fertility rates are higher. The average total fertility rate across a sample of 31 African countries was 90% higher in the poorest households than in the richest (figure 3.10) and 53% higher in rural households than in urban ones (figure 3.11).⁵²

Since fertility rates are generally higher among the poor, population growth in sub-Saharan Africa will tend to increase the share of poor people in the total population unless their incomes rise fast enough to move them out of poverty. If their incomes do not rise, poor people will be less able to buy food in local markets, which in turn would deepen food insecurity. Research conducted for this Report illustrates the interplay among income gains, population growth and food security. Consider two scenarios.⁵³ In a scenario of slow growth in incomes and high population growth,





calorie availability per capita will decline and the purchasing power of the poor will lag, resulting in a steep increase in child malnutrition. The simulation suggests that the most severe impact on malnutrition could be in Central Africa—already devastated by poverty and hunger—with an increase in child malnutrition of 41% between 2010 and 2050 (figure 3.12). In a scenario with rising incomes among the poor and slower population growth simulations show a reduction in child malnutrition of 20%–50% over the same period.

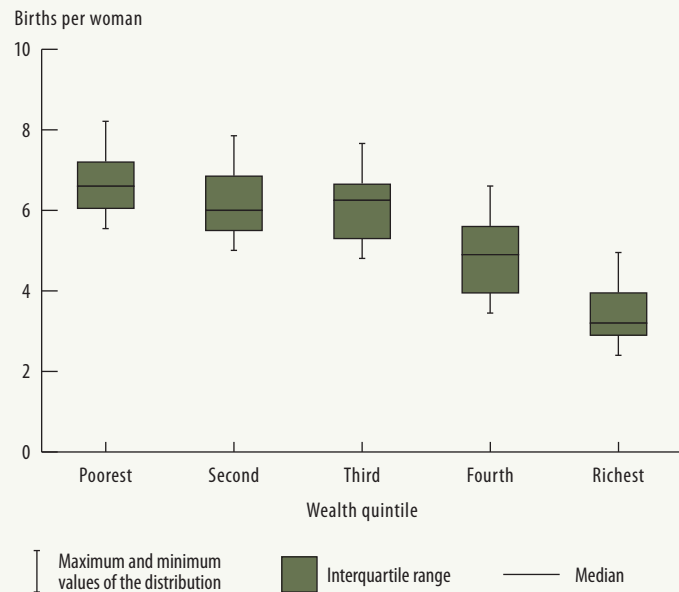
Other demographic trends will also affect food security in sub-Saharan Africa, including urban concentration, migration, changes in health status and an increasingly youthful population. Although the dependency ratio peaked decades ago, some 536 million Africans (60%) are under age 25 (see figure 3.8). Studies suggest that many young people across sub-Saharan Africa are moving away from agricultural livelihoods, especially as farmers, as part of a larger transformation in agriculture and rural areas in favour of urban lifestyles.⁵⁴ The implications for the sustainability of the food system could be profound. Sub-Saharan Africa will need to develop livelihoods for young people, who will place large demands on that system and, where feasible, will need to make rural livelihoods attractive to young people (chapter 4).

In the early 1990s two-thirds of Africans lived in rural areas. Although projections may overestimate the rate of urbanization,⁵⁵ they suggest that around 2035 sub-Saharan Africa will enter its urban age,⁵⁶ with half its people (an estimated 760 million) living in cities (figure 3.13). Exceptionally high rural population growth rates of the 1970s and 1980s are moderating in sub-Saharan Africa, much as they did in Asia.⁵⁷

These population dynamics suggest that food insecurity could become more of an urban than a rural challenge.⁵⁸ Along with rising incomes, urbanization compounds the pressure on nearby areas to meet the demand for food arising from large, concentrated populations.⁵⁹ Research has shown that food-energy deficiency was higher in urban areas in most of the countries investigated.⁶⁰ The research confirmed high levels of child undernutrition in urban areas, pointing out that with urbanization come unhealthy diet changes, such as increased intake of saturated fats and trans fats, sugar and salt, and processed foods containing excessive levels of all of these.

FIGURE 3.10 FERTILITY RATES IN SUB-SAHARAN AFRICA ARE 90% HIGHER IN THE POOREST QUINTILE THAN IN THE RICHEST ...

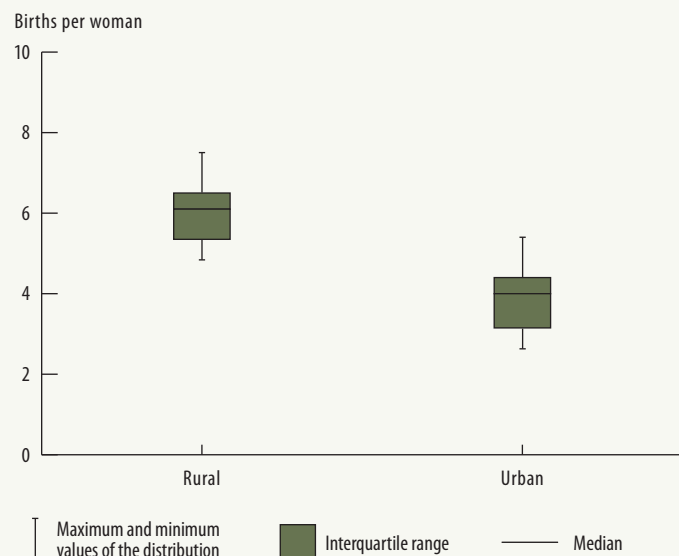
Total fertility rate in 31 African countries, latest available data since 2000



Source: Calculations based on MEASURE DHS, ICF International (2012).

FIGURE 3.11 ... AND 53% HIGHER IN RURAL HOUSEHOLDS THAN IN URBAN HOUSEHOLDS

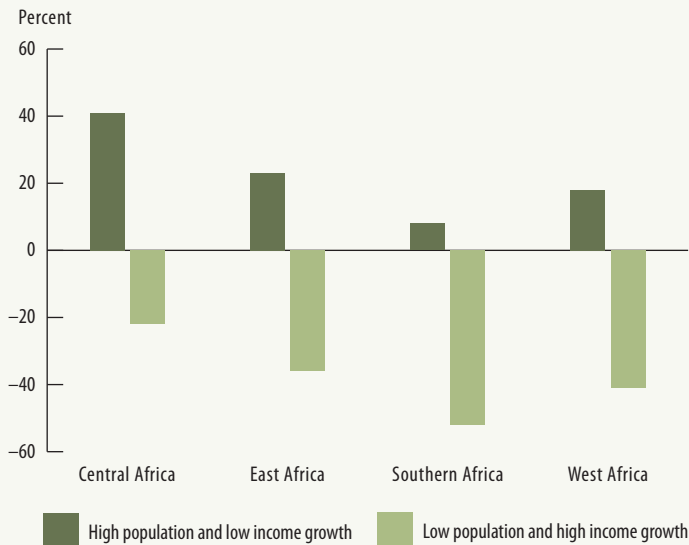
Total fertility rate in 31 African countries, latest available data since 2000



Source: Calculations based on MEASURE DHS, ICF International (2012).

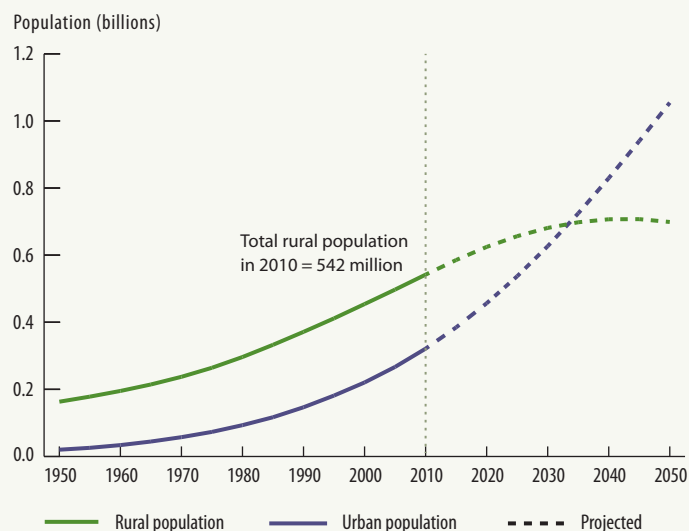
FIGURE 3.12 INCOME AND POPULATION DYNAMICS SWAY FOOD SECURITY OUTCOMES IN SUB-SAHARAN AFRICA

Projected changes in underweight among children under age five for two scenarios of population and income growth, 2010–2050



Source: Thomas and Zuberi 2012.

FIGURE 3.13 MORE PEOPLE IN SUB-SAHARAN AFRICA WILL LIVE IN CITIES THAN IN RURAL AREAS BY 2035



Source: UNDESA 2010b.

Environmental challenges—soil and water

The natural environment, which sustains agriculture and food production, is feeling the effects of the pressures that demographic changes are placing on food systems across sub-Saharan Africa. One way to alleviate that pressure is to expand the land under cultivation.⁶¹ But there are limits to such expansion.⁶² Because most agricultural production in sub-Saharan Africa is rainfed, it is more vulnerable to the vagaries of weather (chapter 2).⁶³ Farms, already small by international norms, are shrinking. In the Democratic Republic of the Congo, the largest country in sub-Saharan Africa, average landholdings contracted from 1.5 hectares in 1970 to 0.5 hectare in 1990⁶⁴—evidence of pressures on land frontiers in sub-Saharan Africa.

At the same time, land degradation and loss of soil fertility are on the rise, reducing yields. Soil depletion is aggravated by low use of inputs and a lack of technological innovation.⁶⁵ Estimates of how much arable land has been degraded vary, but there is agreement that the problem is substantial and likely to worsen as cropland is lost to expanding cities and infrastructure.⁶⁶

One global assessment of agricultural soils published in the mid-1990s estimated that 23% of agricultural land had been degraded.⁶⁷ Sub-Saharan Africa had the second-highest share (30%).⁶⁸ Moreover, there is mounting evidence that soil degradation is accelerating.⁶⁹ Estimates of yield losses from soil erosion in sub-Saharan Africa range widely, from 2% to 40%, making land degradation there the worst in the world.⁷⁰ The changing patterns of food demand in the region, which are putting heavier demands on land and water, are hastening the decline in biodiversity and other environmental services, such as water and air purification and nutrient cycling. Although human well-being depends on these services, as predominantly public goods they have no markets or prices, so their losses continue unabated, seldom detected by economic incentive systems or tallied in national accounts.⁷¹

Sub-Saharan Africa, already water-stressed, may find its water supply increasingly imperilled by climate change.⁷² Changes in the supply from rivers and rain would have devastating implications, since much of the population relies on these sources of water for agriculture and household use.⁷³ Climate change could expose a projected 75–250 million



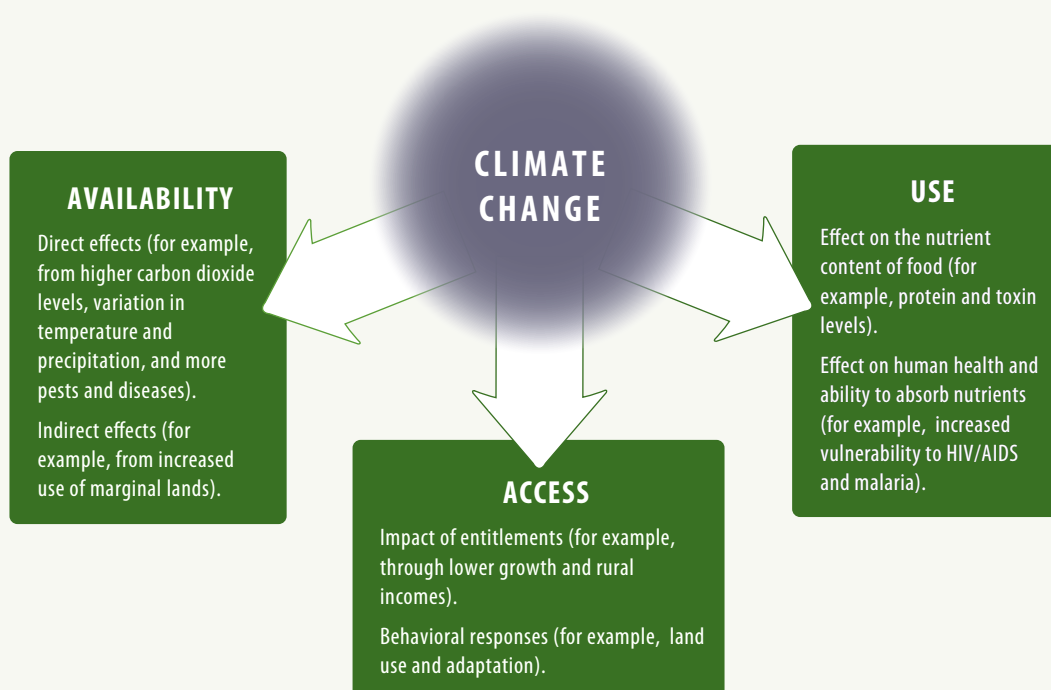
people to increased water stress, halving yields from rainfed agriculture in some countries by 2020.⁷⁴ To prepare, African countries need more precise estimates than are possible from current models, with their high uncertainty and inconsistency. It will be important to invest in more detailed and reliable predictive models.⁷⁵

Modern agricultural techniques, with their chemical fertilizers, mechanization and pesticides, are energy-intensive, relying heavily on fossil fuels. Thus the economics of food security and energy are closely related. Fuel is an input for fertilizer, shipping, distribution, processing, refrigeration and cooking. Energy is also required for extracting water and irrigation, dry cropping, heating greenhouses and livestock sheds, and fuelling tractors. Recent developments in biofuels complicate the relationship between food security and energy. The water-energy-food nexus calls for integrating food security with energy and water policies.

The perils of climate change

The UN Intergovernmental Panel on Climate Change has established that atmospheric concentrations of greenhouse gases have increased markedly since the Industrial Revolution.⁷⁶ The everyday life of poor and vulnerable people will be severely affected by climate change. Increased warming reduces the growing season, with implications for all three components of food security (figure 3.14).⁷⁷ Many countries in sub-Saharan Africa already face semiarid conditions that disrupt agriculture, but climate change is likely to shorten the growing season even more and force large regions of marginal agriculture out of production.⁷⁸ Climate change will also increase evapotranspiration, which will lead to water shortages at critical peak seasons—especially serious in semiarid sub-Saharan Africa.⁷⁹ It is a sad irony that the region least responsible for global climate change looks set to bear the brunt of its harmful consequences.⁸⁰

FIGURE 3.14 THE DESTABILIZING EFFECTS OF CLIMATE CHANGE WILL CUT ACROSS THE COMPONENTS OF FOOD SECURITY



Source: Based on Boko and others (2007).

Changes in climate and weather will shift food production by altering soil temperature, moisture levels, photosynthesis rates and the vitality of plant organisms and their insect ecology. The exact repercussions of changing patterns of rainfall and temperature are difficult to predict, because of uncertain tolerance thresholds and complex feedback cycles involving atmospheric gases, insects, fertilizers, plant pathogens, weeds and soil organic matter.⁸¹

A hotter climate with less precipitation will be especially detrimental, since higher temperatures will increase the loss of water to the atmosphere and further dry soils already punished by lower rainfall. If these changes come slowly, ecological systems could adapt. But current adaptation capacity is weak.⁸² Large adverse impacts are expected in Southern Africa, where even moderate temperature increases could lead to agricultural decline⁸³ and lower cereal yields.⁸⁴ By 2030 yields of maize, the region's staple crop, are projected to fall nearly 30%. Such declines would be catastrophic,⁸⁵ hitting small-scale and subsistence producers hardest. Under a comprehensive climate change scenario, productivity would decline, prices would rise and calorie availability would fall, leaving nearly 1 million more children undernourished over the next two decades.⁸⁶

With climate change will come more frequent and variable weather shocks. If infrastructure is damaged, the distribution of food will suffer, as will people's ability to buy or sell it. Making matters worse, violence tends to be associated with unusually hot growing seasons in sub-Saharan Africa, a destructive pattern that could escalate with climate change.⁸⁷

Continued warming is also expected to cause undesirable changes in the distribution and production of fish in the region⁸⁸ and in the distribution of wild foods important to many poor households, particularly when other food sources decline. A study of 5,000 plant species in sub-Saharan Africa projected that climate change could shrink or shift 81%–97% of habitats suitable for their growth; by 2085, 25%–42% of those habitats could be lost entirely.⁸⁹ The consequences are especially dire for communities that rely on these plant species for food or medicine.

For their part, food and agriculture are responsible for a large share of human-caused greenhouse

gas emissions.⁹⁰ Agriculture must become a net emissions sink, not a net source. And its development will need to focus not only on raising productivity, but also on preparing the sector—and the people whose livelihoods depend on it—for a warmer world.⁹¹

Decision time for sub-Saharan Africa

The persistent challenges and future threats to food security in sub-Saharan Africa demand a fundamental restructuring of the ways it produces, processes, distributes and consumes food. Food production systems—and the food chain more generally—must become fully sustainable.⁹² And the mounting pressures on land, water and energy, along with the many negative environmental effects of food production practices, make it imperative to build the architecture for an ecologically sustainable future.

These mutually reinforcing challenges, linked by complex causal relationships, are often poorly understood. The challenges are global, but they present the greatest risk to the poor countries and people of sub-Saharan Africa, whose capacity to cope with shocks and adapt to new threats is weakest. The context is one of unexpected change, unintended policy consequences, and repercussions that complicate risk management. Dealing with these challenges amid such uncertainty requires making sub-Saharan Africa's food systems more productive and resilient.

Acting now on the policy package outlined in chapter 1 will enhance sub-Saharan Africa's food security in the short run. In the long run it will improve the quality of institutions through social dialogue, better organization and greater accountability. Together with more—and more nutritious—food, these policies will equip empowered, resilient societies with the tools to break free from spiralling malnutrition, expand their life choices and demand a government that responds to their needs for fair policies to end hunger and destitution.

The state has several responsibilities in enabling this process of greater food security. These include building infrastructure and providing social protection, strengthening food markets, involving communities in decision-making, promoting agricultural research and improving nutrition knowledge, especially among the poorest. Reducing



BOX 3.2 PUBLIC POLICIES FOR FOOD SECURITY IN BRAZIL AND INDIA

Well-designed public policies can affect food security and human development as well as economic growth. Consider the experience of Brazil and India. Economic growth has accelerated in both countries since the mid-1990s. But while India's growth has outpaced Brazil's, the share of the population that is undernourished has been stalled at 19%–20% in India while falling by almost half in Brazil to 6% in 2006–2008.

Progress in Brazil's fight against hunger accelerated with the Fome Zero (Zero Hunger) programme introduced in 2003. Aimed at improving access to food for the most vulnerable groups and increasing food production, the strategy built on earlier initiatives for rural development and social protection. It consolidated and scaled up cash transfers (Bolsa Familia) and school meal programmes and bolstered support to income-generating activities, family agriculture, and citizen education and mobilization. Food and nutrition security, declared a priority of the federal government, was institutionalized as a state responsibility through a new ministry directly linked to the president's office. The ministry is tasked with coordinating the work of other ministries in achieving a unified set of goals, including eradicating hunger. The National Council on Food and Nutrition Security supports the ministry,

advises the president and monitors and facilitates communication between the government and civil society. The outcome has been transformational, improving food security and contributing to reducing Brazil's high levels of inequality. The country has met the first Millennium Development Goal target of halving its 1990 poverty level in advance of the 2015 target date. The right to food was formally established under the Brazilian Constitution in 2010.

Multiple reasons have been suggested to explain India's puzzling lack of progress in improving food security despite dramatic economic growth and agricultural expansion since 1990. Whatever the reasons, policy-makers are stepping up efforts to accelerate progress with new programmes and resources. The 2012–2013 budget calls for a multisectoral nutrition augmentation programme that would provide 60 percent more resources to integrated child development services, more resources for school meals and a special initiative to address the nutrition needs, education and skills development of adolescent girls. The plan is to focus first on the 200 districts with the highest prevalence of malnutrition and to spark synergies across multiple sectors, including nutrition, sanitation, drinking water, primary healthcare, women's education, food security and consumer protection.

Source: Burity, Cruz, and Franceschini 2011; Chmielewska, and Souza 2011; Da Silva, Del Grossi, and Galvão de França; Deaton and Drèze 2009; Haddad 2011; Lopes 2010; Mukherjee 2012; Rocha 2009; World Bank 2011c, 2012.

malnutrition, disease and mortality depends on people's ability to feed themselves and on their access to healthcare, formal and informal education, safe drinking water and sanitation, and epidemiological protection. All these supports require active, responsive and accountable governments. There are plenty of examples across the developing world from which to learn (box 3.2).

Many Africans believe that their governments are not doing enough. The 2009 Gallup World Poll, which included a module on food security, reveals that the main concerns of Africans are poverty and hunger. Asked about specific issues that governments should address, the most common responses were agriculture and jobs. About 60% of respondents disagreed with the statement: "The government of this country is doing enough to

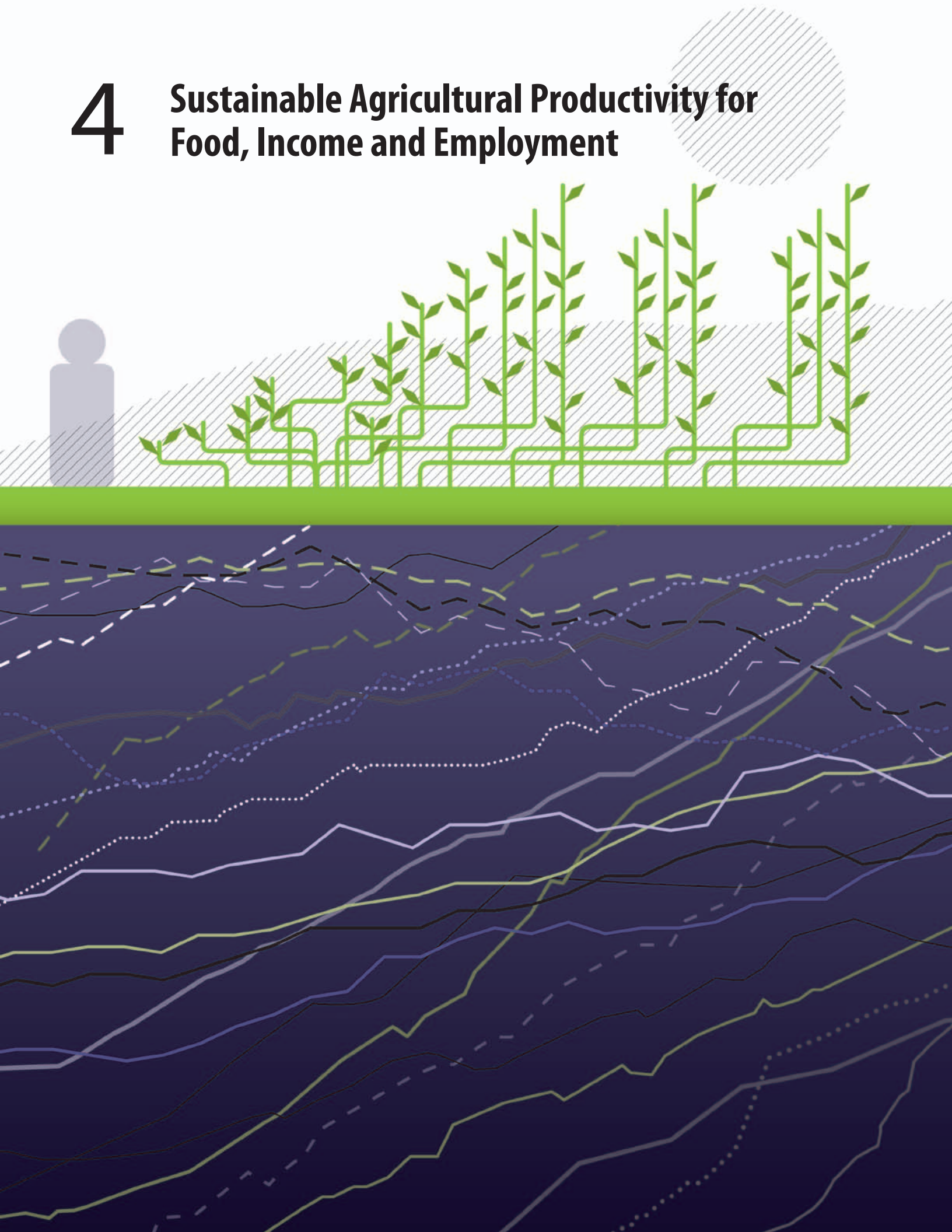
help people get food."⁹³ Where governments are working to make a difference, people acknowledge the efforts.

More countries are committing to more resources for agriculture and to important initiatives that provide political platforms for advancing and monitoring their efforts, such as the Comprehensive Africa Agriculture Development Programme of the New Partnership for Africa's Development (explored in chapter 4).

Sub-Saharan Africa's food security demands turning from rhetoric to action. The rest of this Report considers four areas of policy that, when taken up vigorously in forms suited to individual countries, could finally spring a new dynamic on the continent through the interplay of greater food security and higher human development.

4

Sustainable Agricultural Productivity for Food, Income and Employment





CHAPTER 4

Sustainable Agricultural Productivity for Food, Income and Employment

Sub-Saharan Africa's food security and human development depend enormously on agriculture. Agriculture determines food availability, the first link in the food security chain. It is the main source of income and employment for a majority of Africans, especially the poor, and thus directly supports human development. Completing the circle, income and employment strengthen food security by enabling people to purchase or produce food. Agriculture also shapes how sub-Saharan Africa uses its land and water—and how sustainably. Farm productivity is the key driver of sustainable agricultural progress.

Productivity growth (especially on smallholder farms) generates farm employment, decent wages and other income on and off the farm. By raising incomes and lowering the prices of staple foods, productivity growth also expands the ability of both the rural and the urban poor to buy food. And these gains can translate into more public and private resources for investing in infrastructure, services, research and social protection (chapter 6), further advancing agricultural productivity, food security and human development. This chapter examines the promise of higher agricultural productivity in unleashing a triple dividend for sub-Saharan Africa: a virtuous cycle of sustained food security, higher human development and lower pressures on land and water.

What can boost sub-Saharan Africa's agricultural productivity? Solutions lie in viewing the drivers of agricultural productivity holistically rather than mechanistically. Productivity depends on climate and on efficient and effective use of the factors of production (farmland, water and labour). Agricultural inputs (fertilizers, irrigation, seeds and capital equipment) and farmers' skills also influence farm productivity. Increasing food availability is urgent, so it is tempting to focus on individual inputs. But such short-cuts are neither effective nor sustainable. Public policy needs to comprehensively address how to sustainably enhance input use. More robust policies focus on what motivates farmers to obtain, use and improve inputs and factors of production—the broader set of contextual elements that determine which inputs farmers use—and the underlying incentives.

Elevating agricultural productivity sustainably requires getting these incentives right, so that farmers use inputs in ways that conserve natural resources. Sustained productivity growth can come only from pushing on the frontier of agricultural science and technology—and that comes only from continuous research and adaptation. Policies must advance agricultural science, speed its delivery to farms and transmit farmers' experiences to researchers. Technology is vital for adapting sub-Saharan Africa's agriculture to climate change and to the region's diverse agroclimatic conditions (chapter 2), as well as for supporting sustainable stewardship of natural resources (chapter 3). Adaptation requires local learning and modifying general scientific principles and technologies to fit specific contexts.

Realizing the promise of agricultural productivity

Agricultural growth can be a wellspring of food security and human development, but not all types of agricultural growth are equally effective. This section outlines the conditions for agricultural growth to boost incomes, generate employment and increase food entitlements, especially for poor people: labour-intensive farming that reaches rural labour to jumpstart growth and reduce poverty.

Growth in agricultural productivity can advance food security and human development

As countries develop, agriculture's economic importance shrinks. Growing food takes less time and

TABLE 4.1 SHARE OF THE ECONOMICALLY ACTIVE POPULATION IN AGRICULTURE IN SUB-SAHARAN AFRICA, BY COUNTRY (%)

COUNTRY	1999–2001	2011
Angola	72	69
Benin	54	43
Burkina Faso	92	92
Burundi	91	89
Cameroon	60	46
Central African Republic	73	62
Chad	75	65
Congo, Dem. Rep. of the	62	57
Côte d'Ivoire	49	37
Eritrea	77	73
Ethiopia	82	77
Ghana	57	54
Guinea	84	79
Kenya	75	70
Malawi	83	79
Mali	81	74
Mozambique	83	80
Niger	86	83
Nigeria	33	24
Rwanda	91	89
Senegal	73	70
Sierra Leone	65	59
South Africa	9	6
Tanzania, United Rep. of	81	75
Togo	60	53
Uganda	80	74
Zambia	69	63
Zimbabwe	63	56
Mean (excluding South Africa)	72	66

Note: Includes only countries with more than 1 million economically active people in agriculture.
Source: For 1999–2001, FAO (2010a); for 2011, see statistical table 4 in this Report.

fewer people and resources, freeing people to work in other sectors—or enjoy more leisure time. Does this mean that promoting other sectors could accelerate sub-Saharan Africa's human development? Certainly, by creating employment- and income-generating opportunities in manufacturing and services, encouraging migration from rural areas and meeting food needs through trade or large mechanized farming. Frustration with sub-Saharan Africa's stumbles in agriculture, especially when viewed against the agricultural successes of a country like Brazil, has strengthened this argument.¹

But this point must be weighed against sub-Saharan Africa's earlier failures to force economic transformation of this kind (chapter 3).² And this argument downplays just how important agriculture is to Africans, especially the poor, for food, income and work, three key determinants of food security and human development.³ African agriculture involves diverse crops and livestock, but productivity is particularly important for cereals and starchy roots, which provide two-thirds of total energy intake (three-quarters for the poor). More than 75% of cereals and almost all root crops come from domestic agriculture rather than imports.⁴ Farm incomes remain key to the survival of the 70% of the extremely poor who live in rural areas,⁵ not least because rural nonfarm activity (accounting for 30%–40% of earnings) tends to prosper when farm incomes are rising.⁶ On average, sub-Saharan African countries have two-thirds of their economically active population in agriculture (table 4.1), and among young workers the share is even higher in some countries.⁷ The share of women in agriculture is nearly 50% in sub-Saharan Africa, higher than almost everywhere else in the developing world, so agriculture strongly influences the condition of women.⁸

Agriculture's vital role in the lives of many Africans does not rule out other paths to human development and food security⁹—at least in countries with the capacity, resources (from oil or minerals, for example) and conditions (good trade infrastructure) to move quickly towards manufacturing exports. These countries might be able to meet their food needs through imports and generate jobs and income from nonagricultural production.¹⁰ And investing in large mechanized farms could help achieve food security in countries with sparsely populated cultivable land, especially



if migration to these areas is limited and if the non-agricultural sector can absorb the growing labour force (chapter 7).¹¹

Under the right conditions, however, agricultural growth underpinned by productivity gains can reduce poverty far more effectively than can growth in the rest of the economy (table 4.2 and figure 4.1).¹² Where rural poverty is widespread and much of the labour force lives in rural areas, increasing farm productivity has the potential to drive (but not guarantee) greater economic growth¹³ and poverty reduction,¹⁴ accelerating food security and human development. This holds as true in sub-Saharan Africa today as it did in Asia in the 1960s. Thus, for a large number of Africans, especially the poorest, agricultural growth driven by productivity increases remains—and will for years to come—the best route to the equitable production of food, income and jobs.

Why can growth in agriculture be so much more effective at reducing poverty in sub-Saharan Africa than growth in other sectors,¹⁵ and what are the right conditions for that to happen? First, increased farm production should lead to more and cheaper food (and often more stable access to food, as stocks grow) and to higher income from sales of cash crops and livestock. Both boost purchasing power and thus the ability to buy food (poor people spend a larger than average share of their income on food, as shown in chapter 3). Second, land, the main asset in farming, is typically much more evenly distributed in sub-Saharan Africa than are the human and physical capital required for nonfarm production (chapter 3). When land is very unequally distributed, as in much of Latin America, agricultural growth does not reduce poverty as much.¹⁶ Third, small-scale, labour-intensive farming, as in sub-Saharan Africa, has productivity advantages that large, capital-intensive mechanized farming does not.¹⁷

Agricultural growth can enhance food entitlements even after the early phases of mass poverty reduction, though the effects are most powerful then. As incomes climb and staple food stocks grow, people eat more meat, dairy, fruits, vegetables and other higher value crops. Over time, this helps create demand for livestock and fish. As long as productivity keeps growing, agriculture will produce jobs, both as self-employment on small farms and as wage labour on larger farms. In China smallholder and poor farmers are included in the

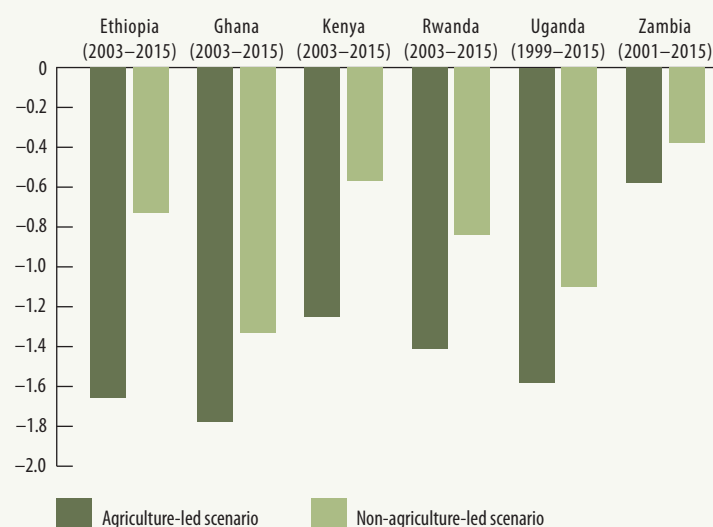
TABLE 4.2 GROWTH IN AGRICULTURE SURPASSES GROWTH IN OTHER SECTORS FOR REDUCING POVERTY

AGRICULTURE	EFFECT	POVERTY INDICATOR	OTHER SECTORS
Agricultural GDP growth per agricultural worker	is 2.9 times more effective	in increasing the average income of the poorest 20%	than growth in nonagricultural GDP.
Agricultural GDP growth per capita	is 2.7 times more effective	in reducing the extreme poverty rate	than nonagricultural growth.
Agricultural GDP growth	is 2.9 times more effective	in reducing the extreme poverty rate	than growth in manufacturing.
Agricultural GDP growth	is 3 times more effective	in increasing household spending in the poorest households	than nonagricultural growth.
Agricultural GDP growth	is 4 times more effective	in reducing the extreme poverty rate	than nonagricultural growth.
	and 1.3 times more effective	in reducing the \$2 a day poverty rate	than nonagricultural growth.

Source: Bravo-Ortega and Lederman 2005; Christiaensen and Demery 2007; De Janvry and Sadoulet 2010b; Loayza and Raddatz 2010; Ligon and Sadoulet 2008; Christiaensen, Demery, and Köhl 2011.

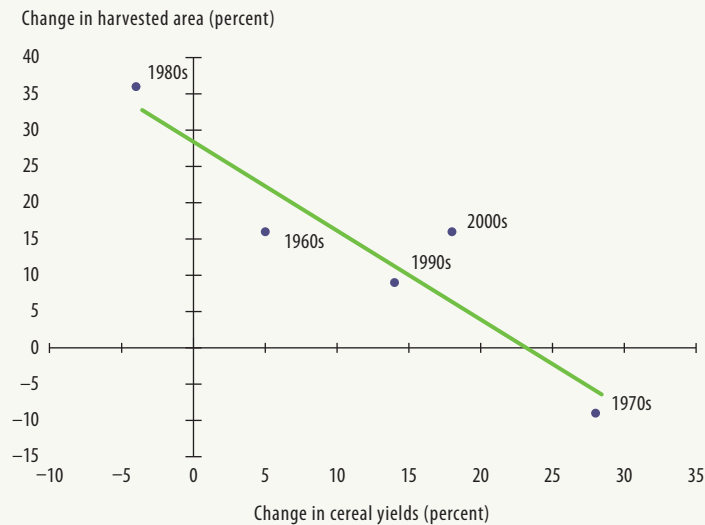
FIGURE 4.1 FOR MOST OF SUB-SAHARAN AFRICA GROWTH IN AGRICULTURE IS MORE EFFECTIVE IN REDUCING POVERTY

Poverty elasticity of income



Note: Based on economywide models simulating the impact of growth on poverty reduction. Both scenarios have an acceleration in the economic growth rate (relative to actual growth), one coming exclusively from agriculture and the other exclusively from the industrial sector.
Source: Diao, Hazell, and Thurlow 2010, table 2, p. 1378.

FIGURE 4.2 HARVESTED AREA IN SUB-SAHARAN AFRICA EXPANDED FASTER WHEN YIELD GAINS SLOWED



Note: Cumulative change during each decade, based on three-year moving averages.
Source: Calculations based on FAO (2012c).

expanding horticultural sector, and in India the same is happening in dairy.¹⁸

Sub-Saharan Africa's prospects are bright for continuing job creation in agriculture. For example, the region's global edge in commercial agriculture lies in processes that are very labour-intensive and difficult to mechanize (hand-picked cotton, tea harvesting, horticulture and floriculture).¹⁹ Agriculture can continue to make headway against poverty as long as smallholder and poor farmers can be integrated into new, more demanding supply chains driven by the conditions set by supermarkets and by consumers in international markets.

Agriculture thus has the potential to generate jobs and income and to expand food entitlements. In countries with low incomes, high poverty rates and a large rural labour force, accelerating agricultural growth is the most critical factor for reducing mass poverty and enhancing food security. Can sub-Saharan Africa do it?

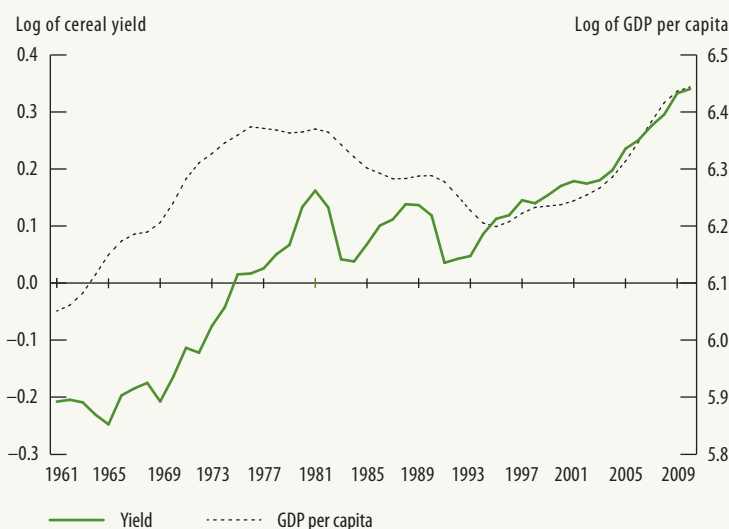
Rapid increases in yields can unlock the potential of agriculture

If agriculture is to advance sub-Saharan Africa's human development and food security, yields must rise—and fast. Just look at Ghana. Since 2000 rural poverty has declined sharply, enabling Ghana to become the first country in the region to meet the Millennium Development Goal target on reducing poverty by half by 2015. This progress was driven in part by expanding the area under cocoa cultivation on labour-intensive smallholder farms. But a cautionary lesson follows: as area expansion approached its limits, extensive cultivation led to environmental stress.²⁰ This pattern has held for the rest of the region: area expansion has driven agricultural production over the past half century, with harvested area increasing each decade since 1961 except in the 1970s. The expansion accelerated whenever yield gains slowed (figure 4.2).

In sub-Saharan Africa periods of rising income per capita have coincided with periods of sustained yield increases (figure 4.3).

To offset rapid population increases and resource depletion (chapter 3), sharp gains in crop yields, especially for staples, must drive growth in farm output. Higher yields will produce more food, generate more income and support good environmental management.²¹ While crop yields are not the only determinants of food security and human

FIGURE 4.3 INCOME PER CAPITA IN SUB-SAHARAN AFRICA HAS RISEN WITH SUSTAINED YIELD INCREASES SINCE 1961, EXCEPT IN 1976–1994



Note: Three-year moving averages.
Source: Calculations based on FAO (2012c) and World Bank (2011b).



development in sub-Saharan Africa (see box 4.1 on the importance of livestock and fish), they are essential for ensuring food availability and access for a majority of Africans.

But can yield gains alone ensure that poor people become food secure? Consider South Africa.

In 2008–2010 cereal yields were 3.75 times higher than in 1961–1963,²² an increase almost as large as East Asia's during its green revolution. However, South Africa's yield growth was driven initially not by labour-intensive productivity gains in smallholder farms but by large-scale capital-intensive maize

BOX 4.1 HOW LIVESTOCK AND FISH FEATURE IN THE LIVELIHOODS OF MANY AFRICANS

While meat and fish still account for a low share of food supply at the aggregate level (see table), they are important sources of livelihood for some groups, particularly in vulnerable communities. Animal husbandry is the basis of pastoralist communities across Africa, from the Maasai and Turkana in East Africa to the Tuareg of the Sahel. Moreover, farmers across the continent supplement their income by rearing small animals such as chickens and goats. Smaller groups of commercial farmers, especially in Southern Africa (Botswana, Namibia), derive a substantial share of income from raising livestock. Still, livestock production remains limited in sub-Saharan Africa: its per capita production value has remained unchanged over the past four decades. In sharp contrast to practice in Asia, in most sub-Saharan African countries animals are not integrated into cultivation, which is usually done by hand, hoe or tractor, and animal manure is little used as fertilizer. For populations near coasts and rivers fish are a critical source of income and nourishment. In coastal communities in Gambia, Ghana and Sierra Leone almost two-thirds of dietary protein and a large share

of calories come from fish. As incomes rise and demand for animal products grows, livestock and fish will play an increasingly important role.

