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Outlook

GFA-31

August 2020

International Food Security Assessment, 2020–30

Despite sharp income declines in 2020 due to the COVID-19 pandemic, food security outlook improves by 2030 for 76 low- and middle-income countries.

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International Food Security Assessment, 2020–30

Felix Baquedano, Cheryl Christensen, Kayode Ajewole, and Jayson Beckman

Abstract

This report presents results from USDA, Economic Research Service's International Food Security Assessment model, a demand-driven framework that includes information on domestic prices and consumer responsiveness to changes in prices and incomes. Prior to the emergence of COVID-19 pandemic, in the 76 low- and middle-income countries examined in the report, the number of people considered food insecure in 2020 was estimated at almost 761 million people or 19.8 percent of the total population. The shock to gross domestic product (GDP) from COVID-19 is projected to increase the number of food-insecure people by almost 84 million and increase the prevalence of food insecurity by an additional 2.2 percentage points. In 2030, the number of food-insecure people is projected to decline to 456.8 million people, but this is 51 million more people than the pre-COVID-19 estimate. Asia, the most populous region in our study, and Sub-Saharan Africa are the regions projected to be most affected by the increase in food insecurity due to the COVID-19 shock to GDP growth. Given the rapidly evolving situation at a country level and the uncertainty of estimates of economic shocks at the country and global levels from the COVID-19 pandemic, the results presented in this report are more representative of a baseline scenario. The projections do not consider the potential impacts of certain types of events that may occur in the future, such as catastrophic weather, armed conflict, or political and economic instability.

Keywords: Food security, food insecurity, food prices, income, food demand, COVID-19, Coronavirus, calories, nutritional target, Sub-Saharan Africa, North Africa, Asia, Latin America, Caribbean.

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Appreciation is extended to Steven Zahniser and Utpal Vasavada, USDA, Economic Research Service (ERS), and Cynthia Nickerson, formerly with ERS, for their guidance in the drafting of this report. We would also like to thank the reviewers for their feed-back and helpful comments, especially Clara Cohen, from USAID; Sharon Sydow and Shawn Arrita, USDA, Office of the Chief Economist; Micah Rosenblum, Diane de Berbardo, and Steve Neff of USDA, Foreign Agricultural Service; Keith Wiebe of the International Food Policy Research Institute; Mario Zappacosta of the Food and Agriculture Organization of the United Nations; and an anonymous reviewer. Special thanks are extended to Karen Thome, USDA, Foreign Agricultural Service, for her assistance during the modeling process. We also thank Carol Ready for editorial assistance, David Marquardt for map design, and Cynthia A. Ray for layout and cover design.

Preface

This report continues the series of food assessments in developing countries begun in the late 1970s by USDA, Economic Research Service. *Global Food Assessments* (GFAs) were done from 1990 to 1992, hence the GFA series. In 1993, the title was changed to *Food Aid Needs Assessment* to more accurately reflect the contents of the report, which focuses on selected developing countries with recent or ongoing food deficits. In 1997, we widened our analysis beyond the assessment of aggregate food availability to include more aspects of food security. We therefore changed the title to *Food Security Assessment*. Starting with the report published in July 2011, we changed the name to *International Food Security Assessment* to clarify that this is not an assessment of food security in the United States.

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United States Department of Agriculture

A report summary from the Economic Research Service August 2020

International Food Security Assessment, 2020–30

Felix Baquedano, Cheryl Christensen, Kayode Ajewole, and Jayson Beckman

What Is the Issue?

Income, food prices and economic inequality are major factors determining how much access people have to food. Agricultural production and market conditions affect how much food is available. Widespread food availability, rising income levels, and low food prices improve a country's food security, although the breadth of these gains can depend on the distribution of income within a country. Conversely, disruptions to income, prices, or food supply can increase food insecurity, especially for the poor. Understanding how these factors collectively influence food demand provides a measure of progress in assessing food security. This report looks at these factors to assess current-year levels of food security and to project changes in food security over the next decade for 76 low- and middle-income countries in Sub-Saharan and North Africa, and in Latin America and Asia. The report provides information for USDA and its stakeholders to estimate long-term projections of food security in these countries. It also analyzes the impact of an income shock associated with the COVID-19 pandemic on present and future food security.

What Did the Study Find?

Given the rapidly evolving situation at the country level and the uncertainty of estimates of economic shocks from the COVID-19 pandemic at the country and global levels, the results presented in this report are representative of a baseline scenario based on macroeconomic trends up to April 2020, consumption and production data up to January 2020, and price trends over the period 2017–2019. Projections do not consider the potential impacts of future catastrophic weather, armed conflict, or political and economic instability events. For the 76 countries covered by this report:

- The number of food-insecure people in 2020 is estimated at 844.3 million, an increase of 83.5 million (11 percent) due to COVID-19 income shock. This implies that 22 percent of the total population of the 76 focus countries is unable to consume 2,100 calories a day, an average caloric level necessary to sustain a healthy and active lifestyle.
- Most of the increase in people estimated to be food insecure as a result of the COVID-19 pandemic are in Asia (41 million people) and Sub-Saharan Africa (35 million people).

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

- Even with the income impacts from COVID-19, food security is projected to improve in all 76 countries over the next 10 years. By 2030, the share of the population that is food insecure in these countries is projected to fall to 10 percent (456.8 million people), a 46 percent drop from 2020 in the number of food-insecure people. Despite this sharp decline, the 2030 estimate of food insecurity is almost 13 percent higher than the pre-COVID-19 scenario.
- Improvement in food security is driven by income growth, relatively stable prices for major grains over the projection period, and lower population growth, particularly in Asia and in Latin America and the Caribbean.
- Per capita income in the following decade is projected to increase by almost 42 percent on average for the 76 countries, but this is 1.3 percentage points lower than the pre-COVID-19 estimate.
- The food gap, defined as the amount of food needed for all food-insecure people to reach the caloric target of 2,100 kcal/day, indicates the intensity of food insecurity. It can be expressed in calories per capita per day or in grain-equivalent quantities and is used to measure the intensity of food security at the aggregate level. For the 76 countries examined, the total food gap is projected to decline in all four regions from a total of 44.7 million tons in 2020 to 24.3 million tons in 2030.

How Was the Study Conducted?

ERS's demand-oriented International Food Security Assessment (IFSA) model projects food demand and food gaps in 76 low- and middle-income countries through 2030. Food insecurity is evaluated for each country by estimating the share of the population unable to reach a caloric target of 2,100 calories per person per day. The intensity of food insecurity is measured by determining the gap between projected food demand for those falling below the threshold and the caloric target. Food demand is expressed in grain equivalents based on caloric content to allow aggregation across four separate food groups: the major grain consumed in the country, other grains, roots and tubers, and all other food. Average per capita food consumption data are from the Food and Agriculture Organization (FAO) of the United Nations' Food Balance Sheets and FAO's cereal balances. Observed domestic prices are from FAO's Global Information Early Warning System (GIEWS) Food Price Monitoring and Analysis tool. Tariff data are from the World Bank World Integrated Trade Solution (WITS). Incomes, exchange rates, and Consumer Price Indexes (CPI) are from the ERS International Macroeconomic Dataset. World prices are from USDA's Agricultural Projections to 2028. GDP shocks associated with the COVID-19 pandemic are taken from the International Monetary Fund's (IMF) April 2020 estimates.

International Food Security Assessment, 2020–30

Overview

The ERS International Food Security Assessment (IFSA) model[1] projects per capita food demand and compares it with a nutritional target of 2,100 calories[2] per person per day, an average caloric level necessary to sustain a healthy and active lifestyle, to help USDA and its stakeholders estimate long-term projections of food security and nutrition in 76 low- and middle-income countries. Using income projections from the ERS International Macroeconomic Data Set, the International Monetary Fund's World Economic Outlook[3] (WEO) report of April 2020, and international and domestic food prices over the medium term, international food security is estimated for 2020 and projected through 2030 for our selected countries. The current report also incorporates the results of a scenario designed to capture the effect of income shocks, as modeled in the WEO, from the COVID-19 pandemic into our standard analysis, providing projections for both pre- and post-COVID-19 conditions and comparing the difference between them to assess the impact of the pandemic on food security. Given the rapidly evolving situation at the country level and the uncertainty of estimates of economic shocks at the country and global levels from the health crisis, the results presented in this report are representative of a baseline scenario. Projections do not consider the impacts of certain types of potential events in the future, such as catastrophic weather, armed conflict, and political and economic instability.

For the 76 countries covered by this report:

- The number of food-insecure people in 2020 is estimated at 844 million, an increase of 83.5 million (11 percent) due to the COVID-19 income shock. This means that more than one-fifth of a total population of 3.8 billion may not have consistent access to the daily caloric target of 2,100 calories.
- Per capita income in the following decade is projected to increase by almost 42 percent on average for the 76 countries, but this is 1.3 percentage points lower than the pre-COVID-19 estimate.

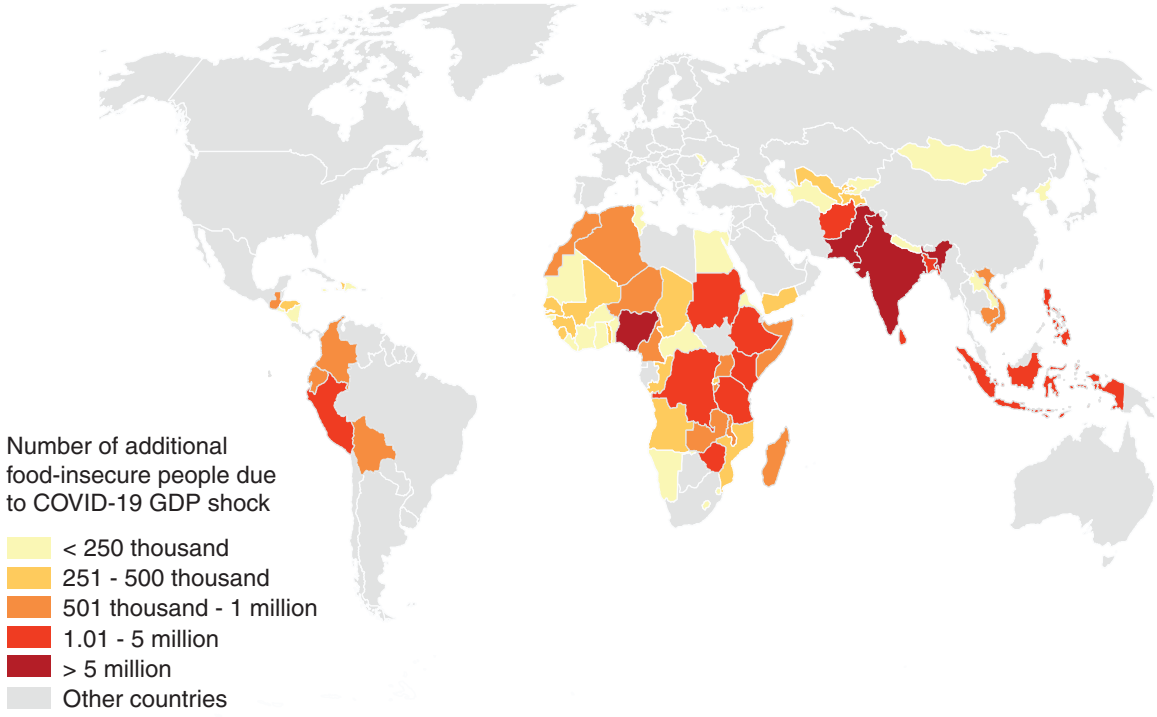
[1]The results from the IFSA model are not directly comparable with other analyses such as FAO's modeling work for its report on the State of Food Insecurity (SOFI), which has a broader country coverage and different methodology. Because the IFSA also uses aggregate data, it cannot be compared directly with evaluations using household-level surveys. It is also difficult to extrapolate our results to FSIN's report on global crises, which uses the 5-phase food insecurity measure—a consensus approach across international organizations and development practitioners directly responding to major crises. For a more in-depth discussion and comparison of USDA's IFSA model with other modeling approaches see Tandon et al. (2017).

[2]The 2,100 kcal/per capita/per day threshold was an internationally agreed-upon level set by United Nations as the recommended level of dietary energy intake for a healthy, well-nourished individual (FAO, 2004).

[3]Before the publication of this report the IMF issued a June 2020 update to their estimates of shocks to GDP growth from COVID-19 in the April issue of the World Economic Outlook report. We were not able to incorporate the IMF's June GDP growth estimates since the results for all of the 76 countries covered in this assessment were not made public. Moreover, the regional country composition used in this assessment differs substantially from that of the IMF assessment, preventing us from using regional averages to modify our own estimates.

- International prices for most major grains are projected to remain relatively stable in real terms. However, local prices may not consistently follow global trends due to fluctuating currencies or poor links between local and international markets.
- By 2030, the share of the population that is food insecure in the 76 countries studied is projected to fall to 10 percent (456.8 million people), a 46 percent drop from 2020. Despite the sharp decline, the 2030 estimate of food insecurity is almost 13 percent higher than the pre-COVID-19 scenario.
- The food gap, defined as the amount of food needed for all food-insecure people to reach the caloric target, indicates the intensity of food insecurity. It can be expressed in calories per capita per day or in grain-equivalent quantities, and is used to measure the intensity of food security at the aggregate level. For the 76 countries examined, the total food gap is projected to decline in each of the four regions, from a total of 44.7 million tons in 2020 to 24.3 million tons in 2030.

Figure 1
COVID-19 shock to income is projected to increase the number of food-insecure people in 76 countries by 83.5 million in 2020



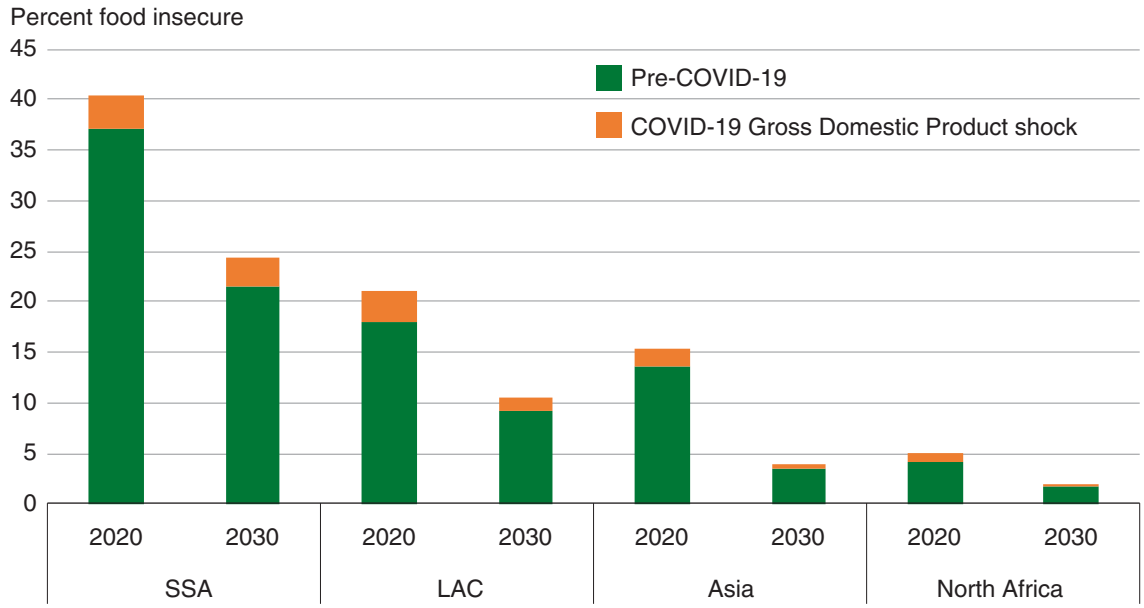
Notes: COVID-19 = Coronavirus disease of 2019; GDP = Gross Domestic Product.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

The 76 countries in this study are divided into four major regions: Sub-Saharan Africa (SSA), Asia, Latin America and the Caribbean (LAC), and North Africa. Estimated levels of food insecurity for 2020 vary greatly across these regions. Most of the additional 83.5 million people who are food insecure as a result of the COVID-19 shock to GDP are in Asia (41 million) and SSA (35 million). Of the four regions, SSA (39 countries) has the highest share and the largest number of food-insecure people: 424.5 million people (40.5 percent of the region's population) are food insecure. Asia (22 countries) has an estimated 373.2 million food-insecure people (15.4 percent of total population). In LAC (11 countries), 36.5 million people (21.1 percent of the population) are food-insecure, while North Africa (four countries) has both the lowest number—9.9 million—and the lowest share (5.1 percent of the population) of food-insecure people.

Even with the income impacts from COVID-19, food security is projected to improve in all 76 countries over the next 10 years. The share of the population that is food insecure is projected to fall to 10 percent (456.8 million) by 2030, a 46 percent drop from the number of food-insecure people in 2020. However, the 2030 estimate of the number of food-insecure people is almost 13 percent (51 million people) higher than the pre-COVID projection. In North Africa, the number of food-insecure people is projected to decrease by more than one-half, with less than 2 percent of the population food insecure in 2030. In the 11 LAC countries included in this study, the share of the population that is food-insecure is projected to decrease by half, falling to 10 percent by 2030. The greatest decline in food insecurity is projected for the 22 Asian countries included in this study, with the share of the population that is food insecure projected to drop by 74 percent to 4 percent, and the number of food-insecure people projected to decline from 373 million to 107 million people. SSA is projected to see the slowest improvement in food security, with the share of food-insecure people falling from 40.5 percent in 2020 to 24.4 percent in 2030. This latter percentage is still more than twice the share in the next most food-insecure region.

Figure 2a
Estimate of the share of the population that is food insecure pre- and post-COVID-19 in International Food Security Assessment regions[1]

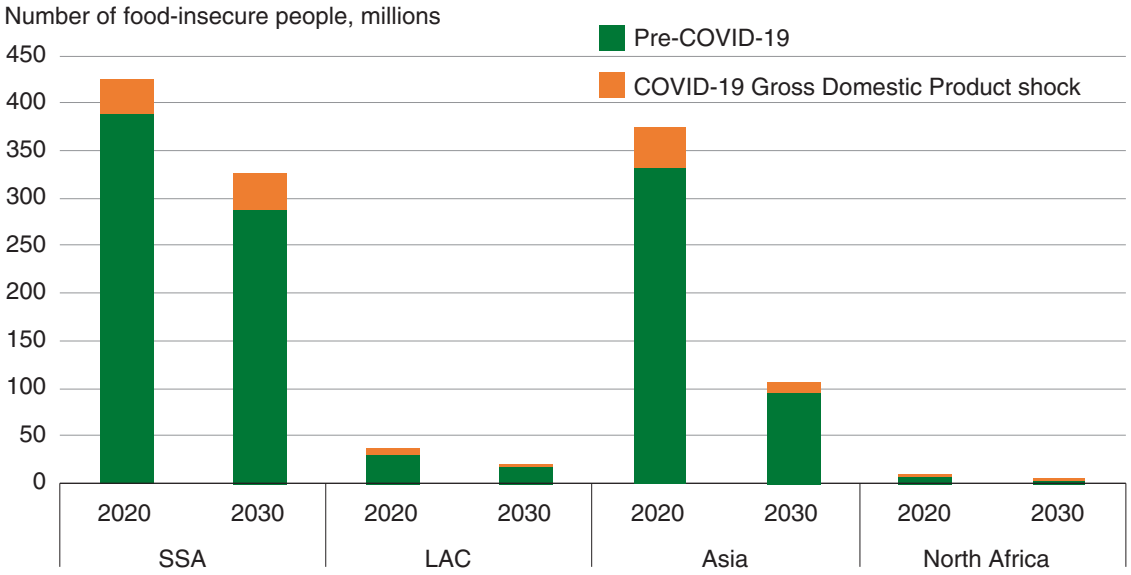


Notes: [1]Regions include only those countries that are a focus of this study. COVID-19 = Coronavirus disease of 2019; SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Figure 2b

Projected decline in the number of food-insecure people in International Food Security Assessment regions[1]

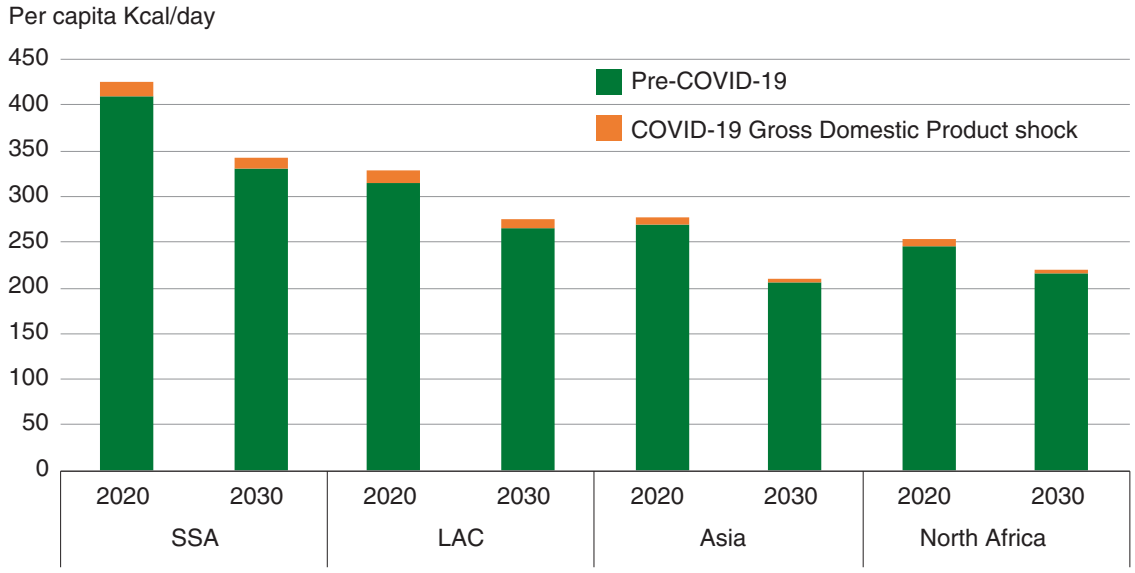


Notes: [1]Regions include only those countries that are a focus of this study. COVID-19 = Coronavirus disease of 2019; SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Figure 2c

Projected changes in the food gap in International Food Security Assessment regions[1]

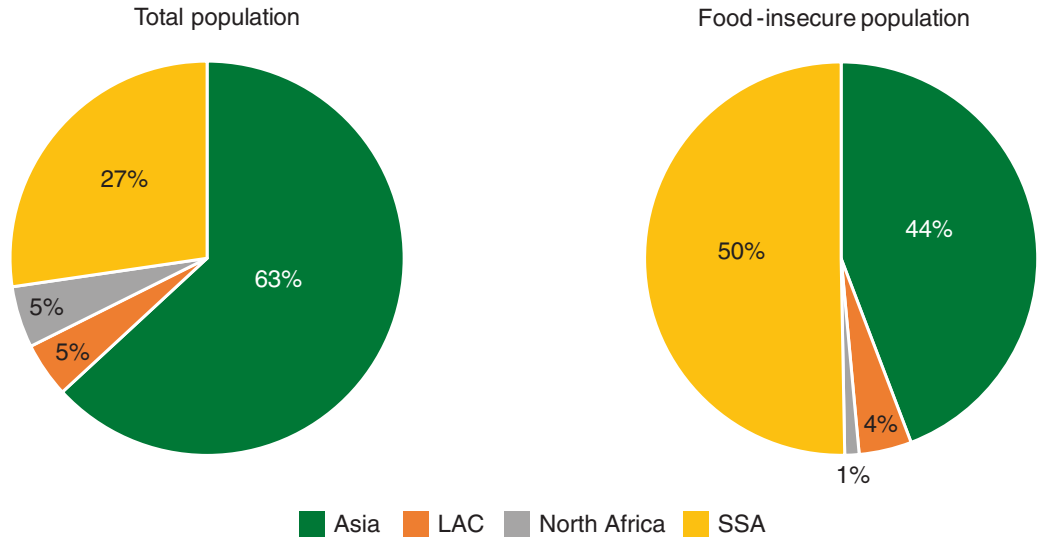


Notes: [1]Regions include only those countries that are a focus of this study. COVID-19 = Coronavirus disease of 2019; SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Figure 3

Sub-Saharan Africa accounts for one-fourth of the population of the 76 countries studied but has half the food-insecure people in 2020



Notes: LAC = Latin America and the Caribbean, SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Table 1

Inflation-adjusted Gross Domestic Product per capita in International Food Security Assessment regions[1], 2020 and 2030

	2020	2030	Change 2020/2030
	US dollars (1,000)		*Percent*
Asia	2.4	3.8	59.4
Change (percent) from pre-COVID-19 estimate	-4.6	-3.4	
Latin America and the Caribbean	5.3	6.7	26.9
Change (percent) from pre-COVID-19 estimate	-5.9	-4.4	
North Africa	3.5	4.2	21.9
Change (percent) from pre-COVID-19 estimate	-5.2	-4.6	
Sub-Saharan Africa	1.2	1.4	16.6
Change (percent) from pre-COVID-19 estimate	-4.8	-5.6	

Notes: [1]Regions include only those countries that are a focus of this study. Value in 2010 U.S. dollars to adjust for inflation. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

With few exceptions, GDP per capita is projected to increase[4] between 2020 and 2030 in most countries examined (table 1). However, reflecting the shock from COVID-19, GDP per capita is lower than originally estimated for both periods. The highest shocks to GDP per capita in 2020 from COVID-19 are in LAC (-5.9 percent) and North Africa (-5.2 percent). But LAC and North Africa have the highest GDP per capita of our four regions. By contrast, SSA has the lowest GDP per capita in 2020 and grows at the slowest rate of all regions. The highest relative increase in GDP per capita from 2020 to 2030 is estimated for Asia, where income is projected to grow by 59 percent in the decade. However, at $ 3,800 per person in 2030, GDP per capita is only the third highest in our sample. By contrast, GDP per capita in LAC is projected to reach $ 6,700 in 2030.

