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# AFRICA

## Facing Alternative Futures

### Prospects for and Paths to Food Security in Africa

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**F**ood security in Africa has substantially worsened since 1970. Although the proportion of malnourished individuals in Sub-Saharan Africa has remained in the range of 33–35 percent since around 1970, the absolute number of malnourished people in Africa has increased substantially with population growth, from around 88 million in 1970 to an estimate of over 200 million in 1999–2001.



**Y**et this discouraging trend need not be a blueprint for the future. New research from IFPRI shows that the policy and investment choices of African policymakers and the international development community can make an enormous difference for Africa's future agricultural production and food security. By modeling the results of a number of different policy scenarios in Africa through the year 2025, we show that the number of malnourished children, one important indicator of food security, could rise as high as 41.9 million or fall as low as 9.4 million. These scenarios, therefore, shed light on the effectiveness of various policies and investments in assuring a food-secure future for Africa.

**Table 1—Projected per capita kilocalories available in Africa under three scenarios, by region, 1997, 2015, 2020, and 2025**

Scenario	Year			
	1997	2015	2020	2025
<i>Business as usual</i>				
Sub-Saharan Africa	2,231	2,377	2,444	2,526
West Asia/North Africa	3,059	3,175	3,209	3,238
<i>Pessimistic</i>				
Sub-Saharan Africa	2,231	2,257	2,290	2,333
West Asia/North Africa	3,059	3,078	3,096	3,116
<i>Vision</i>				
Sub-Saharan Africa	2,231	2,926	3,178	3,455
West Asia/North Africa	3,059	3,500	3,622	3,739

## BUSINESS AS USUAL SCENARIO

The *business as usual* scenario assumes a continuation of current trends and existing plans in food policy, management, and investment. Investments by international donors and national governments in the agricultural sector continue to decline through 2025. Sluggish investment, combined with sporadic policy reform, leads to slow progress in meeting the major challenges facing African agriculture, and agricultural production grows only modestly to 2025. Under this scenario African cereal yields grow by an average 1.4 percent per year between 1997 and 2025 (the figure is 1.7 percent for Sub-Saharan Africa only).

Under this scenario, per capita kilocalorie consumption in Sub-Saharan Africa is projected to increase from 2,231 kilocalories per capita per day in 1997 to 2,526 kilocalories in 2025 (see Table 1), lagging behind the rest of the world. Although kilocalorie consumption rises and the percentage of malnourished children under age five falls from 32.8 to 28.2 percent in Sub-Saharan Africa, the absolute number of malnourished children rises from 32.7 million in 1997 to 38.3 million in 2025 (see Figure 1 and Table 2). Sub-Saharan Africa is the only region where the absolute number of malnourished children increases under the *business as usual* scenario. In West Asia/North Africa<sup>1</sup> the number of malnourished children falls from 5.9 million to 3.6 million in 2025 under this scenario.

<sup>1</sup> Unless otherwise noted, West Asia/North Africa (WANA) includes Algeria, Cyprus, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Saudi Arabia, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen.

# PESSIMISTIC SCENARIO

An alternative, *pessimistic* scenario may represent a more plausible future for Africa. The *pessimistic* scenario envisions a future in which trends in agricultural production and nutrition deteriorate by comparison with *business as usual*. African countries experience a decline in both domestic and international investments. Education investments fall, and higher numbers of households lack access to clean water in 2025. HIV/AIDS continues to affect a large proportion of the population in many African countries. Agricultural productivity and yield growth decline compared with *business as usual*, whereas harvested area growth increases at the same slow rate as in *business as usual*. Soil fertility deterioration and