Increasing agricultural productivity in the major food and cash crops, by increasing incomes, will enable greater investment in livestock and more consumption of meat, dairy, eggs and fish. Sub-Saharan Africa's history of slow food-crop productivity growth has forced most rural households to devote their time and resources to crop production. By contrast, farmers in Asia have benefited from much greater growth in food-crop productivity, enabling them to invest more in other activities, including animal production. As incomes rose in Asia, so did the share of calories from meat, dairy, eggs, and fish. As rural incomes rise, farmers find it advantageous to adopt more intensive methods of livestock and crop management, including aquaculture. A transition from common property to confined production is essential to the environmental sustainability of increased animal use, but getting there depends on increased food-crop productivity.

Source: FAO 2012c; World Fish Center 2005; personal communication with Michael Lipton (University of Sussex) and William A. Masters (Tufts University).

Asia has outpaced sub-Saharan Africa in increasing food and protein supply from animal products since 1961 (%)

FOOD PRODUCT	FOOD SUPPLY				PROTEIN SUPPLY			
	1961		2007		1961		2007	
	SUB-SAHARAN AFRICA	ASIA	SUB-SAHARAN AFRICA	ASIA	SUB-SAHARAN AFRICA	ASIA	SUB-SAHARAN AFRICA	ASIA
Vegetal products	93	94	94	85	80	85	80	68
Cereals	47	61	47	54	49	53	50	47
Starchy roots	20	9	18	3	7	4	8	2
Animal products	7	6	6	15	20	15	20	32
Meat	3	2	3	7	10	4	9	13
Fish, Seafood	1	1	1	1	3	5	4	7
Milk	2	2	2	3	4	5	4	7
Eggs	0	0	0	1	1	1	1	4
Kilocalories per capita per day	2,054	1,805	2,310	2,668	na	na	na	na
Grams of protein per capita per day	na	na	na	na	51.9	47.3	56.0	72.3

na is not applicable.

Source: Calculations based on FAO (2012c).

cultivation and a structure of incentives established under apartheid. These policies focused on the needs of privileged white farmers (who controlled 80% of the land despite accounting for less than 2% of farm operators) and favoured research and subsidies on fertilizer and irrigation, along with repression of smallholder farmers.²³ The policies did little for employment, income or purchasing power (government production subsidies even caused prices to rise) and thus did little to improve the food security of the rural poor.²⁴

Clearly, then, yield gains alone cannot ensure food entitlements for everybody, especially the poor. How yields are increased also matters. Again, consider East Asia's green revolution, when both food entitlements and the availability of food staples soared. In contrast to South Africa under apartheid, the yield gains occurred on small family farms relying on labour-intensive production. And with the supply of food staples rising, their prices fell, improving both the lives of the rural poor and the purchasing power of net food consumers (including the urban poor).²⁵

But if food prices fell, how were farmers—whose incomes drop with prices—better off? The twist is that agricultural productivity was rising faster than agricultural prices were falling,²⁶ keeping farmers ahead in the race between rising farm incomes and falling food prices and benefiting net food consumers in both rural and urban areas. Asia's green revolution improved food security by boosting agricultural productivity and by doing it rapidly—dual requirements that apply to sub-Saharan Africa with equal force.²⁷

And if farm labour productivity rose rapidly, boosting incomes and wages, why did demand for labour remain strong? Keeping Asia's green revolution labour-intensive—and thus absorbing the growing rural labour force—was the faster rise in land productivity (yields) than in labour productivity,²⁸ so demand for labour held strong. Wage and job prospects blossomed in rural areas, especially among the unskilled poor, lowering incentives for urban migration and thus holding down urban unemployment and keeping wages rising.²⁹

China's dramatic reduction in rural and urban poverty shows the power of this kind of growth in agricultural productivity. Much of the reduction in poverty came from agricultural growth, with expansion of manufacturing and services, the largest

sectors, contributing less.³⁰ Rising farm incomes had their largest impact in the early 1980s, but agricultural growth continued to fuel rural nonfarm income even later.³¹

The obvious question: Is it feasible for sub-Saharan Africa to reap similar human development and food security dividends through sustainable productivity-led agricultural growth?

Sharp and sustainable increases in agricultural yields are feasible

Comparing yields within sub-Saharan Africa and across regions suggests that a sharp and sustainable increase in staple yields is feasible in sub-Saharan Africa. South Africa's experience, while based on unjust and extremely flawed access to resources under apartheid, shows how improved water control, more fertilizer use, and development and delivery of better seeds contributed to an almost fourfold increase in cereal yields.³² These same improvements fuelled Asia's green revolution. These measures could also power strong agricultural gains in sub-Saharan Africa and advance food security and human development if applied in a labour-intensive way on small, more evenly distributed farms. The high yields on sub-Saharan Africa's demonstration farms,³³ as well as many individual successes across the region (see below), reveal great potential.³⁴

Comparisons with Asia are sometimes considered misleading because Asia's green revolution was based on irrigated wheat and rice, staples in most of that region, while sub-Saharan Africa's more diversified staples (maize, cassava, millet, sorghum, yams, sweet potatoes, plantains, rice) are grown mainly on nonirrigated land. Some also argue that sub-Saharan Africa's agroecological zones are more diverse than Asia's. But there is little evidence that these differences alter the basic potential for yield gains based on farm science and enhanced use of inputs. Diversity can be addressed by tailoring processes to specific needs across the region and accounting for differences in agroecological characteristics across zones.³⁵ An example is the development of drought-tolerant varieties of millet and sorghum for farmers in the Sahel and the Horn of Africa.³⁶

Feasibility rests on the availability of farmland and water. Unleashing the win-win gains in income and food entitlements requires that land and water



be distributed equitably, as is the case in most of sub-Saharan Africa (with some exceptions in East and Southern Africa)—even more so than in much of Asia during its green revolution (chapter 3). Other determining factors are climate and weather (solar radiation and temperature), which favour agriculture in sub-Saharan Africa.³⁷

With so much in sub-Saharan Africa's favour, what is holding it back? Asia's green revolution had four other vital ingredients: inputs (fertilizer, water management and varietal seeds responsive to fertilizer and water); technology (based on crop, land and water science); trade (access to local, national, regional and global markets); and institutions (rural markets, rural education and other services).³⁸ In the 1960s and 1970s Asia's farm inputs were subsidized, to encourage smallholder farmers to shift to new, high-yield crop varieties. Agricultural science and technology continued to deliver improved seeds and better ways of combining inputs to keep yields growing, as well as improved infrastructure to enable input and output markets to flourish.

Much of sub-Saharan Africa lacks most of these ingredients (chapter 2). Low use of farm inputs, in particular, stalls yield growth. Except in Southern Africa crops consume less than 5 kilograms of the main plant nutrients per hectare—well below the level that sustains rapid yield increases and a far cry from Asia's more than 100 kilograms.³⁹ And fertilizer use pays off only when coupled with good water management⁴⁰ and responsive crop varieties—both also lacking.⁴¹ Imperfect access to markets raises input prices and prevents farmers from selling their surplus, and so incentives to use high-yield crop varieties remain weak.

Increasing the use of farm inputs also requires attention to sustainability, something that was not fully considered during Asia's green revolution. For example, fertilizer was used to excess in parts of China and India, destroying the soil and contaminating drinking water. The challenge in sub-Saharan Africa (except in parts of Southern Africa) is to tackle inadequate irrigation and fertilizer use without harming soils. Lacking appropriate inputs and high-yield crop varieties, African farmers have expanded cultivation onto fragile land, exposing it to erosion by wind and rain. A lack of irrigation compounds the harm.

So, while yield increases will relieve the pressure to expand cultivated area, sustainability concerns,

not yet on the horizon during Asia's green revolution, cannot be ignored. Research on how to economize on inputs in addition to how to make crops more responsive to them (the single priority during Asia's green revolution) can address these concerns. The emerging challenges of climate change (bringing more erratic rainfall and faster evaporation) and high and volatile oil prices (making nitrogen fertilizers and transport more expensive) make finding more efficient ways to use inputs an urgent technical and economic priority.⁴²

But all is not grim. The solutions are known. And sub-Saharan Africa is poised to reap the rewards of an unprecedented window of opportunity.⁴³ Over the last decade the region has made remarkable, sustained economic and social progress, in sharp contrast to the disappointing performance of the previous three decades (chapter 1). And falling birth rates are improving the ratio of workers to dependents, a demographic gift that could last until 2030 and beyond, as long as working-age people can find jobs.⁴⁴ The evidence, while by no means conclusive, suggests that growth in agricultural productivity is already accelerating.⁴⁵ On the other side of the ledger, however, economic growth in sub-Saharan Africa has not been nearly as inclusive or effective in reducing poverty as it has been in other regions.⁴⁶ Realizing the demographic dividend, a major challenge, depends on creating enough good jobs and income-earning opportunities for the working population.

The question remains then: Can agriculture deliver the food security, income and jobs needed to exploit these opportunities? No lack of knowledge, ideas or vision stands between sub-Saharan Africa and this brighter future. And certainly no failure to commit to a new agricultural revolution, as evidenced in African leaders' affirmation of their commitment to agriculture in the Maputo Declaration and the Comprehensive Africa Agriculture Development Programme. But realizing the vision will require policies to increase yields up to the frontier of current science, through faster and wider adoption of better technology, and then policies to expand that frontier so that agricultural yields continue to rise. With rapid growth in agricultural productivity, anchored in rising yields of staple crops, sub-Saharan Africa can reduce mass poverty and ensure food security for most of its people.

Reaching the frontier of agricultural productivity—adopting inputs faster, more broadly and more sustainably

Underuse of agricultural inputs still stands in the way of achieving the vision of food security and human development for all Africans. This chapter has shown that increasing input use is feasible even within the limits of today's technology. The obstacles must thus lie elsewhere. This section looks at how to relax the constraints on the uptake of inputs; the next section examines how research could break through the limits of current technology.

Stimulating sustainable use of inputs

Like farmers everywhere, farmers in sub-Saharan Africa would use more inputs if using them proved worthwhile. Thus improving incentives is the first order of business. And that needs to start with fertilizer, since low use is the proximate cause of low yields. Fertilizer use requires complementary investments in infrastructure, especially for water management. Farmers need help paying for inputs, in part through financial instruments.

Fertilizer is more effective when (and often profitable only when) used with other inputs.⁴⁷ Proper water management is required. Without rain or irrigation water fertilizer burns crops, and without proper drainage fertilizer washes away. Farmers also need market access, so they can trade their surplus and buy fertilizer when they need it.⁴⁸ Low road density in sub-Saharan Africa (equivalent to that in India in 1950)⁴⁹ raises the costs of delivering fertilizer to farmers (chapter 2). If plant varieties are not responsive to fertilizer, using it can backfire. In India, before high-yield plant varieties were developed, fertilizer caused wheat and rice plants to develop stalk at the expense of grain, and many of these tall plants toppled over, destroying the crop.

Government policies and investments supported input use in Asia. Technological breakthroughs included semidwarf varieties of wheat and rice that, when fertilized, were much more efficient at producing grain than stalk. Increased use of fertilizer in the 1960s and 1970s was also encouraged by government subsidies for fertilizer and complementary inputs such as irrigation systems, farm power, credit and fertilizer-responsive crop varieties. And agricultural extension services delivered

fertilizer mixes at the right time and adapted to local conditions, products and soils, along with information on how to use fertilizer most effectively. The subsidies and extension services made fertilizer use effective and worthwhile. African governments can do the same, especially now that anti-interventionist sentiments have given way to a more balanced approach.

It is important for sub-Saharan African countries to use "smart subsidies," to avoid the leakages and distortions of past agricultural interventions.⁵⁰ Malawi reintroduced a national seed and fertilizer subsidy programme in 2005/2006, distributing vouchers for fertilizer and improved seed.⁵¹ The programme targets half the country's farmers, with communities deciding which farmers will participate. Within one year 54% of households had received at least one voucher, and by the next year that figure had jumped to 65%, substantially increasing fertilizer use and maize output on small farms. In 2006/2007 Malawi went from a net food deficit to a 1.3 million tonne surplus, exporting close to 400,000 tonnes of maize worth \$100 million. Between 2005 and 2009 farm income and wages rose, nutrition improved and poverty rates fell. Although not all these impacts can be attributed to the subsidy programme—other favourable conditions during the period included good rainfall, economic stability and high tobacco prices—the programme clearly played a role.⁵²

Zambia has also invested in input and price subsidies to encourage maize production.⁵³ The Farmer Input Support Programme (formerly the Fertilizer Support Programme) and the Food Reserve Agency's maize subsidies have been the primary support. Over 2006–2011 these two programmes accounted for 60% of the Ministry of Agriculture's budget. Smallholder farmer beneficiaries of the fertilizer subsidy rose from a little over 100,000 in 2007/2008 to 900,000 in 2010/2011.⁵⁴ Maize harvests in 2009/2010 and 2010/2011 broke records, with maize output in 2010/2011 (2.1 tonnes per hectare) up 50 percent from the average for 2006–2008 (1.4 tonnes). While ample rains were a major factor in the bumper crops of the last two years, the subsidies were instrumental in boosting farmer production.

Despite Malawi and Zambia's remarkable successes, some cautionary lessons emerge. First, fertilizer subsidies are a fiscal burden that can rapidly



rise out of control. In Malawi the cost of the subsidy programme rose from \$50 million in 2005/2006 (5.6% of the national budget) to \$285 million in 2008/2009 (16.2% of the national budget and 74% of the Ministry of Agriculture budget), albeit with adverse price developments inflating costs.⁵⁵ Subsidies also create expectations and vested interests, so removing (or reducing) the subsidies is difficult, once they have met their objective. In India resistance to removing subsidies has forced the government to carry a heavy fiscal burden that could delay the structural transformation of the economy and diversification beyond agriculture.⁵⁶ China kept fertilizer subsidies so long that environmentally risky overuse was encouraged in some areas.⁵⁷

Second, without accurate targeting, fertilizer subsidies might be too blunt an instrument to reduce poverty and strengthen food security. Poverty has hardly budged in Zambia despite an astonishing two consecutive years of food surpluses and rising production since the mid-2000s (box 4.2). It is not that higher production and fertilizer investments did not help but that more efforts are needed to reach the smallest rural farmers and to understand what influences their behaviour (box 4.3). Better targeting to the poorest households also has the advantage of displacing less commercial activity.⁵⁸

Third, the economic context has to be right. Disappointed with ineffective interventions in agricultural input and output markets over 1970–1990, Kenya liberalized fertilizer markets in the early 1990s, removing price controls and abolishing import quotas.⁵⁹ At the same time it increased public investment in high-yield crop varieties and strengthened rural infrastructure (particularly transport beginning in 2003).⁶⁰ Fertilizer use, maize productivity and maize consumption all picked up between 1990 and 2007.⁶¹ In the 10 years to 2007 the number of Kenyan farmers using fertilizer on maize in the main season rose 25%, and yields were higher for Kenya's high-potential maize zone than for rainfed grains in South and East Asia.⁶² With liberalized fertilizer markets came increased competition among suppliers, lowering wholesale and retail prices, deepening the input distribution network and reducing the cost to farmers. But none of this would have happened had markets and private sector operators not been ready to take advantage of liberalization.

Bridging the infrastructure gap

Farmer behaviour and the economic context for reform are not the only important determinants of policy success. Also crucial are having the right infrastructure, especially for water control and access to markets.

Closing the infrastructure gap will take sizeable and sustained public investment. As with fertilizer subsidies, the impacts will not be immediate, but over time the condition of infrastructure will

BOX 4.2 ZAMBIA: DESPITE THE MAIZE SURPLUS, RURAL POVERTY REMAINS HIGH

Despite Zambia's large investments and remarkable successes in maize production, more than three-quarters of the rural population was living in poverty in 2004 and 2006. Preliminary estimates for 2010 suggest that this has remained unchanged.

The smallest farms did not participate as much as larger farms in the surge in national maize production in 2010/2011, one reason for the persistence of Zambia's high rural poverty rate. Half the larger farms received subsidized fertilizer under the Fertilizer Input Support Programme, but only 14% of the smallest farms did. Farms of more than 2 hectares (25% of smallholder farms, defined as farms under 20 hectares) accounted for nearly 64% of the increase. Farms of less than 2 hectares (75% of smallholder farms), which received little fertilizer and sold little maize, did not benefit as much from the government's fertilizer subsidy and maize price supports. Smallholder farmers were likely even hurt by the maize price subsidy since they had to buy more maize than they produced to meet their food needs and had to pay the higher subsidized prices.

Source: Jayne and others 2011; Mason and others 2011; Zambia Central Statistical Office 2010.

BOX 4.3 KENYA: EFFECTIVE FERTILIZER SUBSIDIES DEPEND ON FARMER BEHAVIOUR

Effective and sustainable fertilizer subsidy programmes are based on understanding what motivates farmers, how to respond to their needs and how to reach the poorest among them. In Western Kenya many farmers were not investing in fertilizer despite strong evidence of profitable returns. Why? Because they did not have enough money to buy fertilizer at the optimum time for applying it. If farmers have an incentive to buy fertilizer when they have the money—right after harvest—they would have the fertilizer when they need it. Thus, the timing of the subsidy offer is crucial. A randomized controlled experiment in 2003–2004 showed that when offered small, time-limited discounts on fertilizer right after harvest, many farmers purchased and used more fertilizer. The lesson? Programmes informed by an understanding of what affects farmer behaviour (which can depend on context) may be more effective and less expensive than no subsidies or heavy, indiscriminate use of subsidies.

Source: Duflo, Kremer, and Robinson 2011.

determine whether fertilizer use is effective—and thus whether farmers use it. An immediate challenge is the low public spending in agriculture. During Asia's green revolution governments spent more than 20% of their budgets on agriculture; African governments spend just 5%–10%.⁶³

Many African governments have committed to increasing public spending on agriculture by signing on to the Comprehensive Africa Agriculture Development Programme, which includes a pillar on water management (see box 4.11 later in the chapter). Inadequate water management in sub-Saharan Africa, particularly in the share of irrigated cropland, explains much of the deficit to Asia in using fertilizer and adopting high-yield varieties. Bridging this gap will require ample investment in irrigation methods that support sustainable and employment-intensive water management.

Low levels of irrigation mean that few sub-Saharan African countries can sustain yield increases, even

with abundant rainfall, because few farmers will risk increasing fertilizer use when water might not be available. Asian countries first adopted yield-enhancing technologies on irrigated land, which offers a more predictable, lower risk environment, before spreading those practices to rainfed areas. Sub-Saharan Africa has little irrigated land, so there are fewer opportunities to take on these experimental risks. Public investments in agriculture need to take that reality into account. In addition, while some may view water for agriculture as competing with water for domestic and industrial use, when properly managed, much of the water used by crops is recycled, recharging surface and groundwater systems.

Further, irrigation need not be extended everywhere. Many areas in sub-Saharan Africa have enough water to make other means of water control effective, and in other regions irrigation is infeasible or economically unattractive.⁶⁴ Some large areas (Ethiopia, Nigeria and the Eastern Cape Province of South Africa) have the potential for gravity-fed irrigation,⁶⁵ and elsewhere innovative, smallholder farmer-friendly energy solutions are taking shape (box 4.4).

Water needs to be managed sustainably. Minor irrigation works are a good option, though uptake has been slow. As irrigation develops and spreads, water conservation becomes ever more vital—through pricing measures, user group management and techniques to reduce evaporation and seepage—especially in semiarid areas. While not every aspect of Asia's experience with irrigation has been successful (box 4.5), it shows that many different types of irrigation can be sustainable.

Access to markets for both agricultural inputs and outputs is another vital dimension of infrastructure. Without it farmers cannot sustain yield increases or sell their surpluses. Governments need to invest in rural roads, railways, warehousing capacity and information and communication technologies.

In many sub-Saharan African countries input market deficiencies are hard to miss, including fertilizer costs higher than those in the United States.⁶⁶ Less obvious are the implications of underdeveloped output markets, including weak incentives for farmers to increase productivity. Sub-Saharan Africa's inadequate road system and warehousing infrastructure often make it difficult or impossible to transport surpluses to storage facilities and markets. For example, in parts of Ethiopia farmers

BOX 4.4 BENIN: SOLAR-POWERED DRIP IRRIGATION HELPS FEMALE SMALLHOLDER FARMERS

Drip irrigation, with the potential to promote food security through more efficient irrigation, is expanding rapidly in sub-Saharan Africa, thanks to the development of solar-powered systems. These drip irrigation systems help make food available year-round (even in the dry season), increase household income and improve nutrition.

In November 2007 two villages in northern Benin's Kalalé District introduced the new irrigation system in partnership with local women's agricultural groups that grow vegetables. A pump powered by a photovoltaic array distributes water to farms through a low-power drip irrigation system. Compared with control villages, the farms using the drip irrigation system produced more vegetables—enough for their own consumption plus a surplus to sell in the market. Food availability, access and use all increased, strengthening food security. Vegetable consumption rose significantly in households benefiting from the irrigation system, largely because of the increased consumption now possible during the normally lean dry season. Beneficiary households “became strong net producers in vegetables, with extra income earned from sales significantly increasing their purchases of staples, pulses and protein during the dry season and of oil during the rainy season” (Burney and others 2010, p. 1850).

Solar-powered drip irrigation systems have higher start-up costs than other irrigation technologies for smallholder farmers but may be a good option in many parts of sub-Saharan Africa. Systems with lower start-up costs may lose that initial advantage because of high and volatile energy prices, which the solar-powered systems avoid. The high initial costs of solar-powered drip irrigation systems make the investment more suitable for groups of poor farmers rather than individual farmers.

Source: Burney and Naylor 2011; Burney and others 2010.



planted high-yield Sassakawa maize hybrids instead of traditional tef and enset staples in 1996–1998. But when they could not move the large surpluses to maize-deficit regions, prices collapsed, food entitlements declined and farmers reverted to traditional varieties.⁶⁷ The inability to market surpluses is common across sub-Saharan Africa.

If access to local, national and regional markets for sub-Saharan Africa's smallholder farmers is beset by obstacles, access to global markets might seem impossible. Some question whether small farms can even be included in today's global food chains based on new technology and complex demands. New crop breeding, tillage and information technologies (such as global positioning system-guided machinery and remote sensors to track field conditions) are lowering the costs of labour supervision, making it possible to manage even very large farms effectively.⁶⁸ Strict standards in modern food supply chains—certification of produce, phytosanitary criteria and origin identification—also give larger farms a substantial advantage.⁶⁹ Small farms, facing rising costs for labour supervision, are hard pressed to respond to an increasing array of demands—as supermarkets and horticultural exporters insist on timely harvesting; uniform products, grades and standards; and shipments bulked up to container size.

Most of the advantages of large farms over small farms in meeting such demands are related to failures in intermediation. Small farms can participate in modern food-supply chains by interacting with supermarkets and exporters through cooperatives, crop collectors and factories. While physical infrastructure remains important, such soft infrastructure is becoming more and more crucial for levelling the playing field for smallholder farmers seeking entry to global markets.⁷⁰

Expanding credit and insurance markets

Access to credit boosts productivity by enabling farmers to purchase fertilizer and more efficient agricultural tools and by allowing them to manage shocks without selling assets. For consumers access to credit allows families to maintain consumption during hard times. Often, however, information asymmetry leads to credit rationing that excludes smallholder farmers.⁷¹ Governments have intervened by providing credit directly to small producers and consumers. But doing so is very costly, and

BOX 4.5

WHAT CAN SUB-SAHARAN AFRICA LEARN FROM ASIA'S IRRIGATION EXPERIENCE?

Asia's green revolution offers valuable lessons for irrigation. Asian agriculture succeeded because a large share of smallholder farms adopted irrigated, raising the incomes of poor farmers and farm workers. Areas with access to major irrigation systems saw poverty decline much more than did nonirrigated areas. In China's northwest and southwest provinces and India's east-central "poverty square," agriculture stagnated and poverty fell more slowly than in widely irrigated areas, creating challenges to regional equity.

Another lesson from Asia's experience concerns irrigation system management and maintenance. Over time irrigation systems came to threaten the sustainability of much surface and ground water resources. Only in recent years has Asia started to come to grips with this problem.

Irrigation in sub-Saharan Africa has benefited mainly large farms. In Kenya, South Africa and the Niger Delta large farms have higher shares of land under irrigation than do smaller farms. Ensuring access for smallholder farmers, especially in the poorest, most-neglected areas, is thus a prerequisite for success. Sub-Saharan Africa also needs to learn from Asia's experience on the environmental implications of irrigation, by ensuring proper water system management and maintenance.

Source: Lipton 2012.

in time the same information problems that afflict private credit markets emerge.

Insurance is another important market for African agriculture. Of the many risks facing agricultural producers in lower income countries, weather and price shocks pose the greatest threats (chapter 2). Insurance can help smallholder farmers absorb shocks and spare their assets. To make up for the absence of formal insurance markets and social protection, farmers improvise measures to reduce the impact of shocks.⁷² Some farmers use mixed-cropping systems and plant multiple varieties to reduce the risk of crop failure. Farmers pay a price for this self-insurance in the form of more work and lower yields. Households enter into informal co-insurance contracts with relatives, neighbours and market partners to provide reciprocal assistance in hard times.⁷³

In the past, developing country governments subsidized crop insurance. However, these interventions foundered on information problems and difficulty maintaining the managerial and financial integrity of insurance companies when the government covered all losses. Public crop insurance became prohibitively expensive, and most programmes were phased out in the 1990s or redesigned as public-private partnerships.⁷⁴

Traditional agricultural insurance is usually sold to individual farmers as named-peril or multiple-peril crop insurance policies. Named-peril insurance products (against hail, for instance) have been sold successfully through private markets. But multiple-peril policies are expensive to administer because verifying losses requires visiting the farms.⁷⁵ Instead, index-based weather insurance schemes are becoming popular in sub-Saharan Africa. Ethiopia and Malawi have pilots—with donors paying the insurance premiums—that transfer the cost of droughts to the international insurance market (box 4.6).⁷⁶ National governments, even if not directly involved, play an instrumental role in these insurance markets—providing weather station infrastructure, fostering an appropriate legal and regulatory environment and educating farmers on insurance matters.⁷⁷

Expanding the frontier of agricultural productivity—creating and applying local knowledge

Eventually, as agriculture reaches the limits of current technology, productivity increases will slow. Breaking through these limits requires developing new technology and knowledge and transmitting them to the farm. In Asia the green revolution was

kept alive by a continuous flow of improved crops and farming technologies, thanks to steady government support of research. In delivering information farmers could use, these research institutions set in motion a virtuous circle: they generated demand for their services and produced better results and more value for farmers. That positive interaction is missing in sub-Saharan Africa (box 4.7). Indeed, support for research institutions—intermittent if not anaemic—that could not consistently meet farmers' needs created a cycle of low expectations that undermined farm science. To break out of this low-equilibrium cycle, research must consistently deliver new cropping methods that respond to the needs of farmers, especially smallholder farmers, through mutual consultation.

Generating knowledge through research and development

To leverage research and development for rapidly and continually rising agricultural yields, sub-Saharan African countries will need an adequately and reliably funded system of maintenance breeding that responds as farmers' needs change, such as when crop locations shift or when pests evolve.⁷⁸ Public funding for research is critical to ensure that technological progress increases agricultural yields in ways that lower poverty, increases food security and advances human development (box 4.8).

BOX 4.6 MALAWI: AN INDEX-BASED INSURANCE PILOT FOR WEATHER-RELATED SHOCKS

Two pilot insurance schemes in Malawi illustrate the potential of index-based insurance to protect domestic prices and facilitate imports at a macro level and to provide needed liquidity to individual farmers at a micro level.

A 2008 pilot project reveals how a cost-effective, index-based approach to insurance can help local markets manage weather-related risks. The government purchased a weather-derivative contract from the World Bank Treasury, which in turn signed it over to a reinsurance company. Payments are triggered by a rainfall index based on national data. If the rainfall index falls more than 10% below the national historical average, the government receives an insurance payout. Because the contract is based on rainfall rather than maize production, the government can be paid before the harvest is assessed, providing resources to buy an option to cap the future import price of maize ahead of actual domestic shortages. The cap option can facilitate imports without destabilizing local markets. The payout in the first trial year was small, but payouts

could increase if weather patterns change or the government's risk-management focus expands.

Malawi also has an index-based insurance scheme that benefits farmers directly, protecting their incomes from weather shocks rather than through payments to the government. Under the scheme, introduced in 2005, small groundnut farmers take out loans with a slightly higher than normal interest rate that covers weather insurance premiums based on a rainfall index. The bank then pays the insurance premium to the insurer, and if there is a drought the insurer (not the farmer) pays some of the loan back to the financial institution. This insurance scheme facilitates bank loans to high-risk farmers and reduces (or eliminates) moral hazard because the triggering event is determined by the rainfall index rather than by production. Farmers can be paid quickly based on regional rainfall data, reducing their need to sell assets to offset the income loss from the drought-induced crop failure.

Source: Hellmuth and others 2009; Linnerooth-Bayer and Mechler 2006; Osgood and others 2008.



BOX 4.7 NEW INCENTIVES FOR SCALING UP AGRICULTURAL INNOVATION

Sub-Saharan Africa has seen many innovations in crop and livestock production and natural resources management, but even the most effective ones have spread slowly. To expand the reach of the best of these, public agencies and private investors need to know which innovations have worked best in each agroecosystem, so they can replicate the successes across the continent. But identifying the successes presents challenges. Innovators know how their own new techniques have performed, but they lack effective means to inform investors and potential adopters. Investors and adopters may have no reliable way to compare innovations or to learn whether a particular innovation would work under different conditions. This information gap is particularly wide in agriculture, where best practices are location-specific and sustainable productivity growth requires diverse innovations to suit particular environments.

Recent research in information economics has revealed a lot about what makes an innovation successful and what makes it spread, creating opportunities for identifying incentives to accelerate the scale-up of innovations. Contests are one proven way to demonstrate to a large audience which innovations work best and under which conditions. Traditional contests select just one or two winners. Because agricultural conditions are so diverse, however, and require many different innovations, contests to test agricultural innovations should identify winners for many conditions.

Agricultural innovations vary widely in how and where they work. Scaling up the best performers requires comparing their incremental gains in adoption (such as tonnes stored per month), improvement per unit (for example, reduced storage losses per tonne per month) and the value of that improvement (the cost of storage). Innovations can be compared for the value they create (for example, the value of higher yields at harvest can be compared with the value of reduced storage losses later). And each innovation can be measured through controlled experiments showing gains per unit of adoption, farm household surveys showing extent of adoption and relative prices showing the opportunity cost of each item.

A well-designed innovation contest would reward innovators in proportion to success. Contestants would submit for auditing evidence from field experiments and adoption surveys, which would then be compared with other innovations. Prizes could be awarded in proportion to measured value. The awards would recognize the work of multiple winners, each with success in a particular niche, enabling donors, investors and government policy-makers to replicate the prize-winning innovations across sub-Saharan Africa. Publicizing this information would attract investment to scale up the most cost-effective agricultural innovations, helping Africans learn from each other how best to increase their food security and advance their human development.

Source: Masters and Delbecq 2008; Elliott 2010.

Some breeding breakthroughs have been achieved—such as hybrid maize in Zambia and Zimbabwe; cassava varieties, especially in Uganda, that are resistant to mosaic virus and spider mite; and Nerica rice in West Africa—but uptake has been slow.⁷⁹ Varietal research supporting farmers in different regions and under different natural conditions is the key to generating usable knowledge. Finding a different variety for each small watershed and agroecosystem is infeasible, but some high-yield varieties have proven versatile by holding up under varying pest and weather conditions. Cross-border agreements for multicountry trials could be a cost-effective approach.

National research and extension systems need to adapt their work to farmers' needs by interacting with farmers. In Sri Lanka, after yields began declining in the dry zone in the 1980s, national research programmes helped turn attention to wet-zone crops. And in India extension workers and research systems at the district level leveraged experience, funding and interaction with farmers to spread new seeds, fertilizer and management practices

faster than an integrated national system could have done. These well-managed extension systems countered possible anti-poor, anti-smallholder farmer biases during the initial spread of new seeds and practices.

Agricultural research in sub-Saharan Africa has to reckon with a wide range of conditions, from diverse ecologies to frequent droughts, poor soil fertility and multiple plant pests and diseases. The key to addressing these conditions is to apply scientific, smallholder farmer-friendly and sustainable cropping methods. These methods should incorporate local knowledge, respond to local needs and address the looming crises of resource depletion and inadequate and low-productivity employment, as well as low yields (box 4.9). For example, in areas of tsetse fly infestation, weakened cattle cannot plough or produce enough manure to fertilize fields. In these and other areas of unfavourable pest, nutrient and water conditions, intercropping might be an effective solution.

Much more public commitment is needed—especially for equipment and other nonwage

BOX 4.8 BALANCING PUBLIC AND PRIVATE RESEARCH FUNDING AT THE TECHNOLOGY FRONTIER

Both public and private financing are needed for research and development. The balance between the two determines how much weight is given to public purpose goals compared with private profitability objectives. Public funding of agricultural research has been essential throughout history to advance agricultural productivity, whether in the United States or in Asia during its green revolution. Recently, however, the balance has been shifting towards private funding, especially at the new technology frontier of genetically modified crops. This has important implications for the ability of technology to improve food security for poor and vulnerable people. Many genetic modifications seek labour-saving improvements that help with private profitability but do not advance the type of productivity increases that ensure the job creation and income expansion needed by the rural poor.

While genetically modified crops are not widely used in sub-Saharan Africa, their expansion so far has been driven by private funding in South Africa and Burkina Faso, the only two sub-Saharan African countries that have formally approved transgenic crops for commercial production. South Africa is the forerunner, having first established research on genetically modified crops by allowing cotton seed supplier, Delta and Pine Land Company (today a subsidiary of Monsanto), to conduct field trials. South Africa has since approved various traits of genetically modified crops for commercial production, relying exclusively on the major private seed and agrochemical companies for seed development. Burkina Faso took a similar approach, approving an

insect-resistant cotton variety. Monsanto led the research, with the involvement of the country's national agricultural research system.

The potential of biotechnology to increase national production and producer incomes and to reduce local food prices can be realized only if food insecure households and resource-poor producers benefit. That requires a research agenda that gives priority to staple food crops and that attends to the productivity constraints of poor producers. Four organizations are addressing the critical challenges of strengthening local research capacity. The Forum for Agricultural Research in Africa serves a research, information sharing and networking role. The Alliance for a Green Revolution in Africa, the African Agricultural Technology Foundation (AATF) and the International Institute for Tropical Agriculture (IITA) are more directly involved in agricultural development projects. AATF and IITA are uniquely focused on biotechnology projects.

In addition to ensuring appropriate public financing, policies must consider biosafety and intellectual property rules, to strike the right balance between incentives for innovation and the risks of new technologies. Proactive support from the international public sector and an alliance of civil society advocacy for a pro-poor research agenda could shift the focus from export crops towards the needs of poor farmers and poor consumers. But for that kind of support and alliance to emerge, a new social dialogue on research and biotechnology is needed.

Source: Fukuda-Parr and Orr (2012) and references therein; Lipton 2005.

costs—for research on high-yield varieties that are nutritious, resistant to local pest and water problems and suitable for a range of conditions. Agricultural research also needs a human development focus that integrates nutrition concerns (chapter 5). Both policies and research should focus on nutrient-rich varieties. As new varieties are developed, they should be screened for higher levels of bioabsorbable iron, zinc and vitamin A. And plant researchers should work with soil and water scientists and economists to manage the impacts of varietal and crop choices on the sustainability of soil and water.

Extension systems, the chief mechanism for exchanging information between farmers and researchers, need to be reinvigorated and integrated with research institutes. Their modest record has led to underfunding, further reducing their effectiveness. In many sub-Saharan African countries agricultural research institutions and

extension organizations operate under different ministries, with very little interaction. And researchers generally earn more than extension workers, accentuating the split between services. Even when research produces useful results, bottlenecks in the extension delivery system, poor infrastructure and a shortage of experts knowledgeable about local conditions often prevent the results from reaching farmers.⁸⁰ Ethiopia's Agricultural Transformation Agency is leveraging the contributions of various stakeholders to strengthen coordination in the agricultural sector (box 4.10).

Well-functioning systems for distributing plant materials complete the delivery chain. In southern India and in Kenya involving seed companies in marketing led to quick uptake of new hybrids, demonstrating the effectiveness of public-private cooperation. Such joint activities require supply capacity and broad market access, still lacking in much of sub-Saharan Africa. Governments must



lead the development of markets in farm inputs and services.

International collaboration in research—across academic institutions, international agencies, regional bodies and national governments—is also crucial, both for speeding advances and for easing the burden on national budgets. In Ghana, for instance, most of the improvements in rice yields resulted from international collaboration. Notable partners included the International Institute for Tropical Agriculture and the Africa Rice Centre, both part of the Consultative Group on International Agricultural Research.⁸¹

Engaging youth in agriculture through innovation

Despite being the largest sector in most sub-Saharan African economies, agriculture often holds little appeal for young people, who see it as a low-status livelihood.⁸² The disparities in living standards between urban and rural areas make cities alluring and the countryside unattractive. A study in Tanzania found that many young people consider farming to be a “dirty activity.”⁸³ In South Africa teenage girls gave several reasons for their negative perception of farming: low wages, low status of children in rural areas and social tension.⁸⁴

Countries need to make agriculture and farming more attractive to young people—both socially and economically. Technological innovation, the engine of social and economic development,⁸⁵ can expand agricultural opportunities for young people.⁸⁶

New ideas and technologies, plus an entrepreneurial spirit, can help young people channel their creativity; transfer knowledge, information and ideas; and stay connected. Universities, Business and Research in Agricultural Innovation (UniBRAIN), a consortium of African agricultural and technology institutions, is one example.⁸⁷ Pioneering a new approach to promoting agricultural innovation and improving agribusiness education in sub-Saharan Africa, UniBRAIN aims to increase collaboration among universities, research institutions and the private sector; improve teaching and learning; and broaden knowledge sharing. It supports agribusiness innovation incubators for young people all along the agricultural value chain. Junior Farmer Field and Life Schools, established by the Food and Agriculture Organization and field tested in several

BOX 4.9 NIGER AND ZAMBIA: AGROFORESTRY AND INTERCROPPING IMPROVE YIELDS

Several countries in sub-Saharan Africa have used fertilizer-tree systems in place of conventional fertilizer to increase crop yields. These systems use fast-growing nitrogen-fixing trees, such as the acacia tree (*Faidherbia albida*), in sequential fallows, semi-permanent tree and crop intercropping, and other methods. In arid regions acacias are commonly intercropped with annual crops like millet and groundnuts because the trees fertilize the soil without competing with crops for water. Millet yields 2.5 times more grain and 3.4 times more protein when intercropped with acacia.

In Niger agroforestry has improved soil fertility and raised crop yields. Agroforestry spread rapidly once the government relaxed its forest code (*Code Forestier*) and allowed farmers to harvest trees on their own land. Millet and sorghum production and farmers' incomes have risen substantially on Niger's more than 4.8 million hectares of agroforests.

In Zambia a majority of smallholder farmers cannot afford commercial fertilizer. Agroforestry could substitute for at least some government-subsidized fertilizer and has the potential to reach farmers missed by subsidy programmes. Trials of maize cropping on unfertilized fields showed average yields of 4.1 tonnes per hectare with acacia intercropping and 1.3 tonnes without it. After the introduction of fertilizer-tree systems on their fields, 84% of interviewed households reported improvements in food security.

Source: Mokgolodi and others 2011; World Agroforestry Centre 2009, 2010; Ajayi and others 2011.

BOX 4.10 ETHIOPIA: THE AGRICULTURAL TRANSFORMATION AGENCY

Ethiopia launched the Agricultural Transformation Agency (ATA) in December 2010 to revitalize the agricultural sector. Modelled after similar bodies in Asia that were instrumental in accelerating economic growth (as in the Republic of Korea and Malaysia), ATA addresses systemic bottlenecks in seeds, soil health and fertility management, input and output markets, extensions and research, and cooperatives.

One of ATA's first goals is to double production of tef, Ethiopia's most widely grown cereal crop, in tandem with the government's objective of doubling overall agricultural production in five years. The Debre Zeit Agricultural Experiment Station, under the support and direction of the Ministry of Agriculture and ATA, ran trials on several promising tef productivity-enhancing technologies during March–July 2011. Targeted objectives included reducing the seeding rate, using row seeding instead of broadcasting and applying complex fertilizers that contain essential micronutrients. The trials were successful, and additional trials and demonstrations are being run with more than 1,400 farmers and 80 farmer training centres. The early results are encouraging and demonstrate the potential for a coordinating agency to leverage the strengths of multiple partners.

Source: www.ata.gov.et.

countries, seek to empower vulnerable youth with the livelihood options and risk-coping skills needed for long-term food security. The schools offer holistic training in agricultural techniques and life and business skills.⁸⁸ The Tanzanian government has spearheaded the Kilimo Kwanza (Agriculture First) initiative to encourage private sector participation in agriculture. Kilimo Kwanza and other like-minded initiatives encourage young people to use their new knowledge to create and improve agricultural products, processes and structures.⁸⁹

The dynamic nonfarm segments of the agriculture value chain hold special promise. The opportunities they advance for innovative entrepreneurs boost the sector's appeal and offer more rewarding financial returns. Activities such as marketing, processing, packaging, distribution, trading, procurement, storage, sales and catering can rebrand agriculture and excite young people's entrepreneurial imaginations.⁹⁰ The energy sector is already seeing complementary innovations.⁹¹

Just as young people brought the revolution in mobile and web-based communication technologies to their communities, so too could they advance creative applications.⁹² With digital information now acquired, stored and managed faster than ever, transaction costs are falling, offering new scope for increasing productivity and profitability and developing new business skills. The AppLab project in Uganda uses Google SMS search technology and the country's manufacturing technology network to access information.⁹³ Data sources include Farmer's Friend, a searchable database that provides agricultural advice and weather forecasts, and Google Trader, which matches buyers and sellers. Village Phone Operators, a group of intermediaries, offers market and weather information and support for conducting e-business, including the submission of business plans to global entrepreneurship competitions, outreach to customers and expansion of networks.⁹⁴

Innovation, entrepreneurship and knowledge-building need institutions that regulate technology, stimulate user feedback and allocate resources. The right infrastructure is also crucial (affordable and reliable electricity to charge mobile phones, for example), especially in rural areas.⁹⁵ Rural youth and women are especially constrained by a lack of financial assets and educational opportunities, so new technology must be inclusive.