As discussed in USDA's long-term agricultural projections to 2029, international food commodity prices are expected to remain relatively stable in inflation-adjusted terms over the coming decade.[5] This is mainly due to global agricultural production outpacing the growth in demand over the next decade, leading to a continuation of commodity prices at relatively low levels throughout the projection period. The exception is rice, which is expected to increase over the 10-year period. In some markets, world and domestic food prices are integrated through trade. In other cases, barriers to trade can contribute to domestic prices moving independently of world prices. Of the 76 countries covered in this report, 17 are projected to have rising real domestic prices[6] for their major grain between 2020 and 2030. Ten of these countries are in SSA.

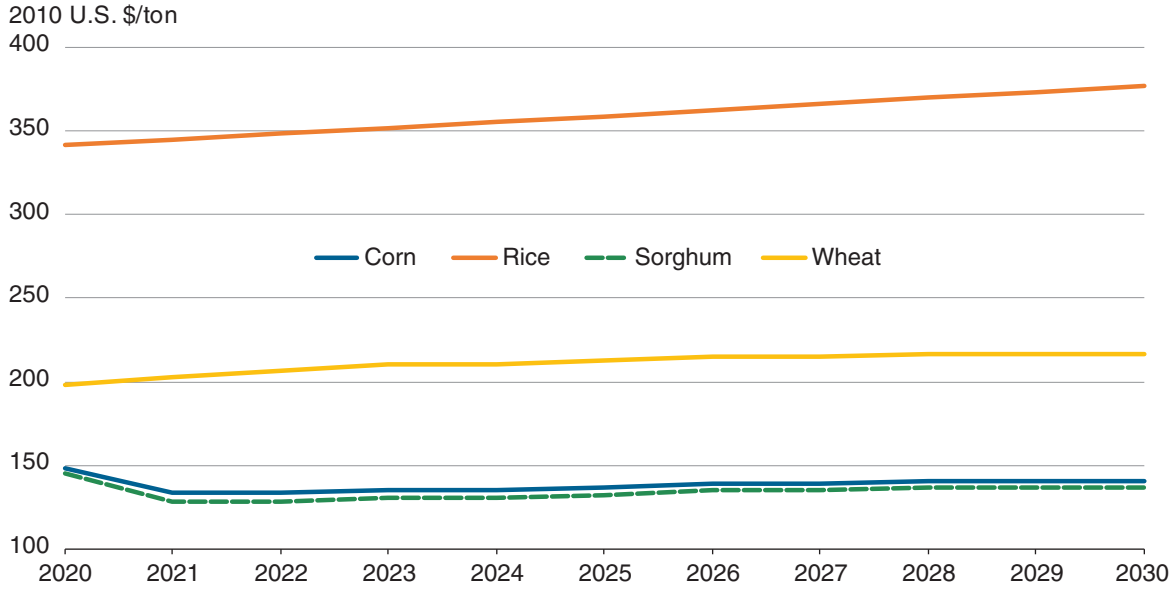
Over the next decade we project grain demand will increase by almost a third in our 76 study countries, and while food grain demand is the largest component of grain demand in all our study regions, we project greater growth for grains for other uses, particularly feed. Feed grain demand (part of "other grain demand" in table 1) is projected to grow faster than food demand as incomes rise and consumers can afford more animal-sourced foods. Total grain demand for 2020 is estimated at 920 million tons, and this is projected to grow to 1.2 billion tons by 2030. However, the 2020 and 2030 estimates for total grain demand are 16 percent lower than the pre-COVID projection, reflecting the impact of the modeled GDP shock. Estimates for other grain demand are most impacted, as they are some 42.5 percent lower on average for 2020 and 2030 than their pre-COVID estimate. Demand for food grains, by contrast, is only marginally impacted, decreasing just over 1 percent from its pre-COVID estimate both in 2020 and 2030.

[4]Macroeconomic projections come from the ERS International Macroeconomic Data Set, which uses data from the World Bank Development Indicators, the International Financial Statistics of the International Monetary Fund, IHS Global Insight, and Oxford Economic Forecasting, as well as estimated and projected values developed by USDA, ERS.

[5]Price projections come from USDA's long-term agricultural projections to 2030, (USDA, Office of the Chief Economist, 2020) and are converted to 2010 prices to adjust for inflation.

[6]Despite discussions of possible general increases in domestic prices for developing countries due to COVID-19, only a relatively small number of countries have experienced high domestic prices between the January and May period of 2020 (Food and Agriculture Organization of the United Nations, 2020). In most cases, price spikes at a local level reflected supply disruption stemming from restrictions on exports from traditional suppliers or movement restrictions due to containment measures applied by countries to minimize the spread of the virus. Other price increases reflected a continued deterioration of macro-economic conditions that predated the COVID-19 shock, such as in parts of Eastern and Southern Africa (Food and Agriculture Organization of the United Nations, 2020).

Figure 4
Inflation-adjusted international prices of major grains, 2020–30



Note: Value in 2010 U.S. dollars to adjust for inflation.

Source: USDA, Office of the Chief Economist; World Agricultural Outlook Board; and Interagency Agricultural Projections Committee, *USDA Agricultural Projections to 2029, Long-term Projections* report to OCE-2020-1.

Over the next decade we project grain demand will increase by almost a third in our 76 study countries, and while food grain demand is the largest component of grain demand in all our study regions, we project greater growth for grains for other uses, particularly feed. Feed grain demand (part of "other grain demand" in table 1) is projected to grow faster than food demand as incomes rise and consumers can afford more animal-sourced foods. Total grain demand for 2020 is estimated at 920 million tons, and this is projected to grow to 1.2 billion tons by 2030. However, the 2020 and 2030 estimates for total grain demand are 16 percent lower than the pre-COVID projection, reflecting the impact of the modeled GDP shock. Estimates for other grain demand are most impacted, as they are some 42.5 percent lower on average for 2020 and 2030 than their pre-COVID estimate. Demand for food grains, by contrast, is only marginally impacted, decreasing just over 1 percent from its pre-COVID estimate both in 2020 and 2030.

Table 2
Food security indicators for 76 low- and middle-income countries, 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	698	222	920	645	275
Change (percent) from pre-COVID-19 estimate	-1.4	-42.0	-15.6	-	-38.2
2030	912	309	1,222	789	433
Change (percent) from pre-COVID-19 estimate	-1.2	-43.1	-16.7	-	-36.2

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service.

Grain production in the 76 countries examined is projected to grow by 22 percent between 2020 and 2030, well above the rate of population growth (15 percent). Projected growth in grain production exceeds population growth in Asia, North Africa and LAC, but in SSA a 28-percent increase in population slightly outpaces a 24-percent increase in production. Production grows fastest in LAC, followed by SSA. In most of the regions studied, production gains are expected to come from improved yields because there is little additional arable land to bring into production, and because low prices discourage area expansion. An exception is SSA, where input use and yields are low, so some area expansion is also expected as more resilient seed varieties and investment in irrigation technology could allow expansion into formerly less suited areas.

The gap between domestic grain production and demand, represented by the implied additional supply required, for the 76 countries in this study is projected to increase by 57 percent between 2020 and 2030, driven primarily by increases in SSA and Asia. Food grain demand drives the gap between production and demand in SSA, while both food and non-food use are significant drivers in Asia.

How Food Security Is Assessed: Method and Definitions (for more detailed information on the model, see Appendix A.)

Food demand is projected for 76 low- and middle-income countries—39 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, and 22 in Asia. Food is divided into four groups: (1) the major grain consumed in the country, (2) other grains, (3) root and tuber crops, and (4) all other food. To allow for aggregation across food groups, the International Food Security Assessment (IFSA) model's projections of food demand are expressed in grain equivalent based on the caloric content of food; this grain equivalent may be expressed in either kilograms or calories. For example, grains have roughly 3.5 calories per gram, and tubers have about 1 calorie per gram. One ton of tubers is therefore equivalent to 0.29 tons of grain.

The IFSA model, as detailed in the appendix, analyzes the gap between projected food demand, which is a function of per capita income and food prices, and a consumption target of 2,100 calories per capita per day. This report uses three indicators of food insecurity. The *food gap* measures the food needed to raise consumption at every income level to the nutritional target. In many countries, per capita consumption in the lower income deciles is much less than per capita consumption for the country. In these countries, the distribution gap provides a measure of the intensity of hunger—the extent to which the food security of already-hungry people deteriorates as a result of income declines or other negative economic conditions. This measure can be expressed on a per capita basis (in calories per day), or as an aggregate measure (the total tons of food needed to fill the gap in a given country).

The second indicator is the ***share*** **of the population that is food insecure**. Food demand is assumed to be met and equal to consumption. We no longer assess consumption by income decile, but instead in a continuous manner across all income levels.

Finally, the ***number*** **of food-insecure people**—those who cannot meet the nutritional target—is based on total population and the population share that consumes less than the nutritional target. Terms commonly used in this report include:

- **Food consumption**—equal to food demand if we assume that the demand is met.
- **Food access**—depends on consumer purchasing power. Food access is estimated based on income level and food prices within each country according to an income-consumption relationship.
- **Food insecurity**—occurs when estimated per capita food consumption for a consumer at a certain income level falls short of the nutritional target of 2,100 calories per person per day.

Modeling the COVID-19 shock to Gross Domestic Product (GDP)

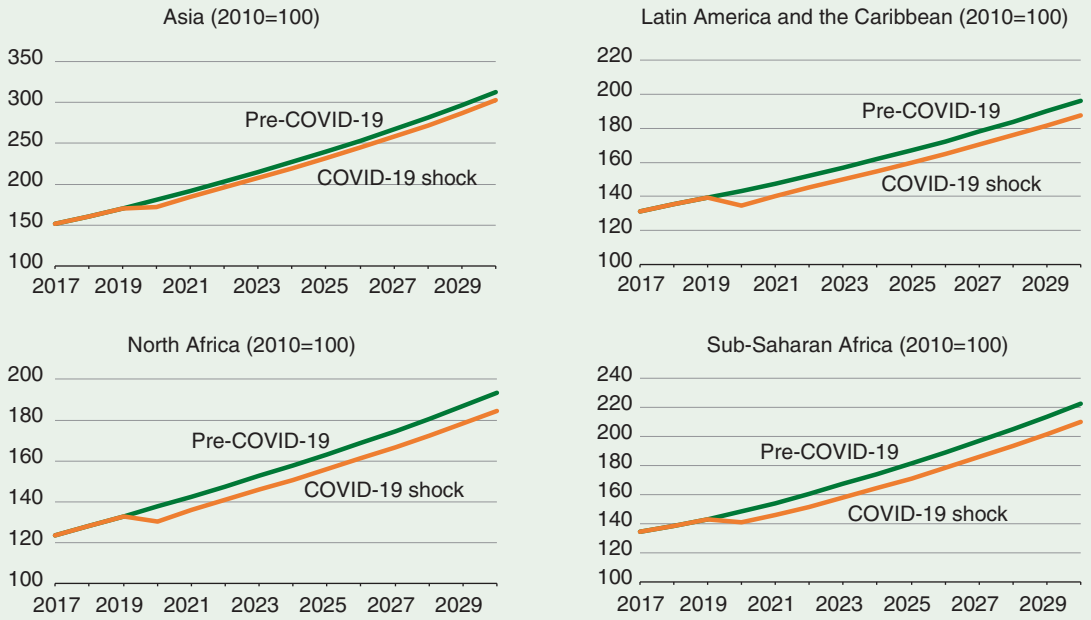
The projected GDP growth in the International Food Security Assessment (IFSA) model, for the period 2020 to 2030, comes from the USDA, Economic Research Service's (ERS) International Macroeconomic Data Set. To model the economic shock from COVID-19, growth rates for individual countries were modified in the model for 2020 and 2021 to reflect the change in real GDP growth as estimated by the International Monetary Fund (IMF) in its April 2020 World Economic Outlook report. The underlying hypothesis used by the IMF for their GDP growth estimates, including the assumed price for oil, interbank interest rates on deposits for major world currencies, and real effective exchange rate changes, were unchanged for the 2020 and 2021 scenarios in the IFSA model.

We also assume that the rate of GDP growth, during the period from 2022 to 2030 will be the same as previously estimated by ERS. The result of our methodological assumption is that GDP growth will begin from a lower base, reducing economic output throughout the 10-year period. This excludes the possibility of a stronger recovery occurring after 2021, which could result in GDP growth returning to its previous growth path, which would reduce the impact on incomes and food insecurity.

Across the 76 countries in the IFSA model, the GDP growth path after the COVID-19 shock is 4 percent lower than the original estimate for the 2022 to 2030 period. However, the gap between the pre- and post-COVID-19 shock to the GDP growth path varies across the four regions in the IFSA model (figure 2). The GDP growth path declines the most after the COVID-19 shock in SSA (-5.7 percent), North Africa (-4.7), and Latin America and the Caribbean (-4.6 percent), and the least in Asia (-3.5 percent).

Box figure 2-1

Inflation-adjusted Gross Domestic Product growth path for the four regions in the international food security assessment model, pre- and post-COVID-19 shock



Notes: Index fitted using values in 2010 U.S. dollars to adjust for inflation. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service using ERS International Macroeconomic Data Set and data from the International Monetary Fund.

Regional Overview

The food security indicators and model projections presented here for 2020 and 2030 are based on historical data and projections from the ERS International Macroeconomic Data Set. The production and consumption data are as of January 2020, so events since then, including droughts and flooding, and any shocks to supply or demand are not reflected in these data or in the analysis that follows. The analysis does incorporate the results of a scenario designed to capture the effect of income shocks from the COVID-19 pandemic in our standard analysis, providing projections for both pre- and post-COVID-19 conditions and comparing the difference between them to assess the impact of the pandemic on food security.

Changes in food security vary across regions. In Sub-Saharan Africa, food security is projected to improve, but slowly, due to rapid population growth and relatively low per capita income growth. Asia, the most populous of the four regions, has fewer food-insecure people than SSA. The 22 countries in Central Asia, East Asia, and Southeast Asia included in this assessment, collectively referred to in this report as Asia, are projected to see the fastest improvements in food security, as the region's largest economies continue to benefit from rapid income growth. The four North African countries assessed are also projected to experience improvements in food security, though levels of food insecurity there are relatively low to begin with. In the 11 countries in the Latin America and Caribbean (LAC) region that are covered by the assessment—5 in Central America, 3 in the Caribbean, and 3 in South America—the share of population that is food insecure is projected to fall by more than half by 2030.

Sub-Saharan Africa

The Sub-Saharan Africa (SSA) region has over 1 billion people. Among the four regions and 39 countries covered by the assessment, SSA has the largest number and the highest share of its population food insecure. Of the nearly 425 million people in SSA who are estimated to be food insecure in 2020 (41 percent of the region's population), 35 million are food insecure due to the shock to GDP from COVID-19 (table 4). The bulk of the increase in the estimate of the number of food-insecure people from the COVID-19 GDP shock is in East Africa (14 million) and West Africa (12.7 million). Notwithstanding the COVID-19 shock, food security is projected to improve by all three measures used in this report, but by 2030, SSA will still account for 71 percent (326 million people) of the estimated food-insecure people in the 76 countries covered by this assessment and will have 24.4 percent of its population food insecure. The SSA region also has the world's fastest-growing population. Thus, the region's projected annual GDP growth of 4 percent translates to average per capita income growth of only 1.6 percent per annum.

Figure 5
Sub-Saharan Africa country coverage in the International Food Security Assessment (IFSA)

Source: ArcWorld Supplement.

West Africa is the largest subregion in SSA in terms of both population and GDP. Notwithstanding increased conflict in the Sahelian countries of West Africa (Burkina Faso, Chad, Mali, Mauritania, Niger and Senegal) and Nigeria, it is the most food-secure region in SSA. Accounting for the effect of COVID-19, the prevalence of food insecurity in 2020 is 27.7 percent—well below the SSA average. A projected decline of 5 percent in GDP due to the COVID-19 shock, is anticipated to increase the number of food-insecure people in 2020 by 12.7 million in the sub-region, for a total of 111 million food-insecure people. West Africa is projected to make improvements in food security over the next decade; by 2030, 12 percent of its population is projected to be food insecure a 56 percent decline from the 2020 estimate. The number of food-insecure people in West Africa is projected to fall almost 46 percent over the next 10 years, to 60 million. Per capita GDP in West Africa is projected to increase 1.5 percent a year over the decade and reach USD 1,955 in 2030, the highest in the subregion (table 3).

In 2020, East Africa has the most food-insecure people (146 million) among SSA subregions; this number is projected to fall to 108 million by 2030, but, due to the COVID-19 shock to GDP, the figure is 18.4 percent higher than originally estimated. The prevalence of food insecurity in the sub-region, as represented by the share of the population that is food insecure, is projected to fall from 39 percent in 2020 to 23 percent in 2030. The improvement in food security mainly reflects a projected increase in GDP per capita of 21 percent over the 10-year period to USD 1,042 in 2030.

Central Africa, the smallest of the subregions, has the slowest reduction in its number of food-insecure people, falling by only 3.5 percent to 86.7 million, this is 5.8 million more people than the pre-COVID-19 estimate. Progress in reducing food insecurity is constrained by conflict and slow economic growth, with some countries also projected not to experience decreases in global food prices. The share of food-insecure people is projected to fall from 71 percent to 55 percent. This lowered share is still the largest projected share of food-insecure people in 2030 for the regions and subregions covered in this report, and Central Africa is projected to remain the poorest in terms of per capita GDP as well.

The food-security situation in Southern Africa is also projected to improve slowly over the next 10 years, with the pace of improvement influenced by the pace of per capita GDP growth. For the next 10 years, the annual per capita growth rate across Southern African countries is projected to be 0.9 percent. This is the slowest per capita GDP growth rate among IFSA regions and subregions. The share of food-insecure people is projected to fall from 52.5 percent to 37.2 percent over the next 10 years, leaving 71.3 million people food insecure in 2030.

SSA's grain production is projected to grow about 2.2 percent per year over the next 10 years through increased productivity and area expansion. This projected rate of production growth is slightly below the projected population growth rate of 2.5 percent, and it is also slower than the increase in both food and feed demand for grains, which customarily increases with rising population and higher incomes that allow people to buy more food. Food grain accounts for most of grain demand for SSA in both 2020 and 2030 and grows faster than feed demand over the projection period, outstripping production growth. This means that SSA's implied additional supply required (IASR) for grain is expected to grow over the next decade, from 23 percent of total grain demand to 33 percent.

Table 3
Inflation-adjusted per capita incomes by Sub-Saharan Africa subregion, 2020 and 2030

Region/subregion	2020	2030
	Dollar (2010 U.S.)	
Sub-Saharan Africa	1,234	1,439
Change (percent) from pre-COVID-19 estimate	-4.8	-5.6
Central Africa	713	877
Change (percent) from pre-COVID-19 estimate	-5.8	-6.5
East Africa	859	1,042
Change (percent) from pre-COVID-19 estimate	-5.2	-7.3
Southern Africa	1,382	1,507
Change (percent) from pre-COVID-19 estimate	-3.9	-4.3
West Africa	1,693	1,955
Change (percent) from pre-COVID-19 estimate	-4.8	-5.0

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, International Macroeconomic Dataset, and data from the International Monetary Fund.