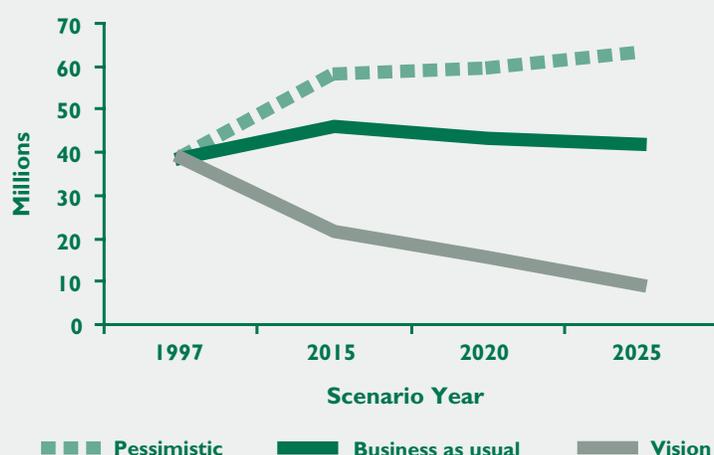
increased erosion affect agricultural land in many African countries, leading to decreased yields. Budget constraints and declining international interest in agriculture result in further declines in public investment in crop breeding for rainfed agriculture in African countries. Declining funding for research leads to diminishing productivity growth in rainfed crop areas, especially in marginal areas.

Malnutrition in Africa proliferates under this scenario. Daily per capita kilocalorie availability in Sub-Saharan Africa increases only slightly under this scenario, from 2,231 kilocalories in 1997 to 2,333 kilocalories in 2025, cutting improvements made under *business as usual* by almost 300 kilocalories. In West Asia/North Africa kilocalorie availability rises from 3,059 to 3,116. The total number of malnourished children under five years old in Sub-Saharan Africa escalates from 32.7 million to 55.1 million in 2025, and in West Asia/North Africa, from 5.9 million to 8.1 million. The share of malnourished children in Sub-Saharan Africa also increases under the *pessimistic* scenario, from 32.8 percent in 1997 to 33.2 percent in 2025.

# VISION SCENARIO

The *vision* scenario attempts to show what type of transformation would be necessary for Africa to battle childhood malnutrition as effectively as the rest of the developing world. This scenario models the interventions necessary to reach the Millennium Development Goal (MDG) target of cutting the proportion of people suffering from hunger in half by 2015.

**FIGURE 1** Projected child malnutrition in Africa under three scenarios, 1997, 2015, 2020, and 2025



**Table 2—Projected child malnutrition in Africa under three scenarios, by region, 1997, 2015, 2020, and 2025 (millions)**

Scenario	Year			
	1997	2015	2020	2025
<i>Business as usual</i>				
Sub-Saharan Africa	32.7	41.3	39.3	38.3
West Asia/North Africa	5.9	4.7	4.1	3.6
<i>Pessimistic</i>				
Sub-Saharan Africa	32.7	49.7	51.2	55.1
West Asia/North Africa	5.9	8.3	8.0	8.1
<i>Vision</i>				
Sub-Saharan Africa	32.7	20.0	15.1	9.4
West Asia/North Africa	5.9	1.7	0.5	0.0

# WATER SCENARIO

In this scenario national governments and international donors increase investments in African countries to help overcome many of the challenges facing agriculture today. Labor productivity increases through greater investments in education and HIV/AIDS prevention and treatment. Improvements are also seen in productivity in rainfed areas, thanks to water-harvesting technologies and extension assistance to farmers.

This scenario calls for an increase in growth of gross domestic product (GDP) from *business as usual* levels of 3.2–4.0 percent per year over the projection period to an annual rate of 6.5 percent for Nigeria and 8 percent for all other African regions. Population growth rises at a lower rate than under *business as usual*. A substantial increase in crop production is required to reach the malnutrition goals for Africa conceived under the *vision* scenario. Crop productivity, as expressed by annual yield growth, would need to increase 50 percent over *business as usual* levels for cereals, roots and tubers, and soybeans.

Additional variables concerning access to clean water and the status and education of women would have to improve drastically to significantly improve malnutrition figures. The rate of female access to secondary schooling would need to reach 90 percent, clean water access would need to reach 95 percent, and the female-to-male life expectancy ratio would need to increase by 2 percent across the region by 2025. These improvements would require tremendous commitment and investment at all levels.

Under this scenario, available kilocalories per capita increase in Sub-Saharan Africa from 2,231 per day in 1997 to 3,455 per day in 2025. The total number of malnourished children in Sub-Saharan Africa is reduced from 32.7 million in 1997 to 9.4 million in 2025. Most notably, the percentage of malnourished children under five years old meets—or comes close to meeting—the proposed MDG target of cutting the percentage of malnourished children in half by 2015 in all African regions.