Because agricultural growth in sub-Saharan Africa has multiplier effects throughout the economy, modernizing agriculture across the value chain offers many opportunities for young people.⁹⁶ Connecting three key assets—a large youth population, advances in innovation and the potential of agricultural development—promises a new way forward.

Building on the new policy momentum for increasing agricultural productivity

African agriculture seems to have emerged from its low point of policy neglect. Two pan-African entities are heading efforts to secure and support government commitment: the Comprehensive Africa Agriculture Development Programme (CAADP) and the Alliance for a Green Revolution in Africa (AGRA). They build on the Maputo Declaration of 2003, when the heads of state of the Assembly of the African Union committed their support to CAADP and its four pillars (box 4.11) and pledged to increase spending on agriculture to 10% of national budgets by 2008. Few sub-Saharan African countries have met that pledge, but the policy tide seems to be turning away from neglect and towards attention to increasing agricultural productivity.

Efforts are also under way to rebuild sub-Saharan Africa's agricultural research and development foundation. Under the framework of CAADP's pillar 4, the Forum for Agricultural Research in Africa is leading initiatives to scale up support for science and technology programmes regionally and nationally. Priorities include staple foods, conservation, biogenetic resources, integrated natural resources management, and improvement of livelihoods in high stress and unstable environments. The aim is to disseminate products, technologies and information by enhancing research capacity, integrating research with extension and enabling extension to reach more farmers at lower cost.

To improve market access, CAADP's pillar 2 is guiding efforts to strengthen local infrastructure (including transportation, storage, handling and packaging systems; retail facilities); information technology; and national and regional trade-related interventions. This strategy recognizes the vital position of rural infrastructure in advancing agricultural development.

CAADP's pillar 3 calls for a continentwide plan of action to end food insecurity. It commits member



BOX 4.11 THE FOUR PILLARS OF THE COMPREHENSIVE AFRICA AGRICULTURE DEVELOPMENT PROGRAMME

The Comprehensive Africa Agriculture Development Programme (CAADP), an initiative of the New Partnership for Africa's Development (NEPAD), was established in 2003 to improve food security and nutrition and increase incomes in sub-Saharan Africa. It implements its programmes in four focus areas, or pillars: sustainable land and water management, market access, food supply and hunger, and agricultural research.

Pillar 1, sustainable land and water management, aims to expand the area under sustainable land management and reliable water control systems throughout sub-Saharan Africa. Initiatives include TerrAfrica, which invests in country programmes for sustainable land and water management. Another initiative addresses regional constraints in scaling up irrigation investments.

Pillar 2, market access, aims to increase market access through improved rural infrastructure and other trade-related interventions. A Fertilizer Financing Mechanism has been launched with the African Union Commission and the African Development

Bank to facilitate access to fertilizers. Other activities focus on integrating regional markets and raising the competitiveness of local producers.

Pillar 3, food supply and hunger, aims to increase food supply and reduce hunger by raising smallholder farmer productivity and improving responses to food emergencies. Programmes focus on people who are chronically food insecure and on populations vulnerable to crises. Initiatives launched under this pillar include the Regional Enhanced Livelihoods for Pastoral Areas project, which focuses on enhancing the livelihoods of pastoralists in the Horn of Africa, and the Home-Grown School Feeding programme, which links school feeding to agricultural development by purchasing and using locally and domestically produced food.

Pillar 4, agricultural research, aims to improve the ability of agricultural research and systems to disseminate new technologies. Plans under this pillar include support farmer adoption of promising new practices resulting from research.

Source: www.caadp.net.

TABLE 4.3 POLICY OPTIONS FOR SUSTAINABLY INCREASING AGRICULTURAL PRODUCTIVITY

POLICY OPTION	STABILITY OF FOOD SYSTEMS		
	AVAILABILITY OF FOOD	ACCESS TO FOOD	USE OF FOOD
Encouraging adoption and sustainable use of agricultural inputs	Fertilizer, seeds and water		
Investing in infrastructure and developing financial markets	- Credit and insurance - Rural infrastructure (roads, storage, water management and control, including irrigation)		
Creating and applying local knowledge	- Agricultural science and technology - Extension service and support to generation and diffusion of localized knowledge, including on improving the use of food - Engaging youth in agriculture and rural activities, including entrepreneurship and innovation		

Source: Based on analysis described in the Report.

countries to three objectives: improving domestic production and marketing of food, facilitating regional trade and increasing household productivity and assets. The goal is a 6% average annual growth in agriculture by 2015.⁹⁷ Initiatives address issues from capacity-building and market access to regional trade and crop commercialization. As of February 2012, 29 countries had signed CAADP

Compacts and 21 countries had developed CAADP-based Agriculture and Food Security Investment Plans.⁹⁸ AGRA, funded largely by the Bill & Melinda Gates Foundation, is focusing on expanding research support for plant breeding.

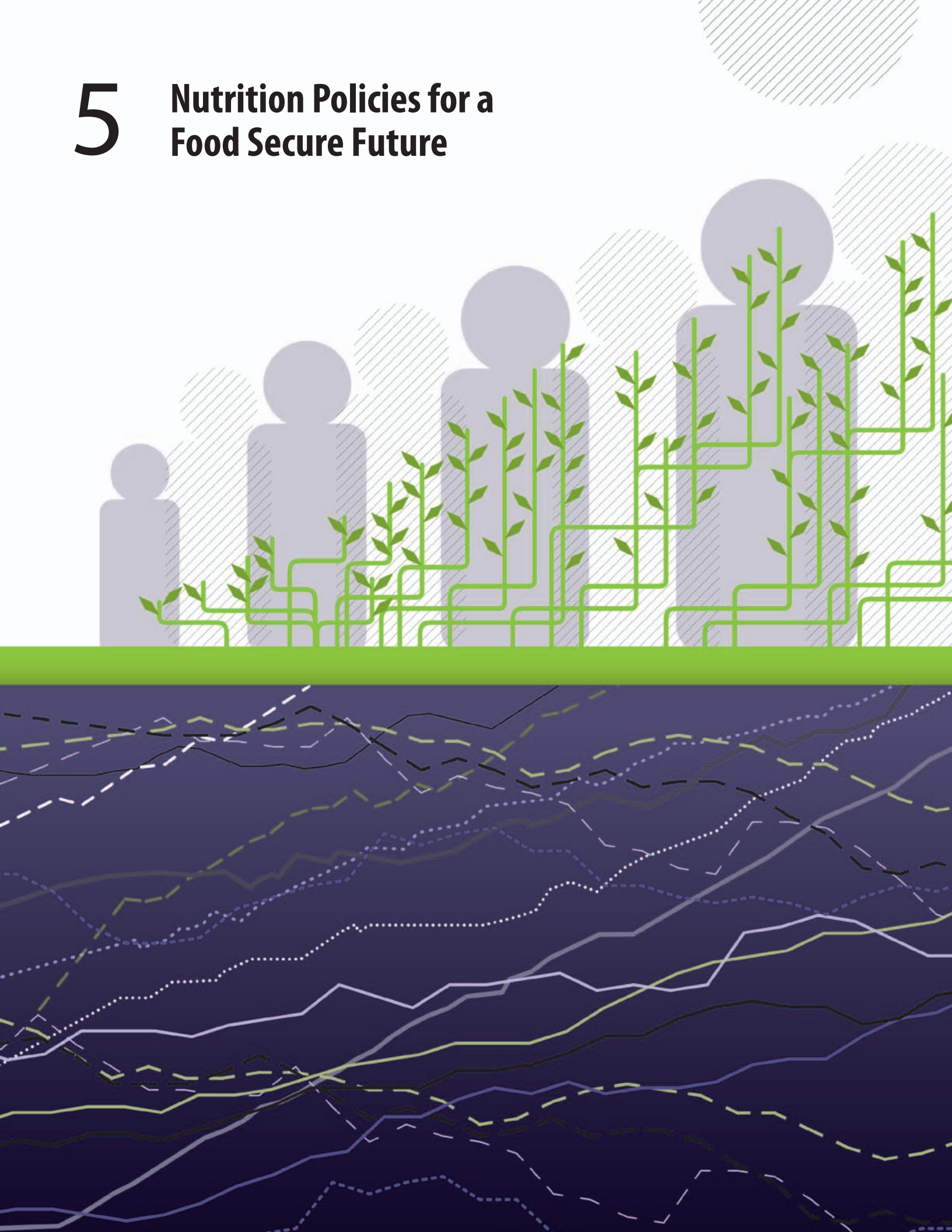
CAADP, AGRA and other regional bodies have made explicit commitments to smallholder agriculture and staple crops, which promise to help

sub-Saharan African countries shape an agricultural sector focused on human development. CAADP's advantages are its roots in African governments and, to some extent, in civil society. For CAADP initiatives to succeed, member countries have to make good on their commitments. Donors have pledged substantial funding for CAADP-led programmes, but progress has been slow.⁹⁹ Countries have pledged to turn aid offers into concrete agricultural investment by matching aid with domestic funding, but first countries need to complete their preparation. Nearly a decade after the Maputo Declaration, actual investment in agriculture still lags.

Overview of policy options

Sustainable increases in agricultural productivity will expand both food availability and access by generating income and employment. Specific interventions will have to be tailored to national and local circumstances but will depend on reaching and continuously expanding the agricultural productivity frontier. This implies policies that encourage adopting and sustainably using agricultural inputs, investing in infrastructure and developing financial markets, and creating and applying local knowledge (table 4.3).

5 Nutrition Policies for a Food Secure Future





CHAPTER 5

Nutrition Policies for a Food Secure Future

Too often, the news from sub-Saharan Africa is easy to predict: famine and humanitarian food crises on the front page, volatile international food prices in the business section and numbing images of emaciated children in the magazine supplement. But while hunger dominates the African narrative, malnutrition, its silent accomplice, seldom makes headlines. Malnutrition is an obstacle to human development. And without much more effective interventions it will continue to inflict irreversible damage on individuals early in life and large economic and social losses on countries for years to come.

Malnutrition is a plague on childhood, but it can be intercepted by employing well-known interventions that include empowering girls and women to make educated choices. Better use of food is also contingent on expanding access to health services, education, sanitation and clean water. Malnutrition has spanned generations as “hidden hunger,” a life-sapping inheritance of nutrient deficiency. But fortifying staple foods can change the lot of Africans. Indeed, increasing micronutrient intake is among the most effective—and cost-effective—ways to combat malnutrition. Increasing intake of just a handful of nutrients (vitamin A, iodine, iron and zinc) can leverage large human development returns from a small input—one of the most efficient development investments a society can make.

Most countries have had to fight the scourge of malnutrition¹ at some point in their history. Over time, as diets improve and diseases are controlled or eradicated, workers become more productive, mothers bear healthier children, and more children survive and live longer. Developed countries have already experienced this “escape from hunger and premature death.”²

As chapter 1 argues, nutrition outcomes link food security and human development: well-nourished children have greater capacity to learn and grow into more capable and productive adults. Even before a child is born, a mother’s life-long nutrition, especially during her child’s gestation, has long-term implications for her child’s ability to learn and grow. With so many benefits to good nutrition, why is malnutrition so pervasive in sub-Saharan Africa? And why has nutrition not improved as much as would be expected with good economic performance? Arguing that the lack of comprehensive nutrition policies is one reason, this chapter

identifies cost-effective policies and interventions that can help sub-Saharan African countries leverage nutrition for higher human development.

As chapter 2 describes, malnutrition’s roots are complex and intertwined. Its determinants are both immediate and structural—diets, cultural norms, power relations and access to basic public services all come into play. Malnutrition is not the same as hunger, though both relate to how people associate with food. Hunger follows an extended period without food.³ Temporal or short-term hunger, experienced by most people occasionally, is accompanied by listlessness and headaches but can be eliminated by eating. Acute hunger and chronic hunger—and related malnutrition—are more extreme and harder to overcome. Acute hunger arises from a temporary but prolonged lack of food, often caused by external shocks. Chronic hunger arises from a constant or recurring lack of food⁴ and threatens long-term human growth and development.⁵ Ending hunger requires increasing the quantity of food so that people can consume enough calories for basic functioning. Ending malnutrition requires increasing the quality of food as well, through diets rich in proteins, essential fatty acids and micronutrients.⁶

This chapter explains the links between poor nutrition and long-term human development, including the concept of a malnutrition–poverty trap, the toll imposed by disease and the scourge of “hidden hunger” (micronutrient deficiency).⁷ It explores policies that could reduce malnutrition in sub-Saharan Africa through household, national and international interventions. The chapter argues for nutrition interventions and for steadfast government commitment to solve a costly, neglected problem. It presents evidence on the benefits of

specific nutrition interventions in Africa and on better use of food for human development.

When household nutrition fails, so does human development

Good nutrition starts in the household, but the benefits ripple outward. The health and productivity gains from ending malnutrition can elevate an entire country's economic growth and human development.⁸ Society pays a heavy, lasting price for malnutrition in the permanent loss of capabilities and thus in lower human development.⁹ Malnutrition costs developing countries up to 3% of GDP annually and can shrink the lifetime earnings of malnourished children more than 10%.¹⁰ In Ethiopia micronutrient deficiency could cost an estimated 10% of GDP over 2006–2015.¹¹ The link does not always work in reverse, however. Higher incomes, for households or countries, do not always lead to better nutrition—or at least not as fast as other factors do (chapter 1).

Good nutrition policies make healthier and stronger societies by increasing labour productivity and reducing poverty.¹² Sub-Saharan African countries, with some of the highest malnutrition levels in the world (chapter 1), urgently need these policies.¹³ Prospects are forever diminished for children who suffer malnutrition.¹⁴ Children who are well nourished early in life are more likely than their malnourished peers to start school on time, score better on cognitive tests and receive higher returns on education.¹⁵ Studies outside sub-Saharan Africa show that an increase in birth weight raises IQ and high school graduation rates in boys, with additional positive effects on height and earnings.¹⁶ A study in sub-Saharan Africa shows similar results.¹⁷

Malnutrition also has negative health impacts. It can prolong or intensify illness, in turn worsening nutrition outcomes and creating a vicious cycle of illness and malnutrition. The increases in illnesses and deaths swell healthcare costs, straining already-scarce resources.¹⁸ Micronutrient deficiencies weaken the immune system, exposing people to greater risk of infection and making malnourished children more susceptible to parasitic infections. Foetal retardation and perinatal diseases occur more often when mothers are malnourished, as does mother-to-child transmission of HIV.¹⁹ In this

vicious cycle infections lead to poor absorption of nutrients, diarrhoea, loss of appetite and altered metabolism, which in turn increase susceptibility to infection.²⁰

Sub-Saharan Africa can dodge the long-term trap of malnutrition but only by tackling many complex policy priorities simultaneously across sectors. Recent efforts focus on the synergies among agriculture, health and nutrition,²¹ but the specific interventions required depend on a country's stage in the "dietary transition." Most sub-Saharan African countries are in stage one, with diets low in calories, macronutrients (proteins, fats, and carbohydrates) and micronutrients.²² This kind of deprivation is especially widespread in rural areas and among children. Many adults in these countries have moved up to stage two, with access to an adequate number of calories, protein and total fat, but still lacking in some micronutrients. And some people are already in stage three, with obesity becoming a growing problem.

The malnutrition–poverty trap

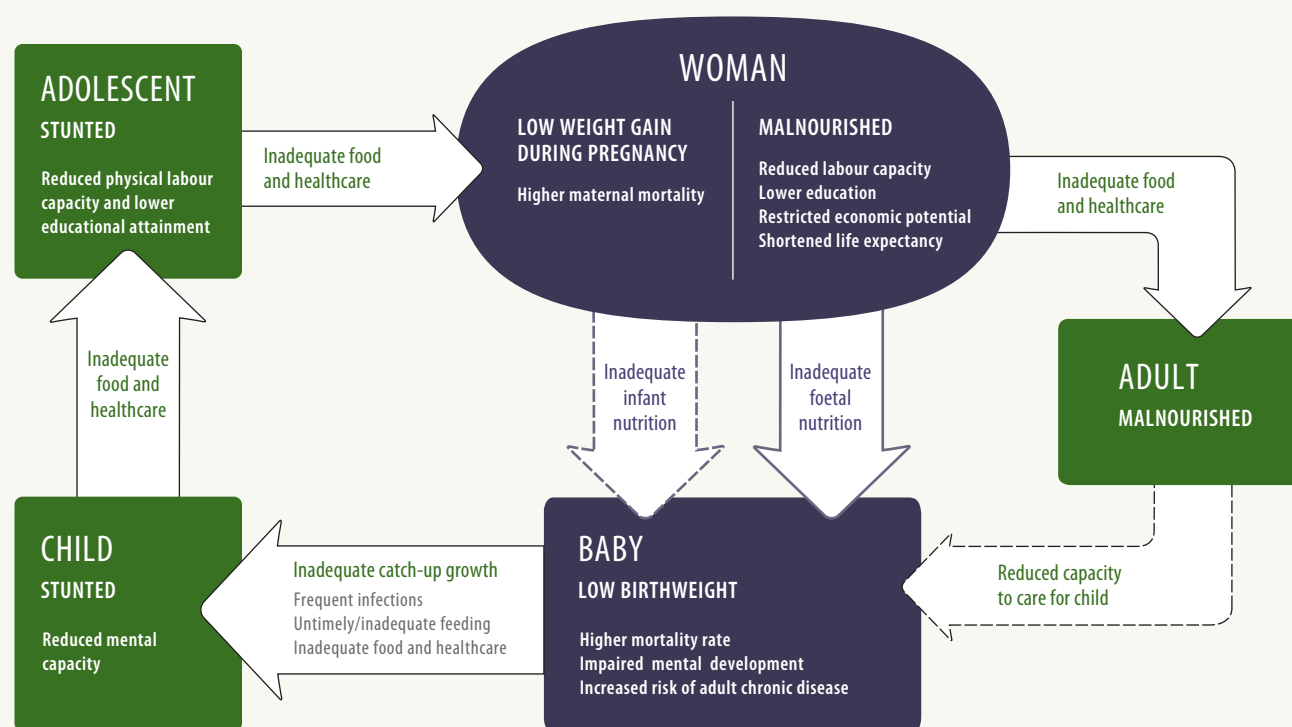
Good nutrition advances human development, but poor nutrition constrains it—the malnutrition–poverty trap. Malnourished people cannot work efficiently, so their wages fall and they struggle to buy food. The cycle then starts over, and households languish in a low-income, low-nutrition state.

The burden of malnutrition begins in the womb. An undernourished mother bears an underweight baby, increasing the risks of illness and death for both of them. Some estimates for developing countries suggest that a child with a low birthweight is more likely to die than a child with a normal birthweight.²³ If the infant survives but fails to consume enough nutritious food, its growth is stunted, limiting its cognitive abilities and making it more susceptible to infectious diseases in childhood and to noncommunicable diseases in adulthood. Stunting can be irreversible, reducing the options for a better education, which then often leads to early marriage and childbearing. Many girls who grow up malnourished marry early and bear another generation of underweight babies, repeating the cycle (figure 5.1).

Both these cycles can persist for generations. Once a household falls into the malnutrition–poverty trap, future generations will find it difficult to escape, even if the economy grows. One study found a small but



FIGURE 5.1 DEPRIVATION AND MALNUTRITION—TRANSMITTED ACROSS GENERATIONS FROM MOTHER TO CHILD



Source: Based on Benson (2004), figure 1, p. 3.

significant association between a grandmother's height and her grandchild's birthweight, indicating that one generation's malnutrition can damage at least the next two.²⁴ Escape begins with empowering women and girls, enabling adequate nutrition for adolescent girls so that they are well-nourished when they become pregnant. This would accelerate progress towards Millennium Development Goal 5, which aims to reduce maternal mortality by three-quarters over 1990–2015.²⁵

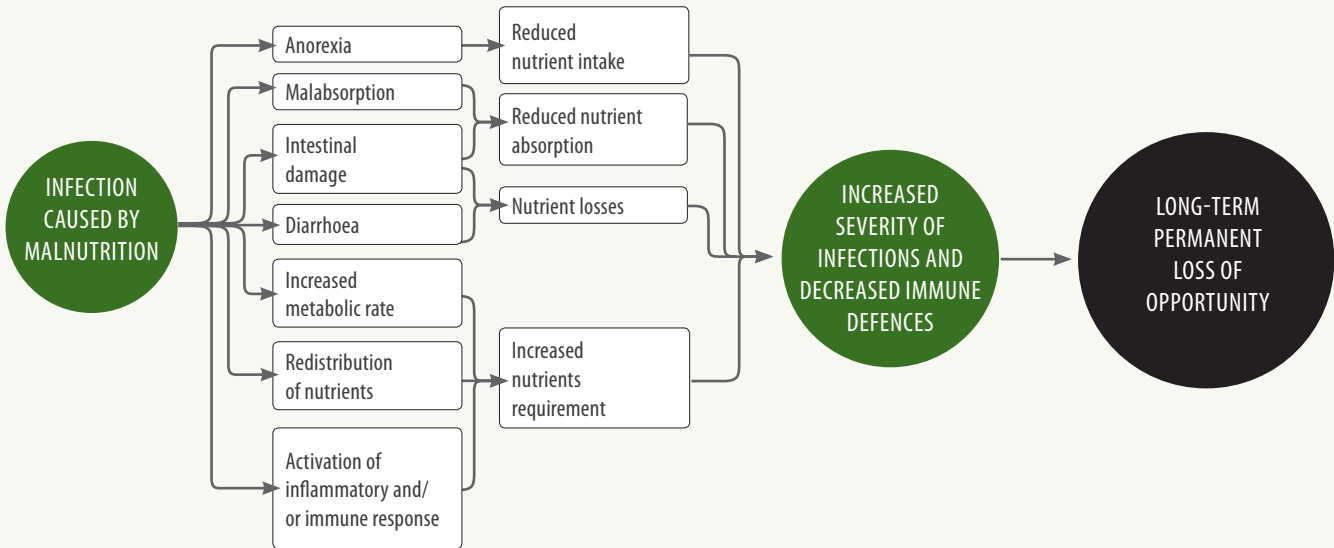
Good nutrition in adulthood is an important but short-lived investment—today's food fuels tomorrow's productivity—but good nutrition in childhood is a lifelong investment in human development. The nine months in utero and the first two years after birth, when nutrition is most important, are a life-shaping growth window. During this time children need healthful diets to support their swift growth. This age group, particularly in sub-Saharan Africa, is the most vulnerable to inadequate feeding

practices and poor health services. Vitamin and mineral deficiencies in the womb and in early childhood can cause blindness, dwarfism, mental retardation and neural tube defects.²⁶ Markers for cardiovascular disease and diabetes emerge in this period.²⁷ Iodine deficiency in the womb affects a child's ability to learn,²⁸ as does anaemia during a child's first two years. Height, determined largely by nutrition during this growth window, also affects adult productivity.²⁹ A 1% loss in adult height from child stunting is associated with a 1.4% loss in productivity.³⁰

Malnutrition, infections and disease—a deadly combination

What pathways enable this cycle of deprivation, and what are the outcomes (figure 5.2)? Malnutrition prolongs or intensifies illness, and longer, more severe illnesses affect children's nutrition, increasing their risk of disease. The challenges of nutrition

FIGURE 5.2 FROM INFECTION TO MALNUTRITION



Source: Based on Calder and Jackson (2000), figure 2, p. 5.

go well beyond food intake. To transform food into nutrition at the cellular level, people need to be in good health.³¹

People's surroundings affect the malnutrition–infection pathway. The cycle of malnutrition–infections–nutrient loss is closely associated with poor access to clean water, sanitation and health services—all still challenges in sub-Saharan Africa. In 2010, 17% of people in urban areas and 51% in rural areas lacked clean water. The sanitation situation is even worse: 57% of people in urban areas and 77% in rural areas lack adequate sanitation.³² And access to health services is impeded by high costs and poor quality, the frequency and severity of disease and long distances to healthcare providers.³³ These deprivations lead to more frequent and more severe diseases, such as diarrhoea, especially in children. Diarrhoeal diseases are responsible for 85% of the disease burden preventable by a clean water supply.³⁴ HIV/AIDS, a leading cause of death and a major impediment to human development in sub-Saharan Africa, is also especially sensitive to nutrition.³⁵ The effects of HIV/AIDS are compounded by a lack of adequate and nutritious food to fortify the immune system, manage infections, optimize

treatment responses, sustain physical activity and support a decent life.³⁶

Urbanization also presents a challenge for the malnutrition–infection pathway. People living in cities usually eat food with a higher concentration of fats, animal products and sugar; consume more processed foods and foods prepared outside the home; and are less likely to breastfeed their babies and provide food supplements for their children.³⁷ Living in cities also alters lifestyles and physical activity. Most urban occupations require less manual labour than rural occupations, and urbanites enjoy more leisure time for other pursuits. These diet and lifestyle distinctions have mixed health implications: greater dietary diversity improves micronutrient intake, but greater fat and sugar consumption and a more sedentary lifestyle increase the risk of obesity, cardiovascular disease and other chronic illnesses.³⁸ Expanding urban populations will require clean water, adequate sanitation and nutritious food. Urbanization can stimulate farmers to produce more food to feed city dwellers, but the missing links in the food chain required to get food from farm to city have to be supplied.



African diets and the micronutrient gap

Micronutrient deficiency lowers mental and physical potential, inhibiting a country's human development. The diets of many Africans consist mainly of staple cereals or root crops, with few foods rich in micronutrients, such as fruits, vegetables and animal-source proteins (chapter 2).³⁹ It is possible to consume enough calories without consuming enough micronutrients. This leads to "hidden hunger" because the signs of micronutrient deficiency are harder to see than other signs of malnutrition. But such deficiencies can deal lifelong blows to health, productivity and mental development.⁴⁰

Three principal deficits underlie inadequate micronutrient intake. One is the lack of variety in foods, due to cost, local availability, social limitations, and food traditions and taboos. The second is the lack of knowledge of what constitutes balanced nutrition, because of poor education. And the third is the inability to absorb micronutrients properly, because of poor preparation, improper storage and cooking practices, dirty water, weak immune systems and "antinutrients" in foods (such as phytates, compounds that inhibit the absorption of essential micronutrients, especially iron and zinc).

Across the world, 2 billion people suffer from one or more micronutrient deficiencies,⁴¹ more than half the 1.3 billion people living on less than \$1.25 a day.⁴² Two-thirds of Africans are estimated to be deficient in vitamin A or iodine (statistical table 3 in this Report). And half the children with vitamin and mineral deficiencies suffer from more than one.⁴³ The lack of micronutrients is compounded by antinutrients. Legumes and cereal grains—the staples of resource-poor communities—often contain phytates.⁴⁴

Interventions against malnutrition

If the benefits of good nutrition are so great, why are interventions needed? One reason is that some factors leading to malnutrition are mostly beyond household control: access to clean water, adequate sanitation and health services. Another reason is that while the benefits to individuals are great, individuals may lack the knowledge or incentives to act (box 5.1). The benefits for society as a whole are even larger, and without public interventions these benefits are unlikely to materialize.

BOX 5.1 THE NEED FOR NUTRITION-FOCUSED POLICIES

A series of studies have shown that more income and cheaper staples foods do not necessarily improve nutrition. Indeed, people do not always optimize their calorie and nutrient intake, as economic models assume they will. Many people spend their additional disposable income, whether from higher incomes or lower food staple prices, on more expensive but less energy- or nutrient-rich food. For example, people in the poorest income group in an Indian province split every additional rupee evenly between millet, the cheapest staple, and rice and wheat, whose calories cost twice as much. People also spent the extra disposable income on other things they value, such as weddings, dowries, christenings, burials and entertainment.

The implication is that providing more cash or more food will not automatically improve nutrition. Policy-makers must better understand the incentives that shape people's behaviour. Only then can they develop better targeted initiatives.

Source: Banerjee and Duflo 2011.

Information abounds on what improves nutrition. So why have sub-Saharan African governments and their partners not given nutrition sufficient attention?⁴⁵ Why is the information not leading to action?

One reason is the belief that rising incomes and the increasing availability of more and cheaper food will automatically resolve the problem. However, as chapter 1 shows, growth has not translated into rapid improvements in nutrition. Counterintuitively, more income and cheaper food staples can, in some cases, lead to even worse nutrition outcomes (see box 5.1).

Another reason is that some of the benefits of good nutrition are hard to see. For example, employers might be unable to distinguish the performance of well-nourished workers from that of undernourished workers, dampening incentives to invest in good nutrition and reducing demand for pre-emptive action.⁴⁶ The effect of malnutrition is obvious only in extreme cases, when the harm is already likely to be irreversible. The difficulty of coordinating multiple actors along multiple fronts may also discourage intervention—or make it less effective. A third reason is that many interventions are needed at the household level, where public influence is indirect at best.⁴⁷

Nutrition is affected by a wide range of circumstances—from the political and economic environment and seasonal and climate conditions

TABLE 5.1 NUTRITION INITIATIVES ARE A COST-EFFECTIVE WAY TO INCREASE WELL-BEING

OPPORTUNITIES AND TARGET POPULATIONS	RATIO OF BENEFITS TO COSTS ^a
<i>Reducing low birthweight for pregnancies with high probability of low birthweight</i>	
Treating women with asymptomatic bacterial infections	0.6–4.9
Treating women with a presumptive sexually transmitted disease	1.3–10.8
Providing drugs for pregnant women with poor obstetric history	4.1–35.2
<i>Improving infant and child nutrition in populations with high prevalence of child malnutrition</i>	
Promoting breastfeeding in hospitals where standard practice has been to promote infant formula	4.8–7.4
Integrating childcare programmes	9.4–16.2
Introducing intensive preschool nutrition programmes focused on poor families	1.4–2.9
<i>Reducing micronutrient deficiencies in populations where deficiencies are prevalent</i>	
Providing iodine (per woman of child-bearing age)	15–520
Providing vitamin A (per child under age six)	4–43
Providing iron (per capita)	176–200
Providing iron (per pregnant woman)	6–14
<i>Investing in technology for developing agriculture</i>	
Disseminating new cultivars with greater yield potential	8.8–14.7
Disseminating iron- and zinc-dense rice and wheat varieties	11.6–19.0
Disseminating vitamin A–dense rice (“golden rice”)	8.5–14.0

a. Measures the returns in monetary terms of each intervention. A higher number implies a higher return for each additional unit invested.

Source: Based on Alderman, Behrman, and Hoddinott (2005).

to cultural and religious customs and the availability of health services and education at the national and community levels. Also in play are agricultural production and income, access to a variety of adequate and nutritious foods, a sanitary environment, sufficient safe water and cooking fuel, and knowledge of sound eating and health practices. A comprehensive strategy to combat sub-Saharan Africa’s nutrition challenge thus demands a multisectoral approach—one backed by resources, commitment and joint action by the state, civil society, the private sector and the global community.⁴⁸

Ramping up nutrition interventions

Because poor and vulnerable groups are most at risk, interventions need careful, equitable targeting.⁴⁹ Agricultural and business sectors must be encouraged to establish sturdy, efficient food production systems. Teaching people how to acquire food and use it properly calls for establishing functional education systems and empowering women to act on their knowledge. And proper sanitation and clean water depend on effective public works.

Realizing the benefits of good nutrition also requires a well-functioning healthcare system, to intercept the transfer from malnutrition to disease.⁵⁰ Improving the nutrition of pregnant women can lead to healthier infants and spare children the crushing burden of lifelong disabilities.⁵¹ School meal programmes for primary school-age children, along with other public services, can provide a social safety net—keeping girls in school, alleviating short-term hunger and ending the malnutrition–infections–nutrient loss cycle.⁵² Adequately nourished children can concentrate better in school and engage in learning that builds the physical and intellectual resilience of emerging generations.⁵³ Campaigns to improve micronutrient intake can eliminate nutrition deficiencies that go undetected for years and that lead to birth defects, illness and even death. And agricultural interventions can increase food availability (chapter 4), the nutritional value of crops and the dietary diversity of communities.

High returns to human development and economic productivity make nutrition a very cost-effective intervention: a dollar invested in nutrition provides a substantial return (table 5.1), especially in countries with large and growing numbers of children. Micronutrient supplements for children (vitamin A, iron and zinc), salt iodization and micronutrient fortification—each cost-effective—can improve nutrition. Better education outcomes and fewer outbreaks of contagious diseases are other benefits.⁵⁴

Realizing the potential of biofortification—and overcoming the limits

Agriculture, the main source of nutrients in food, is central to nutrition and health.⁵⁵ But agricultural policies have neglected nutrition. Biofortification of crops (making crops more nutritious through conventional breeding and genetic modification), together with fortification of foods, could increase the nutritional value of food—and its variety.



Biofortification, though still controversial, is not new, and research has produced important breakthroughs.⁵⁶ Because biofortification focuses on unprocessed food staples—foods that poor people eat in large quantities every day—it implicitly targets low-income households that do not consume commercially fortified processed foods. Biofortification also promises low recurrent costs because, once self-fortifying seeds have been developed, countries can share them. A biofortified crop system can thus be highly sustainable, producing nutrient-strengthened varieties year after year, regardless of policy fads or breaks in the supply of micronutrient supplements. The vitamin A-rich sweet potato developed by HarvestPlus and its partners, now available in Mozambique and Uganda,⁵⁷ hints at the successes possible through biofortification.

But there are limits. Biofortified crops are still in development. Fewer nutrients can be bred into them than can be added through commercial fortification and supplementation, and breeding for micronutrient density might come at the expense of breeding for other traits, such as drought or pest tolerance. In any case, staples, the crops targeted by biofortification, are insufficiently dense in protein and fats to meet the nutrition needs of infants, who suffer the most severe malnutrition. This limitation is partly offset by the health benefits to infants and children of having better-nourished mothers. Biofortified foods are also criticized for concentrating nutrients in a few superior crop varieties bred by a handful of private companies, to the detriment of biodiversity and competition, especially in the context of controversy over genetic modification.⁵⁸

It will take strong research management and socially responsible investments in nutrition by the food industry and other private companies for biofortification to deliver on its powerful promise. It will also take government regulation, farmer involvement and consumer awareness. Indeed, biofortification will succeed only if plant breeders, nutritionists, researchers, governments, nongovernmental organizations and commercial firms collaborate (chapter 4).⁵⁹

Improving household nutrition

While the poorest households in sub-Saharan Africa spend 54%–90% of their income on food (table 5.2), the cost of an *adequate* diet in poor

TABLE 5.2 FOOD ACCOUNTS FOR A LARGE PERCENTAGE OF HOUSEHOLD EXPENSES IN SUB-SAHARAN AFRICA

COUNTRY	NATIONAL	URBAN	RURAL	POOREST QUINTILE	RICHEST QUINTILE
Benin	56	54	57	59	52
Burkina Faso	62	52	65	74	45
Burundi	57	60	57	54	53
Cameroon	63	55	68	68	53
Côte d'Ivoire	55	56	54	58	45
Ethiopia	70	57	75	82	52
Gambia	68	67	69	69	67
Ghana	62	58	64	66	58
Guinea-Bissau	70	64	72	69	64
Kenya	73	57	77	83	56
Madagascar	84	76	86	84	77
Malawi	59	57	59	58	56
Mali	62	54	66	64	55
Nigeria	72	70	75	84	62
Rwanda	56	57	56	77	31
Senegal	57	53	61	62	48
South Africa	40	34	50	58	16
Tanzania	85	86	85	90	76
Uganda	65	44	69	70	50

Source: Depetris Chauvin, Mulangu, and Porto 2012.

countries exceeds household income.⁶⁰ In other words, the entitlements of poor households are often not enough to meet satisfactory nutrition requirements. Food vouchers and cash transfers are thus essential for improving nutrition, especially when families are battling shocks to income or production.⁶¹

One way to advance nutrition and break the inter-generational cycle of malnutrition is to empower women by strengthening girls' and women's rights and increasing their voice in political and social matters.⁶² Gender equality promotes better health and education across a community. Improvements

in women's education over 1970–1995 cut child malnutrition considerably.⁶³ When women have more influence on household decisions, child nutrition improves considerably.⁶⁴

But large gaps in gender equality remain. Where women have less power than men do, nutrition suffers, household food security weakens and access to health care lags.⁶⁵ Girls, who often stay home to do chores or to care for their families,⁶⁶ are less likely than boys to be in school—and tend to drop out earlier if they are enrolled. In sub-Saharan Africa, particularly in rural areas, many girls marry young.⁶⁷ Postponing pregnancy is also crucial for breaking the cycle of malnutrition, as delaying marriage is associated with fewer underweight babies.⁶⁸

In 2008 a special issue of the medical journal *The Lancet* identified direct interventions to prevent and treat child malnutrition, most at the household level (table 5.3). This core set of nutrition interventions, delivered to pregnant women and children in the first two years of life, could eliminate 90% of the global burden of stunting in 36 countries, many in sub-Saharan Africa.⁶⁹ Scaling up this set

of interventions could prevent one in four deaths of children under age five. The estimated cost of scaling up the full set of interventions is \$2.8 billion annually for the sub-Saharan African countries in the sample.⁷⁰

Supplementation (pills, syrups or injections), fortification of food and water, biofortification of crops and dietary changes can all increase micronutrient consumption. An equitable, efficient national policy promotes a mix of these strategies. Supplementation makes it easier to target population groups in need by age, gender or location. Fortification, while the most cost-effective method in many areas, does not always suit rural sub-Saharan Africa, where few markets sell commercially processed and fortified foods, though it remains an option. The antinutrient problem mentioned previously can be countered through traditional methods of processing and preparing common foods, such as fermentation (maize, soybeans, sorghum, cassava, cocoyam, cowpeas and lima beans), which can increase the nutrient value of the diet by inducing phytate hydrolysis.⁷¹

TABLE 5.3 FOCUSING ON THE HOUSEHOLD: MOTHER- AND CHILD-CENTRED INTERVENTIONS TO REDUCE MALNUTRITION AND ITS IMPACTS

INTERVENTION	MOTHER-CENTRED	CHILD-CENTRED
Prevention	Hand washing and other sanitary measures for improved hygiene	Breastfeeding for newborns at delivery
	Iodization of salt or iodized oil capsules for household use	Complementary feeding between the ages of 6 and 24 months, in addition to continued breastfeeding
	Fortification of staple foods, complementary foods and condiments	Zinc supplements for infants and children
	Micronutrient supplementation (for example, calcium and vitamin A)	Fortification and supplementation with vitamin A for children ages 6–59 months
	Individual and group counselling to promote exclusive breastfeeding for a child's first six months	Iodization of salt or iodized oil capsules for household use
	Supplements of iron and folic acid for pregnant women	Hand washing and other measures for improved hygiene
	Behavioural change campaigns, such as to reduce tobacco use and indoor air pollution or to promote use of insecticide-treated bednets	Insecticide-treated bednets
Treatment	Deworming during pregnancy	Management of diarrhoea through zinc intake complemented with oral rehydration solution for infants and children
		Treatment of severe acute malnutrition with ready-to-use therapeutic foods for children under age five
		Treatment of moderate acute malnutrition with fortified foods for children under age five
		Deworming

Source: Modified from Bhutta and others (2008) and Fanzo and Pronyk (2010).



The core interventions offer high returns over a child's lifetime—in mental development, earnings potential and contributions to society (box 5.2). South Africa's flour fortification programme, for example, which enriched wheat and maize with eight micronutrients (including vitamin A, folic acid, iron and zinc), reduced spina bifida (a birth defect in which the backbone and spinal canal do not close before birth) by 42% and anencephaly (the absence at birth of a large part of the brain and skull) by 11%.⁷² Supplementation with iron and folic acid before and during pregnancy, which decreases the risk of anaemia, is invaluable for antenatal care in communities where food quality is poor.

Integrating nutrition in national development policy

Building nutrition security in sub-Saharan Africa requires strategic, coordinated government interventions to address the multiple determinants of malnutrition. Senegal has integrated nutrition into

BOX 5.2 TANZANIA: IODINE DEFICIENCY AND EDUCATION

In the 1990s Tanzania introduced an iodized oil supplement programme that reached about a quarter of its population. A study of the programme's long-term cognitive impact compared grade progression at ages 10–14 for children who had received the supplement in utero and children who had not. It found significant cognitive capacity benefits associated with reducing foetal iodine deficiency. Children whose mothers received the supplement during the first trimester of gestation attained an average of more than a third of a year more education than children whose mothers did not. The estimated effects were much larger and more robust for girls.

Source: Field, Robles, and Torero 2009.

a comprehensive national strategy, and Ghana is moving in that direction (box 5.3).

Governments need the capacity to coordinate interventions in education, health, agriculture and infrastructure. They also need to communicate to the public the harmful effects of malnutrition and

BOX 5.3 SENEGAL AND GHANA: INTEGRATING NUTRITION INTO NATIONAL DEVELOPMENT PLANS

Senegal is among several sub-Saharan African countries that have increased and expanded their investments in nutrition in recent years as part of broader development efforts, and Ghana is moving towards an integrated strategy.

Senegal. Senegal's experience illustrates the multisectoral approach needed to integrate nutrition interventions into a larger national development strategy. The government began to address malnutrition in its 2007–2011 strategy and developed a nutrition strategy for 2012–2017, which includes salt iodization and food fortification with iron and vitamin A. Political commitment is evident in the national nutrition budget, which rose nearly sevenfold between 2002 and 2007, with commitments to increase it annually to 2015.

The share of Senegalese children under age five who are underweight dropped from 22% in 1990 to 15% in 2005. Stunting declined as well, from 34% to 20%. Strong government commitment and financing, a mix of centralized and decentralized implementation, and close collaboration with partners have all contributed to the success of the government's strategy.

Senegal's Unit for the Fight against Malnutrition coordinates activities across the four key ministries related to nutrition (Health, Agriculture, Family and Education). The regional governor and regional monitoring committees oversee and follow up on interventions, and local authorities manage community nutrition activities and subcontract with local and international nongovernmental

organizations. International organizations, including the World Food Programme, the United Nations Children's Fund and the World Health Organization, have also provided support. Senegal has engaged the private sector too, particularly in large-scale fortification of cooking oil and flour and expansion of salt iodization.