Table 4

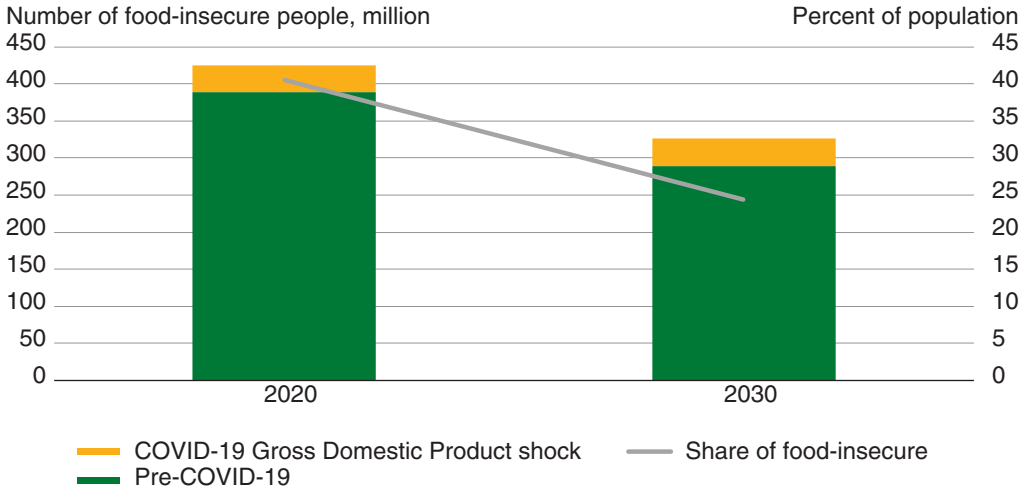
Food security indicators for Sub-Saharan Africa, 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	137	31	168	129	39
Difference from pre-COVID-19 estimate	-3.4	-	-3.4	-	-3.4
2030	202	37	239	160	78
Difference from pre-COVID-19 estimate	-5.4	-	-5.4	-	-5.4

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Sub-Saharan Africa indicators of food insecurity



Sub-Saharan Africa
(1 billion people in 2020)

Sub-Saharan Africa has the highest share and number of food-insecure people, with 425 million food-insecure in 2020 (40.5 percent of the population). The authors project a 23 percent reduction in the number of food-insecure people by 2030.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
Sub-Saharan Africa	**1,048.3**	**1,337.7**	**424.6**	**326.0**	**40.5**	**24.4**	**426**	**342**	**27,243**	**19,187**
Difference from pre-COVID-19 estimate			35.0	37.1	3.3	2.8	16	11	2853	2485
Central Africa	127.5	157.2	89.9	86.7	71	55	543	428	9,405	7,685
Difference from pre-COVID-19 estimate			3.5	5.8	2.8	3.7	23	19	667	829
East Africa	372.2	476.1	146.5	107.7	39	23	486	392	7,790	5,238
Difference from pre-COVID-19 estimate			14.0	16.8	3.8	3.5	20	14	973	867
Southern Africa	147.0	191.7	77.1	71.3	52	37	444	365	4,788	3,965
Difference from pre-COVID-19 estimate			4.7	5.3	3.2	8.5	18	13	437	383
West Africa	401.6	512.6	111.1	60.3	28	12	348	276	5,261	2,299
Difference from pre-COVID-19 estimate			12.7	9.2	6.8	3.9	11	6	775	406

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Central Africa

Central Africa is the most food-insecure subregion in this report. In 2020, after considering the effects of macro shocks from COVID-19, 70.5 percent of the population is estimated to be food insecure. By 2030, 55.2 percent of the population would remain food insecure. An estimated 89.9 million people are food insecure in 2020. A decade later, that number is projected to fall to 86.7 million. The intensity of food insecurity, measured by the per capita calorie gap, is projected to decline from 543 in 2020 to 428 in 2030. Conflict and political instability, which have displaced many people throughout the region, are the greatest obstacles to improving food security in the subregion. The full impact of these displacements is not captured in country-level data used in this analysis.

While the **Republic of the Congo (ROC)** is the second most food-secure country in Central Africa, an estimated 45 percent of its population in 2020 was food insecure before the COVID-19 pandemic, and an estimated 50.7 percent was food insecure after taking into account the COVID-19-related decline in GDP per capita. The ROC continues to recover from years of internal conflict and now has thousands of refugees fleeing conflict in the neighboring countries of the Democratic Republic of the Congo (DRC) and the Central African Republic (CAR), both of which rely heavily on humanitarian assistance. Pre-COVID-19 analysis projected positive growth in GDP per capita for 2020–2030 (0.4 percent), following years of negative growth. However, the COVID-19 macro shock reduced estimated 2020 real per capita GDP by 6.5 percent and 2030 by 7.7 percent. As a result of the 2020 decline in estimated per capita GDP, the share of the population estimated to be food insecure increased by 5.6 percentage points to 50.7 percent. Although progress in reducing food insecurity is made even with the COVID-19 macro shock, the share of the population food insecure in 2030 is about 3.8 percentage points higher—31.6 percent compared with 27.7 percent in the pre-COVID-19 analysis. The intensity of hunger in 2030 is 4.3 percent higher—a shortfall of 309 calories per capita per day compared with 296 in the pre-COVID-19 analysis.

Cameroon is the most food-secure country in Central Africa, with an estimated 15 percent of the population food insecure in 2020 before the COVID-19 pandemic, and 18 percent after considering the COVID-19-related decline in GDP per capita. However, according to an April 2020 USAID report, protracted crises in Nigeria and the CAR, as well as civil unrest and violence in Cameroon's Northwest and Southwest regions, are driving population displacement and exacerbating humanitarian needs in Cameroon. Pre-COVID-19 analysis projected 1.8-percent growth rate for real GDP per capita for 2020–30. However, the COVID-19 macro shock reduced estimated real per capita GDP in 2020 by 5.5 percent and for 2030 by 6 percent. If higher projected income growth had been achieved and low domestic food prices had persisted, less than 5 percent of the population would be food insecure in 2030. With the COVID-19 macro shock, the percentage of those who are food insecure increases to 6.1.

Slightly more than two-thirds of the population of the **Central African Republic (CAR)** in 2020 was estimated to be food insecure before the COVID-19 pandemic, rising to 70 percent taking into account the estimated COVID-19-related decline in per capita GDP for 2020. A persistent, long-standing conflict in the country continues, despite a February 2019 peace agreement which was not effectively implemented (WFP, 2020). The ongoing conflict displaced more than 600,000 people and forced more than 593,000 people to flee as refugees to neighboring countries (USAID, 2019a). Real per capita GDP was projected in pre-COVID-19 analysis to grow by 2.0 percent a year between 2020 and 2030. However, the COVID-19 macro shock reduced estimated real per capita GDP by 3.4 percent for 2020 and 4.7 percent for 2030. Although progress in reducing food insecurity is made

even with the COVID-19 macro shock, the share of the population food insecure in 2030 is 3.6 percentage points higher—36.3 percent compared with 32.7 percent in the pre-COVID-19 analysis. The intensity of hunger in 2030 is 3.9 percent higher— a shortfall of 370.6 calories per capita per day compared with 296 in the pre-COVID-19 analysis.

The **Democratic Republic of the Congo (DRC)** is the most food-insecure country in Central Africa and one of the most food insecure in the world, with an estimated 85 percent of its population food insecure in 2020 before the COVID-19 pandemic and about 87.6 percent taking into account the estimated COVID-19-related decline in per capita income in 2020. Conflict and disease (including a major Ebola outbreak) have contributed to severe food insecurity. DRC has over 5 million displaced people—the greatest number of displaced people in Africa—with many among them severely food insecure (FSIN, 2020). Conflict and internal political tensions have also led to refugees fleeing the DRC for other countries in the region. The impact of these displacements is not fully captured by the analysis in this report. Despite projected improvements, food insecurity in the DRC is projected to persist in 2030. Pre-COVID-19 analysis projected real GDP per capita growth to increase from 2.3 percent in 2014–19 to 3.1 percent for 2020–2030. However, the COVID-19 shock reduced estimated 2020 per capita GDP by 6.5 percent and by 7.7 percent in 2030. While the share of the population that is food insecure in 2030 declines even after factoring in the COVID-19 macro shock, it is about 6 percent higher than in the pre-COVID-19 analysis—73.4 percent compared with 69 percent. The intensity of hunger also declines from a daily per capita calorie gap of almost 971 in 2020 to 799 in 2030, up from 760 in the pre-COVID-19 analysis. Despite this improvement, the DRC's caloric gap in 2030 is the largest of any country included in this analysis.

References

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2019. Country Briefs: Democratic Republic of Congo, September 23.

Food Security Information Network (FSIN). 2020. 2020 Global Report on Food Crises: Joint Analysis for Better Decisions. April.

USAID. 2019a. "Food Assistance Fact Sheet—Central African Republic." December 6.

USAID. 2019b. "Food Assistance Fact Sheet—Democratic Republic of the Congo." September 30.

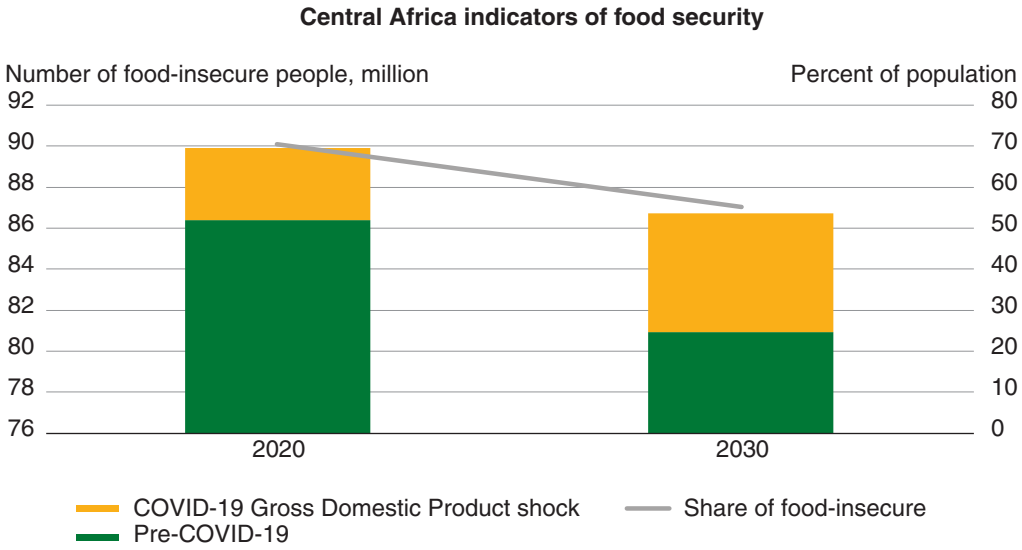
Table 5

Food security indicators for Central Africa (Sub-Saharan Africa), 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	6.5	1.6	8.1	6.5	1.7
Difference from pre-COVID-19 estimate	-0.22	-	-0.22	-	-0.22
2030	9.7	1.8	11.5	7.7	3.8
Difference from pre-COVID-19 estimate	-0.32	-	-0.32	-	-0.32

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.



Central Africa
(128 million people in 2020)

Within Sub-Saharan Africa, Central Africa has the highest share of its population that is food insecure (70.5 percent of the population) and the second highest number of people who are food insecure, at 90 million. The authors project a 3.6 percent reduction in the number of food-insecure people by 2030.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
Central Africa	**127.5**	**157.2**	**89.9**	**86.7**	**70.5**	**55.2**	**543**	**428**	**9,405**	**7,685**
Difference from pre-COVID-19 estimate			3.5	5.8	2.8	3.7	23	19	667	829
Cameroon	27.0	34.4	4.8	2.1	18.0	6.1	291	235	182	64
Difference from pre-COVID-19 estimate			0.8	0.5	3.1	1.4	12.8	9.2	39	17
Central African Republic	6.0	7.3	4.2	2.7	70.6	36.3	533	371	267	117
Difference from pre-COVID-19 estimate			0.2	0.3	2.9	3.6	18.2	13.9	20	16
Congo	5.3	6.7	2.7	2.1	50.7	31.6	377	309	133	85
Difference from pre-COVID-19 estimate			0.3	0.3	5.6	3.8	21.2	12.9	21	13
Congo, DR	89.2	108.9	78.2	79.9	87.6	73.4	971	799	8,823	7,418
Difference from pre-COVID-19 estimate			2.2	4.8	2.5	4.4	38.3	38.4	588	783

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

East Africa

Including the effect of macro shocks associated with COVID-19, the East Africa region is estimated to have 39.4 percent of its population food insecure in 2020. This figure masks dramatic differences across countries. In three countries (Burundi, Chad, and Eritrea), two-thirds or more of the population is food insecure, while in another three countries (Ethiopia, Kenya, and Rwanda), 30 percent or less is food insecure. The subregion is projected to cut its food insecurity share to 22.6 percent by 2030. Stark differences remain between the most and least food-insecure countries, with more than half the population in the three most food-insecure countries (Burundi, Chad, and Eritrea) remaining food insecure, while Ethiopia, Kenya and Rwanda have 10 percent or less of their populations food insecure. The depth of food insecurity, as measured by the per capita calorie gap, also falls from 486 in 2020 to 392 by 2030.

Growth in real per capita GDP is projected to drive improvements in food security in East Africa, even including projected COVID-19 reductions in per capita GDP. Real per capita growth in GDP for the East Africa region is projected to be 2.0 percent between 2020 and 2030. However, four countries have lower GDP per capita growth rates—Burundi (-0.5 percent), Chad (0.8 percent), Somalia (0.2 percent), and Sudan (-0.8 percent). Three other countries have projected growth rates that are much higher than the average for the subregion—Ethiopia (3.2 percent), Kenya (4.0 percent) and Rwanda (3.5 percent).

The region's population growth rate between 2020 and 2030 is projected to be 2.5 percent per annum, down from 3.1 percent during the 2014–19 period but still among the highest in the world. As a result, population growth drives food grain demand, and secondarily non-food grain demand, outstripping regional cereal production growth.

Including the effects of the COVID-19 macro shocks, five East African countries—Burundi, Chad, Eritrea, Somalia, and Sudan—are estimated to have 50 percent or more of their population food insecure in 2020, and are projected to be the most food insecure in the region in 2030.

Burundi is one of East Africa's most food-insecure countries with 76 percent of its population estimated to be food insecure in 2020 before the impact of the COVID-19 pandemic and 81.2 percent after taking into account the estimated COVID-19-related decline in per capita GDP. This small, landlocked country is mostly rural, with limited avenues for economic growth. The country had negative per capita income growth rate over the 2014–19 period, a rate that was projected to continue between 2020 and 2030 (-0.5 percent) in the pre-COVID-19 analysis. The COVID-19 macro shock reduced estimated 2020 GDP per capita by 6.7 percent, and projected 2030 GDP by 4.4 percent. Under the COVID-19 analysis, the share of the population food insecure in 2030 is projected to decline to 75 percent, almost the same percentage as the pre-COVID-19 estimate of food insecurity in 2020. The intensity of food insecurity also declines only marginally, with the daily per capita calorie gap of 597 in 2020 projected to decline by only 50 calories to 547 in 2030.

Somalia had an estimated 46.4 percent of its population food insecure in 2020 before the impact of the COVID-19 pandemic, and 51.1 percent after taking into account the estimated effect of the pandemic on the decline in per capita GDP for 2020. The country had real per capita GDP growth of 0.7 over the 2014–19 period, projected to decline to 0.2 percent for 2020–2030 in the pre-COVID-19 analysis. The COVID-19 macro shock reduced estimated 2020 GDP per capita by 5.3 percent, and projected 2030 per capita GDP by 5.4 percent. Persistent conflict remains a major barrier to improved economic growth and food security. Under the COVID-19 analysis there is a

small reduction in the percent of the population that is food insecure in 2030, but at 48 percent it is almost the same level as the pre-COVID-19 analysis estimate for 2020 food insecurity. The intensity of hunger remains virtually unchanged, with the daily per capita food gap projected to fall by only 11 calories over the next decade (from 492 to 481). The number of food-insecure people is projected to increase from 6.0 million in 2020 to 7.3 million in 2030.

Eritrea is East Africa's most food-insecure country in 2020, with over 90 percent of its population estimated to consume fewer than 2,100 calories/day before the COVID-19 pandemic and over 97 percent estimated food insecure taking into account GDP shocks. The recent implementation of the peace agreement between Ethiopia and Eritrea has improved the security situation in the country but regional conflict continues to impact food security (FSIN, 2020). Pre-COVID-19 analysis projected an annual increase in real per capita income of 1.7 percent for 2020–2030. The COVID-19 macro shock reduced estimated 2020 per capita income by 3.2 percent and 2030 per capita income by 0.1 percent. Even under the COVID-19 analysis food security is projected to improve: 74.1 percent of Eritrea's population is projected to be food insecure in 2030. The intensity of food security is projected to decline by 25 percent as the per capita food gap closes from 838 calories in 2020 to 508 calories in 2030.

In **Sudan**, 44.9 percent of the population was estimated to be food insecure in 2020 before the COVID-19 pandemic, rising to 53.3 when the COVID-19-related GDP shock is considered. Sudan continues to face macroeconomic challenges, including low reserves, shortages of U.S. dollars in its banking system, and increased import demand for food and essential non-food items. As a result, there has been a continuing depreciation of the Sudanese pound and rising inflation (FEWS Sudan Food Security Outlook Update, April 2020). Sudan's real annual per capita GDP growth rate was projected to be negative 0.1 percent between 2020 and 2030, in pre-COVID-19 analysis, improved from negative 1.8 percent during 2014–19. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 9.1 percent and 2030 per capita GDP by 15.4 percent. Food prices, which have risen sharply since 2017, continue to remain high and are projected to increase by 4.0 percent per year over the next decade. Even under the COVID-19 analysis food security is projected to improve, driven mainly by lower population growth, with 33 percent of the population food projected to be food insecure in 2030, about 11 percentage points higher than the pre-COVID-19 projection. The intensity of food insecurity also declines with the per capita food gap declining 453.6 in 2020 to 368.6 in 2030, but the gap is 13 percent higher than the pre-COVID-19 projection.

Growth in real per capita GDP, even after the COVID-19 macroeconomic shock, combined with projected low international food prices, drives projections for the remaining countries in the East Africa subregion. All these countries reduce their prevalence as well as the intensity of food insecurity.

Ethiopia had 26 percent of its population estimated to be food insecure in 2020 in the pre-COVID-19 analysis, rising to 30 percent after taking into account the COVID-19-related macro-economic shock. Per capita real GDP is projected to decline somewhat from previous levels to a still-strong 3.7 percent annual increase for 2020–2030 in pre-COVID-19 analysis. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 4.6 percent and 2030 per capita GDP by 8.9 percent. Even under the COVID-19 analysis, food security is projected to improve with 10.3 percent of the population projected to be food insecure in 2030, only 3 percentage points higher than the pre-COVID-19 analysis. The intensity of food insecurity also improves, declining from 326 in 2020 to 249 in 2030.

Kenya had an estimated 23 percent of its population food insecure in 2020 in the pre-COVID-19 analysis, rising to 26.3 percent once the COVID-19 macroeconomic shock is incorporated. Pre-COVID-19 analysis projected Kenya to have real annual per capita income growth of 3.9 percent for 2020–2030, the highest in the subregion. However, the COVID-19 macro shock reduced estimated 2020 GDP per capita by 4.5 percent and 2030 GDP per capita by 3.8 percent. Kenya was projected to have 4.1 percent of its people food insecure in 2030 in the pre-COVID-19 analysis, rising only slightly to 5.0 percent after taking the COVID-19 macro shock into account. Kenya is also projected to reduce its per capita food gap to 213 calories per person per day, the lowest in the East African subregion, but 2.4 percent higher than the pre-COVID-19 projection.

Uganda had 35 percent of its population estimated to be food insecure in 2020 in pre-COVID-19 analysis, rising slightly to 37.2 percent when the COVID-19 macroeconomic shock is considered. Pre-COVID-19 analysis projected Uganda's real per capita GDP to grow at 2.7 percent for 2020–2030, up from 1.8 percent during the previous 5 years. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 2.4 percent and projected 2030 real per capita GDP by 5 percent. Even under the COVID-19 analysis food security is projected to improve. The pre-COVID-19 analysis for Uganda projected that in 2030, 18 percent of the country's population would be food insecure. Taking into account the COVID-19 macro shock, that percentage rises slightly to 20.8. Uganda is also projected to reduce the intensity of food insecurity as the per capita food gap declines by 17 percent. However, Uganda still has emergency food security needs due to many refugees in the country, many of whom are from South Sudan or the DRC.

In **Rwanda** 26 percent of the population was estimated to be food insecure in 2020 in pre-COVID-19 analysis. This estimate rose by 2.4 percentage points to 28.7 percent after taking into account the COVID-19 macro shock. Pre-COVID-19 analysis projected Rwanda to have annual real per capita GDP growth of 3.5 percent between 2020 and 2030, down from 4.5 percent between 2014 and 2019. The COVID-19 macro shock reduced estimated 2020 GDP per capita by 3.1 percent and 2030 by 2.9 percent. Even under COVID-19, food security in Rwanda is projected to improve. The share of the population food insecure in 2030 is projected to decline to 8.1 percent, less than one percentage point higher than the pre-COVID-19 projection. The per capita calorie gap is projected to decline to 270 in 2030, only 1.9 percent higher than in the pre-COVID-19 analysis.

About 34 percent of **Tanzania's** population was estimated to be food insecure in 2020 in pre-COVID-19 analysis, rising to 36 percent once the COVID-19 macro shock is incorporated. Pre-COVID-19 analysis projected Tanzania's annual per capita GDP growth rate to decline from 3.3 percent during 2014–19 to 1.9 percent during 2020–30. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 3.7 percent and the 2030 estimate by 4.9 percent. Food security is projected to improve even under the COVID-19 analysis. By 2030, the share of the population that is food insecure is projected to decline to 25.8 percent, about 11.8 percent lower than in the pre-COVID-19 analysis. Tanzania's 2030 per capita calorie gap is projected to decline to 416.8, about 3 percent higher than the pre-COVID-19 projection.

References

Famine Early Warning Network (FEWS NET), 2000. Sudan Food Security Outlook Update, April 2020.

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2020. Country Briefs: April 22.

Food Security Information Network (FSIN). 2020. 2020 Global Report on Food Crises: Joint Analysis for Better Decisions, April.

U.S. Agency for International Development. 2020. Food Assistance Fact Sheet–Chad. April 13.