The obstacles to achieving the results modeled under the *vision* scenario are daunting. This scenario requires a 78 percent increase in projected investments for Africa over *business as usual* levels, for a total of US\$303.2 billion, and for Sub-Saharan Africa alone, it would require a 94 percent increase in projected investments over *business as usual*. Investments in rural roads would need to rise 56 percent above *business as usual* levels; in education, 117 percent; in clean water, 55 percent; in irrigation, 141 percent; and in agricultural research, 44 percent.

Water is a key factor in agricultural productivity, and although Sub-Saharan Africa is not water-scarce, it suffers from a serious lack of investment in water resource development. North Africa is considered to be under very high water stress. Improved water harvesting, however, can result in increased effective rainfall for agricultural use in rainfed areas.

Three scenarios based on a *high increase in effective rainfall use (HIER)* assume that effective rainfall increases evenly over the projection period. Under *HIER-1*, business as usual is combined with a 10 percent increase in effective 2025 rainfall use in all basins and countries over actual base-year rainfall. The overall outcome is a combination of higher production with lower cereal prices—an important improvement. The price of wheat declines by 10 percent relative to *business as usual* in 2025 because of the production benefits of high rainfall harvesting; price effects are similar for rice and maize.

Under *HIER-2*, *business as usual* and a 10 percent increase in effective 2025 rainfall use are combined with low investments in irrigation. Here low investments in irrigation result in cereal price increases, but improved rainfall harvesting partly compensates for this, cutting the price increases by about half.

Can rainfall harvest improvements make a significant difference if they occur only on a limited regional basis? Under *HIER-3*, *business as usual* is combined with a 15 percent increase in effective rainfall use in 2025 in Sub-Saharan African countries only. This scenario causes Africa's cereal import burden to be cut by half, reducing average imports from 17.4 million metric tons per year to 8.7 million metric tons per year in 2021–25.

# REDUCTION IN MARKETING MARGINS SCENARIO

Another way of increasing agricultural productivity is to improve rural infrastructure, marketing, and communications, thus decreasing marketing margins. In the *reduced marketing margins* scenario, we estimate the effects of a 50 percent reduction in the marketing margins in Sub-Saharan Africa and a 40 percent reduction in North Africa. All other parameters are the same as under *business as usual*.

This scenario leads to an increase in cereal production and demand in Africa. In the region as a whole, cereal demand increases 5.7 percent over *business as usual* levels, whereas cereal production increases 8.0 percent. The impact is even stronger for meat commodities, with an increase of 9.3 percent in African meat demand and 9.8 percent in meat production. The proposed reduction in marketing margins reduces the percentage of malnourished children in Sub-Saharan Africa in 2025 to 25.2 percent, compared with the 26.8 percent projected under business as usual. This percentage difference is equivalent to 2.3 million fewer malnourished children under five years old in Sub-Saharan Africa in 2025. In West Asia/North Africa, the percentage falls only slightly, from 4.4 percent under business as usual to 3.8 percent under the *reduced marketing margins* scenario.

## TRADE LIBERALIZATION SCENARIOS

Three scenarios were modeled to assess the effects of different levels of trade liberalization on Africa. First, the *full trade liberalization* scenario completely removes trade barriers in all countries. This scenario could have a significant effect on cereal prices in 2025, with increases projected in the range of 9–32 percent above *business as usual* levels. Meat and milk prices escalate even more sharply.

It is more important to determine, however, the net economic benefits of this scenario. The net economic benefits are defined here as the net benefits to producers plus the net benefits to consumers plus the tax savings due to removals of subsidies under trade liberalization compared with the baseline results in 2025. Under full trade liberalization, the net economic benefits in Africa for IMPACT commodities are projected to total US\$5.4 billion in 2025.

The second scenario, the *Africa trade liberalization* scenario, removes all trade barriers for all African countries while retaining baseline protection levels in all other countries and regions. Under this scenario meat and milk prices increase 2–3 percent above *business as usual* levels, and cereal prices increase 5–8 percent.

Third, the *Africa protectionism* scenario assumes an increase of domestic producer subsidies and consumer taxes (through producer and consumer subsidy equivalents) in all African countries in 2005, and maintenance of those levels from 2005 to 2025. Under this scenario

cereal prices rise between 1 and 3 percent above *business as usual* levels, while meat and milk prices increase between 1 and 4 percent.