Ghana. A study of Ghana's readiness to accelerate nutrition initiatives identified more than 20 food and nutrition policies and strategies, including the 2005 Imagine Ghana Free of Malnutrition Strategy, the Community-based Growth Promotion Programme and the 2007–2011 Health Sector Programme of Work. Data and reporting systems were not centrally coordinated, blurring evidence of progress. The programmes covered numerous interventions and spanned several sectors. The Ministry of Food and Agriculture controls the budget for food security and production, while the Ministry of Health directs the health aspects of nutrition.

Following the first comprehensive food security assessment, released in 2009, Ghana adopted two plans to strengthen food security: the National Social Protection Strategy, to protect people in extreme poverty, and the Food and Agriculture Sector Development Policy, to support smallholder farmers through extension services. The government has elevated the Nutrition Unit of the Ghana Health Service to the departmental level, providing autonomy and resources for programme planning and implementation. These initiatives are an important first step towards a comprehensive, coordinated and lasting response to hunger and undernutrition.

Source: www.scalingupnutrition.org/sun-countries/; WHO 2010; Brantuo and others 2009; UNSCN 2009; Biedlerack and Rivers 2009; Hunger Task Force 2008; Benson 2008.

TABLE 5.4 INTERNATIONAL INITIATIVES IN NUTRITION IMPROVEMENT

INITIATIVE	OVERVIEW
Committee on World Food Security	- The UN forum for reviewing and following up on policies for world food security. At the 35th Session in 2009 it became a central component in the evolving Global Partnership for Agriculture, Food Security and Nutrition. - Plans, coordinates and strengthens hunger and food security initiatives at all levels, while ensuring that decisions are backed by hard science. - Includes the United Nations High Level Task Force's Comprehensive Framework for Action, which focuses on increasing investments in smallholder agriculture and in rural development. Degree of integration of nutrition concerns is to be determined.
The Comprehensive Africa Agriculture Development Programme (CAADP)	- Within the larger New Partnership for Africa's Development (NEPAD), a programme for eliminating hunger and reducing poverty through agricultural development. - The Global Alliance for Improved Nutrition (see below) and NEPAD signed a 2011 memorandum of understanding to develop a five-year joint programme supporting national programmes that integrate nutrition security into the CAADP and harmonize CAADP and nutrition interventions. The alliance and NEPAD will assess policies, practices and capacities in agriculture, nutrition and food security—engaging the private sector, donors and national decision-makers and coordinating action to expand access to more nutritious food.
The Consultative Group on International Agriculture Research (CGIAR)	- Supports the CGIAR's research agenda by improving understanding of the options for agriculture to accentuate benefits and mitigate the risks to human health and nutrition. - Commits to reduce poverty and hunger, improve health and nutrition and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership. - Focuses on sub-Saharan Africa, with research to provide new information, tools and evidence on linking agriculture to nutrition and health outcomes. Funding is pending.
Economic Community of West African States: West African Health Organization	- Within the Economic Community of West African States, a regional group of 15 West African countries founded in 1975, the West African Health Organization leads cross-sectoral partnership activities to mobilize agrobiodiversity for local food systems in national and regional programmes against hunger, food insecurity, micronutrient deficiencies and diet-related chronic diseases. - Convenes experts and stakeholders to address nutrition policy and programming challenges, linking agriculture and health and nutrition programmes and promoting local food production for diet diversity.
The Global Alliance for Improved Nutrition	- Established in 2002. - Supports public-private partnerships to increase access to nutritionally enhanced food products. - Invests in and works with more than 600 companies in more than 30 countries to reach nearly 530 million people, over half of them women and children. - Active in Côte d'Ivoire, Egypt, Ethiopia, Ghana, Kenya, Niger, Nigeria, Mali, Morocco, Senegal, South Africa and Uganda.
Scaling Up Nutrition	- Involves the Food and Agriculture Organization, United Nations Children's Fund, United Nations Standing Committee on Nutrition, World Food Programme, World Health Organization, World Bank and UN Renewed Efforts against Child Hunger (see below). - Helps governments scale up nutrition efforts. - Convenes in-country stakeholders, including the United Nations, civil society, the private sector, research organizations and donor agencies; identifies lead development partners to coordinate and convene; identifies capacities and resource gaps; and completes or updates national nutrition strategies. - Includes Ethiopia, Ghana, Mozambique, Senegal, Tanzania and Uganda; Malawi, Niger and Zambia have submitted formal letters of request to join.
UN Renewed Efforts against Child Hunger	- In a UN interagency partnership with governments, scales up multisectoral approaches to malnutrition and hunger by pooling the resources of governments, civil society, the private sector and countries not on track for attaining Millennium Development Goal 1 on halving hunger by 2015. - Piloted in Mauritania, is making progress on the Millennium Development Goal 1 indicator of reducing the share of children under age five who are underweight, from 48% in 1990 to 31% in 2008.
Feed the Future	- Sponsored by the U.S. government. - Pledged at least \$3.5 billion for agricultural development and food security over three years and helped leverage and align more than \$18.5 billion from other donors in support of a common approach to food security. - Partners with others to increase investments in nutrition and agricultural development, emphasizing improved agricultural productivity, expanded markets and trade, increased economic resilience in vulnerable rural communities, greater access to diverse and high-quality foods, and better prevention, identification and treatment of undernutrition. - Focuses on Ethiopia, Ghana, Kenya, Liberia, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, Uganda and Zambia.

Source: Fanzo 2012.



how to avoid it. Making the challenge more difficult is the political economy context: the needed policy measures have effects that are felt mainly over the long term and that confer few short-term political benefits. The design, testing and scaling up of multisectoral programmes in sub-Saharan Africa still rarely combine child and maternal care and disease control with food system and livelihood-based approaches. But momentum seems to be building for interventions that can combat the roots of malnutrition in both health and agriculture.

Adapting successful health sector initiatives to nutrition measures offers promise. Immunization programmes have improved public health, reduced healthcare costs and saved lives.⁷³ An example is the GAVI Alliance,⁷⁴ which implements worldwide vaccination campaigns using existing infrastructure and immunization advocacy to win community support. Nutrition programmes can learn from these experiences. But while citizen participation is undoubtedly important, nutrition advocacy needs to target senior policy-makers.⁷⁵

Encouraging international and regional initiatives

Political backing must continue to grow for the global community's involvement in eradicating malnutrition in sub-Saharan Africa. As mentioned,

the costs of international engagement are not punitive, especially compared with the potential benefits. International and regional efforts are under way to improve nutrition, and most involve international donors and nongovernmental organizations (table 5.4). Activities include support to governments (UN Renewed Efforts against Child Hunger), financial investment (U.S. government-sponsored Feed the Future), public-private partnerships (The Global Alliance for Improved Nutrition), Africa-led agriculture development (Comprehensive Africa Agriculture Development Programme) and research (Consultative Group on International Agriculture Research).

Yet these many international nutrition initiatives present risks of fragmentation.⁷⁶ Recent activities of the Scaling Up Nutrition movement offers the prospect of international coordination and leadership. The movement's Road Map, produced in mid-2010, lays out the principles and direction for increased support for countries as they scale up efforts to tackle malnutrition across a range of sectors. By February 2012, 19 African countries had joined Scaling Up Nutrition.⁷⁷

* * *

Turning food security into sustained human development will require strategic efforts to improve

TABLE 5.5 POLICY OPTIONS FOR ACCELERATING GOOD NUTRITION

POLICY OPTION	STABILITY OF FOOD SYSTEMS		
	AVAILABILITY OF FOOD	ACCESS TO FOOD	USE OF FOOD
Stimulating individual action			• Delayed pregnancy • Adequate nutrition during pregnancy and breastfeeding
Expanding public services			• Education on food use • Healthcare • School feeding programmes • Cash transfers
Generating public action and nutrition-focused policies		• Micronutrient campaigns • Behavioural change campaigns • Supplementation, food fortification, crop biofortification	
	• Gender equality and stronger legal rights for women • National and international policy engagement		

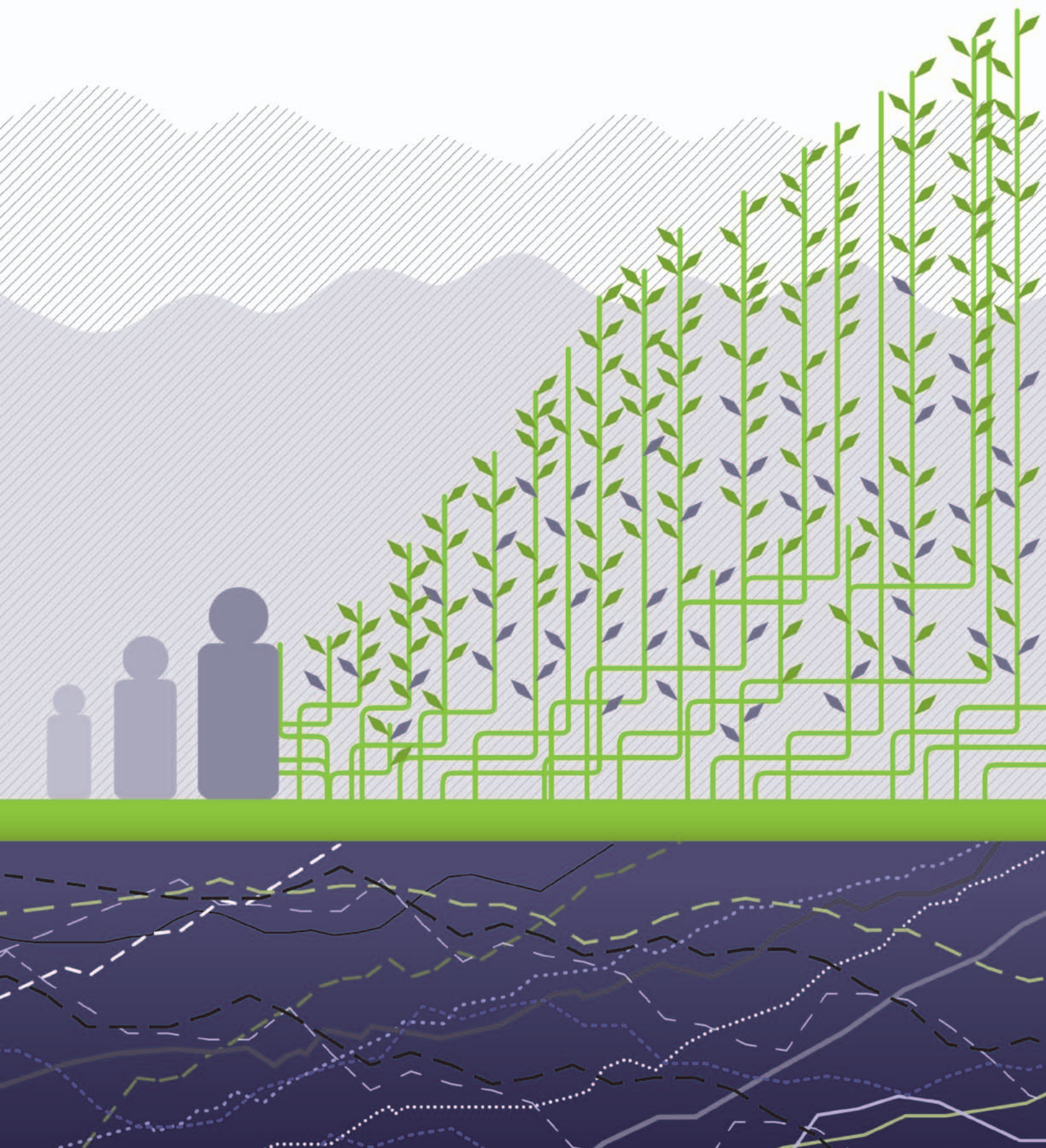
Source: Based on analysis described in the Report.

the nutrition status of Africans. Evidence across the globe and in many sub-Saharan African countries shows the large return on investment in nutrition. Eradicating malnutrition requires individual and household actions to change the dynamics around nutrition and health practices; strong investment

in public services to improve food availability, access and use; and the positioning of nutrition at the centre of national development priorities, integrating policies affecting agriculture, gender equality and incentives to change diets and behaviour (table 5.5).

6

Resilience and Social Protection for Stability in Food Systems





CHAPTER 6

Resilience and Social Protection for Stability in Food Systems

Getting food from field to table is fraught with risk. Shocks, cycles and trends threaten food security and livelihoods in sub-Saharan Africa. Shocks such as conflict, droughts and floods, and food price spikes inflict immediate hardship on the poorest and most vulnerable households and constrain human development over time—and too often the damage is permanent. Cyclical or longer term stresses such as seasonal harvesting patterns that result in long “hungry seasons” between harvests and creeping environmental degradation are slower moving and more predictable, but they devastate communities all the same—especially communities that cannot manage exposure to hazards and protect livelihoods.

Building resilience for food security and human development in sub-Saharan Africa is essential to reduce deep-seated vulnerabilities. It is a complex task requiring the determined contributions of many. But it can be done. First, applying a broad range of measures can reduce the exposure of the food system to stress in the first place—or at least the frequency and intensity of the most damaging pressures. Second, the capacity of poor and vulnerable households to cope with risk can be enhanced through informal networks, insurance markets and well-designed public interventions in a combination determined by local circumstances. Third, an expanded agenda for social protection can strengthen the food security and capabilities of everyone, especially people who face persistent deprivations.

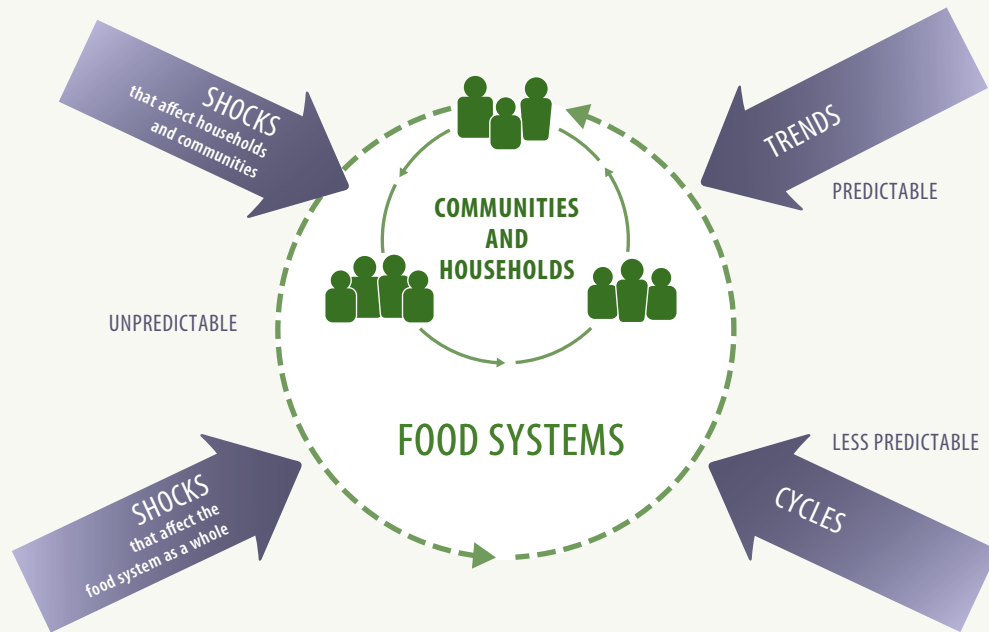
Resilience can be thought of as the opposite of vulnerability.¹ Resilient food systems can withstand political, economic, social and environmental shocks. Resilience makes individuals, households and communities less vulnerable and better able to prevent reversals in food security. Most important, it helps them withstand multiple stresses—occurring with varying frequency, predictability and intensity—and break free of persistent poverty and accelerate human development.

Food systems in sub-Saharan Africa contend with three main types of stress: shocks, cycles and trends (figure 6.1). Shocks strike with little or no warning, and their immediate impacts can be hard to prepare for and cope with. Covariate shocks, such

as spiking international food and energy prices (as in 2007/2008 and 2010/2011), affect the entire food system. Idiosyncratic shocks, such as when a household member loses a job or falls ill, affect individual households and communities. Cycles, with their longer gestation, include seasonal harvests and the associated rise and fall in demand for agricultural labour and are often more predictable. Trends also unfold gradually, allowing for adaptation; they include the effects of soil erosion on agricultural productivity and some of the impacts of climate change. Despite these distinctions, shocks, cycles and trends are interrelated. For instance, in sub-Saharan Africa climate change (trend) and El Niño (weather cycle) contribute to more frequent droughts and floods (shocks). Some changes arise from exogenous factors (climate change, civil conflict and globalization of agricultural trade). Others from endogenous factors (household power relations and demographic changes that affect the demand for food and the supply of labour).²

Chapter 2 identified three sources of instability in African food systems: weather variability, food price volatility and violent conflict. Chapter 3 described three emerging threats—environmental degradation, climate change and demographic pressures—that will increasingly disturb food systems and fray the link between food security and human development. When instability can be averted, the policy goal should be to prevent and relieve stress in food systems; when it cannot, the goal should

FIGURE 6.1 CHANGE DYNAMICS IN FOOD SYSTEMS



Source: Based on analysis described in the Report.

be to build resilience and extend social protection to individuals and households. This chapter looks at how to reach these goals by strengthening policies, markets and institutions for building resilience into sub-Saharan Africa's food systems.

Building resilience to accelerate human development through more stable food systems

The early end of the rainy season in the late months of 2004 spelled disaster for the people of Tindjambane, a village in Mali a few miles from Timbuktu and near the Niger River. The people in the village are mostly Tuareg, traditionally nomadic pastoralists. With livestock dying for lack of pasture, and food crops failing, Tindjambane and several other areas in the Sahel suffered acute food insecurity during most of 2005.³ The Sahel has been particularly vulnerable to shocks. The region experienced another food crisis in 2010, and a food crisis is looming in 2012.

Natural or human-caused disasters affecting the supply and affordability of food can harm people immediately, as in the Sahel. But food disasters can also cause long-term damage to human development. Even the threat of a shock and the uncertainty that creates can result in losses. For example, farmers may choose familiar, low-yield technologies instead of higher yielding possibilities, trading off potential yield gains for some basic security in production.⁴

Empirical evidence shows that in countries with lower human development aggregate shocks adversely affect short-term outcomes in health and education.⁵ Research in Côte d'Ivoire linking deviations from normal rainfall patterns and investment in children finds enrolment declines of 20 percentage points in regions that suffered a weather shock.⁶ A study of South Africa shows that healthier children are more resilient; they start school earlier, continue further in school and repeat fewer classes.⁷

Instability can also have lasting consequences for human development, even after food systems



return to their preshock state. The lack of food during a shock can permanently reduce a child's stature, even if adequate food becomes available later. A study in Zimbabwe found lasting harm to young children exposed to drought and violence in the early 1980s. If they had had the median stature of a child in a developed country they would have, by adolescence, started school nearly six months earlier, completed another 0.85 grade of school and been 3.4 centimetres taller. These differences make for a 14% reduction in lifetime earnings.

All these factors can make a large difference in the lives of vulnerable people.⁸ A study in Ethiopia found that children who were under age three at the peak of the humanitarian crisis in 1984 were shorter, less likely to have completed primary school and more prone to illness as adults, potentially reducing lifetime earnings by as much as 8%.⁹ Recent work in Burundi found that children living in areas experiencing violence were more likely to be severely stunted and had higher mortality rates than children who did not. The longer the exposure to violence, the more severe was the effect.¹⁰

Poor people are more vulnerable to changes in food security not only because they rely heavily on natural resources but also because many developing countries lack effective mechanisms that enable people to manage risks. For example, the absence of insurance or credit markets in rural sub-Saharan Africa means that farmers, confronted by shocks, may be forced to reduce household food intake, sell off productive tools and other assets at fire-sale prices or take their children out of school and put them to work.¹¹

Such transitory challenges are often tackled with discretionary, short-lived interventions. These save lives, but they do not safeguard futures. A more comprehensive agenda is needed to build long-term resilience that protects people's capabilities and enables them to pursue riskier but more productive opportunities.

Relieving pressures on food systems

Prevention is better than cure—but harder to implement. Pre-emptive investments to prevent or relieve stress and volatility in food systems call for vision, commitment and stakeholder collaboration. National and international policy-makers now

recognize that political and economic stability rest in part on meeting people's basic food needs at reasonable prices and that agricultural development and food security depend on good governance, economic stability, social progress and environmental sustainability.¹²

Three sources of instability in African food systems require action: reducing the impacts of conflict and political instability, dampening volatility in international food prices and relieving demographic and environmental pressures. Climate change will be a growing source of instability, requiring global action to reduce the contribution of agriculture to greenhouse gas emissions (box 6.1).

Reducing conflict and political instability

While sub-Saharan Africa has seen improved governance and reduced conflict in the last decade, violent conflict and political instability still prevail in many countries, inflicting severe damage on

BOX 6.1

MITIGATING AGRICULTURE'S CONTRIBUTION TO CLIMATE CHANGE

Agriculture contributes substantially to human-caused greenhouse gas emissions, mainly through changes in land use. Reducing these effects is thus a global priority. Worldwide, agriculture needs to become a net reservoir (sink) for emissions rather than a net source. Even though the contributions from African agriculture to global greenhouse gas emissions are low—and are likely to remain low for some time—agriculture can reduce its impact by pursuing output expansion in ways that are sensitive to its effects on climate change.

Increasing the productivity of African agriculture as outlined in chapter 4 would be consistent with the findings of the 2011 Commission on Sustainable Agriculture, which identified as a top priority “integrat[ing] food security and sustainable agriculture into global and national policies,” including adaptation and mitigation. For African and other developing countries this means investing in climate-smart agricultural practices and food security measures. Scaling up sustainable land and water management is also one of the pillars of the Comprehensive African Agriculture Development Programme of the New Partnership for Africa's Development.

Two initiatives that will support a transition to more sustainable agricultural systems in sub-Saharan Africa received backing at the 2011 Conference of Parties in Durban, South Africa. One is the proposed Green Climate Fund, which by 2020 would provide \$100 billion annually for mitigation and adaptation in developing countries. The other is the Climate Technology Centre and Network, to promote technology transfer between developed and developing countries, which is expected to be fully operational in 2012.

Source: Beddington and others 2011; CAADP 2009; Pachauri and Reisinger 2007; Padma, Bafana, and Nordling 2011.

TABLE 6.1 FOOD AND ENERGY PRICE VOLATILITY HAVE INCREASED IN THE PAST DECADE

Monthly variation in selected real commodity prices, by decade (coefficient of variation, percent)

COMMODITY	1970–1979	1980–1989	1990–1999	2000–2009
Rice	44	43	14	49
Wheat	36	24	21	32
Maize	25	27	20	29
Petroleum	69	41	25	46

Source: Naylor and Falcon 2010, p. 696.

human lives, food systems and livelihoods.¹³ But food insecurity is not just a product of conflict; it is also a cause. Governments that fail to make adequate food available to their people at affordable prices risk political unrest.¹⁴ Abnormal variability in rainfall and the hardships that follow are telling predictors of violent conflict.¹⁵ As climate change intensifies water and land stresses, development and conflict-prevention plans will have to adapt.

In fragile environments such as in the Sahel and the Horn of Africa durable peace depends on mediating the underlying competition for water and land.¹⁶ The four countries ranked lowest on the International Food Policy Research Institute's Global Hunger Index¹⁷ are all in sub-Saharan Africa, and all have experienced recent violent conflict. In South Sudan (not yet covered by the hunger index because of data limitations) two decades of conflict have severely suppressed agricultural development. At independence in 2011 total live-stock production was estimated at a fifth of potential and fish production at a tenth.¹⁸ And in 2009 almost half the population of South Sudan had food intake below the minimum required dietary energy level—almost three-quarters in the state of Western Bahr El Ghazal.¹⁹ The Democratic Republic of the Congo—still struggling to overcome the legacies of the Second Congo War (1998–2003), the deadliest conflict since World War II—has the potential to become sub-Saharan Africa's breadbasket, yet it has the highest estimated prevalence of malnutrition in the world.²⁰ Ending conflicts, accelerating recovery after hostilities

and establishing mechanisms for preventing new flare-ups, though complex undertakings, could substantially reduce the frequency of food system collapse in sub-Saharan Africa.

Dampening volatility in international food prices

As chapter 2 shows, both international and domestic factors can lead to food price volatility, so policies must focus on both. The increasing volatility in global food markets in the past decade (table 6.1) is often attributed to greater demand (arising from population growth, the emerging middle class in developing countries and the popularity of biofuels) and restrictive trade policies.²¹ African countries, highly vulnerable to volatility in global prices, have a clear interest in policies that reduce volatility and relieve pressure on national food systems. As emphasized by the High Level Panel of Experts on Food Security and Nutrition, countries need comprehensive food security strategies that assess policies and programmes, identify gaps and build institutional capacity to address them.²²

Calls are also mounting for a new global architecture for agriculture and food security.²³ A key pillar would be a regulated, multilateral trading system that increases market access for food importers and lifts export restrictions. Export bans by major rice producers in Asia contributed to the 140% escalation in rice prices between November 2007 and May 2008.²⁴ In West Africa, particularly dependent on rice imports, 70%–80% of the international price increase was passed through to domestic markets.²⁵

National targets for biofuel use and subsidies and tariffs on their production and consumption also influence global food markets. World production of bioethanol and biodiesel has increased over the last decade,²⁶ thanks largely to government backing for fossil fuel alternatives. Biofuels link food markets to even more volatile energy markets (see table 6.1). First-generation biofuels are derived mainly from agricultural feedstocks (sugarcane and maize for bioethanol and oilseeds for biodiesel). Next-generation biofuels, including those that rely on cellulose (agricultural and forestry waste), could decouple food and energy markets. But the economic viability and timing of these new technologies remain uncertain, as do the implications for land use.²⁷ Producing biofuels requires balancing



land for biofuels and for food crops and managing the equity concerns that arise when food crops (or the land they grow on) are used for fuel production, which shifts output from the poorer segments of society to the wealthier.

Other measures to reduce volatility in international food prices include intergovernment cooperation in managing food stocks and greater availability of market information. In sub-Saharan Africa the regional dimension is critical (chapter 7).

Relieving demographic and environmental pressures

Population growth intensifies pressure on sub-Saharan Africa's food systems. So, policy options for improving food security over the next several decades must combine technological innovations in sustainable agriculture and measures to reduce population growth.²⁸ Empowering women and expanding their capabilities by improving their access to education and earnings are critical for lowering fertility rates.²⁹

Many countries with high fertility rates have ample scope for making family planning services available to the many women whose contraceptive needs are not being met.³⁰ Rwanda's total fertility rate fell from 6.1 births per woman in 2005 to 4.6 in 2010 as the government established a countrywide information, education and communication programme on family planning.³¹ The proportion of married women ages 15–49 using modern contraceptive methods rose from 10% in 2005 to 45% in 2010.³² Fertility preferences were also affected: the proportion of women wanting no more children rose from 42% to 52%.³³ Other countries in sub-Saharan Africa could achieve similar results.³⁴ Slower population growth would ease pressures on the food system and reduce dependency ratios, enabling economies to grow faster as the share of working-age people rises. This would enable African countries to reap the demographic dividends associated with declining dependency ratios and would ease pressures to provide the additional nutrition required by expectant mothers and their children.

The increased crop production needed to feed the region's growing population will intensify environmental pressures unless steps are taken to strengthen sustainable agriculture. Boosting agricultural yields will require investments to reverse

soil degradation and promote sustainable land use.³⁵ Agroecological approaches could help, especially where soil degradation has been undermining livelihoods for decades³⁶ and when integrating low external input agriculture and adapted green revolution approaches.³⁷

There is some evidence that sustainable intensification³⁸ and organic agriculture can restore and improve farm ecosystem functions and re-establish soil integrity,³⁹ while increasing production and helping agriculture adapt to the fundamental shifts induced by climate change.⁴⁰ Ecologically integrated approaches, such as minimum tillage, integrated pest management, integrated soil fertility management and drip irrigation, have the potential to be resilient and empowering for farmers.

Boosting agricultural production sustainably and strengthening the resilience of African food systems demand diverse approaches that can be adapted to specific crops, localities, cultures and other conditions.⁴¹ To serve such diversity, the breadth of scientific enquiry must be equally diverse and combined with social, economic and political perspectives.

Reducing vulnerability and managing risk through social protection

Large fluctuations in food supplies and prices magnify food insecurity in poor and vulnerable households. The recent price spikes and recurring food emergencies highlight the importance of responding early and effectively to distress (box 6.2) and of ensuring that social protection systems are in place to safeguard food security by combatting persistent poverty and advancing social justice.⁴²

Looking beyond social transfers⁴³ and social risk management and in line with emerging ideas on social protection in sub-Saharan Africa,⁴⁴ this Report focuses on social protection as "a specific set of public actions to address the vulnerability of people's life through social insurance, offering protection against risk and adversity throughout life; through social assistance, offering payments and in-kind transfers to support and enable the poor; and through inclusion efforts that enhance the capability of the marginalised to access social insurance and assistance."⁴⁵ Within this broad definition of social protection for combatting persistent

BOX 6.2 MONITORING FOOD ENTITLEMENTS: RESPONDING TO EARLY WARNINGS

Information is an indispensable tool for public action to increase resilience. Gathering information requires better monitoring of food entitlements. The impacts of price fluctuations—and the corresponding changes in entitlements—can be measured more precisely after the fact, but for public action it is critical to get a sense of who will be affected and how, before these fluctuations occur. Research for this Report based on household survey data for Malawi and Uganda used a simple simulation to analyse how changes in the prices of specific food groups (maize and other staple foods) and negative short-term income shocks influence the number of calories consumed.

The simulations suggest a sizeable impact of shocks on food poverty in both countries, but the effects of price shocks are notably larger than those of income shocks. There were some differences in how shocks affect people in Malawi and Uganda as well.

Price shocks are substantially larger in Malawi than in Uganda because poor people rely much more on staple foods for their caloric consumption in Malawi than in Uganda.

To be useful for guiding public policy, technological innovations and monitoring need to be used properly, and responses need to be quick and appropriate. Early warning systems have existed for decades, but they need to be strengthened if they are to play an important role in protecting people from sudden changes in the food supply. In three cases of extreme food insecurity in sub-Saharan Africa (in Ethiopia, Malawi and Niger) in the early 2000s, early warning systems were in place, but problems of accuracy, credibility and inconsistency made them ineffective. In the recent famine in Somalia, warnings were issued in August 2010, almost a year in advance of the height of the crisis. But the early response was inadequate, and efforts were scaled up only after the rains failed a second time.

Source: Devereux 2009; Harttgen and Klasen 2012; Oxfam and Save the Children 2012.

poverty and advancing social justice, several approaches are especially relevant to food security and human development: developing insurance markets, creating jobs through public works programmes, adjusting social transfers by targeting food aid or cash transfers and managing strategic reserves for food supplies.

Developing insurance markets

Market failures of three main sorts prevent sub-Saharan Africa's poor farmers and livestock producers from accessing private insurance.⁴⁶ One is covariate risk, the likelihood that most farmers in an area will put in claims at the same time because of a widespread crop failure, as in a drought. The second is moral hazard, the possibility that insured farmers or pastoralists will neglect their fields or animals knowing that insurance will cover their losses. The third is adverse selection, the likelihood that only the most risk-prone farmers will purchase insurance. One way to avoid these problems is weather-indexed insurance, which triggers payments when total rainfall fails to reach a defined threshold. Claims can be settled quickly because individual assessments are not required.⁴⁷

Weather-indexed insurance has been promoted as a market-based social protection instrument and successfully piloted in several African countries, but it faces challenges. First, poor farmers cannot afford

or are unwilling to pay market-rate premiums for private insurance, so the programmes rely on extensive public subsidies.⁴⁸ Second, payouts do not reflect a farmer's actual losses but are tied to an index based on rainfall data, so an individual farmer's food security might not be adequately protected. Third, low total rainfall is the only agricultural risk covered—not variations in rainfall over a growing season, flooding, crop pests or livestock diseases.⁴⁹

There are also several innovative multicountry schemes for managing risk to food systems. The World Bank's MultiCat programme, launched in 2009, enables countries to access financial markets (by issuing "catastrophe bonds") to insure their budgets against large economic losses arising from natural disasters.⁵⁰ And since 2010 the International Monetary Fund's (IMF) Rapid Credit Facility has offered financial assistance to fragile, low-income countries in balance of payments difficulty because of natural disasters or other shocks and emergencies. These highly concessional loans come with fewer policy conditions than most IMF loans.⁵¹ The African Union Commission and the World Food Programme recently introduced the African Risk Capacity project to help African countries pool the risks of catastrophic weather events. The mechanism will quickly disburse funds to strengthen responses to disasters and improve disaster planning (box 6.3).⁵²



Several African countries are also expanding health insurance mechanisms. Ghana's National Health Insurance scheme, in operation since 2005, attained an impressive 45% coverage by 2008 according to the most recent household health survey.⁵³ Still in the early stages, the scheme challenges include expanding coverage to the poorest groups, achieving financial sustainability and ensuring an adequate supply of high-quality healthcare to meet the demand stimulated by the programme.

Creating jobs, protecting livelihoods

For decades African countries have used public works programmes to reduce poverty and food insecurity. Work projects have included terracing hill-sides, digging irrigation canals and constructing or rehabilitating feeder roads that link farmers to markets. The programmes are popular because they are self-targeting—only very poor people will work for the programmes' very low food or cash wages. In building infrastructure and other assets, the programmes contribute to economic growth as well as social protection. And they can respond to seasonal unemployment, as months of hard work during the farming season are followed by lean months after the harvest when both on-farm work and off-farm income-generating opportunities are scarce. Food-for-work and cash-for-work programmes are often designed to meet both urgent and longer term food security needs, transferring food or cash to participants for immediate sustenance while also promoting agricultural development.

Despite these ostensible benefits, public works programmes are not without challenges. Many criticize paying below-market wages to attract only the very poor as unethical (contravening "decent work" principles) and counterproductive (the net nutritional benefits can be negligible because of the energy expended in manual labour).⁵⁴ Public works projects often compete for labour just when farmers face peak on-farm labour demands. Also, because the production of assets is generally labour intensive and uses little capital equipment, asset quality can be poor. And without adequate maintenance budgets, the public works can deteriorate rapidly. Finally, people with disabilities, the elderly and people who are chronically ill, often the most food insecure, cannot participate.⁵⁵

India has taken a fresh approach to public works through its National Rural Employment Guarantee

BOX 6.3 COMPREHENSIVE FOOD SECURITY AND VULNERABILITY ANALYSIS

The World Food Programme's Comprehensive Food Security and Vulnerability Analysis looks in depth at a country's food security and household vulnerability. Since 2004 the World Food Programme has completed more than 35 baseline surveys, including in The Gambia, Guinea-Bissau, Liberia, Mozambique and Tanzania. The assessments, conducted in countries with frequent shocks that affect food security, offer a wealth of information on the political, socioeconomic and agroecological context; food supplies; markets; livelihoods; coping strategies; nutrition; health; education; and other issues that can shape policies on climate-resilient development and reduce vulnerability to food insecurity.

The African Union Commission and World Food Programme's African Risk Capacity project seeks to create an Africa risk pool to improve responses to natural disasters. Three mechanisms are being developed to meet this goal. The Pan-African Disaster Risk Pool for Food Security is an African-owned contingency fund for sovereign risk to support governments in the event of a natural disaster. Africa RiskView software quantifies and monitors risks. And the Climate Change Stress Test forecasts the expected maximum costs of weather-related events in upcoming seasons. In addition, the United Nations Platform for Space-based Information for Disaster Management and Emergency Response proposes to use space-based technology to lessen sub-Saharan Africa's vulnerability to natural disasters.

Source: WFP 2012; AU and WFP 2011.

Scheme, based on a legislated right of rural households to 100 days of work each year.⁵⁶ The paid work is demand driven: people work when they need to. And legislation underpins the programme: applicants are paid whether work can be provided or not. Although expensive and complex, such guaranteed employment programmes have great potential for sub-Saharan Africa and could strengthen household food security. South Africa is piloting a Community Work Programme based on this model.⁵⁷

Making social transfers work

Food insecurity can be addressed most directly by providing food (food aid) or the means to acquire it (conditional or unconditional cash transfers).

Food aid

Food aid has been the main way of delivering emergency relief and social protection in sub-Saharan Africa since at least the 1960s. Evaluations of project food aid (such as school feeding and food-for-work programmes) and emergency food aid have concluded that effectiveness is limited mainly to alleviating transitory or acute food insecurity. Food

aid has been portrayed as a means of moving the surpluses of heavily subsidized agriculture from developed countries.⁵⁸

Food aid does have advantages, however, and plays a critical role during acute food crises. It can smooth consumption when prices and supplies fluctuate.⁵⁹ More important, food retains its commodity value—a kilogram of wheat in the granary is always a kilogram of wheat, whatever its price and local availability. Where markets are weak and food availability is tight, the simplest way of guaranteeing food security might just be to give people food. Food aid, then, still has an important role, even in nonemergency contexts (figure 6.2).

Cash transfers

Conditional cash transfers are common in Latin America but less so in sub-Saharan Africa.⁶⁰ The conditions generally cover required health and education practices, such as immunizing young children and sending them to school. The positive impacts on food security are both direct, if households spend the additional money on energy- and nutrient-rich food, and indirect and long term, since healthier, better educated people are less likely to be food insecure.

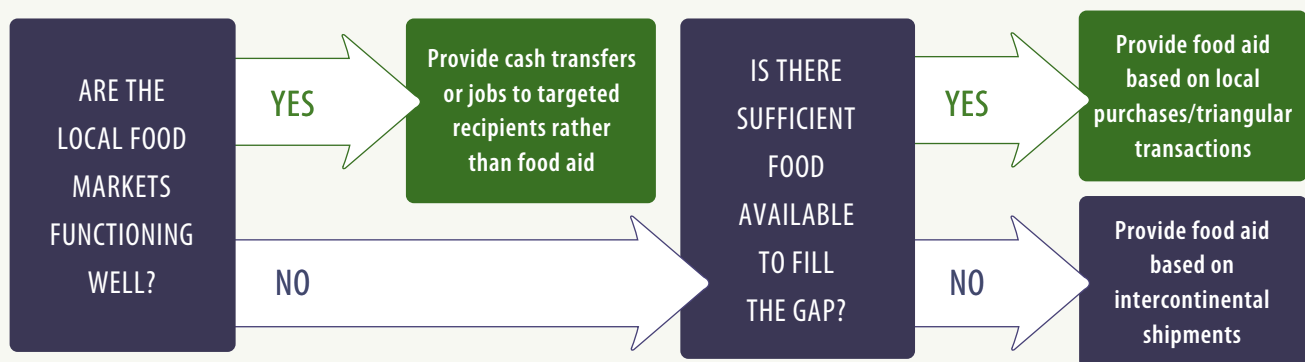
But social protection programmes with multiple objectives risk conflicts among them. People most in need might be least able to meet the conditions: for instance, the most food-insecure families often cannot afford to send their children to school.

Furthermore, conditions that work in Latin America might be less effective in sub-Saharan African countries, where health and education services are weaker and less available, especially in rural areas.⁶¹ And since conditional aid stimulates demand for services, it will be most effective where constraints on supply have eased.

Another option is to use developmental rather than punitive conditions. Zambia is experimenting with a cash transfer model with “soft” conditions. Recipients are informed about school enrolment and attendance responsibilities but are not excluded if the conditions are not met.⁶² Brazil’s Bolsa Familia relies on social worker visits rather than penalties when households fail to comply with conditions. South Africa, whose constitution guarantees the right to social security, thus precluding punitive conditions, is exploring responsibilities linked to cash transfers. Linking cash transfers to developmental awareness could strengthen the social impact of the programme.⁶³

Unconditional cash transfers, more flexible and more responsive to diverse needs than food aid or conditional cash transfers, have become the dominant form of social transfer in sub-Saharan Africa. Rather than undermining production and trade, as food aid can do, cash can stimulate local economies through income and employment multipliers. However, where markets are fragmented and food supplies tight, injecting cash into the economy can drive food prices higher.

FIGURE 6.2 WHEN TO USE FOOD AID?



Source: Based on Barrett and Maxwell (2005).



Cash transfers are typically directed to the chronically poor through community-based selection mechanisms or categorical targeting of vulnerable groups that are not eligible for other social protection measures, such as the elderly, people with disabilities and households with children. Cash transfer programmes can also reach people who are able to work but who lack access to credit, important because of the combination of high youth unemployment and weak financial markets in many sub-Saharan African countries. Uganda's Youth Opportunities Programme, part of a larger effort to rebuild the northern part of the country after decades of civil war, has provided nearly unconditional cash transfers to help young men and women start new businesses. Despite the programme's lack of formal conditions, preliminary results from one evaluation show that most young people invest the funds in developing vocational skills and tools, increasing their work hours and cash income.⁶⁴

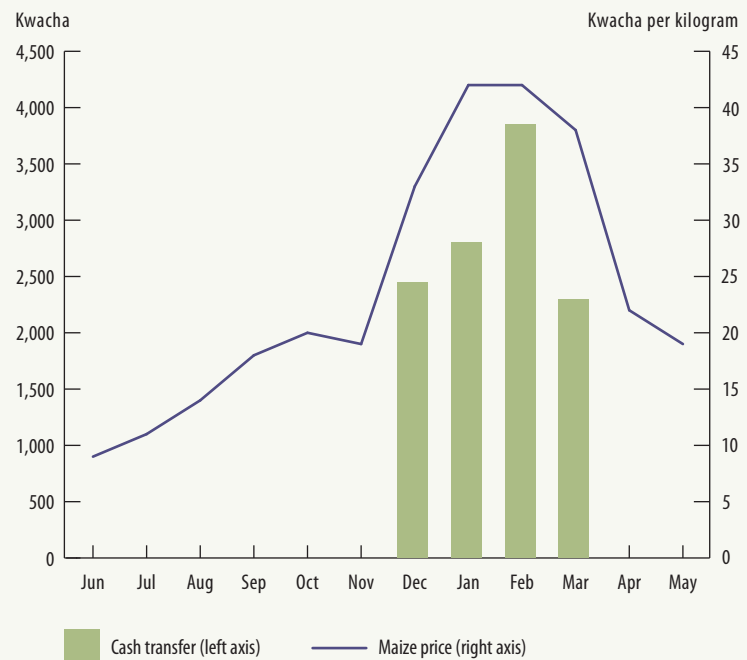
More responsive social transfers

Social transfer programmes—cash and food—have not always responded to gradual inflation or to sudden spikes in food prices or seasonal food price swings, even though such fluctuations are a recognized driver of food insecurity in sub-Saharan Africa (chapter 2).⁶⁵ In Namibia, which has one of the oldest, most extensive cash transfer systems in the region, child grants eroded almost a quarter in real value between 1999 and 2008.⁶⁶ Cash transfers in sub-Saharan Africa rapidly lost purchasing power during the food price crisis of 2007/2008, showing the limits of their effectiveness for addressing volatile food prices, as when Ethiopia replaced irregular food aid with regular cash transfers.⁶⁷ In contrast, Malawi's Food and Cash Transfer and Dowa Emergency Cash Transfers programmes index monthly cash transfers to local prices, so payments rose in step with food prices to maintain constant purchasing power throughout its food crisis (figure 6.3). While this adjustment protected household food security, the administrative and budgetary flexibility required are demanding.