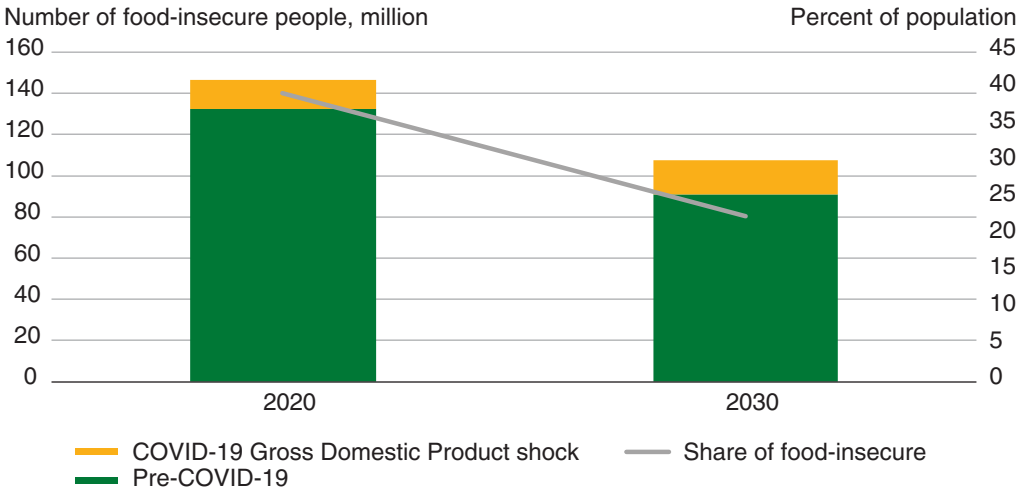
Table 6
Food security indicators for East Africa (Sub-Saharan Africa), 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	6.5	1.6	8.1	6.5	1.7
Difference from pre-COVID-19 estimate	-0.22	-	-0.22	-	-0.22
2030	9.7	1.8	11.5	7.7	3.8
Difference from pre-COVID-19 estimate	-0.32	-	-0.32	-	-0.32

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

East Africa indicators of food security



East Africa
(372 million people in 2020)

In East Africa, the share of the population that is food insecure varies significantly across its 10 countries. For example, Burundi, Chad, and Eritrea have more than 65 percent of their populations living in food insecurity. By contrast, 26 percent of Kenya's population lives in food insecurity. Regionally, the number of food-insecure people is anticipated to decline by 25 percent in 2030 to 108 million people.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
East Africa	**372.2**	**476.1**	**146.5**	**107.7**	**39.4**	**22.6**	**486**	**392**	**7,790**	**5,238**
Difference from pre-COVID-19 estimate			14.0	16.8	3.8	3.5	20	14	973	867
Burundi	12.6	17.2	10.3	12.9	81.2	75.0	597	547	712	824
Difference from pre-COVID-19 estimate			0.7	0.7	5.4	3.8	45	26	97	78
Chad	16.9	22.8	11.3	11.7	66.9	51.2	608	517	876	770
Difference from pre-COVID-19 estimate			0.4	-0.02	2.3	-0.07	15	-0.4	52	-1.6
Eritrea	6.1	6.8	5.9	5.1	97.3	74.1	839	508	617	320
Difference from pre-COVID-19 estimate			0.03	-0.01	0.5	-0.08	23	-0.6	20	-0.7
Ethiopia	114.6	149.1	34.7	15.4	30.3	10.3	326	249	1,244	423
Difference from pre-COVID-19 estimate			4.27	4.59	3.7	3.1	13	15	198	144
Kenya	49.9	56.6	13.1	2.8	26.3	5.0	302	213	490	74
Difference from pre-COVID-19 estimate			1.68	0.42	3.4	0.7	12	5	80	12

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
Rwanda	12.7	15.0	3.6	1.2	28.7	8.1	362	270	162	40
Difference from pre-COVID-19 estimate			0.30	0.13	2.4	0.9	9	5	17	5
Somalia	11.8	15.0	6.0	7.3	51.1	48.8	492	481	339	405
Difference from pre-COVID-19 estimate			0.56	0.72	4.7	4.8	23	22	46	56
Sudan	45.6	59.0	24.3	19.5	53.3	33.0	454	369	1,297	845
Difference from pre-COVID-19 estimate			3.82	6.55	8.4	11.1	37	44	293	351
Tanzania	58.6	76.1	21.1	19.6	36.0	25.8	465	417	1,221	1,018
Difference from pre-COVID-19 estimate			1.41	2.00	2.4	2.6	11	12	109	131
Uganda	43.5	58.5	16.2	12.2	37.2	20.8	418	348	830	519
Difference from pre-COVID-19 estimate			0.87	1.72	2.0	2.9	9	13	61	90

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Southern Africa

Including the effects of COVID-19 macro shocks, the Southern African subregion is the second most food insecure subregion in SSA, with over half of its population estimated to be food insecure in 2020. Weather-related shocks, macroeconomic weakness, domestic strife, and, in some countries, rising local food prices, have combined to diminish food security conditions in the sub-region. Nevertheless, the share of the sub-region's population that is food insecure is projected to decline to 37.2 percent by 2030, and the daily per capita calorie gap is projected to fall from 444 in 2020 to 365 in 2030.

Oil accounts for 90 percent of **Angola**'s export earnings and 50 percent of the country's GDP. The country's relatively weak economy is thus sensitive to oil price changes, especially sharp price declines. Angola had negative real per capita GDP growth between 2014 and 2019 (-2.1 percent) and pre-COVID-19 analysis projected continued negative growth between 2020 and 2030, although at a lower level (-0.1 percent). The COVID-19 macro shock reduced estimated 2020 per capita GDP by 2.4 percent and projected 2030 per capita growth by 2 percent. Food security is projected to improve even in the COVID-19 analysis. The share of Angola's population estimated to be food insecure is projected to decline from 60.4 percent in 2020 to 51.1 percent in 2030, about 1.5 percentage points higher than the pre-COVID-19 projections. The intensity of Angola's food insecurity decreases as the per capita calorie gap is projected to decline from 488 in 2020 to 443 in 2030, about 3 percent higher than the pre-COVID-19 projection, leaving Angola with the second largest per capita food gap in the region. FAO data show retail prices of food have been increasing since early 2018, mainly reflecting a sustained depreciation of the national currency. The low cereal harvest in 2019 has been an additional contributing factor to rising prices (GIEWS country brief). Angola is projected to have increasing real local prices over the next decade, at a rate of 0.3 percent per year.

Madagascar was estimated to have 57.2 percent of its population food insecure in 2020 in pre-COVID-19 analysis, rising to 60.2 percent after considering the impact of the COVID-19 macro shock. Pre-COVID-19 analysis projected Madagascar to have real per capita GDP growth of 1.6 percent per year between 2020 and 2030, the same growth rate that the country had during the 2014–19 period. The COVID-19 shock reduced estimated 2020 per capita GDP by 3.7 percent and projected 2030 real GDP by 2.5 percent. Hence, the opportunity for growth in food demand in Madagascar is constrained. Nevertheless, food security is projected to improve even with the COVID-19 impacts. The share of the population that is food insecure is projected to decline to 45 percent by 2030, 4.6 percent higher than in the pre-COVID-19 analysis. The intensity of food insecurity is projected to decrease from a per capita calorie gap of 460 in 2020 to 393 in 2030, about 2 percent higher than in the pre-COVID-19 analysis. Real local food prices are projected to rise slightly (0.1 percent per annum) between 2020 and 2030, about the same level experienced during 2014–19.

Malawi is one of the most food-secure countries in the Southern Africa subregion. It was estimated to have 26.8 percent of its population food insecure in 2020 in pre-COVID-19 analysis, rising to 29.5 percent taking the COVID-19 macro shock into account. After experiencing zero real per capita GDP growth during the 2014–19 period, pre-COVID-19 analysis projected growth of 1.2 percent per year between 2020 and 2030. The COVID-19 macro shock reduced projected 2020 real per capita GDP by 3.8 percent and the 2030 income estimate by 7.6 percent. Food security is projected to improve even with the COVID-19 shock. By 2030, Malawi is projected to be the most food-secure country in the subregion, with only 9.7 percent of its population food insecure. The intensity of food

insecurity also improves, with the per capita calorie gap declining from 365.4 in 2020 to 278.9 in 2030, some 4.8 percent higher than the pre-COVID-19 projection. Between 2020 and 2030, real local prices are also projected to decline by 5 percent per annum. Malawi continues to have high population growth (3.3 percent per year) over the 2020–30 period.

Mozambique was estimated to have 41.2 percent of its population food insecure in 2020 in the pre-COVID-19 analysis, with the share rising to 42.8 percent when the COVID-19 macro shock is incorporated. Pre-COVID-19 analysis projected real per capita GDP growth to increase from 1.3 percent per annum from 2014 to 2019 to 2.3 percent between 2020 and 2030. However, the COVID-19 macro shock reduced estimated 2020 real GDP per capita by 2.2 percent and 2030 by 1.4 percent. The country faced serious damage from two cyclones in 2019, resulting in extensive crop losses that in turn led to sharp increases in local food prices and the need for emergency assistance (FEWS Net price bulletin April 2020; GIEWS country brief April 29). Real local food prices are projected to increase by 0.6 percent per year between 2020 and 2030, reversing a pattern of declining prices from 2014 to 2019. Notwithstanding the COVID-19 shock and the projected price increase, food security is projected to improve over the decade. The share of the population that is food insecure is projected to decline to 25.8 percent in 2030. The intensity of food insecurity, too, is projected to decline as the per capita calorie gap falls from 442.3 in 2020 to 369.9 in 2030.

Zambia was estimated to have 64.1 percent of its population food insecure in 2020 in pre-COVID-19 analysis. Once the COVID-19 macro shock is considered, the prevalence of food security increases by almost 4 percentage points, to 67.9 percent of the population. Pre-COVID-19 analysis projected that Zambia's GDP per capita growth would accelerate from 0.3 percent per annum from 2014–19 to 1.3 percent from 2020–30. The COVID-19 macro shock reduced estimated 2020 real per capita income by 6.5 percent and 2030 by 7.9 percent. In addition, projected increases in local food prices during the 2020–30 period (0.5 percent per year) would reverse declines experienced during the 2014–19 period, limiting reductions in food insecurity. Even taking into account the COVID-19 macro shock, food security is projected to improve over the next decade, although less than originally projected. The percent of the population food insecure in 2030 is projected to decline to 58.5 in 2030; this is 4.8 percentage points higher than in pre-COVID-19 analysis. The number of food-insecure people rises from 11.8 million in 2020 to 13.5 million in 2030, as annual projected population growth of 2.9 percent between 2020 and 2030 causes the aggregate number of food-insecure people to rise. The intensity of hunger, measured by the per capita calorie decreases from 667.5 in 2020 to 604.6 in 2030, about 5 percent higher than in the pre-COVID-19 analysis.

In **Zimbabwe**, following the 2018/19 drought, crop production was well below average and the country is faced with a 2019/20 national cereal deficit estimated at over 800,000 metric tons (MT) and constraints to increased imports, including low foreign currency reserves and a weakening currency. The 2019/20 rainfall season is projected to be below average and characterized by a late start and erratic rainfall. These weather conditions, combined with projected potentially poor access to agricultural inputs, could lead to below-average cropped area. A second consecutive below-average season is expected to result in lower-than-normal livelihood opportunities, household incomes, and 2020 harvest, driving atypically high assistance needs (FEWS NET). Currency turmoil has contributed to large price increases, with FAO data showing that cereal prices in January 2020 were up to 10 times higher than a year earlier (GIEWS country brief Zimbabwe, March 23, 2020).

Zimbabwe was estimated to have 47.9 percent of its population food insecure in 2020 in pre-COVID-19 analysis. This rises to 57.2 percent when accounting for the COVID-19 macro shock. Pre-COVID-19 analysis projected real per capita GDP growth at 3.9 percent per annum for 2020–30. The COVID-19 macro shock reduced estimated 2020 real per capita income by 10.6 percent and 2030 by 15 percent. Food security is projected to improve over the next decade, but the macro shock from the pandemic constrains the improvement. The share of the population that is food insecure is projected to decline to 33.6 percent in 2030—some 10 percentage points higher than the pre-COVID-19 projection. The per capita calorie gap is also projected to decline from 498.4 in 2020 to 392.1, 12.8 percent more than pre-COVID-19 projections. Continued uncertainty about political and economic conditions could, however, further constrain food security improvement.

References

Famine Early Warning Network (FEWS NET). 2020. Zimbabwe Food Security Outlook, October 2019 to April 2020: Poor harvests and increasing economic hardships lead to high humanitarian assistance needs.

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2020. Country Briefs: Angola, April 30.

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2020. Country Briefs: Zimbabwe, March 23.

Table 7

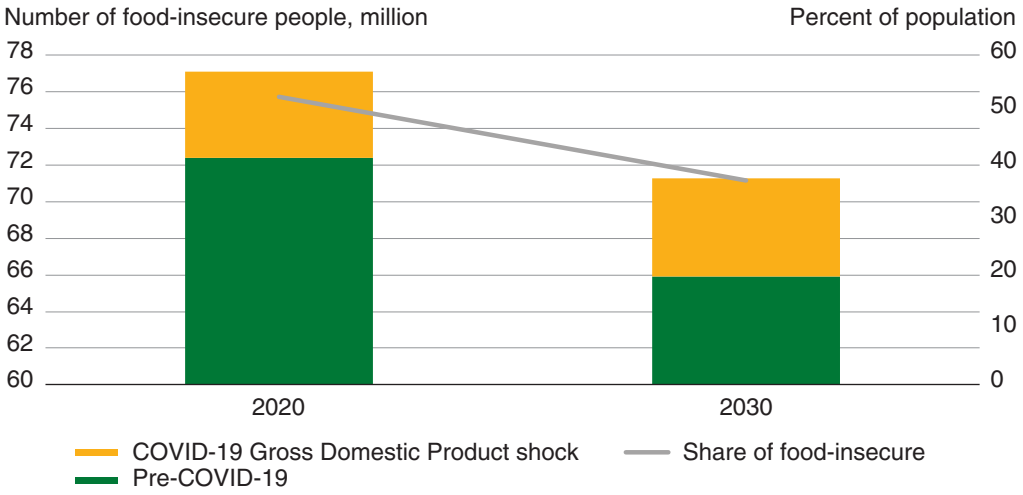
Food security indicators for Southern Africa (Sub-Saharan Africa), 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	20.1	4.2	24.3	14.1	10.1
Difference from pre-COVID-19 estimate	-0.48	-	-0.48	-	-0.48
2030	29.4	5.7	35.1	17.3	17.7
Difference from pre-COVID-19 estimate	-0.77	-	-0.77	-	-0.77

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Southern Africa indicators of food security



Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Southern Africa
(147 million people in 2020)

Southern Africa is the second most food-insecure subregion in Sub-Saharan Africa, with more than half of its population estimated to be food insecure in 2020. A combination of weather-related shocks, macroeconomic weakness, domestic strife, and, in some countries, rising local food prices, have created significant food-security vulnerabilities. Nevertheless, the region is projected to decrease the share of its population food insecure to 37 percent by 2030.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
Southern Africa	**147.0**	**191.7**	**77.1**	**71.3**	**52.5**	**37.2**	**444**	**365**	**4,788**	**3,965**
Difference from pre-COVID-19 estimate			4.7	5.3	3.2	8.5	18	13	437	383
Angola	32.5	45.4	19.6	23.2	60.4	51.1	488	443	1,198	1,284
Difference from pre-COVID-19 estimate			0.6	0.7	1.8	1.5	9	7	58	56
Lesotho	2.0	2.0	1.4	0.7	71.1	33.7	505	339	81	26
Difference from pre-COVID-19 estimate			0.1	0.02	4.8	1.3	28	5	10	1
Madagascar	27.0	33.4	16.2	15.1	60.2	45.0	460	393	1,059	839
Difference from pre-COVID-19 estimate			0.8	0.7	3.1	2.0	15	8	87	53
Malawi	21.2	29.3	6.3	2.8	29.5	9.7	365	279	268	93
Difference from pre-COVID-19 estimate			0.6	0.7	2.8	2.2	11	13	32	25
Mozambique	28.6	36.6	12.2	9.4	42.8	25.8	442	370	713	460
Difference from pre-COVID-19 estimate			0.5	0.3	1.7	0.8	7	3	39	19

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
Namibia	2.6	3.1	0.9	0.5	33.4	15.0	293	233	32	14
Difference from pre-COVID-19 estimate			0.1	0.04	3.9	1.4	12	5	5	1
Swaziland	1.1	1.2	0.3	0.1	22.8	10.7	279	234	8	3
Difference from pre-COVID-19 estimate			0.01	0.01	1.3	0.6	5	2	0.6	0.2
Zambia	17.4	23.1	11.8	13.5	67.9	58.5	667	605	939	973
Difference from pre-COVID-19 estimate			0.7	1.1	3.9	4.8	27	28	89	122
Zimbabwe	14.5	17.6	8.3	5.9	57.2	33.6	498	392	490	274
Difference from pre-COVID-19 estimate			1.4	1.8	9.3	10.4	45	43	116	106

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

West Africa

West Africa has both the largest population (402 million) and the largest total GDP ($714 billion at 2010 prices) of the SSA subregions. However, during the period of 2017–19, critical countries in the subregion—namely the Sahelian countries of Burkina Faso, Mali, and Niger—continued to be affected by violence and insecurity, resulting in population displacements and food insecurity. In 2019, the number of internally displaced people (IDP) reached a combined 500,000 in the three countries (FSIN, 2020). Northern Nigeria, Chad, and Cameroon also were affected by the deterioration of security, both internally and in bordering countries, with IDPs totaling 1.1 million people.

The performance of agriculture in the West Africa subregion was mixed during the baseline period of 2017-19. Cereal production recorded bumper or average crops at a national level, with localized production shortfalls in areas affected by insecurity (FAO, 2020). Episodes of dry weather in 2018 and 2019 reduced the availability of pasture and water, and cross-border restrictions on the movement of animals because of security concerns further compounded challenges related to animal feed access. As a result of reduced access to pasture, livestock production has been severely affected.

Notwithstanding, West Africa is considered the most food-secure region in SSA. Because of its size, Nigeria drives the subregion's food security metrics, and aggregate measures obscure variations across the subregion. Nonetheless, the share of the population that is food insecure in 2020 was estimated at 20.9 percent in the pre-COVID-19 analysis, increasing 6.8 percentage points to 27.7 percent when the shock from the pandemic is incorporated. Per capita GDP growth is projected to grow 1.5 percent a year during the decade, 1.6 percent lower than the pre-COVID-19 estimate. GDP per capita in 2020 and 2030 is also some 5 percent lower in each period than it was in the pre-COVID-19 analysis. Despite the COVID-19 shock, food security improves over the analysis period, with the share of the population considered food insecure declining by more than half to less than 12 percent, but this is 3.9 percentage points higher than originally estimated. The depth of food insecurity, as measured by daily per capita calorie gap, is projected to decline from 348 to less than 276.

Nigeria is the largest economy in the subregion, with the country's GDP in 2020 equal to 70 percent of the subregional economy. Nigeria is highly exposed to world commodity price shocks due to the importance of oil revenues to the economy (FAO et al., 2019). With over 200 million people, Nigeria accounts for 53 percent of the subregion's population. In absolute terms, the country had the highest estimate number of people in the subregion who are food insecure. Almost 66 million people were estimated to be food insecure in 2020 in the pre-COVID-19 analysis, and this figure increases by 9.2 million once the shock from the pandemic is considered. During the period of 2017–19, northeastern Nigeria was affected by insecurity, resulting in the displacement of a large number of people, leading in turn to disrupted trade flows of both crops and livestock, and limited access to food (FAO, 2020 and FSIN, 2020). Per capita GDP during 2014–2019 declined 2 percent a year, and was projected to increase to 1 percent year during the 2020–2030 period. However, the COVID-19 macro shock reduced estimated GDP per capita by 5 percent in 2020 and 6 percent in 2030. Notwithstanding, food security is expected to improve as the share of the population that is food insecure declines by more than half to less than 16 percent. This is almost 3 percentage points higher than the pre-COVID-19 estimate. In absolute terms, in 2030, the country is expected to have 43 million people who are food insecure, the highest number in West Africa. Nigeria's food gap, the number of calories needed to bring all food-insecure people up to a consumption level of 2,100 calories per day, is projected to decline from almost 355 in 2020 to about 282 in 2030.

After Nigeria, **Ghana** and **Côte d'Ivoire** have the second and third largest economies in West Africa, with both economies highly dependent on commodity exports such as cocoa. During the 2017–2019 period, grain production was well above the 5-year average (FAO, 2020). Moreover, per capita GDP growth during the 2014 period was strong in both countries, growing 4 percent a year in Côte d'Ivoire and 3 percent a year in Ghana. The prevalence of food insecurity in 2020, before COVID-19 shock, was below the regional average in both countries. In 2020, pre-COVID-19, the share of the population of Côte d'Ivoire that was food insecure was estimated at 15 percent. The shock from the pandemic is estimated to increase this rate by an additional 4.8 percentage points. In Ghana, the prevalence of food insecurity in 2020, before the GDP shock from COVID-19, was estimated at 25 percent, increasing by 1.8 percentage points when the pandemic is considered. Per capita GDP is projected to grow at a slower rate from 2020 to 2030, and in absolute terms it is estimated to be lower than the pre-COVID-19 estimate in Ghana and marginally higher in Côte d'Ivoire.

By 2030, the prevalence of food insecurity is projected to decline by at least 75 percent in Ghana and Côte d'Ivoire. In Ghana, by 2030 the share of the population considered food insecure is projected to reach 6.8 percent, relatively unchanged from the pre-COVID-19 estimate. In Côte d'Ivoire, the prevalence of food insecurity is estimated at 4.6 percent of the population, 1.1 percentage points higher than the pre-COVID-19 estimate. The daily per capita calorie gap is projected to decline at half the rate of the decline in the prevalence of food insecurity. In Côte d'Ivoire, the daily per capita calorie gap is projected to decline 33 percent, from almost 280 calories in 2020 to 210 calories in 2030. In Ghana, the caloric food gap is estimated to decline some 36 percent, from 314 calories in 2020 to 231 in 2030.

The Sahelian countries of **Burkina Faso**, **Mali**, and **Niger**, have been some of the most affected by insecurity in the West African subregion. During the period of 2017–19, amid instability in the region, the number of internally displaced persons (IDPs) has risen, in 2019 reaching 500,000 people across the three countries (FSIN, 2020). Notwithstanding the increase in violence, the Sahel experienced only localized effects on agricultural output. At a national level, cereal production remained mostly above the 5-year average in all three countries. All three countries are highly susceptible to fluctuations in commodity markets, as cotton and uranium exports are large parts of the economy (FAO et al., 2019). In the pre-COVID-19 analysis, the share of the population that was considered food insecure in 2020 ranged from as low as 12 percent in Mali to 26 percent in Niger; with the prevalence of food insecurity increasing by 1.4 percentage points in the former country and by 3.3 percentage points in the latter once the shock from the pandemic is incorporated. During the 2014–15 period GDP per capita grew at a rate of 1.7 percent a year in Burkina Faso, 2.2 percent in Mali, and 1.7 percent in Niger. GDP per capita is still projected to grow in each of the three countries during the next decade, but the shock to GDP from COVID-19 is projected to lower GDP per capita by 2 percent in Burkina Faso, 3.3 percent in Mali, and 2.1 percent in Niger in 2030 from the pre-pandemic estimate. Nevertheless, food security is projected to improve across all three countries. The prevalence of food insecurity by 2030, as reflected by the share of the population that is food insecure, is projected to decline the most in Niger (-79 percent), followed by Burkina Faso (-58 percent) and Mali (-45 percent). The decline in the daily per capita calorie gap is less steep than the reduction in the prevalence of food insecurity, declining 17 percent in Burkina Faso, 11 percent in Mali, and 29 percent Niger.