## CONCLUSION

Many of the challenges facing Africa's agricultural sector stem from a few root causes, including poor political and economic governance in many African countries, inadequate funding for the agricultural sector, poor water resources management, and neglect of research and development. The strategies for addressing these challenges should take into account local, natural, and human resources, as well as the political and economic agenda of each country. However, the various scenarios assessed here point to common policy priorities for addressing food and nutrition security in Africa.

First, agricultural policies, trade, and tariffs should be reformed. Africa's high export prices limit farmers' access to the international markets. In addition, domestic subsidies, protective tariffs, and other trade barriers imposed by wealthy nations harm farmers in Africa and other poor developing countries.

Second, investments are needed in rural infrastructure, education, and social capital. Significant increases in investment in rural infrastructure would help increase food production and consumption, decrease malnutrition, and increase food security. Increased investments in education are also essential to hasten improvements in food security by enhancing the ability of farmers to adopt more advanced technologies and crop-management techniques. More broadly, education encourages movement into more remunerative nonfarm employment. Investing in social capital by, for example, improving rural associations can provide better support to farmers and, at the same time, become a vehicle for implementing rural development with farmer participation.

Third, management of crops, land, water, and inputs must be improved. Sustainable productivity growth is one of the keys to food security improvements. Thus, agricultural input and crop technologies should focus on land and natural resources conservation, while at the same time increasing agricultural productivity. Agricultural policy must also take into account the importance of secure land tenure in encouraging farmers to make agricultural investments.

Fourth, dramatic increases in investment in agricultural research and extension are needed if any plan for food and nutrition security in Africa is to be successful.

Drastic changes must also take place in the way research and extension are carried out in Africa. There is a need to generate knowledge about fertilizer use and to diffuse that knowledge to the farm population. Expanded research efforts are needed to better understand semi-arid soils.

Finally, greater investment in women is required. Improvements in the status of women can influence food security and nutrition. Women provide 70 to 80 percent of household food production in Sub-Saharan Africa. And while farm plots run by women have been found to have

20–40 percent lower yields than those run by men, it has been shown that when women receive the same levels of education, experience, and farm inputs as men, they can increase the yields of some crops by 22 percent. In addition, raising the level of education among women is essential to household poverty reduction.

Overall, the scenarios modeled in this research show that policy choices and investments made now could substantially improve, or further worsen, the prospects for food security in Africa over the next two decades.

**For further reading:** United Nations Economic Commission for Africa, *Accelerating the pace of development* (Addis Ababa, 2003); M. Rosegrant, S. Paisner, S. Meijer, and J. Witcover, *Global food projections to 2020: Emerging trends and alternative futures*, IFPRI/2020 report (Washington, DC: IFPRI, 2001); NEPAD (New Partnership for Africa's Development), *Comprehensive Africa agriculture development programme* (Rome: FAO, 2002), <[http://www.fao.org/documents/show\\_cdr.asp?url\\_file=//docrep/005/Y683IE/y683Ie00.htm](http://www.fao.org/documents/show_cdr.asp?url_file=//docrep/005/Y683IE/y683Ie00.htm)> (accessed February 2004).

## Modeling the Future: IMPACT and IMPACT–WATER

This brief uses IFPRI's International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) and IMPACT–WATER (for the water scenarios) to consider how several different policy scenarios are likely to affect the supply of, demand for, and trade of crops. This state-of-the-art model, developed at IFPRI in the early 1990s, has been used extensively to project global and regional food supply, demand, and trade and has been continually updated to incorporate more food sectors and geographic regions. The version of IMPACT used in this brief models a competitive world agricultural market for 32 crop and livestock commodities, including all cereals, soybeans, roots and tubers, meats, milk, eggs, oils, oil-cakes/meals, sugar/sweeteners, fruits/vegetables, and fish. It contains 36 country or regional submodels within which supply, demand, and prices for agricultural commodities are determined. The water-food model, IMPACT–WATER, assesses the current situation and plausible future options for irrigation water supply and food security, primarily on a global scale.

Note: This brief is drawn from the larger report by the same authors: *Looking Ahead: Long-Term Prospects for Africa's Agricultural Development and Food Security*, 2020 Vision Discussion Paper 41 (Washington, DC: IFPRI, 2005).

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