Social transfers can be adapted to protect household food security against fluctuating prices in several other ways:

- *Transferring both cash and food.* During a severe six-month drought in 2007/2008, Swaziland's

FIGURE 6.3 IN MALAWI INDEXED CASH TRANSFERS ROSE ALONG WITH FOOD PRICES, 2006/2007



Source: Adapted from Devereux (2012).

Emergency Drought Response project of humanitarian relief transferred half the regular food allowance in cash.⁶⁸

- *Transferring cash when prices are low and food when they are high*, as in Ethiopia's Productive Safety Net Programme.⁶⁹
- *Prolonging cash transfers when prices rise*—for example from six months to eight or nine, as proposed in Ethiopia.⁷⁰
- *Providing transfers as food-denominated vouchers*, to guarantee access to food without undermining markets, as in Malawi.⁷¹

Managing strategic reserves

Until the 1980s many African governments maintained strategic grain reserves to stabilize food supplies and prices across seasons and in bad years (chapter 3). Buffer stocks were replenished by purchasing grain from farmers after the harvest, often at guaranteed prices to encourage production. The stocks were released onto the market at purchase plus storage cost several months later,

when market supplies were thin and prices rising. Sometimes buffer stocks were used to defend an interseasonal “price band”—to keep market prices between a floor and a ceiling level—and sometimes they served an emergency function, to prevent food crises.

Criticized as expensive, inefficient and prone to political manipulation, the grain reserves were scaled back, partially commercialized or phased out as countries liberalized agricultural markets. But that left governments with limited capacity to respond to food supply shocks. In Malawi and Niger the scaling back of grain reserves limited government options for responding to the devastating food crises that followed in 2002 and 2005 (chapter 3).⁷²

Recent reassessments of buffer food stocks acknowledge their food security function while recommending that they be managed independently of government. Programmes would combine physical stocks with a financial fund, to reduce storage costs and facilitate imports of staples in a food emergency.⁷³ There might also be room for regional organizations (such as the Economic Community of West African States, the Intergovernmental Authority on Development and the Southern African Development Community) to coordinate and manage reserve food stocks. Coordination could build on lessons from the 2007/2008 food price crisis, when rice prices dropped by half within weeks of Japan’s announcing that it would release its reserve stocks to stabilize supplies and discourage speculation.⁷⁴

Social protection as an accelerator of food security and human development

Managing risk and reducing vulnerability to crises are the keys to building resilience in sub-Saharan Africa’s food systems and avoiding major setbacks in human development. But with so many people still living in poverty and hunger, simply avoiding deterioration is not enough. A more ambitious social protection agenda must include mechanisms for ending poverty and enabling sustained expansion of human capabilities.

The most effective approaches increase returns to core productive assets, especially labour and land. Investing in agriculture is a direct route to

boosting productivity and reducing rural poverty (chapter 4). Social protection has a role, but the synergies between agriculture and social protection need to be explicitly articulated in coordinated policy agendas.

There are several beneficial synergies between agricultural policies for smallholder farmers and social protection policies in sub-Saharan Africa.⁷⁵ Some flow from agricultural investments to social protection. Investing in agriculture should promote production and raise rural incomes for farmers and landless labourers and for the small traders who supply other goods and services in rural areas. To the extent that these economic benefits are pro-poor, they will reduce the need for social protection. Rising incomes also generate more fiscal resources, which can be allocated to social protection.

And some synergies flow from social protection to agricultural investment. Well-designed and well-implemented social protection interventions, by alleviating seasonal hunger and cash-flow constraints among poor farmers, enable them to invest in better nutrition and key agricultural inputs to boost crop yields. Weather-indexed insurance and employment guarantees can give farmers the confidence to invest in moderately risky production practices, such as planting high-yield crop varieties, knowing that if their harvest fails they will be compensated or can earn income from temporary employment.

There are also trade-offs and risks, especially if social protection programmes are poorly designed or implemented. Seasonal public works programmes can build useful physical infrastructure and transfer income to poor rural families, but if badly timed the programmes can compete with farm labour requirements, compromising the next harvest (box 6.4). Choosing the most effective agricultural investments and social protection interventions depends on carefully assessing local conditions—livelihoods, markets and seasonality.

Interventions that reduce vulnerability and generate welfare gains for some can increase vulnerability and create welfare losses for others. Consider food prices. Higher food prices mean higher incomes for farmers, so a policy that raises food prices is pro-farmer. But this outcome is pro-poor only to the extent that poor farmers are producing surpluses for the market. The poorest and most vulnerable farmers, who produce too



BOX 6.4 MALAWI AND MOZAMBIQUE: SOCIAL PROTECTION AND ACCESS TO AGRICULTURAL INPUTS

Several social protection schemes in Malawi and Mozambique demonstrate the synergies between agricultural and social protection policies.

Agricultural input subsidies. In 2005 Malawi reintroduced input subsidies (chapter 4). The Malawi Agricultural Input Subsidy Programme improved food security by boosting maize production and dampening market price fluctuations. The subsidy programme also reduced poverty considerably, though there have been other contributing factors, such as high tobacco prices, low interest and inflation rates as a result of macroeconomic policies, and good weather. The programme advances both agricultural investment and social protection.

Inputs for work. Conventional public works programmes pay participants in food rations or cash wages. But smallholder farmers in Malawi have identified changing needs throughout the year—cash after harvest when food is plentiful, food during the hungry season when food is scarce and expensive, and inputs during the planting season when seeds and fertilizers are urgently needed but expensive. Because public works programmes often operate around planting time, a nongovernmental organization piloted an innovative inputs-for-work project that constructed rural roads and paid participants with bags of fertilizer and packs of hybrid maize seed. These inputs were enough to yield 450

kilograms of maize under optimal conditions—five months of staple food for an average Malawian family. An evaluation found that payment in inputs was more popular than payment in cash or food.

Input trade fairs. Input trade fairs are expressly arranged markets that bring together food insecure farmers and seed, fertilizer, pesticide and farm implement traders. Rather than distribute the inputs directly, the government dispenses cash-denominated vouchers to farmers to purchase the inputs at the fairs, thus compensating for market failures in the short term and promoting market development over time. Mozambique has organized input trade fairs each year since 2001, reaching a large number of households. The fairs are commonly set up as a disaster-recovery mechanism—for example, after a drought or flood has destroyed household seed stocks—but they can also be used to boost food production in food insecure households that cannot afford good quality seed and other inputs. Rigorous evaluations have yet to be conducted, but the fairs appear to be achieving their immediate objectives and are popular with both farmers and traders. They are relatively expensive, however, and—because Mozambique’s policy is not to repeat a fair in the same location—they might not be generating enough momentum to build functioning markets.

Source: Ellis, Devereux, and White 2009; Levy 2005; Dorward and Chirwa 2011; Carr 2002; Devereux 2012.

little even to feed their families year-round, depend on market purchases during part of the year and lose out when prices rise. So do landless labourers and others who depend on markets for their food year-round. Thus, before any food security policy or social protection intervention is adopted, the potential winners and losers should be determined to identify ways to mitigate adverse consequences for vulnerable groups.

Often unacknowledged is that social protection programmes assign an important role to governments. This comes after three decades of governments withdrawing from agricultural marketing, research and extension and prioritizing market forces and the private sector. Agricultural policies should focus on the problems that both intrusive state intervention (until the 1980s) and unfettered agricultural liberalization (since then) have left unsolved (chapters 3 and 4). Social protection (broadly defined to include livelihood-promoting as well as livelihood-protecting mechanisms) opens policy space for public action to support the well-being of the rural poor and conquer these challenges.

In three areas the links from social protection to food security through agriculture are especially strong: enhancing farmers’ access to inputs, strengthening rural markets to stabilize commodity prices and constructing rural infrastructure.

Enhancing farmers’ access to inputs

Under the old interventionist social protection agenda governments tried to improve farmers’ access to inputs by controlling the supply of fertilizer and seeds and subsidizing their prices and the cost of agricultural credit. This inefficient system eventually became too costly for most sub-Saharan African countries. Liberalizing agricultural markets was expected to result in more efficient delivery of inputs to farmers. But thin markets, dispersed populations, inadequate road networks and transport infrastructure, and undercapitalized traders left supply chains incomplete and slow to develop, especially in landlocked countries. Low-income, risk-averse smallholder farmers could not afford the market prices generated in this context.

The new social protection agenda emerging over the last decade offers innovative tools for making fertilizer and seed more accessible to farmers, including revamped agricultural input subsidies, inputs-for-work schemes and input trade fairs (see box 6.4). In Western Kenya fertilizer uptake improved substantially because of a simple incentive that encouraged farmers to commit at the end of the harvest season, when their incomes are highest, to buying fertilizer for the next harvest (chapter 4).⁷⁶ Uptake was even higher than with a 50% price subsidy, indicating that affordability is not always the most pressing constraint for increasing productivity among smallholder farmers.

Strengthening rural markets to stabilize commodity prices

Seasonal food price fluctuations, by reducing the real incomes of poor rural families that have to buy their food, are a major source of food insecurity and poverty in rural sub-Saharan Africa. Mechanisms to stabilize prices also need to stabilize food entitlements. Traditional measures to dampen prices and smooth consumption across seasons included uniform prices for staple foods—the government set

a single, countrywide annual price. The price was enforced by policing traders or defended by conducting open-market operations, with state trading enterprises buying food after harvest, when it was plentiful, and releasing it later in the year, when it was scarcer. The interventions were expensive, and they were often subverted by private traders or other private sector activity and were abandoned in the 1980s.⁷⁷

Recent cash transfer programmes are sometimes tied to public works projects that can strengthen rural markets and market links, for example, by building rural feeder roads to reduce transaction costs for farmers and traders. Cash transfers boost demand, thus increasing rural market activity, incentivizing local farmers, attracting traders and making trade more competitive.⁷⁸

Constructing rural infrastructure

The antipoverty policies for rural sub-Saharan Africa of the 1980s and 1990s were often poorly timed and sequenced.⁷⁹ In Southeast Asia heavy government intervention in agriculture coincided with extensive public investment in physical infrastructure, such as roads and irrigation systems, and market-related infrastructure, such as transport

TABLE 6.2 POLICY OPTIONS FOR STRENGTHENING RESILIENCE IN FOOD SECURITY AND HUMAN DEVELOPMENT IN SUB-SAHARAN AFRICA

POLICY OPTION	STABILITY OF FOOD SYSTEMS			
	AVAILABILITY OF FOOD		ACCESS TO FOOD	USE OF FOOD
Prevent and relieve food system stresses	• Policies that enhance long-term sustainability (related to population growth, climate change, conflict and violence, macroeconomic stability and market reforms)			
Reduce vulnerability and manage risks	• Food aid	• Weather-indexed insurance • Indexed cash transfers • Regional and national strategic grain reserves	• Conditional or unconditional cash transfers • Cash-plus-food transfers	• Health insurance • School feeding programmes • Vaccination • Therapeutic feeding
Enhance food security and human development	• Input subsidies • Inputs for work • Input trade fairs	• Expanded availability of market information	• Employment guarantee schemes • Cash transfers linked to public works programmes for physical infrastructure	

Source: Based on analysis described in the Report.



networks and telecommunications.⁸⁰ When the government withdrew from agriculture, the private sector and supporting infrastructure were strong enough to enable a smooth transition to high-productivity, private sector-led agricultural growth in many countries. In sub-Saharan Africa, however, the state withdrew from agriculture before the private sector was ready to take up the slack and before essential physical and market infrastructure were in place. In the resulting vacuum, especially in remote rural areas, farmers lost their access to inputs, marketing outlets and agricultural services such as research and extension (chapters 3 and 4).

Social protection can contribute to well-functioning rural infrastructure most directly through public works programmes, which not only transfer income but also construct, rehabilitate and maintain infrastructure such as rural feeder roads, small dams, irrigation canals and hillside terraces for soil conservation and higher crop yields. The income transferred by public works provides social

protection, while the assets built offer agricultural support.

Overview of policy options

Building sub-Saharan Africa's resilience to food system stresses requires addressing the key drivers of instability, managing the risks associated with the many threats and enhancing human capabilities (table 6.2). Market-driven, publicly funded risk management tools and social transfers work together to reduce instability in food systems. The trade-offs, appropriate coverage and institutional arrangements all depend on country conditions. As the next chapter discusses, these interventions should be underpinned by policies and institutions that recognize access to adequate and sufficient food as a fundamental right that people must be empowered to pursue. States can foster resilience through social protection that safeguards and enhances people's access to food and eases their realization of that right.

7

Empowerment for Social Justice, Gender Equality and Food for Everyone





CHAPTER 7

Empowerment for Social Justice, Gender Equality and Food for Everyone

The basic right to food—and thus to life itself—is still being violated in sub-Saharan Africa today. Famines and food crises continue to plague the region as nowhere else in the world. The intolerable cycle of hunger, starvation and despair that traps so many Africans shows no signs of relinquishing its grip. There is ample blame to go around—among national governments in sub-Saharan Africa, multilateral institutions and aid agencies abroad, and others with the knowledge and means to effect change but who take no action. This Report offers a range of policy options and technical solutions that could go a long way towards building a new sub-Saharan Africa that is food secure and capable of advancing prosperity and human development. Many involve shifting resources, capacities and decisions towards the poor, to make the changes more effective and lasting. Sub-Saharan Africa needs a new agenda for social justice that empowers the rural poor and especially women, who hold the key to greater food security and human development. Too many people have suffered for too long. The time for change is long overdue.

Empowering people means that they have more control over their lives—reducing poverty, strengthening food security and driving human development. Empowered individuals and groups are better able to shape and benefit from political, economic and social processes—in the household and on the farm, in the community and in the country.¹ Empowerment has intrinsic value. In the words of Amartya Sen: “The ‘good life’ is partly a life of genuine choice, and not one in which the person is forced into a particular life—however rich it might be in other respects.”² Nelson Mandela expressed the same idea: “When a man is denied the right to live the life he believes in, he has no choice but to become an outlaw.”³

This chapter explores four overlapping ways to empower poor and food insecure people across the key dimensions of food security (availability, access and use): unleashing the power of markets, information and knowledge; boosting participation and voice; advancing social justice and accountability; and unleashing the transformative power of women. Some proposals focus on advancing food security; others are broader, reflecting the

fundamental role of empowerment and freedom in advancing human development. As always, context determines what works where—degree of equality in the distribution of land and other assets, concentration of power among vested interests or broader dispersion, prevailing levels of political and other freedoms, and strength and accountability of existing institutions.

The rural poor receive special attention in the development policy measures identified here, to counter decades of pervasive urban bias (chapter 3). Strengthening food security must begin with empowering the rural poor and rebalancing development priorities towards rural areas—though not at the expense of other vulnerable groups, such as migrants and poor urban residents. Women, too, are a focus, because of pervasive gender inequality and their centrality in agricultural production, food security and human development. Much more determined efforts must be made to reverse this second dominant bias in decision-making and control over resources, because it is unjust and prevents women from reaching their full potential. Cash-strapped policy-makers, looking for more

productive ways to promote economic growth and social development, should realize that empowering women does more than bolster their rights and freedoms—though that is reason enough to act—it is also a well-charted course towards more efficient production, investment and consumption.⁴

Leveraging markets, information and knowledge

Sub-Saharan Africa's markets are plagued by failures and inefficiencies. The poorest and most vulnerable people can gain access only at great—often prohibitive—expense, excluding them from transactions vital for livelihood support. Investing in rural infrastructure and improving access to information can make markets more inclusive. Access to information on crop and farm technologies and output markets can make poor people more food secure and more competitive. This section outlines recent examples unleashing the power of markets, information and knowledge, underlining the importance of empowering rural women.

Investing in infrastructure and market access

Decades of underinvestment, inadequate maintenance and outright destruction in countries in conflict have pillaged sub-Saharan Africa's infrastructure, stalling the development of agricultural markets, perpetuating food insecurity, entrenching geographic exclusion and marginalizing vulnerable communities.⁵ Investing in roads, irrigation systems, storage facilities, bridges and railways can go a long way towards empowering the poor and improving the markets they rely on. But planning and design have to view these investments as explicitly pro-poor if they are to have the desired effects.

Research for this Report found that political marginalization deepens food insecurity by delaying the development of rural transport infrastructure.⁶ In Benin, Ghana, Mali and Senegal the prevalence of stunted children under age five is higher in politically marginalized areas. And higher road density per square kilometre of land is associated with lower prevalence of stunted children. Though external funding also affects road location, disproportionately low shares of investment in rural infrastructure will go to politically marginalized areas until governments level the playing field. Money

and attention typically go to cities, with their political and economic influence, higher road density and thus greater food security. Before Namibia's independence in 1990 poor people were politically marginalized in an extreme way: the country was racially divided along economic, social and geographic lines, and investments in infrastructure and public services overwhelmingly favoured the white minority. Now, with one of the world's lowest population densities, Namibia faces the persistent challenge of helping people in the poorest, most remote areas access services (figure 7.1).

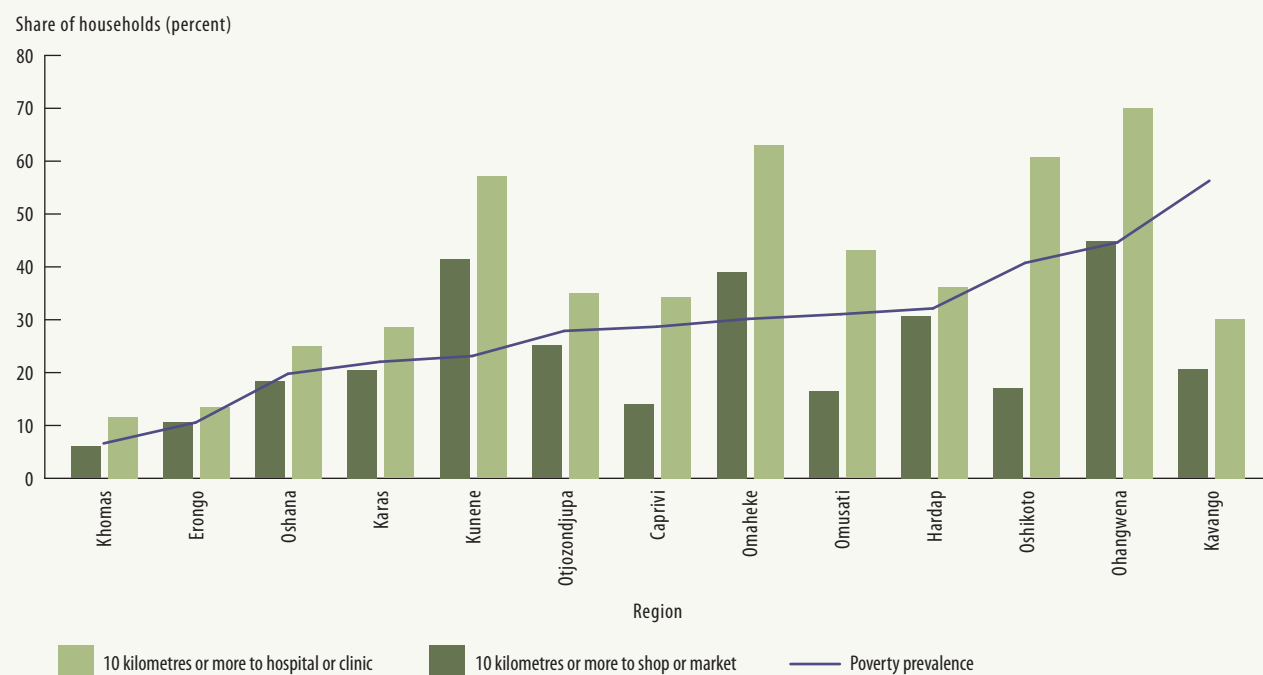
For infrastructure to enable more equitable access to nutritious food, democratic institutions can play a critical role, for instance in planning national road systems and tendering road construction and management contracts.⁷ Ghana's new road fund and central road agency (Ghana Highway Authority) have consolidated responsibility and accountability, strengthened state capacity to develop and maintain the road network and made it easier for citizens to link road outcomes directly to political action.⁸

Better rural infrastructure links farmers to local, national and international markets. Gaps in infrastructure are one reason why most food consumed in sub-Saharan Africa is produced locally and little comes from cross-border trade (chapter 2). Over 2005–2007 African agricultural imports and exports each accounted for less than 5% of world agricultural imports and exports. And over 2004–2007 only a fifth of African food exports were traded within the region, while almost 90% of agricultural imports in African countries originated from outside the region.⁹ Regional integration and trade could generate economies of scale in production, expand markets for farmers and increase the variety of food available to consumers (box 7.1).

The challenges to trade and integration are many.¹⁰ Structural constraints play a role, from low income and investment to limited resource and production complementarities and underdeveloped infrastructure that inhibits the movement of goods. Policy challenges are also a key factor. Trade tariffs and nontariff barriers are high, but implementation of regional trade agreements has been slow. Other factors that should facilitate trade are also underdeveloped: access to trade finance is limited, procedures for producers and traders are complex and harmonization of rules and regulations between countries is often lacking. Moreover, the



FIGURE 7.1 IN NAMIBIA POVERTY AND DIFFICULT ACCESS TO MARKETS AND SERVICES GO HAND IN HAND, 2003/2004



Source: Namibia Central Bureau of Statistics 2006, 2008.

BOX 7.1 UGANDA: ENHANCING REGIONAL INTEGRATION AND TRADE

Regional integration and trade have multiple advantages for sub-Saharan Africa, especially for countries that are landlocked, are far from major transportation routes, have low population density and have small domestic markets. Regional integration and trade could generate economies of scale in production, expand markets for farmers, increase the variety of foods available to consumers, and expose firms to competition, new technologies and opportunities for learning by doing. Funding and other resources needed to advance agricultural research could go much further if pooled and coordinated. Sustainable use of natural resources that cross national borders, such as rivers, lakes and forests, require regional collaboration. And regional integration can reduce dependence on traditional trade partners, building resilience to economic shocks.

Expanding regional integration requires careful policy management. Uganda buffered the impacts of the global economic

slowdown in 2009 and the contraction in demand for its traditional cash crops (coffee, tea and cotton) from its international trade partners by expanding cross-border trade with its neighbors in nontraditional exports (maize, beans and livestock). But the greater external demand for food led to a surge in food prices. Stemming these price pressures has required macroeconomic policy coordination, new social protection measures and investments in expanding agricultural production capacity. Through it all, Ugandan authorities have withstood pressure to introduce export restrictions.

Aware of the potential benefits and challenges from deepening regional integration, African leaders have charged the New Partnership for Africa's Development with promoting integration across the region and improving ties between the many, overlapping African trade blocs. Accelerating progress is key.

Source: Bank of Uganda and Uganda Bureau of Statistics 2011; Binswanger-Mkhize and McCalla 2010; Ancharaz, Mbekeani, and Brixiova 2011.

recent episodes of spiking food prices revealed an urgent need to strengthen regional collaboration to improve information systems on food production and stocks, build regional grain reserves that can be released when localized shortages threaten food entitlements, and coordinate policy responses.

While regional integration and enhanced trade within sub-Saharan Africa are critical, so is integration into the world economy. The trade restrictions facing the region peaked in the 1980s and have come down only slightly since then.¹¹ These restrictions mean that African producers receive lower prices and enjoy lower shares of trade for critical commodities such as cotton, oilseeds, dairy products and cereals.¹² Agroindustrial development, a priority for governments that want to promote value-added production and structural transformation, is hampered by the higher tariffs on processed goods than on raw foods.¹³ Analysis of the market and welfare implications of global trade reform shows that agricultural trade liberalization would account for most of the potential gains, which would particularly benefit sub-Saharan Africa. This highlights the importance to the region of a breakthrough in the Doha Round of international trade negotiations.¹⁴

While increased international trade could expose African food producers to greater food price volatility, the prospects of higher, more stable international food prices would present opportunities for African countries to boost farm incomes and agro-processing. Deepening regional and international integration and trade can facilitate that process, make food markets more efficient and pro-poor, and ultimately increase food security.¹⁵

Harnessing information and communication technologies

Information is power, and communication technologies can channel that power instantaneously to poor and vulnerable people. With real-time information on prices, transport costs and demand, farmers can adjust their production and marketing and increase their efficiency.¹⁶ Information can also reduce food price volatility by better integrating rural markets, and it can expose unscrupulous traders, making it harder for them to cheat farmers. When farmers, transporters, sellers and buyers communicate regularly and rapidly, prices become more transparent, transaction times fall and the bargaining power of small producers increases.

In addition to making markets and communities more efficient, better connectivity can boost farmers' incomes.¹⁷ Research for this Report looked at a project in two rural districts in Niger that provided farmers with a group mobile phone and taught them to use it to check prices and sell their output.¹⁸ Farmers in a control district with similar characteristics received no interventions. The study found that the farmers in the villages with phones increased their crop diversity, primarily by producing more okra, a cash crop grown mainly by women. Another study found that radio broadcasts of agricultural prices in Uganda have empowered farmers to bargain for higher prices,¹⁹ and wider mobile phone coverage has expanded farmers' market choices, enabling them to sell their banana crop in communities 20 miles or more from district centres.²⁰

Innovations in communications that help farmers access financial markets are also showing promise. M-Pesa,²¹ a cellular phone-based, person-to-person money transfer system launched in Kenya in 2007, expanded its customer base from 52,000 in 2007 to 14 million in 2011.²² With thousands of M-Pesa agents nationwide, customers can transfer money electronically, maintain balances in an electronic account accessible by mobile phone and deposit or withdraw money. The economic impacts of M-Pesa have yet to be fully assessed, but it seems to be helping households save, invest and manage risk.²³ Participants in one qualitative study reported that M-Pesa improved food security in their communities by enabling them to take time-sensitive measures (such as paying for seeds, casual labour and other inputs) at the optimum time, increasing their output.²⁴ Some farmers reported that they invested the time and cost savings in productive agricultural activities.²⁵

Within two minutes of a deal on the Ethiopia Commodity Exchange prices are transmitted to farmers on electronic display boards, in text messages and through a multilingual toll-free hotline that receives some 20,000 calls daily.²⁶ In Kenya the Agricultural Commodity Exchange provides similar services.²⁷ Also in Kenya, Kilimo Salama (Safe Agriculture), a pay-as-you-plant insurance product, covers smallholder farmers' agricultural inputs against drought or excessive rain. Mobile technology is used to register new policies and deliver payments based on rainfall levels monitored by automated weather stations.²⁸ In Ghana farmers



and traders use mobile phone services developed by Esoko to place buy and sell orders and relay market prices. The pilot Cocolink programme, launched by the Cocoa Board, sends cocoa farmers advice over mobile phones on farming practices, farm safety, crop disease prevention, postharvest production and marketing.²⁹

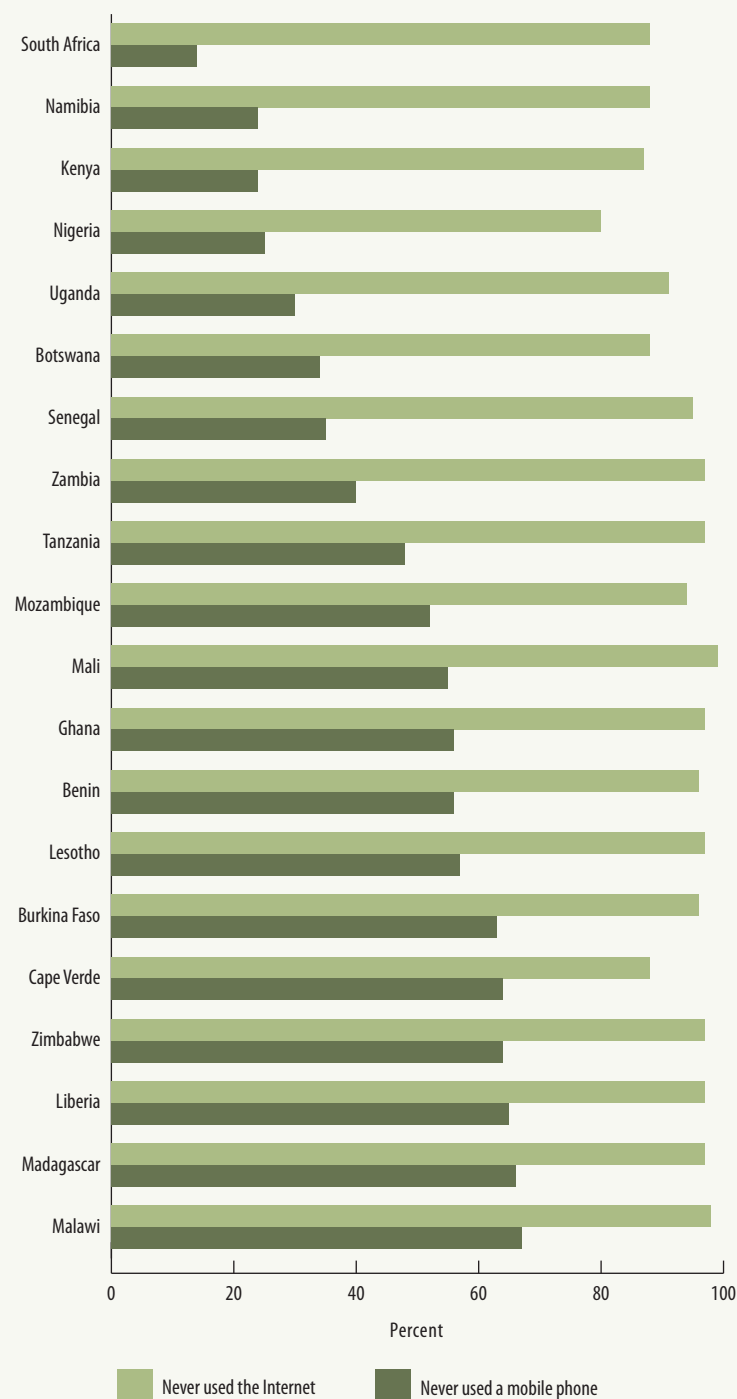
But there are limits to what information and communication technology can achieve. Despite rapid expansion in several sub-Saharan African countries, the region still has low rates of Internet and mobile phone penetration.³⁰ Recent survey data indicate that most rural Africans have never used the Internet, and in many countries most people have never used a mobile phone (figure 7.2). Reasons include lack of communications infrastructure, high capital and recurrent costs, difficulty integrating new technologies with local communication methods and traditions, and insufficient involvement in planning by stakeholders, especially women and youth.³¹

A review of 17 African countries found that government policies undermine the advance of affordable, universal access to the full range of communications services.³² Some policies restrict market entry and the competitive allocation of resources and impose regressive usage taxes. Also at fault are weak institutional arrangements and limited technical capacity and competencies. More basic impediments are the sparse availability of electricity in most rural communities and the high cost of mobile phones, computers and Internet access. Low population density in rural areas makes it less cost-effective to deploy some communications and other public infrastructure. Consequently, radio and television remain the primary information media in rural sub-Saharan Africa.

Putting information and communication technologies to work for human development and food security in sub-Saharan Africa will require effective regulation (including for spectrum allocation and tariffs) to stimulate markets and reduce prices. Policies should strive towards enabling access—especially in rural areas where private returns might be too low to attract investors. Successful roll-out will require skilled users, highly technical infrastructure and knowledge transfer, particularly through locally developed capacity.³³ And making the new technologies attractive to marginalized groups, especially rural women, will require stronger

FIGURE 7.2 INFORMATION AND COMMUNICATION TECHNOLOGIES STILL HAVE LIMITED PENETRATION IN RURAL AREAS IN SUB-SAHARAN AFRICA, 2008/2009

Percent of households responding that they have never used a mobile phone or the Internet.



Source: Afrobarometer 2009.

connectivity in rural areas and more local content contributors.³⁴ Strategies for expanding Internet access need to make sense for both communities and businesses; communities will need to encourage widespread use of services, and businesses will need to provide them.³⁵

Managing technology

Technology can empower the poor and vulnerable by building human capabilities and knowledge. During Asia's green revolution technology raised farm yields and streamlined agriculture, lifting communities out of poverty and advancing human development. But if misapplied, technology can dispossess or marginalize poor people. Narrowly compartmentalized farm science, conducted far from farmers' fields, can produce results that are irrelevant to smallholder farmers, leading to unequal outcomes and wasted opportunities. Success often comes from combining farmers' experiences with research results to build human and social capital and allow technologies to fully inform livelihoods.³⁶

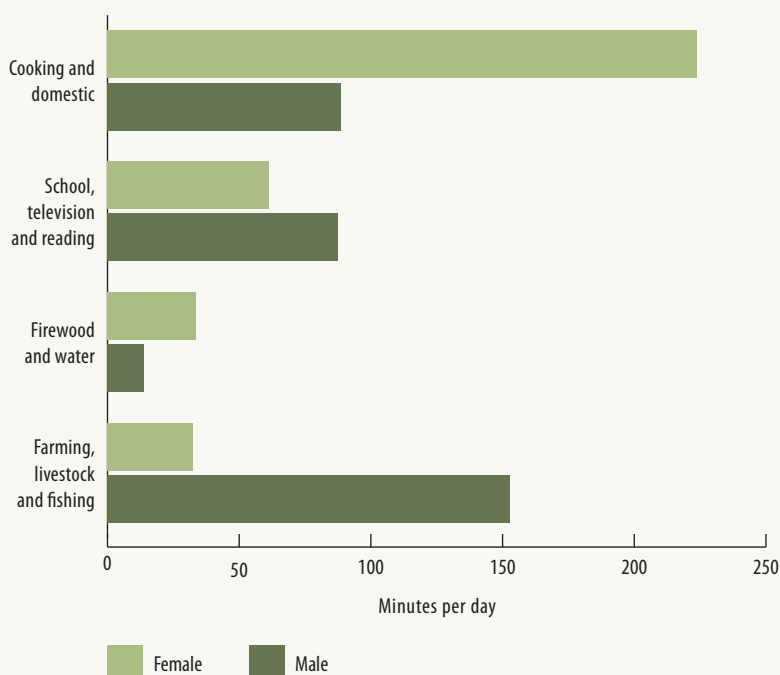
Projects that allow resource-poor farmers to choose, design and adopt appropriate technologies that help crops survive harsh conditions are gradually emerging across sub-Saharan Africa.³⁷ But success is never guaranteed, even under collaborative conditions. West Africa's slow uptake of Nerica (New Rice for Africa, a cross between Asian and African varieties) shows that participatory training sometimes takes too long for replacing more traditional extension and seed delivery systems.³⁸

For women and girls the challenge and promise of technology are both evident. Reducing the time they spend gathering fuelwood and water—more than twice as much time as men and boys do in Lesotho, for example (figure 7.3)—could empower women and free them for more productive tasks, greatly improving efficiency in the rural economy.

Since the early 1990s multifunctional platforms (simple diesel engines that power agricultural processing machinery and generate electricity) have saved time and raised income for rural women across West Africa. One study in Mali found that these platforms could save girls and women eight hours a week in cereal processing time,³⁹ improving girls' primary school enrolment and academic performance by freeing them from many routine burdens that are common in rural areas. Northern Benin's Solar Market Garden, a novel solar-powered drip irrigation system that draws water from both surface and groundwater sources and channels it to high-value fruit and vegetable crops, also increased school enrolment among girls who would otherwise have had to haul the water (chapter 4). An evaluation of the project found that incomes increased and nutrition improved in the first year.⁴⁰

But not all new technologies save time or empower rural women. In fact, some technologies add to women's burdens by making tasks more demanding (the extra weeding required when fertilizer is used, the need to process more output).⁴¹ The greater economic engagement and responsibility resulting from new technologies may strengthen women's independence and control over output, but the net effects are not always straightforward. Clear, however, is that no technological quick fixes will simultaneously boost agricultural yields and reduce ingrained gender biases. Relationships between women and men are dynamic and complex. When a new technology results in a more profitable crop or when a new processing machine increases

FIGURE 7.3 LESOTHO'S GENDER BIAS IN TIME USE, 2002/2003



Source: Lawson 2008, table 1, p. 80.



income, men often move in and take over. Policies thus need a gender perspective to ensure that technologies are developed and applied in ways that shield them from automatic takeover by men.⁴²

One way to increase equitable outcomes is to include women in decisions and activities on market access, inputs and investment. Women typically suffer because household resource distribution favours men.⁴³ Efforts to raise agricultural productivity in sub-Saharan Africa risk producing lower gains for women than for men, as has happened in Asia.⁴⁴ Ambitious agendas for agricultural research, such as those adopted by the Comprehensive Africa Agriculture Development Programme, should involve both male and female farmers, as well as non-farming household members, in developing new technologies—from identifying needs to breeding new varieties.⁴⁵

Boosting participation and voice

Food security requires a strong, participatory voice for poor and vulnerable groups. Participation, an ally of democracy and the freedoms of association and expression, is both a means and an end. When people can influence decisions affecting their well-being, they expand their capabilities. These capabilities, sustained through other endeavours, advance human development. Decisions taken through genuinely participatory processes are more sustainable because they reflect the beliefs, preferences and values of the people who are most affected. Local governments, producer organizations, and civil society and community organizations are critical institutions for strengthening participation and voice—by widely dispersing political, economic and social power.

Strengthening local governments

Local governments, closer to farmers than are central or provincial governments, are often best placed to assess farmers' needs, to encourage communities to shape public policies, and to answer directly to both groups. In sub-Saharan Africa preferential devolution of authority and resources has marginalized disfavoured regions and locales. Competent, active and corruption-free local authorities can argue for fair representation of deprived areas and help redirect resources.⁴⁶ Well-functioning local institutions and empowerment

go hand in hand because empowerment moves decisions and resources to their point of greatest impact, holding local governments accountable to local demands and public and private service providers accountable to local authorities. A key recommendation of the 1996 World Food Summit Plan of Action—which set targets for food security at the individual, household, national, regional and global levels—is “to strengthen local government institutions in rural areas and provide them with adequate resources, decision-making authority and mechanisms for grassroots participation.”⁴⁷

Broad-based participation and strong local institutions can advance food security and human development in at least two ways. First, when people have a political and social voice, food security and human development are more protected from economic and political crises such as famines, which rarely occur in democratic political systems.⁴⁸ Strong local institutions and active civic involvement forge sturdier links between citizens (as producers and consumers of food) and decision-makers and improve accountability.⁴⁹ Second, practices such as extension services, land tenure protection and food management are more effective when communities have a voice and when local governments are responsive to communities.⁵⁰

Local governments are often fragile—under attack from the centre and with inadequate fiscal and managerial resources and weak professional and technical capacity.⁵¹ In many instances self-organized bodies have been more successful than formal government institutions. But both need backing.⁵²

Supporting producer organizations

Producer organizations, now a force to be reckoned with, can amplify the political voice of smallholder farmers and traders and reduce marketing costs. Members share information, coordinate activities, make decisions together and get more involved in value-added activities (input supply, credit, processing, marketing, distribution).⁵³ As intermediaries, these organizations help farmers interact with local institutions and can represent farmers in local and national politics.

In the 2000s many producer organizations emerged in West Africa, often to fill the void left when governments withdrew from the rural economy, especially from agricultural input supply and marketing. In 2001 cotton farmers in Mali went

on strike, their action triggered by falling prices and the wasteful practices of the state-owned cotton company. Output fell by half as many cotton farmers switched to maize and other cash crops for the season.⁵⁴

Farmer field schools are another organized effort to develop farming and leadership skills.⁵⁵ Now operating in many African countries, these schools conduct their activities in farmers' fields and emphasize joint problem solving. Groups of farmers study their production environment and constraints and develop solutions. Field schools have markedly improved the production of food and cash crops. In a positive knock-on effect the resulting surpluses have established the need for improving marketing strategies and adjusting production to market demand. In Kenya, Tanzania and Uganda field school networks bring members into commodity or producer associations to forge new agribusiness links. In Mali groups of field schools have formed apex organizations structured around value chains.

Engaging civil society and community organizations

Civil society organizations are often effective in mobilizing public interest, monitoring government performance and lobbying governments to advance group interests. In agriculture, in addition to producer organizations, they include nongovernmental organizations for agricultural development, rural policy think tanks, professional associations (of agronomists, academics and others), social movements, trade unions, and community and faith-based organizations.⁵⁶

Civil society organizations concerned with food security assist food insecure groups through charity, recovery and relief activities. Other organizations, drawing strength from "right to food" campaigns, provide leverage in advancing food security rights and in intervening when these rights are violated.⁵⁷ Still other civil society organizations help raise the political consciousness of the poor and prod state institutions to be more responsive to their needs and aspirations. Three prominent international civil society organizations are the Food First Information and Action Network, the World Alliance for Nutrition and Human Rights, and the Global Forum on Sustainable Food and Nutrition Security.⁵⁸

Several factors constrain civil society organizations in sub-Saharan Africa. Organizations that

derive much of their financing from foreign donors frequently find their credibility, autonomy and effectiveness questioned, while organizations that criticize government policy can face restrictions on their formation and operation.⁵⁹ And organizations that partner with the state risk being absorbed into it through funding dependence, ideological affinity or their role in filling gaps in public service delivery.⁶⁰ Finally, some organizations are criticized for lack of accountability, poor internal management of financial and organizational resources, and a clientelist approach to beneficiaries.⁶¹

Many Africans report a strong interest in public affairs and participation in their community. In a sample of 20 African countries in 2008/2009 almost two-thirds of respondents reported an interest in public affairs, and close to four-fifths were members of voluntary and community groups (table 7.1). Galvanizing even broader support for public participation depends on strengthening channels for civic engagement—and on guarantees of citizen rights and institutional accountability (discussed in the next section).