Liberia and **Sierra Leone** are the two most impoverished countries in the West Africa subregion. Over the period of 2017–19, economic shocks have affected the trajectory of the national economies and levels of food insecurity. From mid-2018 through 2019, high food-price inflation, driven by a rapid depreciation of the national currencies, reduced economic access to food. During the 2017–19 period, cereal output (particularly rice) in Sierra Leone and Liberia has been volatile, contributing to high food prices (FAO, 2020). The prevalence of food insecurity in 2020 was high before the pre-COVID-19 analysis, reaching 55 percent for Liberia and 32 percent for Sierra Leone. The shock to GDP from the pandemic increased the share of the population that is food insecure in 2020 by an additional 2.7 percentage points in Liberia and by 4.8 percentage points in Sierra Leone. GDP per capita declined during the 2014–19 period in both Liberia (-1.9 percent) and Sierra Leone (-3.2 percent); and even after considering the shock from the pandemic, GDP growth is projected to reverse this trend and grow during the 2020–30 period. But GDP per capita growth does not exceed 2 percent during the decade. Given this context food security is projected to improve, with the share of food insecurity declining 56 percent in Liberia and 38 percent in Sierra Leone. However, more than 22 percent of the population does not consume at least 2,100 calories/day in either country. The depth of food insecurity, as measured by the caloric food gap, also declines by 2030, 28 percent in Liberia and 14 percent in Sierra Leone.

In the **Gambia** and **Guinea-Bissau,** food price inflation, caused by strong depreciation of the local currencies, was a main driver of food insecurity during the 2017–19 period. In the last three years, cereal production in Guinea-Bissau has remained close to the 5-year average but declined in 2019 (FAO, 2020). By contrast, in the Gambia, cereal output remained low and below average for most of the 2017–19 period, despite a recovery in 2019. In the pre-COVID-19 analysis, the share of the population that was food insecure in 2020 reached 18 percent in the Gambia and 25 percent in Guinea-Bissau. The shock to GDP from the pandemic is projected to increase the prevalence of food insecurity in 2020 by an additional 1.3 percentage points in the Gambia and 1.1 percentage points in Guinea-Bissau. During the 2014–19 period, per capita GDP grew at a rate of 3 percent in the Gambia and 2.4 percent in Guinea-Bissau. Reflecting the shock to GDP from COVID-19, growth during the next decade is projected to slow but remain positive, and in absolute terms GDP per capita is projected to be lower than the pre-pandemic estimate. By 2030, food security is projected to improve as the prevalence of food insecurity is projected to fall in both countries. In the Gambia, the share of the population considered food insecure is projected to decline by more than half and reach 7.9 percent in 2030. In Guinea-Bissau, the decline in the prevalence of food insecurity is even stronger, falling by 65 percent in 2030, to less than 5 percent of the population considered food insecure. By 2030, the depth of food insecurity, as reflected by the gap in per capita calories, also improves, but more moderately than the prevalence of food insecurity. Over the decade, the food gap declines by 12 percent in the Gambia and by 17 percent in Guinea-Bissau.

References

Food Security Information Network, 2020. Global report on food crises 2020: Joint Analysis for better decisions. Rome, Italy.

FAO, 2020. Crop prospects and Food Situation – Quarterly Global Report No. 1, March 2020. Rome, Italy.

FAO. 2020. Early Warning Early Action report on food security and agriculture (April–June 2020). Rome, Italy.

FAO, IFAD, UNICEF, WFP, and WHO, 2019. The State of Food Security and Nutrition in the World 2019: Safeguarding against economic slowdowns and downturns. Rome, Italy.

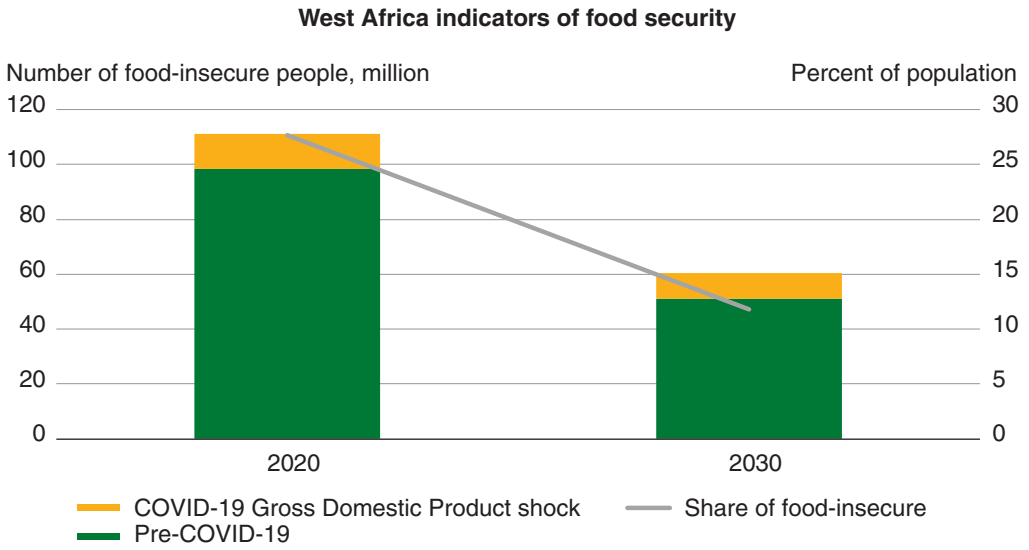
Table 8

Food security indicators for West Africa (Sub-Saharan Africa), 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	63.0	12.8	75.8	53.2	22.6
Difference from pre-COVID-19 estimate	-1.5	-	-1.5	-	-1.5
2030	93.1	15.5	108.6	70.6	38.0
Difference from pre-COVID-19 estimate	-1.9	-	-1.9	-	-1.9

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.



West Africa
(402 million people in 2020)

West Africa is considered the most food-secure subregion in Sub-Saharan Africa. In 2020, the share of the population that was food insecure was 27.7 percent. By 2030, the percentage of people considered food insecure is projected to drop to less than 12 percent of the population.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
West Africa	**401.6**	**512.6**	**111.1**	**60.3**	**27.7**	**11.8**	**348**	**276**	**5,261**	**2,299**
Difference from pre-COVID-19 estimate			0.1	0.04	3.9	1.4	12	5	5	1
Benin	12.0	15.2	1.8	0.5	15.1	3.1	297	227	72	14
Difference from pre-COVID-19 estimate			0.1	0.05	0.8	0.3	4	3	5	2
Burkina Faso	1.9	2.5	0.4	0.2	21.7	9.2	305	252	17	8
Difference from pre-COVID-19 estimate			0.1	0.1	3.7	2.3	14	12	4	2
Cabo Verde	20.8	26.4	5.6	3.1	26.8	11.7	440	361	302	137
Difference from pre-COVID-19 estimate			0.4	0.2	1.8	0.6	9	4	25	8
Côte d'Ivoire	0.6	0.7	0.1	0.0	20.1	4.6	280	210	4	1
Difference from pre-COVID-19 estimate			0.03	0.01	4.8	1.1	18	8	1	0.2
Gambia	27.5	33.9	4.3	2.7	15.5	7.9	375	329	230	127
Difference from pre-COVID-19 estimate			0.36	-0.05	1.3	-0.1	7	-1.0	23	-2.7

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
Ghana	**2.2**	**2.6**	**0.6**	**0.2**	**26.9**	**6.8**	**314**	**231**	**21**	**5**
Difference from pre-COVID-19 estimate			0.04	0.0	1.8	-0.1	7	-0.5	2	-0.1
Guinea	**29.3**	**36.1**	**2.1**	**0.6**	**7.0**	**1.7**	**241**	**197**	**63**	**15**
Difference from pre-COVID-19 estimate			0.33	0.09	1.1	0.3	7	4	12	3
Guinea-Bissau	**12.5**	**16.5**	**1.8**	**0.8**	**14.0**	**4.9**	**318**	**263**	**78**	**30**
Difference from pre-COVID-19 estimate			0.14	-0.03	1.1	-0.2	5	-1.4	7	-1.2
Liberia	**5.1**	**6.6**	**2.9**	**1.7**	**57.3**	**25.0**	**609**	**440**	**201**	**83**
Difference from pre-COVID-19 estimate			0.14	0.03	2.7	0.5	16	3	15	2
Mali	**19.6**	**26.0**	**2.6**	**2.0**	**13.5**	**7.5**	**298**	**266**	**101**	**66**
Difference from pre-COVID-19 estimate			0.27	0.24	1.4	0.9	7	6	12	10
Mauritania	**4.0**	**4.9**	**0.5**	**0.1**	**13.1**	**2.6**	**287**	**222**	**19**	**4**
Difference from pre-COVID-19 estimate			0.11	0.04	2.9	0.9	14	11	5	1
Niger	**21.2**	**28.4**	**6.2**	**1.7**	**29.4**	**6.0**	**415**	**293**	**360**	**70**
Difference from pre-COVID-19 estimate			0.70	0.13	3.3	0.4	15	3	52	6
Nigeria	**214.0**	**274.0**	**74.9**	**43.2**	**35.0**	**15.8**	**354**	**282**	**3,433**	**1,572**
Difference from pre-COVID-19 estimate			9.16	7.76	4.3	2.8	16	12	555	338
Senegal	**15.7**	**19.5**	**2.6**	**0.8**	**16.5**	**4.0**	**257**	**198**	**95**	**22**
Difference from pre-COVID-19 estimate			0.33	0.16	2.1	0.8	8	6	14	5
Sierra Leone	**6.6**	**8.5**	**2.4**	**1.9**	**36.7**	**22.7**	**458**	**394**	**173**	**118**
Difference from pre-COVID-19 estimate			0.32	0.35	4.8	4.1	22	19	30	26
Togo	**8.6**	**11.0**	**2.3**	**0.9**	**26.5**	**8.4**	**323**	**248**	**92**	**29**
Difference from pre-COVID-19 estimate			0.27	0.20	3.1	1.9	12	10	14	7

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

North Africa

The four countries in the North Africa region—Algeria, Egypt, Morocco and Tunisia—are among the most food-secure countries covered in this report. The share of the North African population that is food insecure is projected to decline from 5.1 percent in 2020 to 1.9 percent in 2030. The intensity of food insecurity is projected to decline by 14 percent, with the daily per capita food gap falling to 219 calories in 2030. People in these four countries are now consuming calories at a level comparable to high-income countries, in part due to consumption support policies that could become more difficult to finance in the future. Three of the four countries—Algeria, Egypt and Tunisia—saw sharp price increases in 2018–19, in each case reflecting financial pressures and more challenging economic conditions. Real domestic grain prices are projected to decline in three of the four countries, the exception being Tunisia. Real per capital GDP is projected to increase by 2 percent per year from 2020 to 2030, up from 1.5 percent during 2014–19. However, the shock to GDP from COVID-19 is projected to reduce the absolute value of GDP per capita by 5 percent both in 2020 and 2030. North Africa depends heavily on cereal imports, even in years when its rainfed cereal production is good. The region is projected to increase grain demand for both food and non-food over the next decade, with most of the increase attributable to the growth in food grain demand (27 percent increase). As a result, the IASR for the region increases by 24 percent over the 2020–30 period.

Figure 6
Northern Africa country coverage in the International Food Security Assessment (IFSA)

Source: ArcWorld Supplement.

Algeria is the only oil exporter in the North Africa region. Its policies are sensitive to oil price changes. During a previous oil price decline in 2017–18, Algeria added new taxes, which increased both food prices and inflation generally. Prices subsequently declined in late December 2019 and early January 2020 as the currency strengthened (GIEWS, Country Brief, April 30, 2020). Sharp declines in oil prices could put increased pressure on the Algerian economy. FAO reported that following a sharp decline in the price of crude oil in March 2020, the Algerian Government announced its intention to lower current spending by 30 percent while keeping wages intact and protecting health and education spending (FAO, GIEWS, 2020a).

Pre-COVID-19 analysis projected that Algeria's real annual GDP per capita would grow by 0.8 percent between 2020 and 2030, the lowest projected level in the region. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 6.5 percent, with a slight increase of 0.1 percent in 2030. Over the same period, real domestic food prices are projected to decline by 2.5 percent a year. Food security is projected to improve under the COVID-19 analysis, but Algeria remains North Africa's most food-insecure country. The share of the population food insecure is estimated to be 8.8 percent in 2020—26.6 percent higher than in pre-COVID-19 analysis, declining to 4.1 percent in 2030, slightly lower than the 4.4 percent in the pre-COVID-19 analysis. The per capita calorie gap also declines from 266.2 in 2020 to 236, the same as in pre-COVID-19 analysis.

Egypt, with a population of 102 million, contains more than half the population of the North African region. Pre-COVID-19 analysis projected that Egypt's annual per capita real GDP growth rate would remain relatively unchanged from its 2014–19 level of 2.2 percent for 2020–2030. The COVID-19 demand shock reduced estimated 2020 per capita GDP by 3.3 percent and 2030 by 6.1 percent. Positive per capita GDP growth and a projected 1.9-percent decrease in real local food prices for 2020–30 help to reduce food insecurity even with the COVID-19 macro shock. The share of Egypt's population that is food insecure is projected to decline from 2.7 percent in 2020 to less than 1 percent in 2030, and the intensity of food insecurity is projected to decline from 236.2 calories per capita per day in 2020 to 211.8 in 2030.

Egypt has an extensive program to subsidize access to food. About 71 million of the country's people benefit from a subsidy card program which entitles them to EGP 21 (USD 1.16) worth of goods monthly in addition to 5 loaves of bread per day at less than one tenth of the actual cost. Bakeries are subsidized for the difference in costs, currently about EGP 0.60. Under the current systems, beneficiaries can convert their unused "bread quota" into points to be spent on 44 selected food products sold at State owned or partnered private shops. For the 2019/20 fiscal year (July/June), the Government allocated EGP 89 billion (USD 5.7 billion) for the bread and food subsidy schemes, up by EGP 3 billion compared with 2018/19. Almost 60 percent of the allocation is earmarked for the bread subsidy program, while the rest is dedicated to other food commodities (FAO, GIEWS, 2020b).

Tunisia is North Africa's second most food-secure country. The share of the population food insecure in 2020 was estimated at 5.3 percent in the pre-COVID-19 analysis, rising to 6.9 percent taking into account the COVID-19 macro shock. Pre-COVID-19 analysis projected real per capita GDP growth to increase from 0.8 percent per year during 2014–19 to 3.1 percent during 2020–30. The COVID-19 demand shock reduced estimated 2020 real per capita GDP by 7.1 percent and 2030 by 6.4 percent. Food security is projected to improve under the COVID-19 analysis. The percent of the population food insecure in 2030 is projected to decline to 2.0 percent, slightly higher than the 1.5 percent in pre-COVID-19 analysis. Real domestic cereal prices are projected to increase by 0.3 percent per year over this same period, reversing a pattern of declining prices during 2014–19.

Morocco's rainfed cereal production varies with weather conditions. The country is now experiencing its second year of drought and larger wheat imports are likely (GIEWS, country brief, April 29, 2020). The economy remains strong, and financing imports is not an issue. Projected real per capita GDP growth is expected to increase from 2.1 percent per year during 2014–19 to 3 percent during 2020–30. However, the COVID-19 macro shock reduces estimated 2020 per capita GDP by 7.2 percent and 2030 estimate by 6.2 percent. Food security is projected to improve in the COVID-19 analysis. However, the share of Morocco's population that is food insecure in 2020 (7.1 percent) and 2030
(2.0 percent) is 25 percent higher than in pre-COVID-19 analysis. The intensity of food security increases by about 3 percent, with the per capita calorie gap declining to 221.5 in 2030. Local real food prices are projected to decline by 3 percent per annum between 2020 and 2030.

References

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2020a. Country Brief: Algeria. April 30.

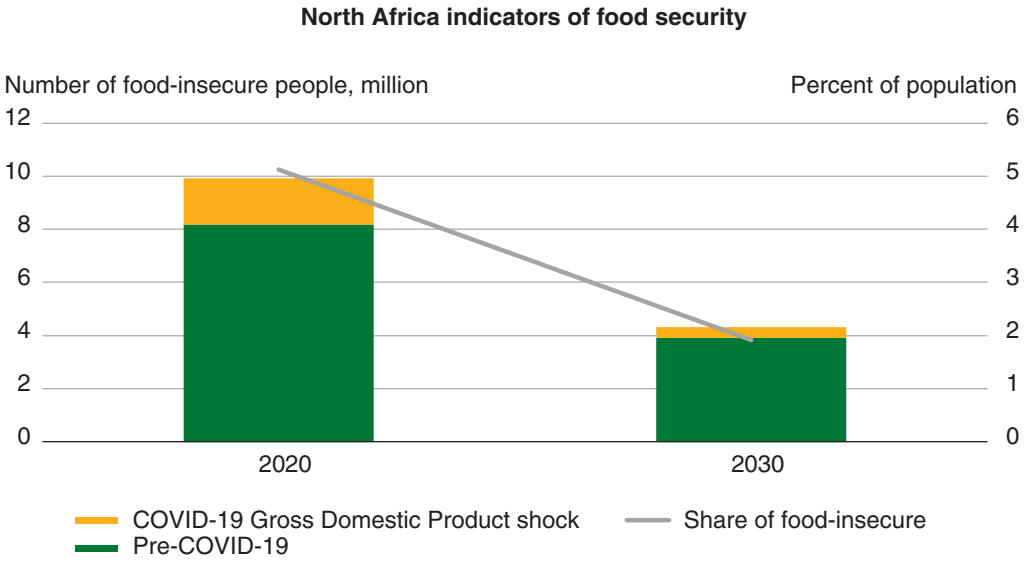
Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2020b. Country Brief: Egypt. May 5.

Table 9
Food security indicators for North Africa, 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	49.8	37.4	87.2	37.3	49.9
Difference from pre-COVID-19 estimate	-0.8	-	-0.8	-	-0.8
2030	63.5	43.9	107.4	45.7	61.7
Difference from pre-COVID-19 estimate	-0.7	-	-0.7	-	-0.7

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.



North Africa
(194 million people in 2020)

The four countries in the North Africa subregion—Algeria, Egypt, Morocco, and Tunisia—are among the most food-secure countries covered in this report. The share of the North African population that is food insecure is projected to decline from 5.1 percent in 2020 to 1.9 percent in 2020. People in these four countries are now consuming calories at a level comparable to what is seen in many higher-income countries, in part due to consumption support policies.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
North Africa	**193.8**	**224.6**	**9.9**	**4.3**	**5.1**	**1.9**	**254**	**219**	**325**	**124**
Difference from pre-COVID-19 estimate			1.7	0.4	0.9	0.2	8	4	67	12
Algeria	43.0	48.1	3.8	2.0	8.8	4.1	266	236	132	61
Difference from pre-COVID-19 estimate			0.8	0.0	1.9	-0.01	11	-0.1	32	-0.1
Egypt	104.1	126.2	2.8	1.3	2.7	1.0	236	212	82	34
Difference from pre-COVID-19 estimate			0.2	0.2	0.2	0.2	2	3	7	5.6
Morocco	35.0	37.9	2.5	0.8	7.1	2.0	264	221	87	22
Difference from pre-COVID-19 estimate			0.5	0.2	1.5	0.4	10	6	21	5.0
Tunisia	11.7	12.4	0.8	0.2	6.9	2.0	248	208	25	6
Difference from pre-COVID-19 estimate			0.2	0.1	1.7	0.5	11	6	7	1.6

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Latin America and the Caribbean

In this assessment, the **Latin America and Caribbean (LAC)** region encompasses 11 countries. In most of the LAC countries covered in the assessment, the main driver of food insecurity during the 2017–19 period were weather shocks, including El Niño, which impacted food availability (FSIN, 2020). In Central America, weather and socioeconomic shocks affected El Salvador, Guatemala, Honduras, and Nicaragua during the 2017–19 period (FSIN, 2020). Each of these four countries has territory within the Central American Dry Corridor (CADA). The CADA region is vast, stretching from the Pacific coast of the Mexican State of Chiapas to the western parts of Costa Rica and Panama and including part of the Pacific side of Guatemala, El Salvador, Honduras, and Nicaragua. Erratic dry weather during key moments of the production seasons in 2017 and 2019 resulted in below-average cereal outputs (FAO, 2020). Moreover, coffee exports, an important source of export revenue and income in rural areas of CADA countries, were also affected (FSIN, 2020). Sociopolitical unrest, a deteriorating economic environment, and gangs and criminal activity have also contributed to population displacements and outmigration, and have led to increasing food insecurity, particularly in rural areas (FSIN, 2020). The combination of these shocks to local economies underpins food insecurity trends in CADA countries. In South America, excluding Bolivia, the countries in our sample (Colombia, Ecuador, and Peru) have some of the lowest shares of food-insecure population, mostly reflecting their upper-middle-income status. However, the South American countries in our sample are all susceptible to economic shocks from world markets, as their economies rely heavily on commodity exports such as copper, oil, natural gas, and coffee (FAO, 2019). Cereal output in the South American countries studied in this assessment has remained close to the 5-year average contributing to high levels of food availability (FAO, 2020a).

Excluding any effects from the COVID-19 pandemic, we estimate that in LAC some 31 million people are food insecure in 2020. When the shock to GDP from the pandemic is considered, this number increases by 5.3 million people. During the 2014–19 period, GDP per capita grew at a rate of 1.6 percent a year. During the next decade, positive GDP growth will continue, though, reflecting the impact from the COVID-19 shock, per capita GDP is projected to be 6 percent lower in 2020 and 4 percent lower in 2030. Nonetheless, food security is projected to improve by 2030, with the prevalence of food insecurity declining by more than 50 percent to 10 percent of the population considered food insecure. This is 1.3 percentage points higher than the pre-COVID-19 analysis. The depth of food insecurity, as measured by the daily per capita calorie gap, is expected to decline from almost 329 calories in 2020 to less than 275 calories in 2030.

Driven by income growth, regional cereal demand is projected to grow from 44.4 million tons in 2020 to 57 million tons in 2030. Non-food cereal demand, including feed, accounts for most of the projected increase in aggregate cereal demand. Annual non-food cereal demand is projected to increase by 7.6 billion tons (37 percent) by 2030. Cereal production in the region over the next decade is not projected to match the growth in cereal demand. Thus, imports will play an important role in fulfilling the regional gap in cereal demand. The implied additional supply requirement to meet aggregate cereal demand (food and nonfood) will increase by 30 percent, corresponding to an additional 8.1 billion tons by 2030.

Figure 7
Latin America and the Caribbean country coverage in the International Food Security Assessment (IFSA)

Source: ArcWorld Supplement.