Advancing social justice and accountability

To advance social justice, Amartya Sen proposed identifying and acting on redressable injustices through a process of social choice that gives people ample opportunity to be heard.⁶² Accountability is a critical complement. Indeed, "the voicing of preferences or judgments divorced from the necessity of consequent action is akin to shouting in the void—somewhat cathartic but ultimately ineffective."⁶³ When accountable authorities answer to empowered communities, social justice is advanced. This section looks at how responsive, rights-based mechanisms promote accountability. It considers how land tenure regimes affect land inequality and insecurity. It then takes a social justice perspective on recent large land acquisitions in sub-Saharan Africa.

Defining rights and accountability

Rights-based approaches for food security give poor, marginalized people a say in how policies, programmes and laws are designed and delivered. A step for holding governments accountable, these



approaches shift primary responsibility for food security from individuals to the state, legally mandating that it protect the food rights of its citizens.

There has been modest progress incorporating rights-based approaches in legal frameworks. Kenya's 2010 constitution states that "every person has the right [. . .] to be free from hunger, and to have adequate food of acceptable quality."⁶⁴ Other less formally protected rights are just as important. The rights to land, water and livestock, for instance, are critical for the food security of poor population groups, especially in communities where land and livestock are the main assets.⁶⁵

Discretionary social protection and food security programmes can be terminated at any time—and often are, especially projects financed by external donors. Permanent, rights-based national programmes, however, rest on an implicit or legally binding social contract between the government and citizens. These programmes are more effective because, with claims to social assistance, citizens can plan with more confidence. A good example is employment guarantee schemes, which transform public works programmes from supply-driven and discretionary to demand-driven and guaranteed (chapters 1 and 6).

Public works programmes are often available for a limited time to targeted groups in specific areas, with opportunities restricted by the nature of the work and small budgets. In contrast, employment guarantee schemes such as India's Mahatma Gandhi National Rural Employment Guarantee Act confer a legally enforceable right to food security that draws its power from India's constitutional protection of the right to life and the state's legal obligation to uphold it. This law emerged from the Right to Food Campaign, a response to drought-related deaths by starvation in Rajasthan.⁶⁶

Effective employment guarantee schemes are grounded in law. But laws are difficult to enforce locally and cannot always protect the most vulnerable groups, so community organization and accountability are important. Social audits are one way to give poor people a say in government programmes. From simply reading out the details at public meetings to scrutinizing activities, budgets and spending, social audits help communities strengthen local governance, democratic accountability and citizen empowerment and secure redress for grievances.⁶⁷ Indian communities use

TABLE 7.1 AFRICANS PARTICIPATE ACTIVELY IN CIVIL SOCIETY, 2008/2009

Percentage of respondents to Afrobarometer surveys

COUNTRY	MEMBER OF VOLUNTARY ASSOCIATION OR COMMUNITY GROUP	VERY OR SOMEWHAT INTERESTED IN PUBLIC AFFAIRS
Benin	47	68
Botswana	21	70
Burkina Faso	47	73
Cape Verde	25	50
Ghana	45	69
Kenya	55	72
Lesotho	43	68
Liberia	57	49
Madagascar	19	59
Malawi	31	62
Mali	64	71
Mozambique	24	68
Namibia	28	59
Nigeria	46	58
Senegal	49	68
South Africa	30	56
Tanzania	42	84
Uganda	45	59
Zambia	30	60
Zimbabwe	21	63
Total	39	64

Source: Afrobarometer 2009.

social audits to monitor delivery of their country's National Rural Employment Guarantee Scheme and its Public Distribution System (which purchases food from farmers and sells it to poor families at subsidized prices). The social audits have exposed multiple shortcomings, and communities have confronted Indian officials over their refusals to register some people for the scheme, nonpayment or late payment of wages, fraud and failure to meet legislated gender quotas.

The media can also advance social justice by shaping public opinion on food and other crises. Citizen journalism enhances accountability by disseminating information through mobile phones, social media and other platforms, enabling communities to publicize crises and disasters.⁶⁸ The Ushahidi (Swahili for testimony) movement that emerged in Kenya in the aftermath of the violence following the 2007 elections enabled people to exchange information and share their experiences of the violence.⁶⁹ Ushahidi has become a tool for monitoring outbreaks of violence in the Democratic Republic of the Congo and helped locate victims of Haiti's January 2010 earthquake. Social media platforms are not always effective, but they have proven able to shape public opinion and democratize the way information is collected and disseminated.

Securing control over land

Land tenure influences social equity and agricultural productivity, with ongoing social and economic implications for food security.⁷⁰ Most Africans still live under informal, customary tenure, rooted in community and kinship⁷¹—in some countries more than 90% of land transactions are governed by informal tenure.⁷² Secure access, tenure, use and control of land, whether through these traditional systems or legal means,⁷³ are essential to achieving food security and to protecting women and vulnerable groups from injustices related to arbitrary management of land.

Women and poor people are most at risk of forfeiting their land rights. Some customs dictate that women's rights to land come through their relationships with men, even when the law protects these rights.⁷⁴ Women are also less empowered than men in the domestic sphere.⁷⁵

When smallholder farmers have secure land rights, efficiency as well as social justice is advanced. Secure and transferable land rights promote agricultural investment. Strengthening the land rights of poor people can bolster food security by increasing the productivity of farm labour, making land transactions fairer (lease or sale) and improving nonfarm agricultural value chains and growth across the economy.⁷⁶

Output per hectare tends to be higher on smaller farms than on large farms,⁷⁷ mainly because the costs of supervising labour are much lower on

small farms. Together with the higher costs of borrowing and managing equipment for small farms, that pattern of relative costs encourages more use of labour per hectare on small farms.⁷⁸ Many efforts in sub-Saharan Africa to build large, mechanized farms have failed, except for some plantation crops (cane sugar, cocoa, coffee, cotton, rubber, spices, tea, tobacco) and highly perishable fruits and vegetables, which have to be processed, packaged and shipped rapidly.⁷⁹ Many of the plantations that prospered often benefited from policies that reserved the best land for a few privileged farmers and that disadvantaged smallholder farmers through discriminatory laws and taxes.⁸⁰

Much agricultural technology for producing crops is scale-invariant (it is as efficient on small farms as on large), so large farms should not be expected to be inherently more efficient.⁸¹ But large farms do benefit from economies of scale in processing and shipping, if not in production, that are important for high-value crops, such as perishable fruits and vegetables. Small farms can successfully produce and sell crops for which processing and shipping are important, through contract farming, which coordinates off-farm processing and distribution activities.⁸²

Ever smaller farms are not always better, however. In much of sub-Saharan Africa partible inheritance and rapid population growth have resulted in small, fragmented farms, making intensive farming difficult, reducing output and lowering land value.⁸³ As part of a country's economic transformation, farms tend to grow larger as the country develops. Farmers try to keep up with rising nonfarm wages in other growing sectors by progressively substituting capital for labour and enlarging their farms.⁸⁴ But this process has to unfold in close step with income growth and the structural transformation of the economy away from agriculture towards manufacturing and services, rather than through forced measures.

Managing large-scale land acquisitions

Motivated by land availability, a favourable climate and low labour costs, international investors have acquired the rights to use large tracts of land in sub-Saharan Africa.⁸⁵ With the appropriate legal framework and physical infrastructure, large-scale land acquisitions could bring development-friendly foreign investment directly to African economies by making productive use of undercultivated areas. Foreign direct investment could increase liquidity in rural areas,



build up rural infrastructure⁸⁶ and modernize agriculture. Through increased input use and investments in irrigation, investors can open up markets for local smallholder farmers and make traditional agriculture less vulnerable to shifting weather patterns. Finally, investment can increase the revenue base through taxes on land and surpluses.⁸⁷

This is all true—in theory. And although at levels well below expectations, several positive developments have benefited local communities, including some new jobs, higher tax revenues, and new social and physical infrastructure.⁸⁸ But the realized benefits are far from automatic, and the risks can be high.⁸⁹ Private investors naturally prioritize their own objectives, not the well-being of the poor and vulnerable.⁹⁰ Requiring local populations’ “voluntary and informed consent” to land sales is meaningful when the interests of local parties are represented by competent and informed intermediaries and when all the facts are on the table.⁹¹

Where the balance of power between large multinationals and uneducated peasant farmers tips steeply towards the multinationals, the risks are vast.⁹² In countries where most people work in agriculture, such large-scale investments may separate people from their land without creating opportunities in nonfarm sectors, aggravating poverty, unemployment and food insecurity—and perhaps accelerating urban migration before cities are ready to absorb more people.⁹³ Furthermore, investments have not focused on food crops: one study found that 63% of such investments were split among three nonfood agricultural products: biofuels (21%), industrial cash crops (21%), and conservation, game reserves, livestock and plantation forests (21%).⁹⁴

Despite the attention to this issue, implementation of these investments has been slow.⁹⁵ Farming has begun on just one in five recently approved projects, and often on a much smaller scale than proposed.⁹⁶ Even more worrisome are the reports of conflicts and controversies,⁹⁷ made worse by the opacity of the investments. Without adequate information about ongoing deals and the value of the land at stake, local communities, civil society organizations and other stakeholders cannot engage effectively. Where there is lack of transparency there are opportunities for graft, corruption and other misconduct.⁹⁸ Lack of consultation and accountability in these transactions disempowers local communities and violates social justice.

Environmental impacts are another concern. Weak environmental protection laws and minimal government capacity for enforcing them mean that rigorous environmental impact assessments are rarely conducted.⁹⁹ Intensive agricultural practices and the conversion of indigenous forests and rangeland to monocropping can jeopardize biodiversity, carbon stocks and the sustainability of land and water resources, which suffer from salinization, water logging and soil erosion.¹⁰⁰

It will take time and political will to rebalance power asymmetries and to increase community participation and monitoring and enforcement. Comprehensive, long-term planning, updated legal frameworks and capacity building in national and local governments, civil society and local communities are all needed.

Unleashing the transformative power of women

There are strong and mutually reinforcing links between expanding women’s capabilities and enhancing food security in sub-Saharan Africa. There is plenty of evidence, some of it surveyed below and elsewhere in the Report, that empowering women is a highly efficient way to achieve progress across the multiple dimensions of food security. But even beyond such instrumental qualities and possible gains in efficiency, women’s empowerment must remain a central policy priority simply because equality and nondiscrimination are of intrinsic value. Women’s rights are human rights and deserve to be promoted for that reason alone. This principle is well-established among African governments, which have all ratified the global Convention on the Elimination of Discrimination against Women, and through the African Charter on Human and People’s Rights on the rights of Women. But there is still much work to be done in turning these rights into reality.

Understanding the burden of the gender divide

There has been some progress in recent years in ensuring equal access to basic health and education, especially among men and women, boys and girls, and in women’s political representation. Sub-Saharan Africa has seen some of the fastest progress on Millennium Development Goal 3,

which addresses equal access to education for boys and girls and other aspects of women's empowerment.¹⁰¹ This progress notwithstanding, a deep gender divide persists for a range of capabilities and opportunities. Women in sub-Saharan Africa and elsewhere have less control over productive resources such as assets, land and credit; their time is often devoted to activities that are nonmarketed and undervalued; and their access to key institutions such as courts and markets is curtailed.¹⁰²

These challenges are particularly pervasive in the rural areas and in the agricultural sector, where women play a central role in households and communities. Men represent 85% of agricultural landholders in sub-Saharan Africa,¹⁰³ and the 15% of land held by women masks a wide variation between countries.¹⁰⁴

One explanation is that the share of countries that ensures equal ownership and inheritance rights for men and women is lower in sub-Saharan Africa than in any other region (see figure 3.2 in chapter 3). Women's access to other inputs is also restricted. Data for Ghana, Madagascar and Nigeria show that men own more than twice the units of livestock that women own.¹⁰⁵ Similar gaps exist for fertilizer, mechanical equipment, new technologies, extension services and access to credit.¹⁰⁶ Time is another resource for which women are not rewarded because of their engagement in nonpaid activities, including housework. Education is strongly correlated with welfare gains in child health, education and nutrition.¹⁰⁷ But for female-headed households in rural areas in particular, education levels lag, and the gender gap is highest in sub-Saharan Africa and South Asia.¹⁰⁸

The recently developed Women's Empowerment in Agriculture Index combines many of these indicators of empowerment. An early application to data from five rural districts in Uganda showed that disempowerment was much higher among women than among men, reflecting the absence of female community leaders, higher time burdens and limited control over resources.¹⁰⁹

Advancing women's capabilities through food security

The link from improvements in food security to better outcomes for women works in a number of ways. As discussed in chapter 4, enhancing food security in sub-Saharan Africa must be based largely on a strategy to strengthen the productivity of smallholder farmers. Since women make up almost half the

agricultural labor force in sub-Saharan Africa (probably an underestimate of the amount work they do), investments in the sector, especially if directed to smallholder farmers, will tend to disproportionately benefit women.¹¹⁰ Investments in partially mechanized farming, which plays an increasing role in some countries, can also have positive impacts on women's empowerment. For example, in sugar cane plantations, when machines are used for cutting the cane—the most physically demanding part of the process—employment opportunities for women may emerge for gathering the canes by hand.¹¹¹

Several studies have also shown that gender inequality in food security outcomes is exacerbated during crises. Women often become the “shock absorbers” of household food security, skipping meals, for instance, to make more food available for other household members.¹¹² Evidence from Uganda also shows that assets held by husbands were better protected against shocks such as floods or droughts than were assets held by wives.¹¹³ And in rural Tanzania, when food is scarce due to droughts or floods, violence against old women is twice that in years of normal rainfall.¹¹⁴

Empowering women to advance food security

When women are better educated, have control over resources and have a voice in decision-making, availability, access and use of food often improve. Policies that empower women can be instrumental in strengthening food security, further empowering women. A recent survey of experiences across a range of African countries shows that female farmers have lower levels of productivity; in one study in Nigeria the gap was 40%.¹¹⁵ But these studies also show that if women had the same education, experience and farm inputs as the average male farmer, women's productivity would catch up to—and in some cases even surpass—that of men. The Food and Agriculture Organization has used these types of estimates to simulate what would happen if women had the same access to resources as men. The results illustrate the gains that could be achieved through interventions to boost gender equality in rural sub-Saharan Africa today. Closing the gender divide could boost agricultural output in developing countries enough to reduce the number of undernourished people in the world by 12%–17%.¹¹⁶

Human development, as an expansion of freedoms and capabilities, speaks to the imperative for women



to become true custodians of their lives. Society as a whole, through broad-based national coalitions, has a role in prioritizing the empowerment of women based on contextual needs: increasing women's human capital endowments, earnings and productivity strengthens their bargaining power. Amplifying their voice facilitates their personal agency, and limiting the transmission of gender inequality over time advances communities and countries.¹¹⁷

Policies and legal frameworks need to ensure that women have access to positions of power and influence equal to that of men.¹¹⁸ This, in turn, will contribute to decision-making that is more sensitive to the gender biases that often originate in the home.¹¹⁹ In the words of Wangari Mathaai, a lifelong activist for women's rights and environmental conservation: "African women in general need to know that it's OK for them to be the way they are—to see the way they are as a strength, and to be liberated from fear and from silence."¹²⁰

Overview of policy options

This chapter affirms that interventions to strengthen food security have greater impact when women,

the poor and the vulnerable have a key role in decision-making. Achieving that requires reinforcing rights-based development approaches that enable people to exercise their full rights as citizens. When active citizens demand their rights, authorities are compelled to respond. For their part, governments need to promulgate and enforce legislation and accountability frameworks.

The policy options discussed in this chapter are summarized in table 7.2. Governments need to shape them to fit each country's circumstances and needs and, as discussed throughout the chapter, particular emphasis needs to be on rural women. In the growing number of countries where democratic governance is deepening and public participation is widening, the policies needed to enhance food security can grow organically through engaged citizenry and international exchanges of knowledge, technology and finance. In the countries where self-centred rulers and elites hold nations in a stranglehold, the explosion of popular anger in the wake of recent global food crises that shook governments across the world might finally wake governments to the urgency of sub-Saharan Africa's food insecurity.

TABLE 7.2 POLICY OPTIONS FOR EMPOWERING THE FOOD INSECURE

POLICY OPTION	STABILITY OF FOOD SYSTEMS		
	AVAILABILITY OF FOOD	ACCESS TO FOOD	USE OF FOOD
Access to information and knowledge	- Information and communication technology - Innovations in farm technologies	- New technology, especially to reduce the time burden on women and increase equality of access to information - Basic education	
Voice and participation	- Producer organizations - Gender-sensitive participatory methods for varietal selection and breeding	- Targeted cash transfer programmes - Civil society organizations	
Social justice and accountability	- Social audits - Accountable institutions - Rights and guarantees, especially for women - Access and control over land, with a focus on women - Media freedoms		

Source: Based on analysis described in the Report.



Notes

Chapter 1

- 1 This Report focuses mainly on the 46 countries of the UNDP Regional Bureau for Africa, as shown in the statistical tables.
- 2 FAO 2011d, annex table, p. 44.
- 3 As requested by the Committee on World Food Security, the Food and Agriculture Organization is revising the methodology for measuring undernourishment and therefore has not updated its estimates for the number of undernourished people in 2009 and 2010 or estimated the number for 2011.
- 4 Conceição and others 2011.
- 5 Banerjee and Duflo 2011.
- 6 FAO 2010b, box 1, p. 8. This definition is adapted from that of the 1996 World Food Summit Declaration (FAO 1996).
- 7 As discussed in UN HLT (2010). The definition thus covers issues that previous definitions neglected, such as long-term capabilities, but does not explicitly mention the important dimensions of dignity and empowerment—which are recognized under the right to food.
- 8 Vizard, Fukuda-Parr, and Elson 2011; UNDP 2000.
- 9 Undernourishment during the first 1,000 days from conception can irreparably damage physical and mental development, handicapping people for life (*The Lancet* 2008; Victora and others 2008; Hoddinott and others 2008).
- 10 Child malnutrition is typically measured by the percentage of children under age five who are stunted, wasting or underweight. Stunting (low height for age) is a measure of malnutrition that reflects a child's failure to obtain adequate nutrition over a long period and can also reflect disease; it represents the long-term effects of malnutrition and is not sensitive to more recent, short-term changes in dietary intake. Wasting (low weight for height) helps identify current or acute undernutrition resulting from failure to gain weight. Underweight (low weight for age) reflects both acute and chronic malnutrition.
- 11 *The Lancet* 2008; Victora and others 2008; Hoddinott and others 2008.
- 12 Alderman, Behrman, and Hoddinott 2005.
- 13 In Mozambique civic education through mobile phone messaging, a hotline for reporting electoral misconduct and distribution of a free newspaper devoted to voter education boosted electoral participation (Aker, Collier, and Vicente 2011). In São Tomé and Príncipe a campaign with the slogan "Your vote should be free and in good conscience" reduced rampant vote-buying (Vicente 2010).
- 14 Sen 1981.
- 15 Devereux and Næraa 1996.
- 16 Levine 2012.
- 17 Personal communication from Gary Eilerts, August 2011, based on data from the Famine Early Warning Network.
- 18 Garcia and Moore 2012.
- 19 Drèze and Sen 1989; Burchi and De Muro 2012.
- 20 Crocker 2008.
- 21 Sen 1985.

- 22 UN General Assembly 1948.
- 23 ECOSOC 1999.
- 24 Mechlem 2004.
- 25 OHCHR and FAO 2010.
- 26 FAO 2005c.
- 27 OHCHR 2011.
- 28 UN General Assembly 2009.
- 29 UNDP 2011.
- 30 UNDP 2011.
- 31 Based on data from UNDP (2011, statistical table 1, pp. 127–30).
- 32 The regional aggregates for the HDI are computed using unbalanced data (a different number of countries for different years). However, the findings reported here do not change when balanced data are used (which reduces the number of countries that are considered). For more details see UNDP (2011, statistical table 2, pp. 131–34).
- 33 IMF 2011c, table SA1, p. 78.
- 34 IMF 2012, p. 2.
- 35 UNDP 2012.
- 36 Based on UNDP (2012).
- 37 Leke and others 2010.
- 38 World Bank 2009c.
- 39 World Bank 2012; 2008 is the latest year for which calculations on regionally aggregated poverty data are available.
- 40 Fosu 2009.
- 41 Lipton 2005; Von Braun, Gulati, and Fan 2005.
- 42 Lipton 2005.
- 43 Lipton (2012), citing Hazell and Ramasamy (1991).
- 44 Lipton (2012), citing Christiansen, Demery, and Kühl (2006).
- 45 SOFA Team and Doss 2011, p. 3.
- 46 Tembon and Fort 2008.
- 47 Quisumbing 1996, p. 1587.
- 48 Benson 2008.
- 49 Micronutrient Initiative and others 2009.
- 50 Dasgupta 2003.
- 51 Blössner and de Onis 2005.

Chapter 2

- 1 Food security has been characterized in many ways (see, for instance, Barrett 2010 and Becquey and others 2010). This Report departs from the commonly applied four pillars of food security as presented in FAO (1996) and uses this framework to characterize the challenges of food security in sub-Saharan Africa.
- 2 Lipton 2012.
- 3 Stocks, which also determine food availability, reflect the accumulation of flows net of consumption.
- 4 Lipton 2009.
- 5 While there is no universally agreed way of classifying these systems, Dixon, Gulliver, and Gibbon (2001) identify 15 farming systems in sub-Saharan Africa based on the natural resource base, dominant livelihoods (sources of staple foods and cash income, which depend on crops, livestock, fishing, forestry, remittances and off-farm activities), degree of crop-livestock integration and scale of operation.

- 6 In the Dixon, Gulliver, and Gibbon (2001, table 2.1, p. 34) classification, four farming systems account for half of sub-Saharan Africa's agricultural population and around 40% of its agricultural area. The maize-mixed system (with maize, tobacco, cotton, cattle, goats, poultry and off-farm work as principal livelihoods) and the cereal-root crop mixed system (with maize, sorghum, millet, cassava, yams, legumes and cattle as principal livelihoods) each account for 15% of agricultural population. The maize-mixed system dominates in East and Southern Africa; the cereal-root crop mixed system in the Guinea Savannah—which extends from the Atlantic coast to the highlands of Ethiopia, south of the Sahel and north to the wetter areas transitioning to tropical forest. The other two principal farming systems are the root crop system (with yams, cassava, legumes and off-farm income as principal livelihoods), extending from Sierra Leone to Benin, Cameroon, Côte d'Ivoire, Ghana, Nigeria and Togo, and the agropastoral millet-sorghum system (sorghum, pearl millet, pulses, sesame, cattle, sheep, goats, poultry and off-farm work as principal livelihoods), occurring in the Sahel, from Senegal to Niger, and in eastern Ethiopia and northern Kenya.
- 7 The Food and Agriculture Organization notes about smallholder farmers that "the definition . . . differs between countries and between agro-ecological zones. In favourable areas with high population densities [smallholder farmers] often cultivate less than 1 hectare of land, whereas they may cultivate 10 hectares or more in semi-arid areas, or manage 10 head of livestock" (Faurès and Santini 2008, p. 93).
- 8 InterAcademy Council 2004.
- 9 InterAcademy Council 2004.
- 10 Binswanger-Mkhize and McCalla 2010.
- 11 Bruinsma 2009, table 6, p. 10; table 7, p. 13. Suitable is defined as land able to support at least a crop at a minimum of 20% of the maximum constraint-free yield.
- 12 Deininger and others 2011, table A2.6, p. 165. The upper threshold for population density is 25 people per square kilometre. The five key crops are wheat, sugarcane, oil palm, maize and soybean.
- 13 World Bank 2009b.
- 14 Deininger and others 2011; Bruinsma 2009; World Bank 2009b.
- 15 Binswanger-Mkhize and McCalla 2010.
- 16 Using three-year averages reduces the impact of fluctuations in area and production driven by market conditions, weather or other factors.
- 17 Lipton 2012.
- 18 Cereals are the focus not only because of their importance as a source of calories and nutrients in African diets but also because data on starchy roots is sketchier (Lipton 2012) and because various cereals have roughly the same nutritional value per unit of weight, which makes aggregating production data across cereals more meaningful and transparent (Masters 2011).
- 19 Calculations based on FAO (2012c).
- 20 Area harvested includes only area from which crops were gathered (thus excluding area planted

- or sowed but not harvested), and when the same crop is sown or planted more than once in the same field in the same year it is counted as many times as it is harvested. Thus, while area harvested is a proxy for agricultural area expansion, it is important to bear in mind that it excludes agricultural areas that are not harvested and it counts the same area more than once when there are repeated harvests on the same field. For details, see the glossary in FAO (2012c).
- 21 This section is based on Lipton (2012).
 - 22 In the 1980s intercropping provided 81% of sub-Saharan Africa's bean production (Lipton 2012 citing Cardona 1990, p. 56) and about half of its cassava production (Lipton 2012 citing Leihner 1983). In Malawi it accounted for 94% of total cultivated area and 94% of maize production (Lipton 2012 citing Ngwira and others 1990, p. 154). Only for maize would shares be expected to have fallen substantially in 2011.
 - 23 Timmer 2009.
 - 24 Aksoy and Ng 2008, p. 12.
 - 25 Aksoy and Ng 2008, p. 13.
 - 26 Calculations based on WFP (n.d.).
 - 27 Naiken 2002.
 - 28 Sen 1981, p. 1. Italics in the original.
 - 29 Devereux 2009, p. 26.
 - 30 Devereux 2009, p. 26.
 - 31 ILO 2012.
 - 32 ILO 2008.
 - 33 UN 2011; ILO 2012, table A14a, p. 102.
 - 34 Wodon and Zaman 2010; Zezza and others 2008; Aksoy and Hoekman 2010; Barrett 2008; personal communication with William A. Masters, Tufts University, March 2012.
 - 35 Charmes 2010, p. 5.
 - 36 Charmes 2010, pp. 5–6.
 - 37 Conceição, Levine, and Brixiova 2011.
 - 38 Garcia and Moore 2012, p. 176.
 - 39 Roberts, Shyam, and Rastogi 2006, figure 2, p. 6.
 - 40 Foster and Briceño-Garmendia 2010, p. 58.
 - 41 Dercon and others 2009, p. 1019.
 - 42 Barrett 2005.
 - 43 It is difficult to find reliable estimates of post-harvest losses, especially for sub-Saharan Africa (personal communication with Michael Lipton, University of Sussex, March 2012). Estimates vary widely and are often exaggerated and unreliable (APHLIS 2012). Recent estimates from national research in East and Southern Africa value post-harvest losses at \$1.6 billion a year, or 13.5% of the total value of grain production (World Bank, Natural Resources Institute, and FAO 2011, p. 18).
 - 44 Malnutrition includes not enough, too much, or the wrong type of food; malabsorption of nutrients; and the inability to use nutrients properly because of infections or disease. Clinically, malnutrition is represented by an inadequate or excess intake of protein, energy and micronutrients such as vitamins and by the frequent infections and disorders that result (WHO 2000; FAO 2000).
 - 45 Data for 2009 are from UNAIDS (2010, annex 1, pp. 178–207).
 - 46 WHO 2011c.
 - 47 Caulfield, Richard, and Black 2004.
 - 48 Caulfield, Richard, and Black 2004.
 - 49 De Waal and Whiteside 2003.
 - 50 World Bank 2011b.
 - 51 UNICEF and WHO 2012, pp. 38–55.
 - 52 UNICEF and WHO 2012, pp. 54.
 - 53 World Bank 2011b.
 - 54 WHO 2011b.
 - 55 Chastre and others 2009; World Bank 2007b.
 - 56 Burchi, Fanzo, and Frison 2011.
 - 57 McLean and others 2009, table 4, p. 451.
 - 58 UNSCN 2010.
 - 59 De Benoist and others 2008, p. 198.
 - 60 Hotz and Brown 2004.
 - 61 De Onis, Blössner, and Borghi 2010, p. 1260.
 - 62 Dehghan, Akhtar-Danesh, and Merchant 2005.
 - 63 Brown and Hansen 2008, p. 4.
 - 64 The Pearson correlation between growth and rain deviation is not statistically significant for sub-Saharan Africa over the entire period. It is also statistically insignificant only for the years from 2000 onwards. The association is statistically significant for the years prior to 2000: the Pearson correlation coefficient is 0.06 with a *p*-value of 0.026. The decoupling cannot be explained by growth in resource-exporting countries driven by the commodity boom from the beginning of the century to 2008. The results are the same when these countries are excluded.
 - 65 Based on author's calculations from data from NOAA (n.d.).
 - 66 Schmidhuber and Tubiello 2007; Badolo and Kinda 2011.
 - 67 Ferris and Petz 2011.
 - 68 Calculations based on CRED (2012).
 - 69 This has led to a shift from concerns with producers in developing countries during the steady decline in agricultural prices to concern with the impact of volatile and sharply rising prices on poor consumers (Naylor and Falcon 2010). However, high volatility does not necessarily harm consumers if they can adjust to price shifts by substituting cheaper staple foods for more expensive foods. So, high prices harm consumers, but volatility harms producers, as they may invest less and suboptimally in a period of unstable prices (Barrett and Bellemare 2011).
 - 70 The impact was especially intense for rice and thus strongly affected West Africa, where rice is a more important part of diets than elsewhere on the continent (Aker and others 2011; Minot 2011).
 - 71 FAO 2011a, p. 9.
 - 72 Conceição, Levine, and Brixiova 2011.
 - 73 Ivanic and Martin 2008, p. 20.
 - 74 Ivanic, Martin, and Zaman 2011, p. 13.
 - 75 Ivanic and Martin 2008; Ivanic, Martin, and Zaman 2011. Estimates based on simulations come with caveats. They reflect vulnerability to food price changes rather than actual numbers of people pushed into poverty. They consider only the impacts of changes in food prices, not those of changes in prices of other commodities, such as oil. And some disagree on the impacts of second- and third-round effects of rising food prices (such as whether wages for unskilled labour increase with prices and the degree to which substitution of other commodities shields the poor from the impacts of rising prices in some markets; Headey and Fan 2010).
 - 76 Cornia, Deotti, and Sassi 2012; Devereux, Sabates-Wheeler, and Longhurst 2012.
 - 77 Dercon and Krishnan 1998, p. 15.
 - 78 Cornia, Deotti, and Sassi 2012.
 - 79 Devereux 2010.
 - 80 De Soysa and others 1999.
 - 81 Flores 2004.
 - 82 Bozzoli and Brück 2009; Brück and Schindler 2009.
 - 83 Dercon 2004.
 - 84 Miguel, Satyanath, and Sergenti 2004; Miguel 2007; Burke and others 2009.
 - 85 Arezki and Brückner 2011.
 - 86 Flores 2004.
 - 87 The average annual number of conflicts in sub-Saharan Africa increased from 4 in the 1960s to 14 in the 1990s but fell to 10 in the 2000s. Calculations based on UCDP/PRI0 (2012).

Chapter 3

- 1 McIntyre and others 2009a,b.
- 2 Quisumbing and Meinzen-Dick 2001.
- 3 Quisumbing 1996.
- 4 See Kumase, Bisseleua, and Klasen (2010) for Cameroon; Moock (1976) and Dey (1992) for Kenya; and Udry and others (1995) for Burkina Faso.
- 5 There is some evidence of improvement over the past decade. Using parametric statistical methods, Sala-i-Martin and Pinkovskiy (2010) find that the Gini coefficient (0 = perfect equality and 1 = perfect inequality) for sub-Saharan Africa increased from around 0.63 in the 1970s to 0.66 in the late 1980s and early 1990s and then fell steadily to 0.63 by 2005. Using unweighted household survey data, Ortiz and Cummins (2011) estimate that it fell from 0.49 in 1990 to 0.46 in 2000 to 0.44 in 2008. Yet, some of the most unequal countries in the world are in sub-Saharan Africa, including Namibia and South Africa.
- 6 Bruno, Ravallion, and Squire 1996.
- 7 Birdsall 2006. For theory and evidence on the political economy dimensions of the relationship between inequality and growth, see Alesina and Rodrik (1994) and Perotti (1996). Also see Rajan and Zingales (2006), whose model explains the persistence of underdevelopment as a result of incumbent elites opposing reforms and education that benefit the poor.
- 8 Ravallion 1997, 2012; Fosu 2009. Findings are consistent, showing that the impact of GDP growth on poverty reduction is a decreasing function of initial inequality. The impact of growth depends not only on income distribution, but also on its dynamics. While it is certainly possible to have rapid poverty reduction with increasing inequality—China is an example—these results suggest that inequality slowed the rate of poverty decline compared with a situation in which income was more evenly distributed.
- 9 This relationship is often explained by the interaction of inequality with other characteristics of developing countries. For example, when capital markets are underdeveloped and imperfect, inequality slows growth because an unequal distribution of income limits access to credit, including for investments in human capital, so that countries remain stuck in poverty (Banerjee and Newman 1993; Galor and Zeira 1993).
- 10 Easterly 2007.



- 11 Stewart 2000; Cramer 2005.
- 12 Berg and Ostry 2011.
- 13 Sen 1992.
- 14 The inequality-adjusted HDI takes into account the losses in human development associated with the unequal distribution of health, education and income. Under perfect equality the inequality-adjusted HDI is the same as the HDI, but it drops below the HDI as inequality rises. In this sense, the inequality-adjusted HDI is the true level of human development (taking inequality into account), while the HDI is an index of the potential human development that could be achieved if there were no inequality. See UNDP (2011).
- 15 A 1 standard deviation increase in kilometres of road per square metre is associated with four times the reduction in child stunting as a 1 standard deviation increase in the use of land for crops, and twice the reduction as a 1 standard deviation increase in the use of land for pasture (Harding and Wantchekon 2012).
- 16 Lipton 1977.
- 17 Lewis (1954, 1955), whose model viewed agriculture as essentially a costless source of labour for the industrial sector, once employment opportunities were available.
- 18 Bates 2005.
- 19 Binswanger and Deininger 1997.
- 20 Anderson and Masters 2009.
- 21 Anderson and Masters 2009.
- 22 Block and Bates 2011.
- 23 Block and Bates 2011.
- 24 Kherallah and others 2000.
- 25 Chang 2009.
- 26 Bezemer and Headey 2008.
- 27 This is largely a consequence of Engel's law, which observes that as income rises, the proportion of it spent on food falls.
- 28 Timmer and Akkus 2008.
- 29 Byerlee, de Janvry, and Sadoulet 2009.
- 30 Byerlee, de Janvry, and Sadoulet 2009.
- 31 Akande and others 2005.
- 32 Timmer 2004.
- 33 Djurfeldt and Jirstrom 2005.
- 34 In 2005 purchasing power parity terms. Calculations are based on data from SIPRI (2011) and IFPRI (2011).
- 35 Lipton, Sinha, and Blackman. 2001.
- 36 De Janvry and Sadoulet 2010a.
- 37 Block and Bates 2011.
- 38 Block (2010) and the references cited there provides evidence of this turnaround, though the data are contested, and the pace and drivers are not well understood.
- 39 Masters 2011; Eastwood and Lipton 2011.
- 40 Chang 2009.
- 41 UNDP 2005, p. 130.
- 42 European Commission 2012, p. 18.
- 43 World Bank 2007b, p. 99.
- 44 World Bank 2010b.
- 45 Deininger and others 2011; Nhantumbo and Salomão 2010; Waterhouse, Lauriciano, and Norfold (2010); Aabø and Kring 2012.
- 46 von Braun 2009, p. 10.
- 47 UNDESA 2011b.
- 48 UNDESA 2009a, 2011c.
- 49 Bruinsma 2009, table 1, p. 5; FAO 2009a.
- 50 Bruinsma 2009, table 2, p. 5.
- 51 Bruinsma 2009, table 2, p. 5.
- 52 Calculations based on data from MEASURE DHS, ICF International (2012); Garenne 2008.
- 53 Thomas and Zuberi 2012.
- 54 Bryceson 2006; Bryceson and Jamal 1997.
- 55 Potts 2012.
- 56 UN-Habitat 2008.
- 57 Masters 2011.
- 58 Crush and Frayne 2010.
- 59 Msangi and Rosegrant 2009.
- 60 Garrett and Ruel 2000.
- 61 Evans 2008.
- 62 Reich and others 2001.
- 63 Msangi and Rosegrant 2009.
- 64 Nagayets 2005, p. 361; McIntyre and others 2009b.
- 65 FAO 2005b.
- 66 UNFPA 2007; Bidogeza 2012.
- 67 Oldeman 1994.
- 68 Bringezu and others 2010, p. 3.
- 69 Tan and others 2005; Bringezu and others 2010.
- 70 Den Biggelaar and others 2004, p. 53; Henao and Baanante 2006.
- 71 McIntyre and others 2009a; European Communities 2008.
- 72 Parry and others 2009; Rosen and Vincent 1999.
- 73 De Wit and Stankiewicz 2006.
- 74 Pachauri and Reisinger 2007, p. 50.
- 75 Ackerman and others 2008.
- 76 Pachauri and Reisinger 2007.
- 77 FAO 2005a; Boko and others 2007.
- 78 Boko and others 2007.
- 79 Personal communication with Michael Lipton, University of Sussex, March 2012.
- 80 UNDP 2007.
- 81 Pimental 1993.
- 82 Boko and others 2007.
- 83 Lobell and others 2008.
- 84 Easterling and others 2007.
- 85 Collier 2008.
- 86 Ringler and others 2010, p. 12.
- 87 Burke and others 2009.
- 88 Allison and others 2009.
- 89 Levin and Pershing (2006, p. 22), citing McClean and others (2005).
- 90 Measured in carbon dioxide-equivalent greenhouse gas emissions in 2004, including forestry. Pachauri and Reisinger 2007, p. 36.
- 91 Naylor 2011.
- 92 Royal Society 2009.
- 93 Gallup 2009.
- 3 This discussion is based on Lipton (2012).
- 4 Lipton 2012.
- 5 This number, from Ravallion, Chen, and Sangraula (2007, p. 14), is for 2002 and is based on the \$1.08 a day poverty line (in 1993 purchasing power parity) that preceded the revisions that increased the extreme poverty line to \$1.25 a day (in 2005 purchasing power parity). However, Ravallion, Chen, and Sangraula (2007) suggest that poverty is likely to remain predominantly rural in sub-Saharan Africa for decades.
- 6 Lipton 2012.
- 7 World Bank 2009a, p. 6.
- 8 FAO 2011c, p. 7.
- 9 Dercon 2009.
- 10 Gollin 2010.
- 11 Deininger and Byerlee 2011. The authors, however, stress that the positive benefits are conditional on a set of demanding institutional and technological factors, including well-defined property rights, well-functioning markets, growth and employment led by nonfarm sectors, broadly and transparently accessible information on land conditions, and the right technology.
- 12 Thirtle, Lin, and Piesse 2003.
- 13 While there is a rich literature on this topic, recent empirical evidence comes from Christiaensen, Demery, and Köhl (2011). They show that as average income rises, the importance of agriculture in driving growth falls, with nonfarm rural income, manufacturing and services playing a greater role, as industrial and urban economic activities progressively lift the rest of the economy. But for low levels of income, particularly in sub-Saharan Africa, the agricultural sector plays the leading role in driving economic growth.
- 14 For recent evidence see de Janvry and Sadoulet (2010b); see also World Bank (2007b).
- 15 Lipton 2012.
- 16 De Janvry and Sadoulet (2010b, p. 4) show that the gains in cereal productivity in Latin America and the Caribbean since the early 1990s, while the largest of any developing region, did not go along with reductions in rural poverty, due to the less egalitarian land tenure system than in Asia, where there were sharp drops in rural poverty.
- 17 De Janvry and Sadoulet (2010b, p. 4) again show that Latin America and the Caribbean are an exception, since large gains in agricultural labor productivity were driven by mechanization, with little impact on rural poverty, in contrast with the experience in Asia.
- 18 Byerlee, de Janvry, and Sadoulet 2009.
- 19 Poulton and others 2008.
- 20 World Bank 2007b; Government of Ghana and UNDP 2010.
- 21 Conway 1998; Royal Society 2009; Godfray and others 2010.
- 22 According to FAO (2012c), cereal yields in South Africa were 1.1 tonnes per hectare in 1961–1963 and 4.2 tonnes per hectare in 2008–2010.
- 23 Lipton 2012.
- 24 While yields have increased since the early 1960s, yield growth has accelerated over the last 10 years, coinciding with a change in the drivers of

Chapter 4

- 1 Collier and Dercon 2009.
- 2 Eicher and Baker (1992, p. 41) describe how the success of large-scale agriculture in the colonial period, such as the Gezira scheme in Sudan, tea plantations in East Africa, Firestone rubber estates in Liberia and Unilever estates in the Democratic Republic of the Congo, fuelled support in the postcolonial period, especially in the 1960s through the 1970s, for "transformation approaches" to agriculture. Based on setting up large mechanized farms on unoccupied land, these efforts almost universally failed. The next "great thing" was "integrated rural development," an approach to planning smallholder agriculture. That

- yield growth (less cultivation of marginal land, the spread of genetically modified maize to half the land and more use of irrigation; Lipton 2012).
- 25 This discussion is based on Lipton (2005).
- 26 More precisely, as per Lipton (2005), total factor productivity has to increase faster than the ratio of farm output prices (which fall as food supply rises) to input prices (which rise because increasing productivity boosts demand for inputs). Total factor productivity is the rate at which all inputs are transformed into farm output.
- 27 When farmers can plant both staple and cash crops, income growth can also be generated by progressively moving from staples to cash crops, and the condition that productivity growth needs to run ahead of price decreases is somewhat relaxed (Lipton 2005).
- 28 This condition is relaxed if there are no land constraints, because labour absorption can continue through area expansion, but labour productivity remains essential for wage gains. This was the case in Ghana. While area expansion may still be possible in some sub-Saharan African countries, limits to area expansion are growing, as discussed in chapter 2 and earlier in this chapter, so yield gains need to outpace advances in labour productivity.
- 29 Lipton 2005.
- 30 Montalvo and Ravallion 2010.
- 31 Ravallion and Chen 2007.
- 32 Cereal yields increased from an average of 1.1 tonnes per hectare in 1961–1963 to 4.1 in 2008–2010. Calculations based on FAO (2012c).
- 33 For example, World Bank (2007b, p. 67) reports that maize yields on demonstration farms are three to five times higher than countrywide averages. In Malawi demonstration farms yield more than 5 tonnes per hectare, while the national average is just 1 tonne. Other countries also show large gaps: 5 tonnes to less than 2 tonnes in Ethiopia, 4.5 to 1.5 in Nigeria, 4.1 to 1.8 in Uganda, 3 to 1.5 in Mali and 3 to 1 in Mozambique.
- 34 Haggblade and Hazell 2010.
- 35 Some argue that sub-Saharan Africa has more diverse agroecological zones than does Asia, but Asia's variety is comparable (Lipton 2012).
- 36 Hunt and Lipton 2011.
- 37 InterAcademy Council 2010.
- 38 Lipton 2005.
- 39 Lipton 2012.
- 40 With insufficient water, fertilizers destroy crops; with too much, fertilizers wash away.
- 41 While organic and inorganic fertilizers are typically complements, there are areas in sub-Saharan Africa where the soil lacks sufficient humus to make inorganic fertilizer effective. In such soils, mostly in West Africa, extra organic compost or manure, to form humus, needs to be added. These conditions are, however, exceptional, even in West Africa (personal communication with Michael Lipton, University of Sussex).
- 42 Lipton 2012.
- 43 Masters 2011.
- 44 See also Eastwood and Lipton (2011).
- 45 Alene 2010.
- 46 See, for example, AfDB and others (2011).
- 47 This discussion is based on Lipton (2012).
- 48 For evidence on the importance of fertilizer affordability in Kenya and Uganda, see Matsumoto and Yamano (2009).
- 49 Hunt 2011.
- 50 Dorward 2009. On smart subsidies, see Morris and others (2007).
- 51 Description and data on the Malawi input subsidy programme are from Dorward, Chirwa, and Jayne (2010) and from Dorward and Chirwa (2011).
- 52 Hunt 2011, p. 19.
- 53 Description and data on Zambia from Jayne and others (2011) and Mason and others (2011).
- 54 Mason and others 2011.
- 55 Dorward, Chirwa, and Jayne 2010, table 4.4, p. 22.
- 56 Timmer 2004.
- 57 Kahrl and others 2010.
- 58 A study of the Malawi fertilizer subsidy programme found that for each kilogram (kg) of subsidized fertilizer, 0.18 kg of commercial fertilizer was displaced from the market when the subsidy went to the poorest farmers, but that when it went to relatively nonpoor farmers it displaced 0.3 kg (Ricker-Gilbert, Jayne, and Chirwa 2011, p. 26).
- 59 Ariga and Jayne 2009, p. 8.
- 60 Ariga and Jayne 2009, p. 14.
- 61 Ariga and Jayne 2009, p. vi.
- 62 Hunt 2011, p. 21.
- 63 Lipton 2012.
- 64 You and others 2010.
- 65 Hunt 2011.
- 66 World Bank 2007b, figure 6.2, p. 151.
- 67 Lipton 2012.
- 68 Deininger and Byerlee 2011.
- 69 Reardon and others 2003; Reardon and Timmer 2007.
- 70 Eastwood, Lipton, and Newell (2010) and Reardon and others (2009) suggest that opportunities for including small farmers exist mainly in horticulture and dairy.
- 71 Jayne and others 2010.
- 72 Haddad and Zeller 1997.
- 73 Platteau 1991.
- 74 Hazell and Hess 2010.
- 75 Mahul and Stutley 2010.
- 76 Hellmuth and others 2009.
- 77 Hazell and Hess 2010.
- 78 This discussion draws on Lipton (2012).
- 79 Lipton 2012.
- 80 Ejeta 2009.
- 81 Oladele and Wakatsuki 2010; Oladele and others 2010.
- 82 Leavy and Smith 2010.
- 83 Juma 2007, p. 2.
- 84 Kritzing 2002.
- 85 Juma 2011.
- 86 Juma 2011.
- 87 For further information, see www.fara-africa.org/our-projects/unibrain/.
- 88 FAO 2007.
- 89 United Republic of Tanzania n.d.
- 90 WEF 2009; Ngongi 2012.
- 91 For further information, see www.matchmaker.info/maker06.php.
- 92 Rajalahti, Janssen, and Pehu 2008.
- 93 For further information, see www.ckw.applab.org/section/index.
- 94 For further information, see www.grameenfoundation.org/what-we-do/empowering-poor.
- 95 Amri-Lawson and Wobst 2011.
- 96 Juma 2011; ATPS n.d.
- 97 See www.caadp.net/index.php.
- 98 UNECA and AU 2012; CAADP 2012.
- 99 NEPAD 2010, p. 14.