Haiti is the most food-insecure country among the LAC countries included in the assessment. In recent years, the country has suffered devastating natural disasters, including earthquakes and hurricanes, and has faced political instability. Longstanding deforestation has resulted in extensive soil erosion, which has exacerbated the impacts of more frequent droughts. During the period 2017–19, severe weather shocks, including insufficient and erratic rainfall patterns in 2017 and 2019, reduced (or adversely affected) agricultural output. Moreover, a sharp depreciation of the currency and an increase in food prices decreased the purchasing power of the poorest households (FAO, 2020 and FSIN, 2020). In 2020, some 6.2 million people were estimated to be food insecure, with this number increasing by more than 300,000 people when the shock to GDP from COVID-19 is incorporated. When the effects of the pandemic are included in the analysis, the share of the population considered food insecure is almost 59 percent. During the 2014–19 period, per capita GDP declined at a rate of -0.4 a year, even after considering the GDP shock from COVID-19. This trend is projected to reverse itself over the next decade and incomes are projected to grow. However, the effect of the pandemic is projected to lower estimates for GDP per capita by 5.4 percent in 2020 and 6.6 percent in 2030. By 2030, the prevalence of food insecurity is projected to fall moderately, to 45.8 percent of the population, keeping Haiti as the most food-insecure country in LAC. The depth of food insecurity, measured by the daily per capita calorie gap, is projected to decline moderately over the decade, going from 707 calories in 2020 to 624 calories by 2030.

Guatemala, the largest economy in Central America, has one of the highest levels of income inequality in the Western Hemisphere, with the richest 20 percent of the population accounting for 54 percent of the country's wealth and the poorest 20 percent accounting for 4.5 percent. Guatemala also has Central America's largest indigenous population, particularly in rural areas where 40 percent of the population is of indigenous origin. This population is particularly vulnerable as it tends to be poorer and less food secure relative to the general population. Agriculture is one of Guatemala's largest economic sectors, accounting for about 13.5 percent of GDP and more than 40 percent of total exports. The 2017–19 period was characterized by erratic weather, with cereal production declining during most of the period, and with cereal output below average in 2019 (FAO, 2020). In the pre-COVID-19 analysis, some 4.9 million people were estimated to be food insecure in 2020. The shock to GDP from the pandemic increases this figure by more than 500,000 people. Including the shock from COVID-19, 31 percent of the population is estimated to be food insecure in 2020. During the 2014–19 period, per capita GDP grew at a rate of 0.4 percent. During the next decade, growth is projected to accelerate, though in absolute terms, GDP per capita is projected to be 4.8 percent lower in 2020 and 1.9 percent lower in 2030 from the pre-COVID-19 estimate. By 2030, the prevalence of food insecurity is projected to decline by more than half, with 15 percent of the population considered food insecure. The daily per capita calorie gap is estimated to decline more moderately, from 362 calories in 2020 to 298 calories by 2030.

In **Honduras**, agricultural production fluctuated considerably due to weather-induced shocks during the 2017–19 period, with output falling below-average in 2019 (FAO, 2020). The multiyear decline in production affected not only major staple crops for domestic consumption, such as maize and beans, but also important export crops including coffee. Many Hondurans depend on subsistence farming, with little access to other sources of income. Erratic weather patterns during the 2017–19 period contributed to reduced food availability, reduced purchasing power, and strained the resiliency of many households—all factors that underpin food insecurity in Honduras. In the pre-COVID-19 analysis some 20 percent of the population is considered food-insecure. The prevalence of food insecurity increases by 3.3 percentage points when the effects of the pandemic are considered. Including the shock to GDP from COVID-19, some 2.2 million people are classified as food insecure in 2020. From 2014 to 2019, GDP per capita grew at about 2.3 percent a year. In the decade from 2020 to 2030, growth will increase moderately. However, in absolute terms the income shock from the pandemic is expected to decrease per capita GDP by 5 percent from its pre-COVID-19 estimates in 2020 and 2030. By 2030, the share of the population that is considered food insecure is projected to fall to 9 percent overall. Moreover, the daily per capita calorie gap is expected to decline from 331 kcal in 2020 to 268 kcal by 2030.

El Salvador is the smallest country in Central America and the country with the highest population density, containing 6.4 million people. El Salvador also has the highest per capita income of the CADA countries. An important share of this income comes from remittances, which in 2018 represented 21 percent of GDP (World Bank, 2020). Cereal output during the period of 2017–19 stayed at its five-year average level, unlike other CADA countries where production declined (FAO, 2020). In the pre-COVID-19 analysis for 2020, 15.5 percent of the population was considered food insecure, with the effects of the pandemic increasing the prevalence of food insecurity by 3.9 percentage points. In 2020, including the COVID-19 shock to GDP, some 1.2 million people were food insecure. During 2014–19. GDP per capita grew at a rate of 2.2 percent a year. During the next decade, growth will remain relatively unchanged. Reflecting the COVID-19 income shock, in absolute terms GDP per capita is estimated to be 7.4 percent lower in 2020 and 4.3 percent lower in 2030. By 2030, the number of food-insecure people is projected to fall by more than half, to 0.5 million, representing

8.6 percent of the population. The daily per capita calorie gap is projected to fall, but more moderately, from 277 calories in 2020 to 233 in 2030.

Nicaragua is the poorest of the Central American countries examined in this assessment. As in other Central American countries, agriculture is an important part of the Nicaraguan economy, accounting for 15 percent of GDP and almost 75 percent of the country's exports. Throughout 2017–19, the country experienced several weather shocks that were like those seen in other Central American countries. These weather shocks led to a stagnation of agricultural output. Sociopolitical instability that began in 2018 triggered an economic recession that has only worsened in 2020 as the effects of COVID-19 came into play. In the pre-COVID-19 analysis for 2020, 34 percent of the population was considered food insecure. The shock to GDP growth from the pandemic is projected to increase the prevalence of food insecurity by 3.5 percentage points in 2020, for a total of 2.4 million people considered food insecure. From 2014 to 2019, GDP per capita barely grew, increasing at a rate of 0.2 percent a year. During the next 10 years, growth is projected to increase to more than 1 percent. However, in absolute terms, GDP per capita is estimated to be 5.1 percent lower in 2020 and 9.2 percent lower in 2030 than the pre-COVID-19 estimate. Food security is projected to improve by 2030 despite the decline in GDP per capita. The prevalence of food insecurity is projected to decline by more than 20 percent, with 30 percent of the population considered food insecure by 2030. The daily per capita calorie gap, too, is projected to decline from 421 calories in 2020 to 386 calories by 2030.

Ecuador is the only country covered in the LAC region that derives an important share of its GDP from crude oil exports. A sustained period of declining and relatively low oil prices that began in 2018 continued through early 2020, and has led to tightened fiscal budgets and falling or slowing economic growth, with real annual per capita GDP growth declining by 0.8 percent per year during the 2014–19 period. Cereal outputs were also below their 5-year average in 2019, mainly reflecting prevailing low prices. In the pre-COVID-19 analysis for 2020, almost 22 percent of the population was estimated to be food insecure. The prevalence of food insecurity increases by 5.3 percentage points when the shock of the pandemic is considered. In 2020, including the shock to GDP growth from COVID-19, some 4.5 million people are considered food insecure. By 2030, driven by a recovery in GDP per capita growth, the prevalence of food insecurity is projected to be close to 12 percent, declining by more than half from 2020. The daily per capita calorie gap declines more moderately, from 261 calories in 2020 to 212 by 2030.

Bolivia is the poorest country in South America and the third poorest in Latin America. The country has made progress over the last decade at reducing poverty and income inequality (FAO, 2019). The Bolivian economy is highly dependent on exports of natural gas and copper. Declining energy and commodity prices during the baseline period of 2017–19 pressured the country's finances downward. Cereal production, however, was above the five-year average for most of the 2017–19 period. In the pre-COVID-19 analysis, 35.5 percent of the population was estimated to be food insecure, the prevalence of food insecurity increases by 6.5 percentage points. Including the COVID-19 shock, close to 5 million people are estimated to be food insecure in 2020. During the 2014–19 period, GDP per capita grew at a rate of 2.8 percent, in the next decade growth is projected to average 2 percent a year. However, in absolute terms, GDP per capita is expected to be 6 percent lower in 2020 and 7 percent lower in 2030 from the pre-COVID-19 estimate. Nonetheless, food security is projected to improve over the next decade, with the prevalence of food insecurity declining by more than half and only 20 percent of the population considered food insecure. The daily per capita calorie gap, which measures the intensity of food insecurity, declines from 333 calories in 2020 to 260 in 2030.

Peru, a middle-income country, is the third richest country in our sample for LAC, and is highly dependent on exports of minerals, ores, and metals (UNCTAD, 2019). Agricultural outputs during the period of 2017–2019 have remained slightly below their 5-year average, impacted by erratic weather patterns, including severe droughts. In the pre-COVID-19 analysis for 2020, 10.8 percent of the population was food insecure. The shock to GDP from the pandemic increased the prevalence of food insecurity by 3.4 percentage points, more than the average for the region. In 2020, including the COVID-19 shock, some 4.6 million people are considered food insecure. Per capita GDP during the 2014–19 period grew at a rate of 2.5 percent a year and is estimated to increase to 3 percent year during the 2020–2030 period. However, in absolute terms, the estimate of GDP per capita is 8 percent lower in 2020 and 6.3 percent lower in 2030 from the pre-COVID-19 analysis. By 2030, the prevalence of food insecurity is projected to fall to 3.9 percent, with only 1.3 million people considered food insecure. The daily per capita calorie gap is projected to fall more moderately, from 258 kcal in 2020 to 205 calories by 2030.

References

Food Security Information Network, 2020. Global report on food crises 2020: Joint analysis for better decisions. Rome, Italy.

FAO, IFAD, UNICEF, WFP and WHO. 2019. The State of Food Security and Nutrition in the World 2019: Safeguarding against economic slowdowns and downturns. Rome, Italy.

FAO, 2020a. Crop prospects and Food Situation – Quarterly Global Report No. 1, March 2020. Rome, Italy.

FAO. 2020b. Early Warning Early Action report on food security and agriculture (April–June 2020). Rome, Italy.

FAO, IFAD, UNICEF, WFP, and WHO, 2019. The State of Food Security and Nutrition in the World 2019: Safeguarding against economic slowdowns and downturns. Rome, Italy.

UNCTAD, 2019. State of commodity dependence 2019. Geneva, Switzerland.

Table 10

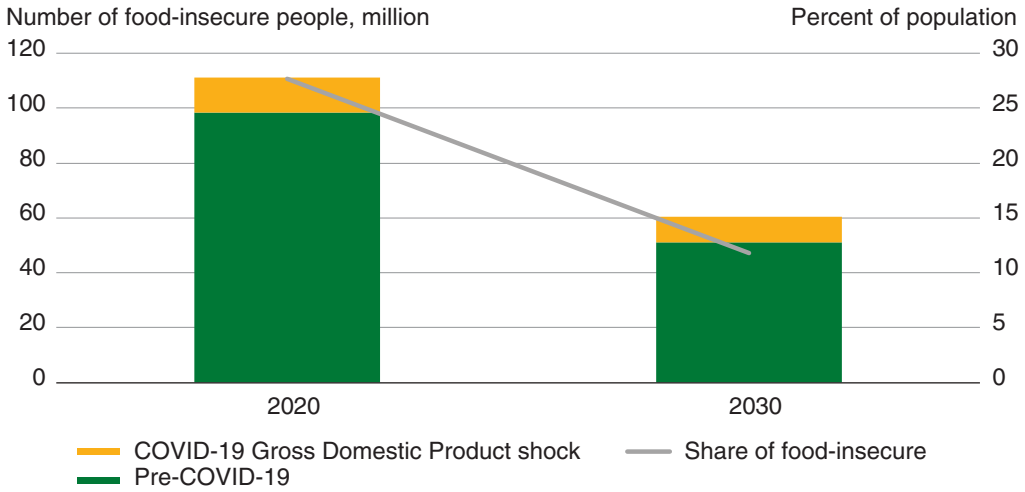
Food security indicators for Latin America and the Caribbean, 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	23.8	20.6	44.4	17.3	27.1
Difference from pre-COVID-19 estimate	-0.59	-	-0.59	-	-0.59
2030	28.9	28.2	57.1	21.9	35.2
Difference from pre-COVID-19 estimate	-0.42	-	-0.42	-	-0.42

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Food security indicators for Latin America and the Caribbean, 2020 and 2030



Latin America and the Caribbean (LAC)

(173 million people in 2020)

In LAC, some 36.5 million people are food insecure in 2020. About 60 percent of the population considered food insecure in LAC are in Bolivia, Ecuador, Guatemala, and Haiti. By 2030, the share of the region's population that is food insecure falls by more than half to 10.4 percent or 19.8 million people. The main drivers of the improvement in food security are continued economic growth, slower population growth, and stable or declining cereal prices.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
Latin America and the Caribbean	**173.0**	**189.7**	**36.5**	**19.8**	**21.1**	**10.4**	**329**	**275**	**1,760**	**932**
Difference from pre-COVID-19 estimate			5.3	2.5	3.1	1.3	14	9	279	131
Bolivia	11.6	13.3	4.9	2.6	42.0	20.0	333	260	219	93
Difference from pre-COVID-19 estimate			0.8	0.6	6.5	4.7	22	16	46	26
Colombia	49.1	53.0	3.9	1.2	7.9	2.2	237	197	123	30
Difference from pre-COVID-19 estimate			0.7	0.1	1.3	0.2	7	3	24	4
Dominican Republic	10.5	11.4	0.7	0.2	6.4	1.6	206	170	20	4
Difference from pre-COVID-19 estimate			0.1	0.1	1.4	0.4	8	6	5	1
Ecuador	16.9	18.7	4.5	2.2	26.9	11.7	261	212	165	64
Difference from pre-COVID-19 estimate			0.9	0.2	5.3	1.2	16	5	41	8

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
El Salvador	6.2	6.3	1.2	0.5	19.4	8.6	277	233	38	14
Difference from pre-COVID-19 estimate			0.2	0.1	3.9	1.1	15	6	9	2
Guatemala	17.2	19.9	5.4	3.1	31.4	15.4	362	298	223	105
Difference from pre-COVID-19 estimate			0.5	0.1	3.0	0.7	12	3	28	6
Haiti	11.1	12.4	6.5	5.7	58.8	45.8	707	624	592	456
Difference from pre-COVID-19 estimate			0.3	0.4	3.0	3.4	20	20	46	47
Honduras	9.5	10.8	2.2	1.0	23.4	9.1	331	268	82	29
Difference from pre-COVID-19 estimate			0.3	0.2	3.3	1.4	13	8	15	5
Jamaica	2.8	2.8	0.3	0.1	12.0	2.3	222	171	10	1
Difference from pre-COVID-19 estimate			0.1	0.01	3.2	0.5	13	5	3	0.4
Nicaragua	6.2	6.8	2.4	2.0	37.9	29.5	421	386	125	97
Difference from pre-COVID-19 estimate			0.2	0.4	3.5	5.5	15	23	16	23
Peru	31.9	34.4	4.6	1.3	14.3	3.9	258	205	164	38
Difference from pre-COVID-19 estimate			1.1	0.3	3.4	0.8	14	6	46	9

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Asia

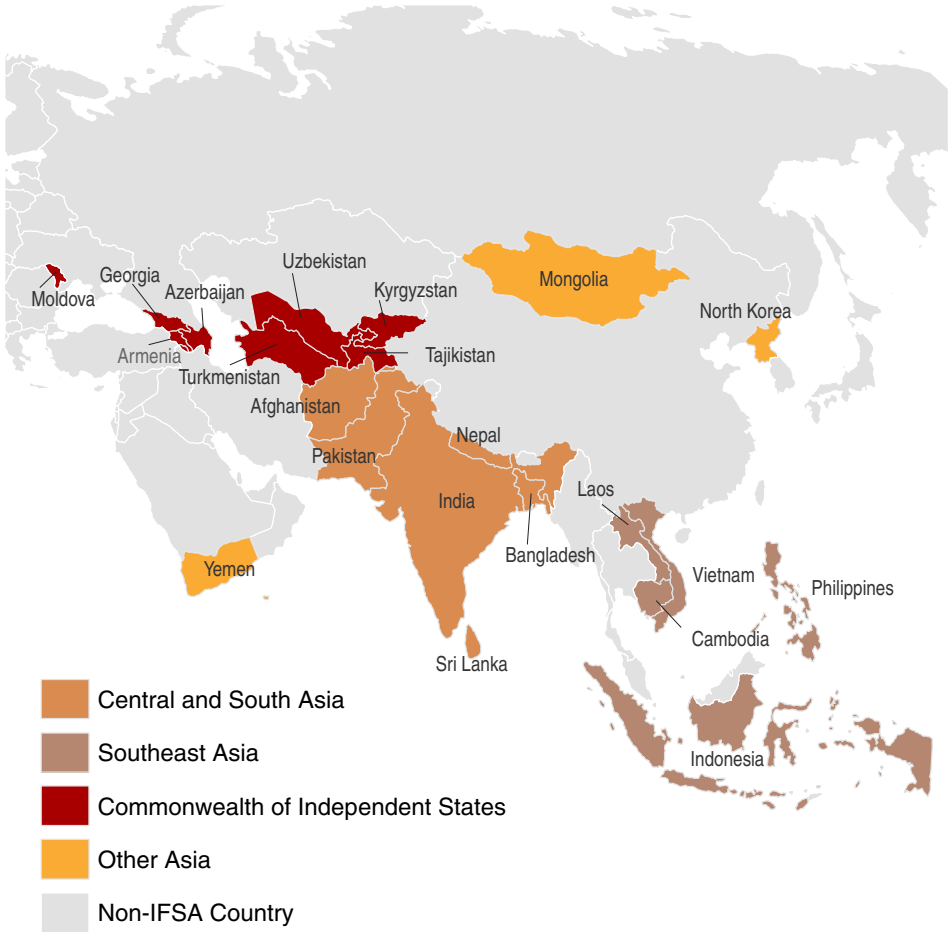
In 2020, the 22 countries included in the Asia region of this report had a population of roughly 2.4 billion, or 64 percent of total population covered by this assessment. By 2030, as a result of declining population growth rates—slowing over the next decade to about 1 percent per year—the 22 countries in the Asia region will see the share of their combined population that is food-insecure drop by more than 70 percent, even after considering the effects from COVID-19. The region has experienced strong growth in cereal production, generally as a result of increasing yields and gains in productivity. Cereal production is projected to grow by nearly 2.2 percent per year between 2020 and 2030, well above the rate of population growth. Nonfood grain demand, reflecting continued economic growth, is projected to increase more sharply than food grain demand over the next decade, with the former projected to grow by 51 percent and the latter by 27 percent. The growth in total grain demand increases the region's IASR by 62 percent, as grain production grows at a lower rate than demand.

In 2020, even after accounting for the COVID-19 shock to GDP growth, the Asia region had the second lowest share of population—15.4 percent—and total number of food-insecure people—373.2 million—of any of the regions in the IFSA. Food insecurity is projected to improve in all countries in the region due to strong income growth and low or declining food prices in most countries. The share of Asia's population that is food insecure is projected to decline to 4 percent by 2030. However, three countries—Afghanistan, North Korea and Yemen—have much larger shares of their population food insecure in both 2020 and 2030. The intensity of food insecurity (measured by the number of calories per capita per day required to bring consumption to a 2,100-calorie target) is low for the region—287 kcal, compared with the global average of 360 kcal. The gap is highest in Yemen, North Korea, and Afghanistan.

The main drivers of improved food security in the region are strong growth in real per capita GDP, and low or declining real cereal prices. These drivers are supported by generally strong domestic cereal production.

Much of the improvement in food security in the region is due to gains by India and Indonesia, which together account for two-thirds of the population of the Asia region.

Figure 8
Asia country coverage in the International Food Security Assessment (IFSA)



Source: ArcWorld Supplement.

India, as the largest country in our sample for Asia, plays a major role in improving the region's food security indicators. During the 2017–19 period, India made major advances in food security due to governmental policies aimed at increasing the availability and accessibility of major agricultural commodities including rice, wheat, coarse grains, oilseeds and pulses. Food subsidies benefit some 800 million Indians (Indian Ministry of Consumer Affairs, Food, and Public Distribution, 2019). Moreover, in 2019, consumer prices for main staples continued their downward trend of recent years, driven by increase in food production and subsidized food prices (Indian Ministry of Agriculture and Farmers' Welfare, Commission for Agricultural Costs and Prices, 2019). In 2019, India more than doubled its buffer stocks for rice, wheat, and coarse grains. The high stock levels reflect the national policies geared to boosting productivity and profitability in agriculture, consequently providing subsidized food to consumers. The growth in food grain production was supported through the National Food Security Mission (NFSM), a program that was introduced in the 2007–08 marketing season to increase food grain production. Since its inception, the NSFM has supported increase in procurement prices and provided producers with input subsidies and technology (OECD and ICRIER, 2018).

Pre-COVID-19 analysis projected per capita GDP growth of 5.2 percent for 2020–2030, below the 6.1 percent growth for 2014–2019. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 4.6 percent and projected 2030 per capita GDP by 4.2 percent. Food security is projected to improve under the COVID-19 analysis. India is projected to have 10.5 percent of its population food insecure in 2020, 17.4 percent greater than the pre-COVID-19 estimate. By 2030, however, less than 1 percent of the population is projected to be food insecure, relatively unchanged from the pre-COVID-19 analysis. The per capita food gap, or the number of calories necessary so that everyone consumes 2,100 calories/day, is projected to decline from 233 calories/day to 159.6 calories/day by 2030, about 2 percent higher than in pre-COVID-19 analysis.

Indonesia was estimated to have 6.5 percent of its population food insecure in pre-COVID-19 analysis, rising to 7.3 percent once the effects of the COVID-19 macro shock are considered. Pre-COVID-19 analysis projected Indonesia's real per capita GDP to increase from an annual average of 4.1 percent during 2014–19 to 4.4 percent between 2020 and 2030. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 4.4 percent and projected 2030 per capita GDP by 0.7 percent. Food security is projected to improve in the COVID-19 analysis. The share of the population that is food insecure is projected to be 1.1 percent in 2030, unchanged from the pre-COVID-19 analysis. Indonesia's food gap, expressed in calories per capita per day, is projected to decrease from 242.2 in 2020 to 188 by 2030, the same as under pre-COVID analysis. This reduction in the prevalence of food insecurity reflects strong per capita GDP growth even with the COVID-19 shock. At the same time, real food prices are projected to decline by 0.1 percent per year between 2020 and 2030. The combination of economic growth and lower prices drives broad-based improvements in food security.

Four other populous countries—Pakistan, the Philippines, Vietnam, and Bangladesh—together account for about one-fourth of the population of the Asia region. All realize improvements in food security, although these improvements differ across countries.

Pakistan is the most food insecure of the four countries, with 31.2 percent of its population estimated to be food insecure in 2020 in pre-COVID-19 analysis, rising to 34.5 percent after considering the effects of the COVID-19 macro shock. Pre-COVID-19 analysis projected that Pakistan's real per capita GDP growth rate would remain unchanged from the 2014–19 period through 2020–30, at 3.5 percent. The COVID-19 demand shock reduced estimated 2020 per capita GDP by 4.8 percent and projected 2030 per capita GDP by 7.1 percent. Food security is projected to improve even with the COVID-19 macro shock, although progress diminishes. The share of the population food insecure is projected to be 11.8 percent, 23 percent higher than in the pre-COVID-19 analysis. The intensity of food insecurity also declines, as the daily per capita calorie gap declines from 374.6 in 2020 to 281.4, about 4 percent higher than in pre-COVID-19 analysis. As in other countries in the region, growth is accompanied by declining real cereal prices, which are projected to fall by 2.7 percent per year between 2020 and 2030.