Chapter 5

- The term *malnutrition* is used here to refer to the full set of nutrition problems: undernutrition, overweight/obesity and micronutrient deficiency.
- Even though malnutrition is not the same as hunger, as discussed later in the chapter; Fogel 2004.
- Sanchez and others 2005.
- DFID 2009.
- Narayan, Walker, and Trathen 2009.
- Black and others 2008; Arimond and Ruel 2004; Ruel 2003.
- The chapter draws on Fanzo (2012) and Micronutrient Initiative and UNICEF (2004).
- Alderman, Behrman, and Hoddinott 2005.
- Dasgupta 2003.
- World Bank 2006, p. 2.
- Rajkumar, Gaukler, and Tilahun 2012, p. xxv.
- World Bank 2006, p. x; Haddad and others 2002; Bliss and Stern 1978a,b.
- WHO 2011a; personal communication with Mercedes de Onis, Coordinator of the Growth Assessment and Surveillance Unit, World Health Organization, Department of Nutrition, December 2011.
- Hoddinott and others 2008, p. 411.
- Sanchez 2009; Alderman and others 2001; Victora and others 2008.
- Black, Devereux, and Salvanes 2007, pp. 423–424.
- Glewwe and Jacoby 1995.
- Scrimshaw and SanGiovanni 1997; Blössner and de Onis 2005.
- Calder and Jackson 2000, p. 9; Fishman and others 2004.
- Müller, Kouyaté, and Becher 2003; Dasgupta 1995, p. 405; Calder and Jackson 2000, p. 14.
- Fan and Pandya-Lorch 2012.
- Paarlberg 2012.
- Black and others 2008, p. 251.
- Victoria and others 2008.
- FAO 2005b, pp. 2, 21.
- World Bank 2006, p. 24.
- Barker, Bergmann, and Ogra 2008.
- Behrman, Alderman, and Hoddinott 2004, p. 386.
- Behrman and Rosenzweig 2001, p. 26.
- Hunt 2005, p. 11, citing Haddad and Bouis 1991.
- Caulfield and others 2004.
- UNICEF and WHO 2012, p. 55.
- Katona and Katona-Apte 2008; UNICEF 1990.
- Cairncross and others 2010.
- Niehof, Rugalema, and Gillespie 2010.
- Castleman, Seumo-Fosso, and Cogill 2004.
- Popkin 2008.
- Ruel, Garrett, and Haddad 2008.
- Chastre and others 2009; World Bank 2007a.
- Micronutrient Initiative and others 2009.
- Burchi, Fanzo, and Frison 2011.
- World Bank 2012.
- Micronutrient Initiative and others 2009, p. 2.
- Welch and Graham 2002; Welch 2002.
- Black and others 2008.



- 46 Banerjee and Duflo 2011.
47 Benson 2008.
48 Benson 2008; Drèze and Sen 1989 p. 276.
49 Fanzo and Pronyk 2010.
50 Katona and Katona-Apte 2008.
51 Black and others 2008.
52 Kristjansson and others 2007.
53 Chandler and others 1995; Grantham–McGregor, Chang, and Walker 1998.
54 Behrman, Alderman, and Hoddinott 2004.
55 Fan and Pandya-Lorch 2012.
56 CIAT and IFPRI 2002.
57 Syngenta Foundation for Sustainable Agriculture 2012.
58 Navdanya and others 2011.
59 Bouis and Islam 2012; Birner and others 2007; Livingston, Schonberger, and Delaney 2011.
60 Chastre and others 2009; De Pee and others 2010.
61 Von Grebmer and others 2010; WFP 2009.
62 UNSCN 2010.
63 Smith and Haddad 2000.
64 Smith and others 2003.
65 UNSCN 2004.
66 UNICEF 2006.
67 Mensch, Singh, and Casterline 2005.
68 UNSCN 2010.
69 Horton and others 2010, p. 6. Of the 36, 20 are sub-Saharan African countries, including Angola, Burkina Faso, Burundi, Cameroon, the Democratic Republic of the Congo, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, South Africa, Sudan (before South Sudan declared its independence), Tanzania, Uganda and Zambia.
70 Horton and others 2010, p. 27.
71 Hotz and Gibson 2007; Hurrell 2004; Teucher, Olivares, and Cori 2004.
72 Sayed and others 2008.
73 WHO, UNICEF, and World Bank 2009.
74 The GAVI Alliance, formerly the Global Alliance for Vaccines and Immunization, is a public-private global partnership that spearheads vaccine development and deployment. Partners include the United Nations Children's Fund, national governments, the World Health Organization, the World Bank, the Bill & Melinda Gates Foundation, the vaccine industry, civil society groups, and research and technical health institutes.
75 Benson 2008.
76 Save the Children 2012.
77 Countries include Benin, Burkina Faso, Ethiopia, The Gambia, Ghana, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, Zambia and Zimbabwe.
- shocks, rather than to predict the occurrence of a crisis, which is the main focus in discussions of vulnerability (Alinovi, Mane, and Romano 2009).
2 Dorward and others 2006.
3 Snelling 2005.
4 Dercon 2009.
5 Ferreira and Schady 2009.
6 Shock was measured as more than one standard deviation from the historical mean in a given year (Jensen 2000, p. 402).
7 Yamauchi 2006.
8 Alderman, Hoddinott, and Kinsey 2006, p. 451.
9 Dercon and Porter 2010, p. 18.
10 The study uses stunting as to estimate the impact of civil war on children's health (Bundervoet, Verwimp, and Akresh 2009; Verwimp 2012).
11 Fuentes-Nieva and Seck 2010.
12 Naylor 2011.
13 Themnér and Wallensteen 2011; Africa Progress Panel 2009.
14 Naylor 2011.
15 Miguel, Satyanath, and Sergenti 2004; Hendrix and Glaser 2007.
16 UNEP 2009.
17 The Global Hunger Index combines undernourishment in the population, the share of underweight children and the under-five mortality rate with levels of hunger classified as "extremely alarming." The four lowest ranked countries are Burundi, Chad, the Democratic Republic of the Congo and Eritrea (IFPRI 2011; Von Grebmer and others 2011).
18 Government of South Sudan and others 2011, pp. 15, 18.
19 SSCCE n.d., table 157, p. 97.
20 Ulimwengu, Roberts, and Randriamamonjy 2012.
21 HLPE 2011; Headey and Fan 2008.
22 The High Level Panel of Experts was set up in 2010 by the UN Committee on World Food Security to analyse the causes and effects of food price volatility and advise on options to ensure food security when volatility disrupts markets.
23 Von Braun 2010; FAO and others 2011.
24 Headey and Fan 2008.
25 Aker and others 2011, p. 11; Naylor 2011.
26 Naylor 2011.
27 Molony and Smith 2010; Naylor 2011.
28 Thomas and Zuberi 2012.
29 Sen 1999.
30 Women with an unmet need for family planning are those who are fertile and sexually active, are not using any method of contraception, and report in surveys that they do not want any more children or want to delay the birth of their next child (UNDESA 2011a).
31 Bongaarts 2011, p. 212.
32 Bongaarts 2011, p. 212.
33 Bongaarts 2011, p. 212.
34 Machiyama 2010.
35 Pretty, Toulmin, and Williams 2011; Bringezu and others 2010.
36 Bringezu and others 2010.
37 Pretty 2008; Royal Society 2009; Conway and Waage 2010.
38 Pretty, Toulmin, and Williams 2011.
39 Bringezu and others 2010.
40 Badgley and others (2007); Godfray and others (2010); Pretty and others (2006); Pretty (2008); and Pretty, Toulmin, and Williams (2011) provide supporting evidence. Badgley and others (2007) show that current research suggests that organic agriculture could substantially increase food supply. In a study of 286 agricultural sustainability projects in developing countries involving 12.6 million predominantly smallholder farmers on 37 million hectares, Pretty and others (2007) found an average yield increase of 79% across a wide variety of systems and crop types. However, Hunt and Lipton (2011) question the robustness of these findings, pointing to several obstacles that may discourage smallholder farmers from organic farming.
41 Royal Society 2009.
42 This section is based on Devereux (2012).
43 Dercon 2011.
44 Holzmann and Jorgensen 2001.
45 European Communities 2010, p. 33; emphasis in original.
46 Clarke and Dercon 2009.
47 Hazell and Hess 2010.
48 Chetty and Looney 2006.
49 Giné and Yang 2009. Bongo (2012) discusses the potential and challenges for microinsurance.
50 World Bank Treasury 2009.
51 IMF 2011b.
52 AU and WFP 2011.
53 Brugiavini and Pace 2010; Witter and Garshong 2009.
54 Devereux 2012.
55 Harriss-White and Heyer 2010; Devereux 2010.
56 Devereux 2012.
57 Philip 2012.
58 Barrett and Maxwell 2005.
59 Were Omamo and others 2010.
60 Garcia and Moore 2012; Barrientos and Hulme 2008.
61 Schubert and Slater 2006.
62 Schüring 2010.
63 Samson 2009.
64 Blattman, Fiala, and Martinez 2011.
65 Harriss-White and Heyer 2010.
66 Levine, van der Berg, and Yu 2011, p. 44.
67 Sabates-Wheeler and Devereux 2010.
68 Devereux and Jere 2008, p. iv.
69 Sabates-Wheeler and Devereux 2010.
70 Devereux (2012), citing FEG Consulting (2008).
71 Levy (2005), as cited in Devereux 2012.
72 Devereux 2002; Cornia and Deotti 2008.
73 RHVP 2010; Byerlee, Jayne, and Myers 2006.
74 Timmer 2009, pp. 17–18.
75 Devereux and others 2008.
76 Duflo, Kremer, and Robinson 2011, p. 2353.
77 Devereux 2012.
78 Davies and Davey 2008.
79 Dorward and others 2004.
80 Devereux 2012.
- ## Chapter 6
- 1 The natural sciences assign several meanings to *resilience*. In engineering the focus is on a system's ability to return to equilibrium after a perturbation. In ecology it is the magnitude of disturbance that a system can absorb before it redefines its structure by changing the variables and processes that control behaviour. Applied to household food security, *resilience* refers to a household's capability to absorb the negative effects of unpredictable
- ## Chapter 7
- 1 UNDP 2010.
2 Sen 1996.
3 Mandela 1995, p. 304.
4 World Bank 2011c; Rakotoarisoa, lafrate, and Paschali 2011.
5 DeGrassi 2005.
6 Harding and Wantchekon 2012.

- 7 Lake and Baum 2001.
- 8 Harding and Wantchekon 2012.
- 9 Rakotoarisoa, lafrate, and Paschali 2011, p. 7.
- 10 This is based on Ancharaz, Mbekeani, and Brixiova (2011) and Binswanger-Mkhize and McCalla (2010).
- 11 Binswanger-Mkhize and McCalla 2010, p. 3646.
- 12 Binswanger-Mkhize and McCalla 2010, p. 3646.
- 13 Binswanger-Mkhize and McCalla 2010, p. 3647.
- 14 Anderson, Martin, and van der Mensbrugghe 2006.
- 15 Binswanger-Mkhize and McCalla 2010.
- 16 Aker and Mbiti 2010.
- 17 Kaushik and Singh 2004; Jensen 2007; Aker 2008; Goyal 2010.
- 18 Aker and Ksoll 2012.
- 19 Svensson and Yanagizawa 2008.
- 20 Muto and Yamano 2009.
- 21 M-Pesa is an acronym that combines mobile and Pesa, the Kiswahili word for money.
- 22 Safaricom 2011, p. 1.
- 23 Mbiti and Weil 2011; Aker and Ksoll 2012.
- 24 Plyler, Haas, and Nagarajan 2010.
- 25 Plyler, Haas, and Nagarajan 2010.
- 26 World Bank 2011a.
- 27 www.kacekenya.co.ke.
- 28 Maritz 2011.
- 29 Maritz 2011.
- 30 UN 2011, statistical annex, pp. 22–23.
- 31 Richardson 2009.
- 32 This and the next paragraph are based on Asenso-Okyere and Mekonnen (2012). Calandro and others (2010).
- 33 OECD, AfDB, and UNECA 2009.
- 34 GSMA 2010, 2012.
- 35 Asenso-Okyere and Mekonnen 2012.
- 36 Lilja and Dixon 2008.
- 37 Lilja and Bellon 2006.
- 38 Kijima, Otsuka, and Sserunkuma 2011.
- 39 Brew-Hammond and Crole-Rees 2004, p. 13.
- 40 Burney and Naylor 2011.
- 41 Doss 2001.
- 42 Quisumbing and Meinzen-Dick 2001.
- 43 Dey Abbas 1997.
- 44 Negin and others 2009.
- 45 Doss 2001.
- 46 Bonfiglioli 2007.
- 47 World Food Summit 1996.
- 48 Sen 1999.
- 49 UNDP 2002.
- 50 UNCDF 2007.
- 51 UNCDF 2007.
- 52 Wunsch 2001.
- 53 World Bank 2002.
- 54 Toulmin and Guèye 2003.
- 55 This paragraph is based on KIT, Faida MaLi, and IIRR 2006.
- 56 DFID 2004.
- 57 Bailey 2007.
- 58 Windfur 1998; FAO 2009b.
- 59 Devarajan, Khemani, and Walton 2011.
- 60 DFID 2004.
- 61 Devarajan, Khemani, and Walton 2011.
- 62 Sen 2009.
- 63 Goetz and Jenkins 2002, p. 9.
- 64 Constitution of Kenya 2010, Chapter 2—The Republic, 43(1x).
- 65 De Schutter 2011b.
- 66 Devereux 2012.
- 67 This description is based on Vij (2011).
- 68 Banda 2010.
- 69 Okolloh 2008.
- 70 Lipton 2009; UNECA 2004b; Acemoglu 2010.
- 71 UNECA 2004b.
- 72 Knight 2010, p. 3.
- 73 Commission on Legal Empowerment of the Poor 2008.
- 74 Bomuhangi, Doss, and Meinzen-Dick 2011.
- 75 UN Women 2011.
- 76 Lipton 2009.
- 77 Eastwood, Lipton, and Newell 2010; Lipton 2009.
- 78 Lipton 2009, 2012.
- 79 Binswanger and Rosenzweig 1986; Eicher and Baker 1992; Lipton 2009.
- 80 Binswanger, Deininger, and Feder 1995; Binswanger-Mkhize and McCalla 2010.
- 81 Eastwood, Lipton, and Newell 2010.
- 82 Eastwood, Lipton, and Newell 2010.
- 83 Eastwood, Lipton, and Newell 2010; Lipton 2009.
- 84 Eastwood, Lipton, and Newell 2010; Lipton 2009.
- 85 Von Braun and Meinzen-Dick 2009.
- 86 Collier and Dercon 2009.
- 87 Deininger and Byerlee 2011; Arezki, Deininger, and Selod 2011.
- 88 Waterhouse, Lauriciano, and Norfolk 2010.
- 89 De Schutter 2011a.
- 90 Borras and Franco 2010.
- 91 As included in FAO, IFAD, UNCTAD, and World Bank (2010), the Responsible Agricultural Investment Principles suggest the need for negotiations with landholders and land users based on “informed and free choice.”
- 92 Nhantumbo and Salomão 2010; von Braun and Meinzen-Dick 2009; Oakland Institute 2011; German, Schoneveld, and Mwangi 2011.
- 93 UNDESA 2010a.
- 94 Deininger and others 2011, figure 2.3, p. 51.
- 95 Cotula 2011.
- 96 Deininger and others 2011, p. 52.
- 97 Hanlon 2011; Nhantumbo and Salomão 2010; German, Schoneveld, and Mwangi 2011; Oakland Institute 2011.
- 98 Cotula 2011.
- 99 Locke 2009; Nhantumbo and Salomão 2010.
- 100 UNDESA 2010a.
- 101 UNECA and others 2011.
- 102 World Bank 2011c; UN Women 2011.
- 103 FAO 2011c, p. 23.
- 104 FAO 2011c, p. 119.
- 105 FAO 2011c, p. 26.
- 106 FAO 2011c.
- 107 Klasen 2002.
- 108 FAO 2011c.
- 109 Feed the Future and others 2012.
- 110 FAO 2011c, p. 7.
- 111 Meinzen-Dick and others 2011.
- 112 Quisumbing, Meinzen-Dick, and Bassett 2008.
- 113 Quisumbing, Kumar, and Behrman 2011.
- 114 Miguel 2005.
- 115 World Bank 2011d, p. 20.
- 116 FAO 2011c, p. 42.
- 117 Sen 1999.
- 118 PHI and others 2011.
- 119 McFadden 2011.
- 120 As quoted in Sears (1991).



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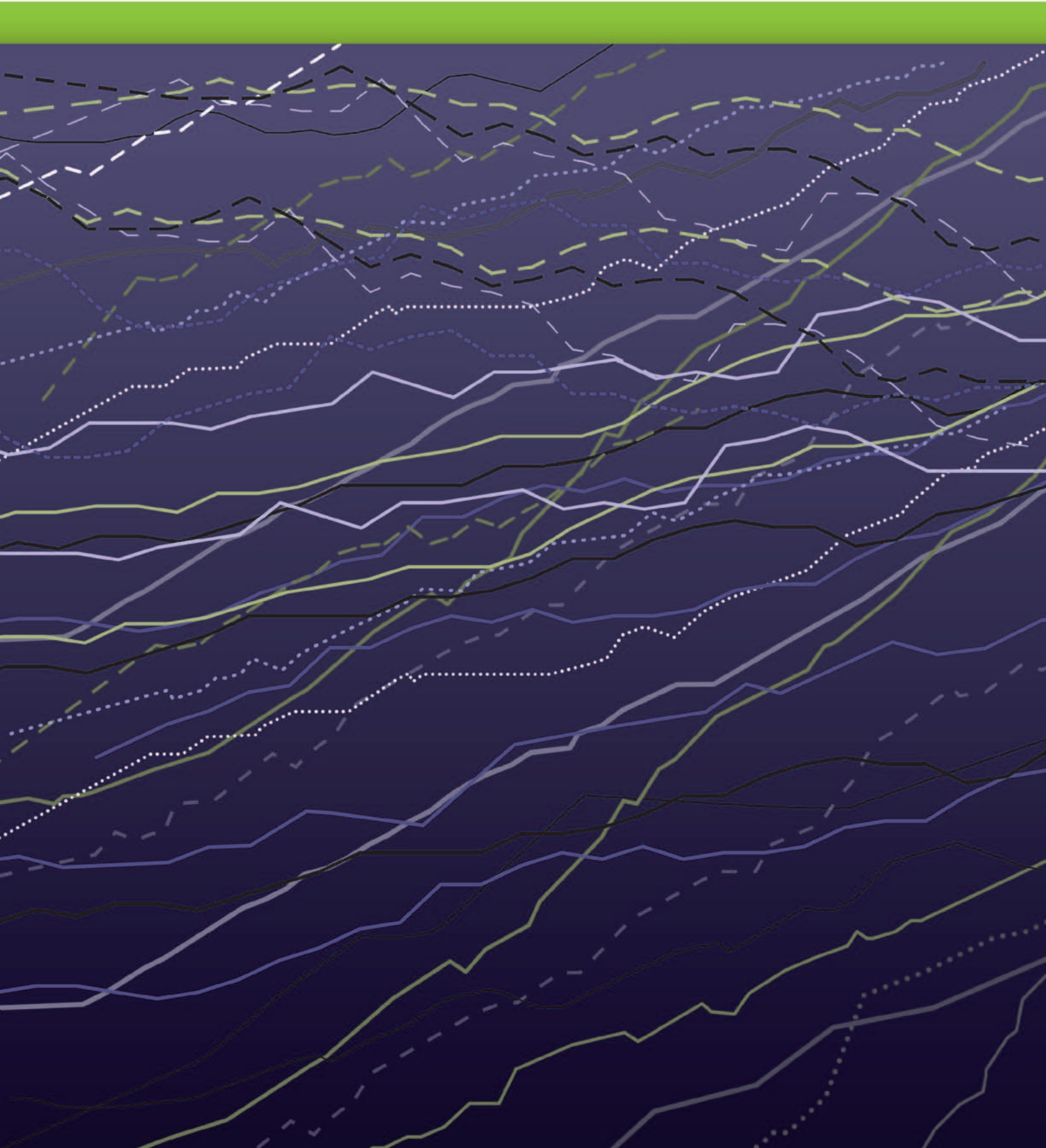
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Statistical Annex





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Readers guide

The statistical tables include the 46 countries of the United Nations Development Programme Regional Bureau for Africa.

South Sudan's statistics are not yet fully available from the internationally harmonized data sources that are the basis for the statistical tables. Technical note 2 presents recent national data on human development and food security for South Sudan.

Sub-Saharan Africa aggregates are population weighted unless otherwise noted

A dash between two years (as in 2008–2010) indicates that the data are for the most recent year available in the period specified, unless otherwise noted. Growth rates are usually the annual average between the first and last years of the period shown.

A slash between two years (as in 2008/2010) indicates that the data are the average for the years shown, unless otherwise noted.

.. means that data are not available for the specified cell.

TABLE 1 HUMAN DEVELOPMENT

	HUMAN DEVELOPMENT INDEX	LIFE EXPECTANCY AT BIRTH	MEAN YEARS OF SCHOOLING	EXPECTED YEARS OF SCHOOLING	GROSS NATIONAL INCOME PER CAPITA
	value	years			2005 PPP ^a \$
COUNTRIES	2011	2011	2011	2011	2011
Angola	0.486	51.1	4.4	9.1	4,874
Benin	0.427	56.1	3.3	9.2	1,364
Botswana	0.633	53.2	8.9	12.2	13,049
Burkina Faso	0.331	55.4	1.3	6.3	1,141
Burundi	0.316	50.4	2.7	10.5	368
Cameroon	0.482	51.6	5.9	10.3	2,031
Cape Verde	0.568	74.2	3.5	11.6	3,402
Central African Republic	0.343	48.4	3.5	6.6	707
Chad	0.328	49.6	1.5	7.2	1,105
Comoros	0.433	61.1	2.8	10.7	1,079
Congo, Democratic Republic of	0.286	48.4	3.5	8.2	280
Congo, Republic of	0.533	57.4	5.9	10.5	3,066
Côte d'Ivoire	0.400	55.4	3.3	6.3	1,387
Equatorial Guinea	0.537	51.1	5.4	7.7	17,608
Eritrea	0.349	61.6	3.4	4.8	536
Ethiopia	0.363	59.3	1.5	8.5	971
Gabon	0.674	62.7	7.5	13.1	12,249
Gambia	0.420	58.5	2.8	9.0	1,282
Ghana	0.541	64.2	7.1	10.5	1,584
Guinea	0.344	54.1	1.6	8.6	863
Guinea-Bissau	0.353	48.1	2.3	9.1	994
Kenya	0.509	57.1	7.0	11.0	1,492
Lesotho	0.450	48.2	5.9	9.9	1,664
Liberia	0.329	56.8	3.9	11.0	265
Madagascar	0.480	66.7	5.2	10.7	824
Malawi	0.400	54.2	4.2	8.9	753
Mali	0.359	51.4	2.0	8.3	1,123
Mauritania	0.453	58.6	3.7	8.1	1,859
Mauritius	0.728	73.4	7.2	13.6	12,918
Mozambique	0.322	50.2	1.2	9.2	898



	HUMAN DEVELOPMENT INDEX	LIFE EXPECTANCY AT BIRTH	MEAN YEARS OF SCHOOLING	EXPECTED YEARS OF SCHOOLING	GROSS NATIONAL INCOME PER CAPITA
	value	years			2005 PPP ^a \$
COUNTRIES	2011	2011	2011	2011	2011
Namibia	0.625	62.5	7.4	11.6	6,206
Niger	0.295	54.7	1.4	4.9	641
Nigeria	0.459	51.9	5.0	8.9	2,069
Rwanda	0.429	55.4	3.3	11.1	1,133
São Tomé and Príncipe	0.509	64.7	4.2	10.8	1,792
Senegal	0.459	59.3	4.5	7.5	1,708
Seychelles	0.773	73.6	9.4	13.3	16,729
Sierra Leone	0.336	47.8	2.9	7.2	737
South Africa	0.619	52.8	8.5	13.1	9,469
South Sudan	..	..	..	..	..
Swaziland	0.522	48.7	7.1	10.6	4,484
Tanzania, United Republic of	0.466	58.2	5.1	9.1	1,328
Togo	0.435	57.1	5.3	9.6	798
Uganda	0.446	54.1	4.7	10.8	1,124
Zambia	0.430	49.0	6.5	7.9	1,254
Zimbabwe	0.376	51.4	7.2	9.9	376
Sub-Saharan Africa	0.463	54.4	4.5	9.2	1,966

Note:

^a Purchasing power parity.

Sources:

Column 1: Human Development Report Office (HDRO) calculations based on data from UNDESA (2011), Barro and Lee (2010), UNESCO Institute for Statistics (2011), World Bank (2012b) and IMF (2011).

Column 2: UNDESA 2011.

Columns 3 and 4: HDRO calculations based on data from Barro and Lee (2010).

Column 5: HDRO calculations based on data from World Bank (2012b), IMF (2011) and UNDESA (2011).

TABLE 2 FOOD AVAILABILITY

COUNTRIES	CEREAL PRODUCTION				AGRICULTURE VALUE ADDED	NET CEREAL IMPORTS	FOOD AID DELIVERIES	NET FOOD PRODUCTION INDEX
	FOOD SUPPLY	YIELD	PER CAPITA	SHARE OF SUB-SAHARAN AFRICA TOTAL				
	kcal per capita per day	kg per hectare	kg	%				
	2005/2007	2008/2010	2008/2010	2008/2010	2005–2010	2007/2009	2009	2007/2009
Angola	1,949.3	644.8	50.2	0.81	10.0	34	0.03	174.3
Benin	2,512.3	1,327.6	167.6	1.25	32.2	25	18.44	112.7
Botswana	2,235.0	492.2	25.6	0.04	2.9	84	0.00	113.0
Burkina Faso	2,669.0	1,032.0	260.8	3.60	33.3	15	28.24	129.0
Burundi	1,679.7	1,327.9	36.9	0.26	34.8	7	62.05	111.0
Cameroon	2,259.0	1,684.5	135.7	2.25	19.5	40	10.02	119.3
Cape Verde	2,549.3	260.7	18.0	0.01	8.9	214	18.07	115.0
Central African Republic	1,956.0	1,120.2	56.0	0.21	56.5	8	22.79	121.0
Chad	2,040.0	816.4	186.7	1.76	13.6	14	109.84	120.0
Comoros	1,857.3	1,170.5	35.4	0.02	46.3	62	7.50	112.0
Congo, Democratic Republic of	1,585.3	771.6	23.8	1.32	42.9	10	179.64	97.7
Congo, Republic of	2,512.7	786.1	6.1	0.02	3.9	18	6.99	121.7
Côte d'Ivoire	2,514.7	1,721.5	74.0	1.24	22.9	61	25.59	119.0
Equatorial Guinea	..	..	..	..	3.2	..	0.00	91.3
Eritrea	1,586.7	429.4	37.7	0.17	14.5	27	0.01	125.7
Ethiopia	1,951.7	1,615.5	181.1	12.71	47.7	17	978.54	143.3
Gabon	2,730.0	2,017.2	28.0	0.04	4.4	81	0.00	103.0
Gambia	2,345.3	1,050.9	179.7	0.26	26.9	100	12.69	94.7
Ghana	2,849.0	1,690.7	109.1	2.25	30.2	32	30.46	143.7
Guinea	2,529.3	1,475.4	297.4	2.51	13.0	37	15.54	129.7
Guinea-Bissau	2,288.0	1,555.0	150.7	0.19	..	22	2.40	121.7
Kenya	2,060.0	1,424.3	83.1	2.84	19.4	38	269.36	130.0
Lesotho	2,468.3	573.3	49.9	0.09	7.9	116	7.57	78.7
Liberia	2,163.3	1,305.2	77.1	0.25	61.3	56	26.06	127.7
Madagascar	2,132.7	2,869.8	239.8	4.17	29.1	13	22.23	113.3
Malawi	2,127.0	1,976.2	246.0	3.08	30.5	3	96.95	130.0
Mali	2,579.3	1,533.5	391.8	5.06	36.5	16	30.17	165.0
Mauritania	2,822.7	810.4	62.8	0.18	20.2	..	26.89	114.7
Mauritius	2,935.7	8,733.9	0.7	0.00	4.2	208	0.00	102.7
Mozambique	2,071.0	954.6	96.7	1.91	31.9	29	160.38	101.7



COUNTRIES	CEREAL PRODUCTION							
	FOOD SUPPLY	YIELD	PER CAPITA	SHARE OF SUB-SAHARAN AFRICA TOTAL	AGRICULTURE VALUE ADDED	NET CEREAL IMPORTS	FOOD AID DELIVERIES	NET FOOD PRODUCTION INDEX
	kcal per capita per day	kg per hectare	kg	%	% of GDP	kg per capita	thousand tonnes	100 = 1999–2001
	2005/2007	2008/2010	2008/2010	2008/2010	2005–2010	2007/2009	2009	2007/2009
Namibia	2,349.0	411.0	50.5	0.10	7.5	58	0.36	101.3
Niger	2,306.0	449.4	298.3	3.86	..	14	47.51	173.3
Nigeria	2,708.0	1,513.1	153.2	20.35	32.7	29	0.00	130.7
Rwanda	2,054.0	1,679.1	60.0	0.54	33.9	9	28.98	132.7
São Tomé and Príncipe	2,662.3	3,407.8	22.4	0.00	16.8	89	6.10	110.3
Senegal	2,317.7	1,168.4	148.0	1.55	16.7	108	15.69	112.3
Seychelles	2,426.0	..	..	..	1.9	217	0.00	41.0
Sierra Leone	2,127.7	1,429.5	152.3	0.76	49.0	24	17.06	201.0
South Africa	2,985.7	4,212.0	299.3	12.85	3.0	30	0.00	118.0
South Sudan	..	..	..	..	..	..	..	..
Swaziland	2,307.3	1,176.5	55.7	0.06	7.5	143	2.53	114.7
Tanzania, United Republic of	2,017.0	1,240.0	141.4	5.32	28.1	13	29.31	133.3
Togo	2,146.3	1,191.6	171.7	0.88	43.5	29	25.24	129.7
Uganda	2,247.3	1,566.4	87.7	2.45	24.2	11	111.67	110.0
Zambia	1,885.3	2,266.8	174.0	1.93	9.2	–9	15.21	123.7
Zimbabwe	2,207.3	503.5	81.0	0.88	17.4	64	220.45	84.3
Sub-Saharan Africa	2,292.5	1,395.0^a	148.1	100.00^b	9.2^c	26	2,688.35^b	120.0^d

Notes:**a** Based on regional aggregates from FAO (2012b).**b** Total sum.**c** Weighted by GDP. Population-weighted value is 29.0.**d** Simple mean.**Sources:****Columns 1 and 2:** Calculations based on data from FAO (2012b).**Columns 3 and 6:** Calculations based on data from FAO (2012b) and UNDESA (2011).**Column 4:** Calculations based on data from FAO (2012b).**Columns 5 and 8:** World Bank 2012b.**Column 7:** World Bank 2012a.

TABLE 3 FOOD USE

COUNTRIES	UNDER-FIVE NUTRITION			MORTALITY		UNDER- NOURISHMENT PREVALENCE	DEPTH OF HUNGER (AVERAGE FOOD DEFICIT OF UNDER- NOURISHED POPULATION)	ANAEMIA PREVALENCE	VITAMIN A DEFICIENCY PREVALENCE		
	WASTING	STUNTING	UNDERWEIGHT	INFANT	UNDER-FIVE						
	% of children under age five			deaths per 1,000 live births			% of population			kilocalories per capita per day	% of population
	2000–2010	2000–2010	2000–2010	2010	2010		2006–2008			2006–2008	1993–2005
Angola	8.2	29.2	15.6	97.9	160.5	41	320	30	64		
Benin	8.4	44.7	20.2	73.2	115.4	12	210	82	71		
Botswana	7.2	31.4	11.2	36.1	47.7	25	240	38	26		
Burkina Faso	11.3	35.1	26.0	92.6	176.2	8	200	92	54		
Burundi	8.2	63.1	38.9	87.8	141.9	62	390	56	28		
Cameroon	7.3	36.4	16.6	84.4	136.2	22	230	68	39		
Cape Verde	..	..	..	29.2	35.6	11	190	40	2		
Central African Republic	10.5	44.6	21.8	106.0	158.8	40	300	84	68		
Chad	16.1	44.8	33.9	98.9	173.4	39	320	71	50		
Comoros	13.3	46.9	25.0	62.8	85.6	47	300	65	22		
Congo, Democratic Republic of	14.0	45.8	28.2	111.7	169.9	..	..	71	61		
Congo, Republic of	8.0	31.2	11.8	60.8	93.4	13	230	66	25		
Côte d'Ivoire	14.0	39.0	29.4	85.9	123.0	14	230	69	57		
Equatorial Guinea	2.8	35.0	10.6	80.5	120.8	..	..	41	14		
Eritrea	14.9	43.7	34.5	42.3	60.8	65	350	70	21		
Ethiopia	12.3	50.7	34.6	67.8	105.9	41	320	75	46		
Gabon	4.3	26.3	8.8	54.4	73.5	..	140	45	17		
Gambia	7.4	27.6	15.8	56.9	98.1	19	240	79	64		
Ghana	8.7	28.6	14.3	50.0	74.4	5	180	76	76		
Guinea	10.8	39.3	22.5	81.2	129.9	16	260	79	46		
Guinea-Bissau	5.6	28.1	17.2	92.0	149.5	22	250	75	55		
Kenya	7.0	35.2	16.4	55.1	84.7	33	260	69	84		
Lesotho	5.6	45.2	16.6	64.6	85.0	14	220	49	33		
Liberia	7.8	39.4	20.4	73.6	102.6	32	330	87	53		
Madagascar	15.2	52.8	36.8	43.1	62.1	25	250	68	42		
Malawi	4.2	53.2	15.5	58.1	92.1	27	280	73	59		
Mali	15.3	38.5	27.9	99.2	178.1	12	220	83	59		
Mauritania	8.1	23.0	15.9	75.3	111.2	8	210	68	48		
Mauritius	..	..	..	13.0	15.1	5	180	17	9		
Mozambique	4.2	43.7	18.3	92.2	135.0	38	330	75	69		



COUNTRIES	UNDER-FIVE NUTRITION			MORTALITY		UNDER- NOURISHMENT PREVALENCE	DEPTH OF HUNGER (AVERAGE FOOD DEFICIT OF UNDER- NOURISHED POPULATION)	ANAEMIA PREVALENCE	VITAMIN A DEFICIENCY PREVALENCE			
	WASTING	STUNTING	UNDERWEIGHT	INFANT	UNDER-FIVE							
	% of children under age five			deaths per 1,000 live births						% of population	kilocalories per capita per day	% of population
	2000–2010	2000–2010	2000–2010	2010	2010					2006–2008	2006–2008	1993–2005
Namibia	7.5	29.6	17.5	29.3	40.1	18	220	41	18			
Niger	12.4	54.8	39.9	72.5	143.3	16	240	81	67			
Nigeria	14.4	41.0	26.7	88.4	142.9	6	180	76	30			
Rwanda	4.8	51.7	18.0	59.1	91.1	32	300	42	6			
São Tomé and Príncipe	11.2	31.6	14.4	53.1	79.9	..	160	37	96			
Senegal	8.7	20.1	14.5	49.8	75.2	19	220	70	37			
Seychelles	..	..	..	11.7	13.5	8	150	24	8			
Sierra Leone	10.5	37.4	21.3	113.7	174.0	35	340	83	75			
South Africa	4.7	23.9	8.7	40.7	56.6	..	150	24	17			
South Sudan	..	..	..	..	..	..	..	..	..			
Swaziland	1.1	40.4	7.3	55.1	77.7	19	220	47	45			
Tanzania, United Republic of	4.9	42.5	16.2	50.0	75.8	34	280	72	24			
Togo	6.0	26.9	20.5	66.0	103.4	30	280	52	35			
Uganda	6.3	38.7	16.4	63.0	98.9	22	240	64	28			
Zambia	5.6	45.8	14.9	68.9	111.0	44	320	53	54			
Zimbabwe	7.3	35.8	14.0	50.9	79.8	30	300	19	36			
Sub-Saharan Africa	9.9 ^a	41.1 ^a	21.3 ^a	76.0 ^b	121.0 ^b	27 ^c	243	67	67			

Notes:

- a** Based on regional aggregates from WHO (2011).
b Based on regional aggregates from UN IGME (2012).

- c** Based on regional aggregates from FAO Statistics Division (2011).

Sources:

Columns 1–3: WHO 2011; personal communication with Mercedes de Onis, coordinator of the Growth Assessment and Surveillance Unit, World Health Organization, Department of Nutrition, December 2011.

Columns 4 and 5: UN IGME 2012.

Columns 6 and 7: FAO Statistics Division 2011.

Column 8: De Benoist and others 2008.

Column 9: WHO 2009.