The **Philippines** begins at a lower prevalence of food insecurity, with an estimated 18.9 percent of its population food insecure in 2020 in pre-COVID-19 analysis, rising to 20.9 percent when the COVID-19 macro shock is considered. Pre-COVID-19 analysis projected estimated 2020 real per capita income growth in the Philippines to slow over the coming decade, from an annual average of 4.7 percent during 2014–19 to 3.7 percent during 2020–30. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 5.1 percent and projected 2030 per capita GDP by 2.9 percent. Food security is projected to improve even with the COVID-19 macro shock, although by less. Some

6.8 percent of the population is projected to be food insecure in 2030. This rises to 7.3 percent when the COVID-19 macro shock is taken into account–over 10 percent higher than the pre-COVID-19 projection. The intensity of hunger is projected to decline from 330.5 per capita per day in 2020 to 261.9 in 2030—1.2 percent above the pre-COVID-18 projection.

Vietnam is the fastest-growing and most food-secure of the four countries, with 9 percent of its population estimated to be food insecure in 2020 in pre-COVID-19, rising to 9.9 percent after accounting for the effects of the COVID-19 macro shock. Pre-COVID-19 analysis projected that Vietnam's real per capita GDP growth rate would decline from an annual average of 5.7 percent during 2014–19 to 5.1 percent during 2020–30. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 3.6 percent and projected 2030 per capita GDP by 2.7 percent. Food security is projected to improve over the next decade even with the COVID-19 macro shock. By 2030, the percent of the population that is food insecure is projected to be 1.1 percent, compared with 1 percent for the pre-COVID projection. Local cereal prices are projected to decline by 1.9 percent over the 2020–30 period, slightly above the annual decline of 1.5 percent during 2014–19.

Bangladesh was estimated to have 16.2 percent of its population food insecure in 2020 in pre-COVID-19 analysis, rising to 17.9 percent after considering the effects of the COVID-19 macro shock. Pre-COVID-19 analysis projected that Bangladesh would have slower real per capita income growth over the coming decade: an annual average of 4.7 percent during 2020–30 compared with a 6.2 percent annual average during 2014–19. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 4 percent. By 2030 the post-COVID-19 per capita GDP level is projected to be slightly higher (0.4 percent) than the pre-COVID-19 projection. Food security is projected to improve even with the COVID-19 macro shock. The share of the population that is food insecure is projected to decline to 3.9 percent by 2030. The intensity of food security also declines, with the daily per capita calorie gap declining to 205, about the same as the pre-COVID-18 analysis. Bangladesh is also projected to experience lower real local cereal prices, with declines of 3.4 percent per year over the 2020–30 period.

Asia's most food-insecure countries are Afghanistan, Yemen, and North Korea.

Afghanistan continues to experience conflict and internal population displacement. In 2019, it was identified as having the world's third worst food security crisis, with 11.3 million people facing food insecurity at crisis levels (FSIN, 2020: 21). Afghanistan accounted for 7.4 percent of Asia's food-insecure population in 2020, but is projected to account for 23.3 percent of that population by 2030. Pre-COVID-19 analysis projected real annual per capita GDP growth in Afghanistan to be 1.8 percent over the 2020–30 period—slower than what is projected for other Asian countries but an improvement over the country's negative growth rate during 2014–19. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 7 percent and the projected 2030 per capita GDP by 6.2 percent. Food security is projected to increase even when the COVID-19 shock is considered, although progress is less. Pre-COVID-19 analysis estimated that in 2020, 67.2 percent of the population of Afghanistan was food insecure, increasing to 73 percent after the effects of the COVID shock are taken into account—an increase of 8.6 percent. The percentage of the population food insecure in 2030 falls to 54 percent—11 percent above the pre-COVID-19 projection.

Yemen continues to suffer armed conflict and internal population displacement. In this precarious setting, Yemeni cereal production, generally a small share of total consumption, in 2019 was about 12 percent less than the previous year's harvest and more than 30 percent below the five-year average (FAO, GIEWS 2019). Yemen was identified as the world's worst food security crisis in 2019, with

15.9 million people facing food security at crisis levels (FSIN 2020: 21). With 58.3 percent of its population food insecure in 2020 under pre-COVID-19 conditions, Yemen is among the world's most food-insecure countries in Asia. The ongoing conflict caused the Yemeni economy to contract sharply over the past half-decade. After experiencing an annual rate of real per capita income growth of -9.9 percent during the 2014–19 period, pre-COVID-19 analysis projected that Yemen would have growth rates averaging 3.1 percent during the 2020–30 period. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 1.2 percent and 2030 per capita income by 0.8 percent. Food security is projected to improve over the next decade, even after the effects of the COVID-19 macro shock are included. The share of the population that is food insecure is projected to be 23.5 percent, about 2 percent higher than the pre-COVID-19 projection. Over the coming decade, the intensity of food insecurity is projected to decline, with the per capita food gap falling from 455 calories per capita per day in 2020 to 312 calories in 2030, about the same as projections from pre-COVID-18 analysis. Nevertheless, the projected improvement in food security over the next decade is very uncertain given the ongoing war, which has already claimed tens of thousands of lives and is contributing to famine and to diseases including cholera.

An estimated 59.2 percent of **North Korea's** population is food-insecure in 2020, rising slightly to 59.8 percent when the effects of the COVID-19 macro shock are taken into account. Pre-COVID-19 analysis projected North Korea's real per capita GDP to grow by 1.1 percent a year between 2020 and 2030, an improvement over the economic contractions of recent years. The COVID-19 macro shock reduced estimated 2020 per capita GDP by 0.8 percent and 2030 per capita GDP by 1.9 percent. Last year, an assessment by the United Nations indicated that 10.9 million people in North Korea were in need of humanitarian assistance (United Nations Resident Coordinator for DPR Korea, 2019: 5). Domestic grain prices are projected to decline by 2.4 percent a year over the next decade. Under these conditions, including the COVID-19 macro shock, the percentage of the population that is food insecure in North Korea would decline to 44.9 percent. The intensity of food insecurity is also projected to decrease, with the daily per capita caloric gap declining from 430 in 2020 to 368 by 2030, about 1.5 percent higher than projected in pre-COVID-19 analysis.

References

Food and Agriculture Organization of the United Nations, Global Information and Early Warning System (FAO, GIEWS). 2019. Country Brief: Yemen. September 25.

Food Security Information Network (FSIN). 2020. 2020 Global Report on Food Crises: Joint Analysis for Better Decisions. April.

Indian Ministry of Agriculture and Farmers' Welfare, Commission for Agricultural Cost and Prices (CACP). 2019. "Price Policy for Khalif Crops, The Marketing Season 2019–20."

Indian Ministry of Consumer Affairs, Food, and Public Distribution. 2019. "National Food Security Act (NFSA) 2013." September 30.

Organization for Economic Co-operation and Development (OECD) and Indian Council for Research on International Economic Relations (ICRIER). 2018. "Agricultural Policies in India." *OECD Food and Agricultural Reviews*, OECD Publishing, Paris.

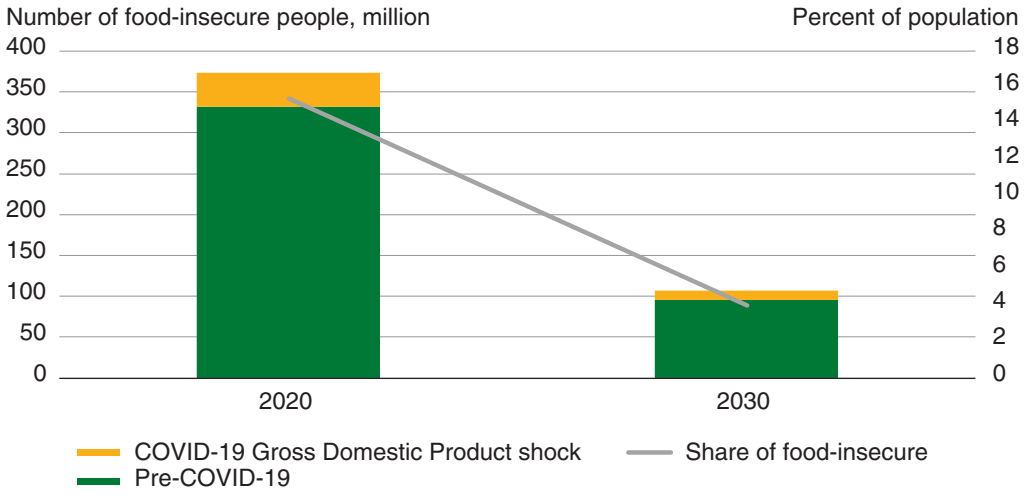
Table 11
Food security indicators for Asia, 2020 and 2030

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2020	487.3	132.6	620.0	461.0	158.9
Difference from pre-COVID-19 estimate	-5.00	-	-5.00	-	-5.00
2030	618.4	199.8	818.2	560.9	257.3
Difference from pre-COVID-19 estimate	-4.10	-	-4.10	-	-4.10

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Food security indicators for Asia, 2020 and 2030



Asia
(2.4 billion people in 2020)

In 2020, the Asia region had the second highest number of food-insecure people—373.2 million—of any of the regions in the IFSA, but the second lowest share of population food insecure, at 15.4 percent. Food insecurity is projected to improve in all countries in the region, due to strong income growth and low or declining food prices in most countries. The share of Asia's population that is food insecure is projected to decline to 4 percent by 2030.

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Percent*		*Kcal/day*		*1,000 MT*	
Asia	**2,422.8**	**2,669.5**	**373.2**	**106.6**	**15.4**	**4.0**	**278**	**210**	**15,417**	**4,099**
Difference from pre-COVID-19 estimate			41.4	11.5	1.7	0.4	9	4	1,999	521
Armenia	3.0	2.9	0.1	0.0	2.9	0.1	176	131	2	0.1
Difference from pre-COVID-19 estimate			0.02	0.0	0.7	0.0	6	2	0.5	0.0
Azerbaijan	10.2	10.8	0.4	0.1	3.8	1.1	167	144	7	2
Difference from pre-COVID-19 estimate			0.1	0.0	0.8	0.4	5	6	1.8	0.7
Georgia	4.9	4.9	0.4	0.1	8.8	1.4	226	174	13	1
Difference from pre-COVID-19 estimate			0.1	0.0	2.2	0.4	11	6	3.6	0.5
Kyrgyzstan	6.0	6.4	0.3	0.05	5.2	0.7	207	163	8	1
Difference from pre-COVID-19 estimate			0.1	0.0	1.6	0.0	10	1	2.8	0.1
Moldova	3.4	3.0	0.3	0.01	10.1	0.2	197	123	9	0.1
Difference from pre-COVID-19 estimate			0.1	0.0	2.7	0.1	11	4	2.8	0.0

	Population		Population food insecure		Population share food insecure		Food gap (per capita)		Food gap (total)*	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
Tajikistan	8.9	10.1	3.6	2.0	41.0	19.4	389	306	178	75
Difference from pre-COVID-19 estimate			0.3	0.1	3.0	1.2	12	5	18.2	5.7
Turkmenistan	5.5	6.0	0.2	0.02	3.5	0.3	188	147	5	0.4
Difference from pre-COVID-19 estimate			0.04	0.0	0.7	0.0	5	1	1.0	0.0
Uzbekistan	30.6	32.9	1.2	0.1	4.0	0.2	184	136	29	1
Difference from pre-COVID-19 estimate			0.3	0.01	0.9	0.0	6	2	7.3	0.3
Afghanistan	36.6	45.7	26.8	24.7	73.0	54.0	468	377	1,496	1,111
Difference from pre-COVID-19 estimate			2.1	2.5	5.8	5.4	32	21	213.2	165.8
Bangladesh	162.7	177.1	29.1	6.9	17.9	3.9	272	205	1,166	209
Difference from pre-COVID-19 estimate			2.8	-0.1	1.7	0.0	6	-0.3	136.7	-2.5
India	1,326.1	1,460.7	139.2	8.6	10.5	0.6	233	160	4,306	181
Difference from pre-COVID-19 estimate			20.6	1.7	1.6	0.1	7	3	746.3	38.8
Nepal	30.3	32.5	2.6	0.2	8.7	0.7	233	167	87	5
Difference from pre-COVID-19 estimate			0.2	0.0	0.6	0.0	3	0.4	7.3	0.1
Pakistan	213.7	242.9	73.8	28.6	34.5	11.8	375	281	3,496	1,018
Difference from pre-COVID-19 estimate			7.0	5.4	3.3	2.2	13	11	442.2	223.4
Sri Lanka	22.9	24.1	4.9	1.1	21.2	4.6	264	195	193	33
Difference from pre-COVID-19 estimate			1.2	0.3	5.0	1.4	17	10	55.5	11.2
North Korea	25.6	26.7	15.3	12.0	59.8	44.9	430	368	956	641
Difference from pre-COVID-19 estimate			0.2	0.4	0.6	1.5	3	5	16.3	29.9
Mongolia	3.2	3.4	1.0	0.3	30.6	8.8	328	242	40	9
Difference from pre-COVID-19 estimate			0.1	0.01	3.1	0.3	11	1	5.2	0.3
Yemen	29.9	35.7	17.7	8.4	59.3	23.5	455	312	1,004	325
Difference from pre-COVID-19 estimate			0.3	0.1	1.0	0.4	5	1	27.2	6.9
Cambodia	16.9	19.0	3.8	0.8	22.2	4.3	297	215	172	27
Difference from pre-COVID-19 estimate			0.7	0.2	4.1	1.1	15	9	38.7	7.9
Indonesia	267.0	285.1	19.6	3.1	7.3	1.1	242	188	711	88
Difference from pre-COVID-19 estimate			2.2	0.1	0.8	0.0	5	0.4	92.1	1.7
Laos	7.4	8.5	0.2	0.01	3.3	0.1	187	136	8	0.2
Difference from pre-COVID-19 estimate			0.1	0.0	0.8	0.0	7	3	2.1	0.1
Philippines	109.2	125.7	22.8	8.5	20.9	6.8	331	262	1,139	337
Difference from pre-COVID-19 estimate			2.2	0.6	2.0	0.5	8	3	133.3	26.6
Vietnam	98.7	105.5	9.8	1.1	9.9	1.1	264	194	393	34
Difference from pre-COVID-19 estimate			1.0	0.1	1.0	0.1	5	2	44.8	3.8

Notes: *Measured in grain equivalents. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service, based on results from the International Food Security Assessment model.

Appendix: Food Security Assessment Model: Definitions and Methodology

The IFSA model[7] used in this report projects food consumption (food demand), food access, and food gaps in 76 low- and middle-income countries through 2020. Food is divided into 4 groups covering 100 percent of food consumption: the major grain (determined by calorie share), other grains, root crops, and all other food.

The food security of a country is evaluated based on the gap between projected domestic food consumption (food demand) and a caloric target, which we set at 2,100 calories per capita per day—a caloric level necessary to sustain life at a moderate level of activity. The modeling projections of food demand are expressed in grain equivalent based on each food group's caloric content to allow aggregation across food groups; this grain equivalent is easily expressed in either kilograms or calories.

Three food security indicators are provided: (1) the share of food insecure, which is the share of the total population unable to reach the nutritional target; (2) the number of food-insecure people; and (3) the food gap, which is the amount of food needed to allow each individual consuming below the threshold level to reach the caloric target. This caloric target indicates relative well-being and helps to quantify unequal food access within a country.

Projection results provide a baseline for the food security situation in each country, and the results depend on the model's specification and underlying assumptions. The simulation framework used to project food demand is based on partial-equilibrium models for each country in the assessment. Beghin et al. (2015a) introduce the methodology, and Beghin et al. (2017) provide more detail on price transmission and food security projections.

Each country model comprises a price-independent generalized log-linear (PIGLOG) demand system for each of the four food groups (Muellbauer, 1975). The demand system is calibrated on a 3-year-average of prices and incomes (2016–18), observed consumption levels, a measure of inequality, and income and price elasticities. Demand projections are based on projected prices and incomes; the model implicitly assumes that both the *preferences* represented by the demand system and the *income distributions* embedded in the calibration and projections are constant over time.

The distribution of consumption used to calculate food security measures is described by a constant coefficient of variation, which implies an increasing standard deviation of consumption as consumption rises over the projection period, but does not account for potential structural changes in an economy. The implied price and income elasticities evolve over the projection period as prices and incomes change; generally, food groups become more income-inelastic because incomes rise.

[7]The methodology to estimate the IFSA model indicators was replaced in 2016; to understand the changes to the model and impact on our food security estimates see Rosen et al., (2016).

Structural framework for estimating and projecting food demand in the aggregate

Demand system definition and calibration

We specify demand q_i^h for a given food group *i*, for income-decile *h* as:

$$(1) \qquad q_i^h = \left(x_i^h / p_i\right)\left(A_i(p_i) + B_i(p_i)\ln\left(x^h\right)\right)$$

where p_i is the price (expressed in real local currency), and x^h is the decile-level income. We further specify $A_i(p_i) = a_{i0} + a_{i1}p_i$, and $B_i(p_i) = b_{i0} + b_{i1}p_i$.

The PIGLOG demand formulation allows for aggregation of income decile-level demands in (1) into average per capita market demand for each food group *i* (2).

$$(2) \qquad \overline{q}_i = \left(\frac{x_i}{p_i}\right)\left((a_{i0} + a_{i1}p_i) + (b_{i0} + b_{i1}p_i)(\ln\left(\overline{x}\right) + \ln(\frac{10}{z}))\right)$$

The latter is a function of average per capita income $\overline{x}$ and Theil's entropy measure of income inequality *z*.

We also define average expenditure share for good category *i* as:

$$(3) \qquad \overline{w}_i = (a_{i0} + a_{i1}p_i) + (b_{i0} + b_{i1}p_i)(\ln\left(\overline{x}\right) + \ln(\frac{10}{z}))$$

The elasticity of average demand for good *i* with respect to average income (or total expenditure) is:

$$(4) \qquad \varepsilon_{\overline{q}_i\overline{x}} = 1 + (b_{i0} + b_{i1}) / \overline{w}_i$$

The own-price elasticity of the average demand is:

$$(5) \qquad \varepsilon_{\overline{q}_i p_i} = -1 + \left(\frac{p_i}{\overline{w}_i}\right)\left(a_{i1} + b_{i1}(\ln\left(\overline{x}\right) + \ln(\frac{10}{z}\right))$$

In each country, consumers at different income levels have similar underlying preferences over good *i* as embodied in parameters a_{i0}, a_{i1}, b_{i0}, b_{i1}, but their respective consumptions vary because their respective incomes vary.

With a system of three linear equations (equations 3, 4, and 5) with four unknown variables, one parameter remains free. The free parameter (chosen to be b_{i0}) is used to ensure that decile demands behave consistently with stylized facts of food security as follows: price sensitivity and income responsiveness decline with income levels; own-price elasticities must be negative; and food expenditure shares tend to fall with increasing income. A range of values of the free parameters allows ensuring these stylized facts are satisfied by the calibrated demand system. Here we pin down b_{i0} such that the ratio of price elasticities for the bottom and top deciles is equal to the ratio of the natural logarithm of their national income shares.

For any given free parameter value, the system of equations is solved for parameters b_{i1}, a_{i1}, and a_{i0} as a function of the free parameter. Once these three parameters are recovered, parameters $\tilde{a}_{i0}, \tilde{a}_{i1}, \tilde{b}_{i0}, \text{and } \tilde{b}_{i1}$, along with income x^h and price p_i, are used to generate the consumption level of good *i* for each decile specified in equation (1). In this initial calibration, the quality of any good *i* is assumed constant across the income distribution.

For each country, we calibrate a demand system for each of the four food groups based on income, consumption levels, and prices from the 3 years preceding the projection period (2016–18). We determine the major grain (which varies across countries) based on caloric share in the diet. The other grains food group contains all other grains; the prices for this food group are weighted by its components' caloric shares. At the calibration stage, we either observe domestic food prices (including the components of a price index for other grains that is weighted by caloric share) or create synthetic prices.

For the food prices not observed in the calibration stage, we create a synthetic domestic price, p_i^{ds}, that is linked to the world price, p_i^w, and expressed in local currency. The parameter θ is the price transmission slope, which we assume is 0.7. The parameter trc^{int} represents international transportation and market costs [e.g., cost, insurance and freight (CIF) and free on board (FOB)], which we assume are 10 percent, and trc^{dom} are domestic trade costs, which we assume are $20 per ton in real terms:

$$p_i^{ds} = \theta^* p_i^w * \left(1 + trc^{int} trc_{int} / \theta\right) * \left(1 + tariff / \theta\right) + trc^{dom} \quad (6)$$

At this stage, we also calibrate a price transmission equation that links the domestic price p_i^{dom} (either observed or synthetic) to the world price. The generic price transmission equation is:

$$p_i^{dom} = \theta^* p_i^w + \widehat{I} \quad (7)$$

During the calibration stage, we solve for the intercept, *I*, in real terms, and hold it constant during the projection period.

Projection of food demand calculation and food security indicators

The IFSA food security indicators (share of food-insecure population, number of food-insecure people, and food gap) are derived from the levels of food demand projected using the calibrated demand system.

For each country, we use the demand parameters and projected income, x_t, and prices, p_{it}, to project food demand, q_{it}, for each of the four food groups *i* in each year *t* so that $q_{it} = \widehat{A}_i\left(x_t / p_{it}\right)\left(\left(p_{it}\right) + \widehat{B}_i(p_{it}) \ln\left(x_t\right)\right.$. We aggregate demand for the four food groups into total food demand expressed in calories, so that $\sum q_{it} = Q_t$, which we also refer to as food or calorie consumption. We use this measure of total demand to calculate food security indicators.

We follow FAO (2019) to estimate the distribution of calorie consumption beginning with a coefficient of variation (CV) of food availability, which characterizes consumption distributed with a mean *m* and variance *v*, so that $CV = \left(\sqrt{v}/m\right)$.[8] Given the CV and the projected mean caloric consumption (Q_t), we can recover the variance, *v*, of the empirical distribution for a given year *t*.

Assuming food consumption *Qt* is distributed lognormal, then *ln(Qt)* is distributed *N(μ,σ2)* with $\mu = \ln\left(\frac{m^2}{\sqrt{v+m^2}}\right)$ and $\sigma^2 = \ln\left(1+v/m^2\right)$. Once μ and σ^2 are computed, we recover the proportion of the population that falls below the calorie target (2,100 calories per capita per day) using the standard normal CDF, Φ: $\Phi^{insecure} = \Phi\left(\frac{\ln(2100-\mu)}{\sigma}\right)$. Here, $\Phi^{insecure}$ indicates **the share of the population that is food insecure**. Using this share and total population in the respective country, we obtain the total **number of food-insecure people** in this country.