TABLE 4 AGRICULTURAL INPUTS

COUNTRIES	AGRICULTURAL LAND	AVERAGE MONTHLY PRECIPITATION	ANNUAL AGRICULTURAL WATER WITHDRAWAL PER CAPITA	FERTILIZER CONSUMPTION	ECONOMICALLY ACTIVE POPULATION IN AGRICULTURE	AGRICULTURAL RESEARCH STAFF IN THE PUBLIC SECTOR		PUBLIC AGRICULTURAL EXPENDITURE	
						TOTAL	WITH DOCTORAL DEGREE	SHARE OF TOTAL GOVERNMENT EXPENDITURE	IN RESEARCH AND DEVELOPMENT
	% of total land area	millimetres	cubic metres	kg per hectare of arable land	% of total	number	%	%	2005 PPP ^a US\$ millions
	2009	2008	1999–2004	2008	2011	2008	2008–2009	2005–2009	2008
Angola	46.8	81.3	15.1	8.3	69.0	..	..	3.6	..
Benin	29.8	103.7	8.8	0.0	43.3	115	47.5	4.6	43.2
Botswana	45.6	32.5	45.5	..	41.9	97	24.3	3.3	37.9
Burkina Faso	43.7	73.9	56.1	3.9	92.0	240	50.4	13.8	38.8
Burundi	83.7	95.6	34.8	2.2	89.1	115	9.6	4.4	19.1
Cameroon	19.8	109.8	46.6	8.6	46.4	..	..	4.5	..
Cape Verde	21.8	62.6	45.7	..	16.5	..	..	..	..
Central African Republic	8.4	108.2	0.3	..	62.3	..	..	2.5	..
Chad	39.2	30.8	23.1	..	64.5	..	..	5.0	..
Comoros	83.3	171.6	8.6	..	69.1	..	..	1.8	..
Congo, Democratic Republic of	9.9	127.7	1.2	0.9	56.7	..	..	1.8	..
Congo, Republic of	30.9	131.8	2.2	1.1	31.2	94	40.9	0.9	9.1
Côte d'Ivoire	63.8	107.9	36.2	18.9	36.9	123	56.8	2.1	85.2
Equatorial Guinea	10.9	161.0	1.9	..	63.8	..	..	..	..
Eritrea	75.2	26.0	127.4	0.0	73.4	122	6.9	..	6.0
Ethiopia	35.0	76.7	75.4	7.7	76.8	1,318	11.9	11.7	137.2
Gabon	19.9	132.9	40.5	14.1	25.2	61	33.3	..	3.2
Gambia	66.5	106.0	15.4	2.6	75.7	38	7.4	7.3	5.0
Ghana	68.1	110.4	34.0	6.4	54.3	537	35.0	9.0	189.1
Guinea	58.0	157.2	163.0	1.5	79.3	229	14.4	14.5	7.2
Guinea-Bissau	58.0	156.3	116.1	..	79.0	..	..	1.2	..
Kenya	48.1	49.3	64.0	33.3	70.1	1,012	34.2	1.9	343.0
Lesotho	77.0	50.3	5.1	..	38.5	..	..	3.5	..
Liberia	27.1	217.0	21.1	..	61.4	..	..	2.3	..
Madagascar	70.2	100.5	931.4	4.3	69.6	212	26.1	4.2	23.8
Malawi	59.1	78.0	72.1	1.7	78.6	..	27.2	13.2	..
Mali	33.7	30.9	522.3	9.0	74.3	313	35.4	12.7	49.3
Mauritania	38.5	10.0	567.6	..	50.1	74	28.5	5.8	12.8
Mauritius	48.3	170.7	398.0	210.1	7.9	158	13.0	3.5	44.2
Mozambique	62.7	64.8	30.2	0.0	80.3	263	9.1	3.9	35.4



COUNTRIES	AGRICULTURAL LAND	AVERAGE MONTHLY PRECIPITATION	ANNUAL AGRICULTURAL WATER WITHDRAWAL PER CAPITA	FERTILIZER CONSUMPTION	ECONOMICALLY ACTIVE POPULATION IN AGRICULTURE	AGRICULTURAL RESEARCH STAFF IN THE PUBLIC SECTOR		PUBLIC AGRICULTURAL EXPENDITURE	
						TOTAL	WITH DOCTORAL DEGREE	SHARE OF TOTAL GOVERNMENT EXPENDITURE	IN RESEARCH AND DEVELOPMENT
	% of total land area	millimetres	cubic metres	kg per hectare of arable land	% of total	number	%	%	2005 PPP ^a US\$ millions
	2009	2008	1999–2004	2008	2011	2008	2008–2009	2005–2009	2008
Namibia	47.1	21.7	112.4	0.3	32.9	70	17.0	8.0	43.2
Niger	34.6	16.2	190.4	0.4	82.6	93	36.5	12.2	12.4
Nigeria	81.8	91.2	44.5	13.3	24.1	2,062	35.2	4.6	807.8
Rwanda	81.1	85.3	12.6	8.3	89.2	104	9.6	3.3	36.2
São Tomé and Príncipe	58.3	..	..	..	56.9	..	..	6.0	..
Senegal	49.4	67.1	206.0	2.4	69.9	141	54.9	13.9	50.9
Seychelles	6.5	..	11.0	29.0	73.2	..	..	0.7	..
Sierra Leone	47.7	210.4	84.5	..	59.5	67	22.1	2.9	11.9
South Africa	81.7	31.3	175.1	49.7	6.2	784	45.6	..	544.6
South Sudan	..	..	..	..	..	..	..	..	..
Swaziland	71.0	45.9	945.6	..	28.1	..	..	3.7	..
Tanzania, United Republic of	40.1	76.5	129.3	5.9	75.4	674	24.7	2.5	154.4
Togo	62.1	113.2	15.0	4.9	52.8	63	37.5	8.0	17.4
Uganda	69.9	95.7	4.7	3.4	74.2	299	39.0	3.2	176.0
Zambia	31.5	92.7	129.4	50.1	62.6	209	16.0	4.0	16.1
Zimbabwe	42.4	51.1	263.2	27.9	55.6	148	14.1	6.0	..
Sub-Saharan Africa	52.6^b	91.5^c	102.4	12.2^d	58.2^c	9,834^e	27.9^c	5.6^c	318.5

Notes:

- a** Purchasing power parity.
b Weighted by total agricultural land area.
c Simple mean.
d Weighted by total arable land area.
e Total sum.

Sources:

Column 1: Calculations based on data from FAO (2012b).
Column 2: Human Development Report Office and calculations based on data from NOAA (2011).

Column 3: Calculations based on data from FAO (2012a) and UNDESA (2011).

Column 4: World Bank 2012b.

Column 5: FAO 2012b.

Columns 6, 7 and 9: IFPRI 2011.

Column 8: Fan, Omilola, and Lambert 2009; ReSAKSS 2011.

TABLE 5 ACCESS TO FOOD

COUNTRIES	POVERTY HEADCOUNT RATIO		POVERTY GAP AT PPP ^a \$1.25 A DAY	INCOME INEQUALITY	FOOD CONSUMPTION EXPENDITURE	ROAD NETWORK DENSITY	PAVED ROAD LENGTH	FOOD PRICE INDEX
	AT PPP ^a \$1.25 A DAY	AT NATIONAL POVERTY LINE						
	% of population		%	Gini index	% of total household expenditure	metres per capita	% of total roads	100 = 2005
	2000–2009	2000–2009	2000–2009	2000–2010	2000–2010	1999–2008	2000–2008	2010
Angola	54.3	..	29.9	58.6	..	3.7	10.4	219.7
Benin	47.3	39.0	15.7	38.6	..	2.6	9.5	127.9
Botswana	..	30.6	..	..	35.4	13.8	32.6	178.3
Burkina Faso	56.5	46.4	20.3	39.6	48.8	6.7	4.2	134.2
Burundi	81.3	66.9	36.4	33.3	..	1.8	10.4	170.1
Cameroon	9.6	39.9	1.2	38.9	..	3.0	8.4	126.4
Cape Verde	21.0	26.6	6.1	50.5	41.0	3.1	69.0	127.1
Central African Republic	62.8	62.0	31.3	56.3	..	6.6	..	127.4
Chad	61.9	55.0	25.6	39.8	68.0	4.0	0.8	..
Comoros	46.1	44.8	20.8	64.3	..	1.6	76.5	109.2
Congo, Democratic Republic of	59.2	71.3	25.3	44.4	70.0	2.8	1.8	309.4
Congo, Republic of	54.1	50.1	22.8	47.3	..	4.7	7.1	98.3
Côte d'Ivoire	23.8	42.7	7.5	41.5	..	4.4	7.9	131.0
Equatorial Guinea	..	..	..	..	..	5.5	..	..
Eritrea	..	..	..	..	..	1.1	21.8	..
Ethiopia	39.0	38.9	9.6	29.8	50.8	0.6	13.7	234.6
Gabon	4.8	32.7	0.9	41.5	..	6.8	10.2	..
Gambia	34.3	58.0	12.1	47.3	..	2.6	19.3	130.8
Ghana	30.0	28.5	10.5	42.8	51.0	2.7	14.9	166.0
Guinea	43.3	53.0	15.0	39.4	..	5.1	9.8	300.2
Guinea-Bissau	48.8	64.7	16.5	35.5	..	2.7	27.9	..
Kenya	19.7	45.9	6.1	47.7	45.8	1.8	14.1	168.7
Lesotho	43.4	56.6	20.8	52.5	44.3	3.0	18.3	161.6
Liberia	83.7	63.8	40.8	38.2	..	3.7	6.2	..
Madagascar	67.8	68.7	26.5	47.2	..	3.2	11.6	152.1
Malawi	73.9	52.4	32.3	39.0	65.5	1.3	45.0	148.2
Mali	51.4	47.4	18.8	39.0	66.5	1.4	19.0	124.1
Mauritania	21.2	46.3	5.7	39.0	..	3.4	26.8	..
Mauritius	..	..	..	..	37.8	1.6	98.0	160.1
Mozambique	59.6	54.7	25.1	45.7	54.5	1.4	20.8	182.6



COUNTRIES	POVERTY HEADCOUNT RATIO			INCOME INEQUALITY	FOOD CONSUMPTION EXPENDITURE	ROAD NETWORK DENSITY	PAVED ROAD LENGTH	FOOD PRICE INDEX
	AT PPP ^a \$1.25 A DAY	AT NATIONAL POVERTY LINE	POVERTY GAP AT PPP ^a \$1.25 A DAY					
	% of population		%					
	2000–2009	2000–2009	2000–2009	2000–2010	2000–2010	1999–2008	2000–2008	2010
Namibia	..	38.0	..	..	24.3	35.1	12.8	159.9
Niger	43.1	59.5	11.9	34.0	29.7	1.3	20.7	129.8
Nigeria	64.4	54.7	29.6	42.9	..	1.4	15.0	164.5
Rwanda	76.8	58.5	40.9	53.1	71.7	1.6	19.0	162.9
São Tomé and Príncipe	29.7	53.8	8.5	50.8	..	2.3	68.1	303.2
Senegal	33.5	50.8	10.8	39.2	54.2	1.3	29.3	121.0
Seychelles	0.3	..	0.1	65.8	32.7	5.9	96.5	207.7
Sierra Leone	53.4	66.4	20.3	42.5	49.3	2.5	8.0	193.1
South Africa	17.4	23.0	3.3	67.4	17.8	8.1	17.3	148.8
South Sudan	..	..	..	..	..	..	..	..
Swaziland	62.9	69.2	29.4	50.7	..	3.3	30.0	166.7
Tanzania, United Republic of	67.9	33.4	28.1	37.6	62.7	2.1	7.4	163.2
Togo	38.7	61.7	11.4	34.4	63.7	2.1	21.0	133.6
Uganda	37.7	24.5	12.1	44.3	45.0	2.7	23.0	165.4
Zambia	..	59.3	..	50.7	64.0	6.5	22.0	151.0
Zimbabwe	..	72.0	..	..	..	7.7	19.0	..
Sub-Saharan Africa	47.5^b	..	20.6^b	..	49.8^c	2.8	23.8^c	166.5^c

Note:**a** Purchasing power parity.**b** Based on regional aggregates from World Bank (2012c).**c** Simple mean.**Sources:****Columns 1–4 and 7:** World Bank 2012b.**Column 5:** FAO Statistics Division 2011.**Column 6:** Calculations based on data from UNDESA (2011) and World Bank (2012b).**Column 8:** Calculations based on data from the International Monetary Fund Africa Department.

TABLE 6 STABILITY OF FOOD SYSTEMS

COUNTRIES	GROSS OFFICIAL DEVELOPMENT ASSISTANCE DISBURSEMENT BY DEVELOPMENT ASSISTANCE COMMITTEE DONORS					FOOD PRICE VOLATILITY					
	DEVELOPMENTAL FOOD AID AND FOOD SECURITY ASSISTANCE	AGRICULTURE	FISHING	POPULATION AFFECTED BY DROUGHT	POPULATION AFFECTED BY FLOODS						
							% of sub-Saharan Africa total	current US\$ millions	current US\$ millions	thousands	thousands
							coefficient of variation ^a				
2009	2009	2009	2005/2011	2005/2011	2008/2010						
Angola	0.54	28.43	2.92	25	517	5.0					
Benin	1.20	44.15	3.62	0	970	4.4					
Botswana	0.01	1.48	..	0	5	3.3					
Burkina Faso	3.74	108.15	0.41	0	393	2.8					
Burundi	3.27	25.49	0.16	2,413	24	4.1					
Cameroon	0.47	16.25	3.39	0	24	1.6					
Cape Verde	0.95	7.36	3.85	0	–	1.8					
Central African Republic	1.66	2.36	..	0	8	3.0					
Chad	2.25	13.79	2.79	2,400	333	5.3					
Comoros	0.52	0.57	..	0	3	1.7					
Congo, Democratic Republic of	5.54	46.97	1.19	0	85	8.6					
Congo, Republic of	0.38	1.73	0.06	0	20	2.4					
Côte d'Ivoire	1.27	63.75	0.12	0	9	3.1					
Equatorial Guinea	0.00	0.12	0.36	..	..	..					
Eritrea	0.60	13.24	0.01	1,700	..	8.7					
Ethiopia	21.32	469.45	1.42	20,006	1,118	7.8					
Gabon	0.00	1.64	2.51	..	..	1.2					
Gambia	0.99	9.94	6.56	0	54	2.2					
Ghana	1.97	174.88	6.49	0	577	4.0					
Guinea	1.78	16.55	5.93	0	114	4.5					
Guinea-Bissau	0.88	6.51	3.02	32	57	4.4					
Kenya	3.66	86.59	0.17	11,055	1,272	3.8					
Lesotho	0.52	1.41	..	475	5	2.3					
Liberia	2.70	17.15	..	0	33	6.2					
Madagascar	3.02	51.64	3.68	734	92	2.2					
Malawi	5.60	66.35	4.08	5,620	294	7.8					
Mali	3.27	139.52	5.20	1,625	95	4.3					
Mauritania	1.78	25.04	6.53	300	80	..					
Mauritius	0.00	0.16	0.79	..	..	2.2					
Mozambique	6.68	97.24	8.45	2,880	529	2.8					

GROSS OFFICIAL DEVELOPMENT ASSISTANCE DISBURSEMENT BY
DEVELOPMENT ASSISTANCE COMMITTEE DONORS

	DEVELOPMENTAL FOOD AID AND FOOD SECURITY ASSISTANCE	AGRICULTURE	FISHING	POPULATION AFFECTED BY DROUGHT	POPULATION AFFECTED BY FLOODS	FOOD PRICE VOLATILITY
	% of sub-Saharan Africa total	current US\$ millions	current US\$ millions	thousands	thousands	coefficient of variation ^a
COUNTRIES	2009	2009	2009	2005/2011	2005/2011	2008/2010
Namibia	0.04	3.24	1.48	0	771	2.3
Niger	4.72	36.36	0.00	10,900	395	4.4
Nigeria	0.08	39.93	0.04	0	1,712	5.0
Rwanda	1.57	49.30	0.04	1,000	19	4.9
São Tomé and Príncipe	0.07	0.77	0.07	..	..	5.7
Senegal	1.80	58.66	3.96	0	445	4.5
Seychelles	0.00	..	9.89	..	..	7.2
Sierra Leone	2.35	13.67	5.45	0	21	5.6
South Africa	0.03	8.85	1.80	0	89	1.9
South Sudan	..	..	..	..	..	..
Swaziland	0.08	16.61	..	410	3	2.7
Tanzania, United Republic of	1.05	181.86	0.78	3,700	68	2.1
Togo	1.40	17.21	0.09	0	286	4.6
Uganda	5.58	120.37	7.87	2,369	537	6.8
Zambia	2.09	43.49	0.01	1,200	2,190	2.5
Zimbabwe	2.61	46.26	..	3,780	18	..
Sub-Saharan Africa	100.0	49.48	2.81	72,623^a	13,264^a	4.1^c

Note:**a** Total sum.**c** Simple mean.**b** Average of the coefficients of variation for three years. The coefficient of variation is the standard deviation divided by the mean of a series.**Sources:****Column 1:** Calculations based on data from World Bank (2012a).**Columns 2 and 3:** World Bank 2012a.**Columns 4 and 5:** Calculations based on data from from CRED (2012).**Column 6:** Calculations based on data from the International Monetary Fund Africa Department (2012).

TABLE 7 SUSTAINABILITY

	POPULATION	TOTAL FERTILITY RATE	ANNUAL FRESHWATER WITHDRAWALS, AGRICULTURE	POPULATION LIVING ON DEGRADED LAND	POPULATION WITH ACCESS TO AN IMPROVED WATER SOURCE	POPULATION WITH ACCESS TO IMPROVED SANITATION FACILITIES	NATURAL RESOURCES DEPLETION (ADJUSTED NET SAVINGS)
	millions	children per woman	% of total freshwater withdrawals	%	%	%	% of GNI
COUNTRIES	2012	2010/2015	1999–2004	2009	2008	2008	2009
Angola	20.2	5.1	32.8	3.3	50	57	29.1
Benin	9.4	5.1	45.4	1.7	75	12	1.2
Botswana	2.1	2.6	41.2	22.0	95	60	2.8
Burkina Faso	17.5	5.8	70.1	73.2	76	11	1.6
Burundi	8.7	4.1	77.1	18.5	72	46	10.6
Cameroon	20.5	4.3	76.1	15.3	74	47	4.8
Cape Verde	0.5	2.3	90.9	..	84	54	0.0
Central African Republic	4.6	4.4	1.5	0.0	67	34	0.0
Chad	11.8	5.7	51.8	45.4	50	9	25.2
Comoros	0.8	4.7	47.0	..	95	36	1.0
Congo, Democratic Republic of	69.6	5.5	17.7	0.1	46	23	10.7
Congo, Republic of	4.2	4.4	8.7	0.1	71	30	50.6
Côte d'Ivoire	20.6	4.2	42.6	1.3	80	23	3.1
Equatorial Guinea	0.7	5.0	5.7	0.0	..	..	66.0
Eritrea	5.6	4.2	94.5	58.8	61	14	0.8
Ethiopia	86.5	3.9	93.6	72.3	38	12	4.5
Gabon	1.6	3.2	38.5	0.0	87	33	29.2
Gambia	1.8	4.7	28.1	18.0	92	67	1.0
Ghana	25.5	4.0	66.4	1.4	82	13	6.9
Guinea	10.5	5.0	84.0	0.9	71	19	6.6
Guinea-Bissau	1.6	4.9	82.3	1.0	61	21	0.0
Kenya	42.7	4.6	79.2	31.0	59	31	1.2
Lesotho	2.2	3.1	20.0	63.6	85	29	1.4
Liberia	4.2	5.0	33.6	0.0	68	17	11.0
Madagascar	21.9	4.5	97.5	0.0	41	11	0.2
Malawi	15.9	6.0	83.6	19.4	80	56	0.9
Mali	16.3	6.1	90.1	59.5	56	36	0.0
Mauritania	3.6	4.4	93.7	23.8	49	26	18.8
Mauritius	1.3	1.6	67.7	..	99	91	0.0
Mozambique	24.5	4.7	73.9	1.9	47	17	3.8



	POPULATION	TOTAL FERTILITY RATE	ANNUAL FRESHWATER WITHDRAWALS, AGRICULTURE	POPULATION LIVING ON DEGRADED LAND	POPULATION WITH ACCESS TO AN IMPROVED WATER SOURCE	POPULATION WITH ACCESS TO IMPROVED SANITATION FACILITIES	NATURAL RESOURCES DEPLETION (ADJUSTED NET SAVINGS)
	millions	children per woman	% of total freshwater withdrawals	%	%	%	% of GNI
COUNTRIES	2012	2010/2015	1999–2004	2009	2008	2008	2009
Namibia	2.4	3.1	71.0	28.5	92	33	0.3
Niger	16.6	6.9	88.0	25.1	48	9	1.2
Nigeria	166.6	5.4	53.4	11.5	58	32	15.0
Rwanda	11.3	5.3	68.0	10.2	65	54	2.4
São Tomé and Príncipe	0.2	3.5	..	..	89	26	1.0
Senegal	13.1	4.6	93.0	16.2	69	51	0.3
Seychelles	0.1	..	6.6	..	..	..	0.0
Sierra Leone	6.1	4.7	71.0	0.0	49	13	2.1
South Africa	50.7	2.4	62.7	17.5	91	77	5.4
South Sudan	..	..	..	..	..	..	..
Swaziland	1.2	3.2	96.6	0.0	69	55	0.1
Tanzania, United Republic of	47.7	5.5	89.4	25.0	54	24	2.5
Togo	6.3	3.9	45.0	5.1	60	12	3.6
Uganda	35.6	5.9	36.4	23.5	67	48	4.7
Zambia	13.9	6.3	75.9	4.6	60	49	11.5
Zimbabwe	13.0	3.1	78.9	29.4	82	44	3.5
Sub-Saharan Africa	842^a	4.5^b	60.7^b	..	60	31	7.7^b

Note:

- a** Total sum.
b Simple mean.

Sources:

Columns 1 and 2: UNDESA 2011.
Column 3: FAO 2012a.

Columns 4–6: United Nations Statistics
 Division 2012.

Column 7: World Bank 2012b.

Definitions of statistical terms

Agricultural land The share of land area that is arable, under permanent crops and under permanent pastures. Arable land is land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or pasture, land under market or kitchen gardens and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with multiyear crops that need not be replanted after each harvest and includes land under flowering shrubs, fruit trees, nut trees and vines, such as cocoa, coffee and rubber, but excludes land under trees grown for wood or timber. Permanent pasture is land used for five or more years for forage, including natural and cultivated crops.

Agricultural research staff in the public sector Total number of full-time equivalent agricultural research staff in the government, higher education and nonprofit sectors.

Agricultural research staff in the public sector with doctoral degree Number of full-time equivalent agricultural research staff with a doctoral degree divided by the total number of full-time equivalent agricultural research staff in the public sector (that is, government, higher education and nonprofit agencies).

Agriculture value added Net output (the sum of all output less intermediate inputs), calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources, used in production for industries classified in International Standard Industrial Classification divisions 1–5, which includes forestry, hunting and fishing as well as cultivation of crops and livestock production.

Anaemia prevalence The proportion of population with a haemoglobin level of less than 110 grams per litre.

Annual agricultural water withdrawal per capita Total water withdrawn for irrigation and livestock production divided by midyear population.

Annual freshwater withdrawals, agriculture Withdrawals for irrigation and livestock production divided by total water withdrawals, which includes water from desalination plants in countries where they are a significant source but excludes evaporation losses from storage basins, multiplied by 100.

Average monthly precipitation Amount of precipitation for a location over a year divided by 12.

Cereal production per capita Amount of crops harvested for dry grain only, including wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat and mixed grains and excluding cereal crops harvested for hay or harvested green for food, feed or silage or for grazing, divided by midyear population.

Cereal production, share of sub-Saharan Africa total Amount of crops harvested for dry grain only, including wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat and mixed grains and excluding cereal crops harvested for hay or harvested green for food, feed or silage or for grazing, divided by total cereal production in sub-Saharan Africa.

Cereal yield Crops harvested for dry grain only, including wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat and mixed grains and excluding cereal crops harvested for hay or harvested green for food, feed or silage or for grazing, divided by total harvested land area.

Depth of hunger (average food deficit of undernourished population) The minimum amount of dietary energy needed to maintain body weight and undertake light activity minus the average amount of dietary energy that undernourished people get from the foods they eat. A value above 300 is considered high.

Economically active population in agriculture The percentage of the economically active population engaged in or seeking work in agriculture, hunting, fishing or forestry.

Expected years of schooling Number of years of schooling that a child of school-entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child's life.

Fertility rate, total The number of children who would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.

Fertilizer consumption The quantity of plant nutrients used per unit of arable land, including nitrogen, potash and phosphate (including ground rock phosphate) and excluding traditional nutrients (animal and plant manures). Data are reported on a calendar year basis (January–December); data for countries that report on a crop year basis have been converted to calendar year basis.

Food aid deliveries Food aid shipments that transfer food commodities from donor to recipient countries on a total grant basis or on highly concessional terms. Processed and blended cereals are converted into their grain equivalent by applying the conversion factors included in the Rule of Procedures under the 1999 Food Aid Convention to facilitate comparisons between deliveries of different commodities.

Food consumption expenditure Monetary value of acquired food, purchased and nonpurchased, including alcoholic and nonalcoholic beverages, as well as food expenses away from home, in bars, restaurants, foodcourts, work canteens, street vendors and the like



divided by the monetary value of acquired goods for consumption, food and nonfood items, consumed by members of household, excluding nonconsumption expenses such as direct taxes, subscriptions and insurance premiums, multiplied by 100.

Food price index A price index covering edible food crops that contain nutrients. Coffee and tea are excluded.

Food price volatility A measure of variation in food prices over time.

Food supply The total amount of food available for human consumption, usually derived from the commodity account.

Gross national income per capita Aggregate income of an economy generated by its production and its ownership of factors of production, less the incomes paid for the use of factors of production owned by the rest of the world, converted to international dollars using purchasing power parity rates, divided by midyear population.

Gross official development assistance disbursement for agriculture by Development Assistance Committee donors Total official development assistance from the Development Assistance Committee of the Organisation for Economic Co-operation and Development for the agricultural sector, including agricultural policy and administrative management, agriculture development, agricultural water land resources, agricultural water resources, agricultural inputs, food crop production, industrial crops and export crops, livestock, agrarian reform, agricultural alternative development, agricultural extension, agricultural education and training, agricultural research, agricultural services, plant and post-harvest protection and pest control, agricultural financial services and agricultural co-operatives.

Gross official development assistance disbursement for developmental food aid and food security assistance by Development Assistance Committee donors Total official development assistance from the Development Assistance Committee of the Organisation for Economic Co-operation and Development for food aid and food security programmes.

Gross official development assistance disbursement for fishing by Development Assistance Committee donors Total official development assistance from the Development Assistance Committee of the Organisation for Economic Co-operation and Development for fishing policy and administrative management, fishery development, fishery education and training, fishery research and fishery services.

Human Development Index A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.

Improved sanitation facilities, population with access to The percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection.

Improved water source, population with access to The percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public stand-pipe, borehole, protected well or spring or rainwater collection. Unimproved sources include vendors, tanker trucks and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 litres a person a day from a source within 1 kilometre of the dwelling.

Infant mortality rate Number of infants dying between birth and exactly age 1, expressed per 1,000 live births.

Income inequality (Gini index) Measure of the deviation of the distribution of income (or consumption) among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.

Iodine deficiency prevalence The proportion of the population with urinary iodine of less than 100 micrograms per litre.

Life expectancy at birth Number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life.

Mean years of schooling Average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level.

Natural resource depletion (adjusted net savings) Monetary expression of energy, mineral and forest depletion expressed as a percentage of total gross national income (GNI).

Net cereal imports Cereal imports minus exports, both measured by volume in kilograms. A negative value indicates that a country is a net exporter of cereals.

Net food production index The net amount of food produced (after deducting for feed and seed), including all edible agricultural products that contain nutrients and excluding coffee and tea, by a country's agricultural sector relative to a base period, calculated as the disposable average output of all food commodities in weight or volume during the period divided by the average for the base period, multiplied by 100.

Paved road length The length of all roads that are surfaced with crushed stone (macadam) and hydrocarbon

binder or bituminized agents with concrete or with cobblestones divided by the length of the total road network, which includes motorways, highways, main or national roads, secondary or regional roads, and other urban and rural roads, multiplied by 100.

Population De facto population in a country, area or region.

Population affected by drought Number of people affected by drought, which is an extended period of deficiency in a region's water supply as a result of below average precipitation that can lead to losses in agriculture, affect inland navigation and hydropower plants, reduce available drinking water and cause famine.

Population affected by floods Number of people affected by floods, which are a significant rise of water level in a stream, lake, reservoir or coastal region.

Population living on degraded land (share of total population)

The percentage of people living on severely and very severely degraded land, which is based on four aspects of ecosystem services: biomass, soil health, water quantity and biodiversity. Severe degradation indicates that biotic functions are largely destroyed and that land is nonreclaimable at the farm level. Very severe degradation indicates that biotic functions are fully destroyed and that land is nonreclaimable for productive use.

Poverty headcount ratio at PPP \$1.25 a day Percentage of the population living on less than \$1.25 a day at 2005 purchasing power parity (PPP) prices.

Poverty headcount ratio at national poverty line Percentage of the population living below the national poverty line. National estimates are based on population-weighted subgroup estimates from household surveys.

Poverty gap at PPP \$1.25 a day The mean shortfall from the poverty line (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line. This measure reflects the depth of poverty as well as its incidence.

Public agricultural expenditure in research and development

Total agricultural research and development expenditures by the government, higher education and nonprofit sectors, including salaries, operating costs, and capital costs.

Public agricultural expenditure as a share of total government expenditure Agricultural expenditure divided by total government expenditure, multiplied by 100.

Road network density Total road network length, including motorways, highways, main or national roads, secondary or regional roads, and other urban and rural roads, divided by midyear population.

Under-five mortality rate Probability per 1,000 live births that a newborn baby will die before reaching age 5, if subject to current age-specific mortality rates.

Under-five stunting Percentage of children under age 5 whose height is two standard deviations or more below the median height-for-age of the reference population.

Under-five underweight Percentage of children under age 5 whose weight is less than two standard deviations below the median weight-for-age of the reference population.

Under-five wasting Percentage of children under age 5 whose weight is two standard deviations or more below the median weight-for-height of the reference population.

Undernourishment prevalence Percentage of the population with an acceptable bodyweight for attained height whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out light physical activity.

Vitamin A deficiency The proportion of the population with a serum retinol level of less than 0.70 micromoles per litre.



TECHNICAL NOTE 1

Measuring food security

Measuring food security presents many challenges.¹ An ideal indicator would capture all aspects of food security: availability, access, use and stability. Data constraints and a lack of an unambiguous way to aggregate all four dimensions make this difficult. In practice, proxy measures are used for each dimension. Five methodologies commonly used for assessing food security have advantages and limitations, as detailed below.

Prevalence of undernourishment based on food balance sheets

The prevalence of undernourishment is the share of the population not meeting minimum dietary energy requirements and is used to monitor national and regional levels and trends in hunger. The Food and Agriculture Organization (FAO) estimates this indicator of hunger using food balance sheet data, a measure of the distribution of access to food and a threshold based on minimum energy requirements reflecting the composition of the population by age and sex. The U.S. Department of Agriculture takes a similar approach but uses a different methodology.

Food balance sheet estimates are derived from assessments of production, net imports and use, but these assessments have limitations. The production of cereals, for example, is estimated differently than the production of roots and tubers; roots and tubers are often kept in the ground as storage crops, making production hard to estimate. Countries where roots and tubers account for a significant proportion of production (such as those in Central Africa and parts of West Africa) cannot be easily compared with countries where cereals are the main crops. Data collection also presents a challenge: household waste varies with income, among other factors, such that energy intake based on food balance sheet calculations tends to be overestimated in industrialized countries and underestimated in developing countries. Finally, prevalence of undernourishment cannot provide disaggregated estimates and real-time monitoring. The FAO is revising this indicator.

Headcount methods based on Household Budget Surveys and Household Income/Expenditure Surveys

Household Budget Surveys and Household Income/Expenditure Surveys are used to derive headcount

measures of food deprivation, an approach that allows monitoring and evaluation at different levels (including within-country and national-level food insecurity) and captures dietary diversity. However, this approach requires large amounts of frequently collected household information to capture short-term changes in food security. This creates limitations for comprehensive and regular assessments of food security. Even when data are collected regularly, there are disadvantages to this method: seasonality is hard to account for, and data may not include food waste or food consumption away from home.

Anthropometric indicators

Anthropometric indicators, such as the percentage of underweight, wasted or stunted children or the body mass index of adults, focus directly on the outcome of food insecurity at the individual level. An obvious advantage is that anthropometric indicators reflect the nutritional status of people—the ultimate goal—because they are inferred from direct measurement. In that respect they are superior to household-level measures that do not reflect intrahousehold differences. Anthropometric measures are also less resource intensive and less prone to measurement error than are measures of household food consumption. Moreover, the efforts made to expand coverage of the Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other surveys provide good coverage for Africa. However, these indicators are influenced by access to healthcare and basic public services in addition to food intake, which makes it difficult to separate overlapping causes of food insecurity.

Self-reported food security assessments

Some surveys look at whether people perceive themselves as hungry or food insecure and include emotional dimensions, such as anxiety about not being able to meet basic food requirements. Some assessment tools are quantitative and part of omnibus-type instruments, such as those conducted by Gallup World Poll or Afrobarometer. Others are more rapid and qualitative. Such tools may also be designed to investigate behavioural changes, such as reducing quantity or quality of food as a coping strategy. Validation research shows that self-reported

indicators are highly correlated with income and consumption expenditure and dietary energy intake. Challenges remain in cross-validating indicators across cultural backgrounds and countries and over time.

Composite indicators

Composite indicators combine multiple indicators into one. One example of composite indicators of hunger is the International Food Policy Research Institute's Global Hunger Index. Composite indicators are usually appreciated for their simplicity. They have also been used to rank countries by performance. However, in designing composite indicators, researchers face

several choices: which indicators to include in the index, what weights to assign each indicator and what method to use to aggregate the indicators and weights into a single number. The decision results in an indicator with different properties and information and does not address the underlying challenges in measuring the subcomponents.

Note

- ¹ This note is based on Barrett (2010), Aurino and Cofiero (forthcoming), Cafiero and Gennari (2011), Committee on Food Security for All as a Sustainability Challenge and National Research Council of the National Academies (2011), Deitchler and others (2011), Kennedy (2002), Sibrian, Naiken, and Mernies (2007), Smith, Alderman, and Aduayom (2006) and Svedberg (2000, 2002).



TECHNICAL NOTE 2

South Sudan: Human Development and Food Security in Africa's Newest Country

South Sudan became Africa's newest country when it gained independence in July 2011. In September of that year it became a member of the United Nations. In the years prior to independence and within the context of the institution-building process set out in the 2002 Comprehensive Peace Agreement, South Sudan has made long strides towards establishing a well-functioning national statistics system. It carried out a population census in 2008 and a household income and expenditure survey in 2009 and released its first national accounts data in 2011. Despite these achievements, the country's statistics are not yet fully available from international harmonized data sources. Therefore, they are not included in the statistical tables. But national data sources make it possible to ascertain a picture of human development and food security in South Sudan.

Human development

South Sudan's gross domestic product per capita is relatively high for African standards, but its gross national income is lower than the average for sub-Saharan Africa (table T2.1). This reflects the country's dependence on oil production, part of the revenue from which is repatriated by foreign companies. According to a national poverty assessment, just over half the population lives in poverty. The country also faces challenges in health and education. The infant mortality rate exceeds 100 deaths per 1,000 live births, and the prevalence of wasting is more than three times the regional average. The country lags behind the rest of sub-Saharan Africa in all health measures except the prevalence of stunting. The net primary school enrolment rate in 2010 was 44%, the fourth lowest in the world. This lack of schooling has led to a literacy rate of about 27%. There is also substantial regional diversity across South Sudanese states (table T2.2).

Food security

Agriculture is an important element of South Sudan's economy and 78% of South Sudanese depend on farming for their livelihood.¹

The principal threats to food security in South Sudan include rainfall variability, difficulties obtaining

TABLE T2.1 HUMAN DEVELOPMENT IN SOUTH SUDAN AND THE REST OF SUB-SAHARAN AFRICA

INDICATOR	SOUTH SUDAN
<i>Income</i>	
GDP per capita (current \$)	1,546
GNI per capita (current \$)	984
Gini index	46
<i>Poverty</i>	
Poverty headcount ratio at national poverty line (% of population)	51
Poverty gap at national poverty line (%)	24
<i>Health and nutrition</i>	
Under-five mortality rate (per 1,000 live births)	135
Infant mortality rate (per 1,000 live births)	102
Malnutrition prevalence, weight for age (% of children under age 5)	34
Malnutrition prevalence, height for age (% of children under age 5)	34
Improved sanitation facilities (% of population with access)	14
Improved water source (% of population with access)	55
<i>Education</i>	
Literacy rate, adult (% of population ages 15 and older)	27
School enrollment, primary (%)	72
School enrollment, secondary (%)	6

Note: Data are for the most recent year available for 2005–2010.

Source: Government of Southern Sudan Ministry of Health and SSCSE 2006; Government of Southern Sudan Ministry of Education, Science and Technology 2010; South Sudan National Bureau of Statistics 2011; SSCSE 2010a,b, n.d.

seeds and fertilizers, weak infrastructure and high transportation costs, trade restrictions between Sudan and South Sudan, high dependence on international trade and food prices, and rising oil prices as well as the threat of conflict.²

Food accounts for 79% of household consumption.³ Malnutrition remains persistently high, with 47% of the population undernourished⁴ and high acute malnutrition⁵ (see table T2.1). Large inequalities

TABLE T2.2 HUMAN DEVELOPMENT BY SOUTH SUDANESE STATE

STATES	MATERNAL MORTALITY RATIO (PER 100,000 LIVE BIRTHS)	INFANT MORTALITY RATE (PER 1,000 LIVE BIRTHS)	SAFE DRINKING WATER (% OF POPULATION WITH ACCESS)	ADULT LITERACY RATE (% AGES 15 AND OLDER)	POVERTY INCIDENCE (%)
Central Equatoria	1,867	107	37	44	43.5
Eastern Equatoria	1,844	83	59	19	49.8
Jonglei	1,861	74	22	16	48.3
Lakes	2,243	90	67	18	48.9
North Bahr el Ghazal	2,182	129	49	21	75.6
Unity State	1,732	64	57	26	68.4
Upper Nile	2,094	82	68	45	43.7
Warrap	2,173	139	61	16	64.2
West Bahr el Ghazal	2,216	97	37	34	43.2
Western Equatoria	2,327	151	35	33	42.1

Source: Government of Southern Sudan Ministry of Health and SSCCSE 2006; Government of Southern Sudan Ministry of Education, Science and Technology 2010; SSCCSE 2010a.

persist: the average daily caloric intake of South Sudan's population is 1,890 kilocalories per person, just above the daily minimum of 1,717.⁶ The spread between states is substantial: lowest in Unity State (1,430 kilocalories per person) and highest in Western Equatoria (2,490).⁷

Notes

- 1 SSCCSE 2010b, p. 4.
- 2 FAO and WFP 2012.
- 3 SSCCSE 2010a, p. 31.
- 4 SSCCSE n.d., p. 97.
- 5 SSCCSE n.d., p. 83–84.
- 6 SSCCSE n.d., p. 97.
- 7 SSCCSE n.d., p. 97.

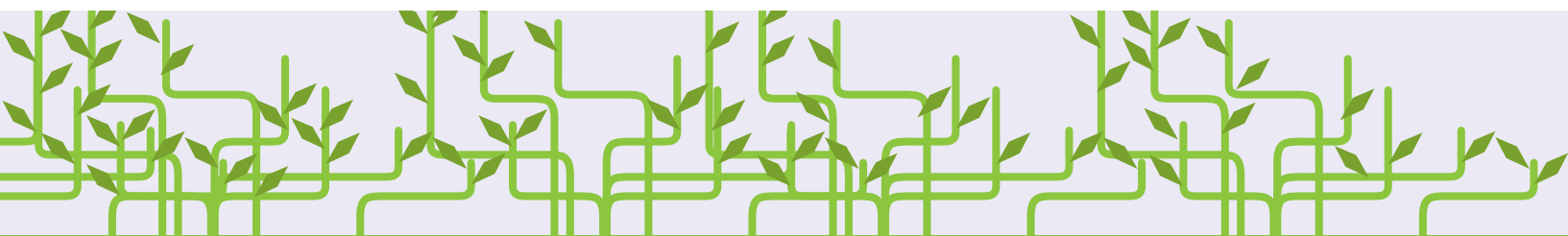


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For too long the face of sub-Saharan Africa has been one of dehumanizing hunger. Food insecurity—the inability to consistently acquire enough calories and nutrients for a healthy and productive life—is pervasive. The spectre of famine, which has virtually disappeared elsewhere in the world, continues to haunt parts of the region.



Yet sub-Saharan Africa has ample agricultural land, plenty of water and a generally favourable climate for growing food. And in the last 10 years many African countries posted world-beating economic growth rates and became among the fastest movers on the Human Development Index. This first *Africa Human Development Report* seeks to understand the deeper causes behind these two jarring paradoxes and explores options for unleashing an era of mutually reinforcing advances in food security and human development.

The chain of food security that runs from food availability through food access to food use is under constant stress in sub-Saharan Africa. Agricultural productivity remains much lower than in other regions. Many countries in the region are net food importers, and some frequently need food aid. Even where food is available, millions cannot afford it or are prevented from buying or trading it. Important as food availability and access are, food security is about still more. Proper use of food determines whether food security sustains human development. Malnutrition leads to illness and death—as insufficient access to safe water, energy and sanitation combine with diseases such as HIV/AIDS and malaria in a lethal mix.

Misguided policies, weak institutions and failing markets are the deeper causes of sub-Saharan Africa's food insecurity. This tainted inheritance is most evident in households and communities where unequal power relations further trap vulnerable groups in a vicious cycle of deprivation, food insecurity and low human development. Moreover, demographic change, environmental pressure and climate change add formidable threats to the region's food security.

The Report argues for action in four interrelated areas. First, boosting agricultural productivity in sustainable ways can improve food availability and economic access by bolstering food production and purchasing power. Second, effective nutrition policies can set the conditions to absorb and use calories and nutrients properly. Third, building resilient communities and households can protect access to food. Fourth, empowering the rural poor and especially women can improve access to food by harnessing the power of information, innovation and markets and more equitably allocating food and resources within families and across communities.

The end of hunger and starvation in sub-Saharan Africa is much overdue.



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