Next, the expected average food intake of food-insecure people, $q^{food\ insecure}_{cal\ average}$, can be recovered using the partial mean of the calorie availability below the target (2,100), which we calculate as $q^{food}_{cal} = e^{\mu-\sigma/\Phi\text{^}2100\left[\phi((\ln(2100)-\mu)/\sigma\right]}$, where ϕ is the standard normal density function.

The **food gap** is the difference between the caloric target of 2,100 and the average calorie availability for food-insecure people. This provides a measure of the food gap in calories per day per food-insecure person. The latter multiplied by the number of food-insecure people and converted into grain equivalent per year yields a food gap measure based on annual grain volume.

Data

The model is calibrated for each of the four food groups based on average prices and income from 2016–18. Prices are expressed in real local currency units. Quantities are expressed in grain-equivalent units.

Calibrated parameters and variables:

Demand parameters ($\tilde{a}_{i0}, \tilde{a}_{i1}, \tilde{b}_{i0}, \text{and } \tilde{b}_{i1}$), Price Intercepts, Domestic Prices (Synthetic) Projections are based on data from the USDA, Economic Research Service, *International Macroeconomic Dataset* and the USDA, *Agricultural Projections to 2028*, and utilize the calibrated demand parameters and price transmission between world and domestic prices.

Endogenous projection variables:

Food Demand, Domestic Prices

Exogenous variables used in Calibration and Projection:

[8]See the appendix of Beghin et al. (2015b) for more detail.

Average Consumption per capita – Food and Agriculture Organization (FAO) of the United Nations Food Balance Sheet (most recent available).[9]

Grain Shares – FAO Food Balance Sheet[10]

Elasticities of Price and Income – unpublished calculations by Jim Seale using 2011 International Comparison Program (ICP) data, following the methodology in Muhammad et al. (2011).[11]

Domestic Prices (Observed) – FAO Global Information and Early Warning System (GIEWS), annual average; market depends on reporting.

Tariffs – World Bank's World Integrated Trade Solution (WITS)[12]Exchange Rates and Consumer Price Indices (CPIs) – *ERS International Macroeconomic Data Set*[13]

Population – U.S. Department of Commerce, Bureau of the Census.

World Prices – *USDA Agricultural Projections to 2027*[14]

Per Capita Income – generated using GDP and population from *ERS International Macroeconomic Data Set*[15]

Income Distribution – World Bank Data Bank.[16] Assumed constant during the projection period.

Coefficient of Variation (CV) of Food Consumption – FAO State of Food Insecurity (FAO, 2019). Assumed constant during the projection period.

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[9]Food Balance Sheets (FBS) are for 2017. There are no current FBS for Somalia, Eritrea, Burundi, or the Democratic Republic of the Congo. We use grain consumption levels and share of grains in total calories as reported in the FAO-GIEWS *Cereal Supply and Demand Balance for Sub-Saharan African Countries: situation as of November 2016* report to generate per capita consumption for each food group. We bring forward the reported consumption of all food groups using information from FAO's grain supply data and changes in caloric intake.

[10]For Somalia, we use an FBS from the original Food and Agriculture Organization Statistical Database, which is no longer maintained. We use the FBS of neighboring countries (Burundi-Rwanda; DR Congo-Congo; Eritrea-Ethiopia) to approximate the shares of grains and roots and tubers in total calories for the other countries.

[11]Elasticities are not available for all countries. We use estimates from neighboring countries (Somalia-Ethiopia; Eritrea-Ethiopia; Algeria-avg; Tunisia and Morocco; Afghanistan-avg; Tajikistan and Pakistan; Turkmenistan-avg; Tajikistan, Kyrgyzstan, Kazakhstan; Uzbekistan-avg; Tajikistan, Kyrgyzstan, Kazakhstan). We use less elastic values for major grain in Vietnam, Philippines, Indonesia, India, Pakistan, and Bangladesh, and for other grain in India.

[12]Tariffs are available through 2017. Somalia, Turkmenistan, Eritrea, and North Korea tariffs are not available. For Eritrea, we use the Common Market for Eastern and Southern Africa (COMESA) average. Somalia has imposed a 12.3 percent tariff on commercial imports (LCU Logistics). Turkmenistan has no tariff but imposes excise taxes that have historically been 10 percent. North Korea does not import on the open market, so we assume zero tariffs and do not quantify other trade frictions.

[13]We modeled Ecuador and El Salvador in U.S. dollars instead of local currency as in the ERS International Macroeconomic Dataset, based on data from IMF and Oxford Economics. We constructed projections for Somalia, North Korea, and Zimbabwe using data from International Monetary Fund, IHS Markit, and Oxford Economics.

[14]The world price series are maize (US gulf #2 yellow); rice (Thai, B, fob Bangkok); sorghum (US Gulf, #2 yellow); wheat (gulf, #2 HRW); barley (EC, French, Rouen); Oats (US Farm); roots and tubers (cassava; tapioca, hard pellets, Rotterdam, fob); other food (represented by soybean oil, Dutch fob, ex-mill). World price projections are not available for all cereals represented in the FAO Food Balance Sheets and the FAO GIEWS price database. We use the world price of wheat to represent rye; and sorghum to represent all other cereals (e.g. millet, teff, fonio).

[15]Projections were constructed using information from IMF, Oxford Economics, and IHS Markit for Zimbabwe, Somalia, and North Korea.

[16]Income distributions are not available for all countries. We use Eritrea-Ethiopia; Somalia-Ethiopia; Zimbabwe-Zambia; North Korea-Mongolia; and Afghanistan-avg. Uzbekistan, Pakistan, Tajikistan.

Modeling Staple Cereal Production

Agricultural production is decomposed into yield (production per hectare) and area for grains. Production (PR) for a given country *c* in year *t* is obtained by multiplying projected yield (YL) and area (AR).

$$PR_{ct} = AR_{ct} * YL_{ct}$$

The projections cover the period 2019–29. They are based on producer price projections in local currency units and world price projections from the USDA Agricultural Projections.

Yield

Yield projections are based on parameters estimated econometrically using panel data and are calibrated to observed yields for 2016–18. Yields respond to expected relative return ratios per hectare (RR), autonomous technical change over time (T), and include a country-specific effect.

$$YL_{ct} = f(RR_{ct}, T_t)$$

The return ratios are the ratio of the return per hectare (price, *p*, times yield) divided by the price of fertilizer, $RR_{ct} = p_{ct}Y_{ct} / p_t^{fert}$. The expected return ratios include a contemporaneous and a long-term expectation component and are expressed in real local currency (rlcu). We use USDA Agricultural Projection (to 2028) prices for superphosphate and the major grain by production volume (for grain). We express the international price in rlcu, and then use the transmission equation $p^{domestic} = 0.7p^{world}+0.3I$ to model the domestic price. The intercept, *I*, is the mean of the price over the regression time period (1985–2016). The production data is from FAO.

Modeling Area

Following the typical older Nerlovian specification, we specify area as a function of lagged area, and of expected relative prices (output price and fertilizer price).

$$AR_{ct} = f(p_{ct}, p_{ct}^{fert}, A_{ct-1}, T)$$

The expectation takes the average of contemporaneous and lagged relative prices. We also include a time trend in area to capture non-price shifters in area decisions, and a country fixed effect. We numerically calibrate the area equation to the base year average of 2014–16 using consensus estimates for price and lagged acreage responses.

Modeling Implied Additional Supply Required (IASR)

The Implied Additional Supply Required (IASR) quantifies the total grain demand in each country that is not projected to be met through domestic production. Total grain demand (TD) is comprised of food demand (FD), generated by our demand-driven model, and non-food use (NFD), which is comprised of seed, feed, processing, and other uses. The IASR for grains thus can be expressed as: IASR=TD-PR.

We assume that demand for grain for processing, seed, and other uses grows at the same rate as production. The demand for grain feed grows at the average rate observed during 2006–16.

References

Beghin, J., B. Meade, and S. Rosen. 2015a. *A Consistent Food Demand Framework for International Food Security Assessment.* TB-1941, U.S. Department of Agriculture, Economic Research Service, June.

Beghin, J., B. Meade, and S. Rosen. 2015b. *A Consistent Food Demand Framework for International Food Security Assessment.* Iowa State University, Economics Working Paper WP #14023, February.

Beghin, J., B. Meade, and S. Rosen. 2017. "A Consistent Food Demand Framework for International Food Security Assessment*," Journal of Policy Modeling* 39(5): 827–842.

Food and Agriculture Organization of the United Nations (FAO). 2015. "The State of Food Insecurity in the World." Rome, Italy.

Muellbauer, J. 1975. "Aggregation, income distribution and consumer demand," *The Review of Economic Studies* 42(4): 525–543.

Muhammad, A., J.L. Seale, B. Meade, and A. Regmi. 2011. *International Evidence on Food Consumption Patterns: An Update Using 2005 International Comparison Program Data*. TB-1929, U.S. Department of Agriculture, Economic Research Service.

Rosen, S., K. Thome, and B. Meade. International Food Security Assessment, 2016–2026, GFA-27, U.S. Department of Agriculture, Economic Research Service, June 2016.

Tandon, S., M. Landes, C. Christensen, S. Legrand, N. Broussard, K. Farrin, and K. Thome. Progress and Challenges in Global Food Security. United States Department of Agriculture, Economic Research Service. Economic Information Bulletin No. (EIB-175) 90 pp, July, 2017.

Appendix I: Food Security Measures for International Food Security Assessment Countries, 2020–2030

Appendix table 1-1

Summary information for 76 countries in the International Food Security Assessment

			Current projection		Difference from pre-COVID-19 estimate		Current projection		Difference from pre-COVID-19 estimate		Current projection		Difference from pre-COVID-19 estimate		Current projection		Difference from pre-COVID-19 estimate	
	Population		Population food insecure		Population food insecure		Share of population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (per capita)		Food gap (total)		Food gap (total)	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Million*		*Percent*		*Percent*		*Kilo-calories/day*		*Kilo-calories/day*		*1,000 metric tons*		*1,000 metric tons*	
Total for IFSA countries	**3,837.8**	**4,421.5**	**844.3**	**456.8**	**83.5**	**51.5**	**22.0**	**10.3**	**2.2**	**1.2**	**359.8**	**287.6**	**13.4**	**8.5**	**44,746.1**	**24,342.4**	**5,198.0**	**3,149.0**
Asia	2,422.8	2669.5	373.2	106.6	41.4	11.5	15.4	4.0	1.7	0.4	277.8	210.3	9.3	4.4	15,417.4	4,099.0	1,998.9	521.1
Armenia	3.0	2.9	0.1	0.0	0.0	0.0	2.9	0.1	0.7	0.0	176.0	130.9	5.8	2.3	1.9	0.1	0.5	0.0
Azerbaijan	10.2	10.8	0.4	0.1	0.1	0.0	3.8	1.1	0.8	0.4	167.5	143.9	5.3	5.9	7.5	1.9	1.8	0.7
Georgia	4.9	4.9	0.4	0.1	0.1	0.0	8.8	1.4	2.2	0.4	225.7	173.7	11.0	6.1	12.7	1.5	3.6	0.5
Kyrgyzstan	6.0	6.4	0.3	0.0	0.1	0.0	5.2	0.7	1.6	0.0	206.8	162.7	10.5	0.8	8.3	1.0	2.8	0.1
Moldova	3.4	3.0	0.3	0.0	0.1	0.0	10.1	0.2	2.7	0.1	197.0	123.4	11.2	3.7	8.9	0.1	2.8	0.0
Tajikistan	8.9	10.1	3.6	2.0	0.3	0.1	41.0	19.4	3.0	1.2	389.0	305.7	11.9	4.8	177.8	75.3	18.2	5.7
Turkmenistan	5.5	6.0	0.2	0.0	0.0	0.0	3.5	0.3	0.7	0.0	187.8	146.7	5.2	1.0	4.7	0.4	1.0	0.0
Uzbekistan	30.6	32.9	1.2	0.1	0.3	0.0	4.0	0.2	0.9	0.0	183.8	136.1	6.4	2.3	29.1	1.3	7.3	0.3
Afghanistan	36.6	45.7	26.8	24.7	2.1	2.5	73.0	54.0	5.8	5.4	468.2	376.9	32.2	20.6	1,496.4	1,111.4	213.2	165.8
Bangladesh	162.7	177.1	29.1	6.9	2.8	-0.1	17.9	3.9	1.7	-0.0	271.6	205.2	6.5	-0.3	1,165.9	208.6	136.7	-2.5
India	1,326.1	1460.7	139.2	8.6	20.6	1.7	10.5	0.6	1.6	0.1	233.3	159.6	7.0	3.2	4,305.5	181.3	746.3	38.8
Nepal	30.3	32.5	2.6	0.2	0.2	0.0	8.7	0.7	0.6	0.0	233.3	167.4	3.1	0.4	87.5	5.1	7.3	0.1
Pakistan	213.7	242.9	73.8	28.6	7.0	5.4	34.5	11.8	3.3	2.2	374.6	281.4	12.9	11.1	3,495.6	1,018.3	442.2	223.4
Sri Lanka	22.9	24.1	4.9	1.1	1.2	0.3	21.2	4.6	5.0	1.4	264.0	195.3	17.4	9.9	193.2	32.7	55.5	11.2
North Korea	25.6	26.7	15.3	12.0	0.2	0.4	59.8	44.9	0.6	1.5	429.7	368.1	2.9	5.4	956.1	640.7	16.3	29.9
Mongolia	3.2	3.4	1.0	0.3	0.1	0.0	30.6	8.8	3.1	0.3	327.6	242.0	11.1	1.3	39.6	9.0	5.2	0.3
Yemen	29.9	35.7	17.7	8.4	0.3	0.1	59.3	23.5	1.0	0.4	455.4	311.8	4.8	1.5	1,004.2	324.7	27.2	6.9
Cambodia	16.9	19.0	3.8	0.8	0.7	0.2	22.2	4.3	4.1	1.1	297.4	215.2	15.3	8.9	172.0	26.8	38.7	7.9
Indonesia	267.0	285.1	19.6	3.1	2.2	0.1	7.3	1.1	0.8	0.0	242.2	188.5	4.8	0.4	710.7	88.3	92.1	1.7
Laos	7.4	8.5	0.2	0.0	0.1	0.0	3.3	0.1	0.8	0.0	186.6	135.5	6.9	3.3	7.5	0.2	2.1	0.1
Philippines	109.2	125.7	22.8	8.5	2.2	0.6	20.9	6.8	2.0	0.5	330.5	261.9	8.3	3.0	1,139.4	336.5	133.3	26.6
Vietnam	98.7	105.5	9.8	1.1	1.0	0.1	9.9	1.1	1.0	0.1	264.0	194.3	5.0	2.1	393.0	33.7	44.8	3.8

Continued—

Appendix table 1-1

Summary information for 76 countries in the International Food Security Assessment—*continued*

	Population		Current projection: Population food insecure		Difference from pre-COVID-19 estimate: Population food insecure		Current projection: Share of population food insecure		Difference from pre-COVID-19 estimate: Share of population food insecure		Current projection: Food gap (per capita)		Difference from pre-COVID-19 estimate: Food gap (per capita)		Current projection: Food gap (total)		Difference from pre-COVID-19 estimate: Food gap (total)	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Million*		*Percent*		*Percent*		*Kilo-calories/day*		*Kilo-calories/day*		*1,000 metric tons*		*1,000 metric tons*	
Latin America and the Caribbean	**173.0**	**189.7**	**36.5**	**19.8**	**5.3**	**2.5**	**21.1**	**10.4**	**3.1**	**1.3**	**328.6**	**274.8**	**14.2**	**9.2**	**1,760.1**	**932.4**	**279.2**	**131.2**
Bolivia	11.6	13.3	4.9	2.6	0.8	0.6	42.0	20.0	6.5	4.7	332.8	259.7	22.0	16.3	218.9	92.5	46.3	26.0
Colombia	49.1	53.0	3.9	1.2	0.7	0.1	7.9	2.2	1.3	0.2	237.2	196.8	7.4	2.8	123.1	30.4	24.2	3.8
Dominican Republic	10.5	11.4	0.7	0.2	0.1	0.1	6.4	1.6	1.4	0.4	205.9	170.0	7.7	6.1	20.0	4.4	4.9	1.4
Ecuador	16.9	18.7	4.5	2.2	0.9	0.2	26.9	11.7	5.3	1.2	261.2	211.9	16.2	4.6	164.5	64.3	40.6	7.9
El Salvador	6.2	6.3	1.2	0.5	0.2	0.1	19.4	8.6	3.9	1.1	277.3	232.8	14.8	5.8	37.8	14.3	9.3	2.2
Guatemala	17.2	19.9	5.4	3.1	0.5	0.1	31.4	15.4	3.0	0.7	362.2	298.0	11.7	3.0	223.2	104.6	27.9	5.6
Haiti	11.1	12.4	6.5	5.7	0.3	0.4	58.8	45.8	3.0	3.4	707.0	624.3	20.2	19.6	591.8	455.6	46.2	46.9
Honduras	9.5	10.8	2.2	1.0	0.3	0.2	23.4	9.1	3.3	1.4	330.9	267.7	13.5	7.9	82.1	29.5	14.6	5.3
Jamaica	2.8	2.8	0.3	0.1	0.1	0.0	12.0	2.3	3.2	0.5	221.8	171.1	13.1	5.2	9.7	1.4	3.0	0.4
Nicaragua	6.2	6.8	2.4	2.0	0.2	0.4	37.9	29.5	3.5	5.5	421.1	385.6	15.0	23.1	125.4	97.3	15.8	22.8
Peru	31.9	34.4	4.6	1.3	1.1	0.3	14.3	3.9	3.4	0.8	257.7	205.1	14.4	6.4	163.7	38.2	46.3	8.9
North Africa	**193.8**	**224.6**	**9.9**	**4.3**	**1.7**	**0.4**	**5.1**	**1.9**	**0.9**	**0.2**	**253.6**	**219.2**	**8.4**	**3.8**	**325.4**	**124.1**	**66.7**	**12.2**
Algeria	43.0	48.1	3.8	2.0	0.8	-0.0	8.8	4.1	1.9	-0.0	266.2	235.6	10.7	-0.1	131.5	61.0	31.8	-0.1
Egypt	104.1	126.2	2.8	1.3	0.2	0.2	2.7	1.0	0.2	0.2	236.2	211.8	2.5	3.5	81.9	34.2	7.4	5.6
Morocco	35.0	37.9	2.5	0.8	0.5	0.2	7.1	2.0	1.5	0.4	264.2	221.5	9.8	5.7	86.7	22.5	20.7	5.0
Tunisia	11.7	12.4	0.8	0.2	0.2	0.1	6.9	2.0	1.7	0.5	247.7	208.1	10.6	6.2	25.3	6.4	6.9	1.6
Sub-Saharan Africa	**1,048.3**	**1337.7**	**424.6**	**326.0**	**35.0**	**37.1**	**40.5**	**24.4**	**3.3**	**2.8**	**425.7**	**341.9**	**16.1**	**11.0**	**27,243.2**	**19,186.9**	**2,853.2**	**2,484.5**
Central Africa	***127.5***	***157.2***	***89.9***	***86.7***	***3.5***	***5.8***	***70.5***	***55.2***	***2.8***	***3.7***	***542.8***	***428.4***	***22.6***	***18.6***	***9,405.0***	***7,685.0***	***667.3***	***828.6***
Cameroon	27.0	34.4	4.8	2.1	0.8	0.5	18.0	6.1	3.1	1.4	290.6	235.2	12.8	9.2	182.2	64.3	38.5	16.6
Central African Republic	6.0	7.3	4.2	2.7	0.2	0.3	70.6	36.3	2.9	3.6	532.7	370.6	18.2	13.9	267.1	116.9	19.9	15.6
Congo	5.3	6.7	2.7	2.1	0.3	0.3	50.7	31.6	5.6	3.8	377.4	309.0	21.2	12.9	133.1	85.4	21.4	13.5
Congo, DR	89.2	108.9	78.2	79.9	2.2	4.8	87.6	73.4	2.5	4.4	970.6	798.8	38.3	38.4	8,822.7	7,418.4	587.5	782.9
East Africa	***372.2***	***476.1***	***146.5***	***107.7***	***14.0***	***16.8***	***39.4***	***22.6***	***3.8***	***3.5***	***486.2***	***391.9***	***19.7***	***14.2***	***77,89.5***	***5,238.5***	***973.2***	***866.7***
Burundi	12.6	17.2	10.3	12.9	0.7	0.7	81.2	75.0	5.4	3.8	596.9	547.3	44.5	25.7	712.4	824.2	97.4	78.5

Continued—

Appendix table 1-1

Summary information for 76 countries in the International Food Security Assessment—continued

	Population		Current projection: Population food insecure		Difference from pre-COVID-19 estimate: Population food insecure		Current projection: Share of population food insecure		Difference from pre-COVID-19 estimate: Share of population food insecure		Current projection: Food gap (per capita)		Difference from pre-COVID-19 estimate: Food gap (per capita)		Current projection: Food gap (total)		Difference from pre-COVID-19 estimate: Food gap (total)	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Million*		*Percent*		*Percent*		*Kilo-calories/day*		*Kilo-calories/day*		*1,000 metric tons*		*1,000 metric tons*	
Chad	16.9	22.8	11.3	11.7	0.4	-0.0	66.9	51.2	2.3	-0.1	607.9	516.8	15.3	-0.4	876.5	770.0	51.8	-1.6
Eritrea	6.1	6.8	5.9	5.1	0.03	-0.0	97.3	74.1	0.5	-0.1	838.7	508.1	22.7	-0.6	617.0	319.8	20.1	-0.7
Ethiopia	114.6	149.1	34.7	15.4	4.3	4.6	30.3	10.3	3.7	3.1	326.2	249.5	13.4	15.5	1,244.0	423.3	198.0	144.4
Kenya	49.9	56.6	13.1	2.8	1.7	0.4	26.3	5.0	3.4	0.7	301.7	212.7	11.9	5.0	490.5	74.1	79.8	12.5
Rwanda	12.7	15.0	3.6	1.2	0.3	0.1	28.7	8.1	2.4	0.9	362.0	270.1	9.5	5.1	162.1	40.3	17.3	4.9
Somalia	11.8	15.0	6.0	7.3	0.6	0.7	51.1	48.8	4.7	4.8	492.5	481.1	22.6	22.3	339.2	404.6	45.5	56.5
Sudan	45.6	59.0	24.3	19.5	3.8	6.6	53.3	33.0	8.4	11.1	453.6	368.6	37.0	43.6	1,297.0	844.6	293.2	350.6
Tanzania	58.6	76.1	21.1	19.6	1.4	2.0	36.0	25.8	2.4	2.6	464.6	416.8	11.3	12.4	1,220.9	1,018.0	109.4	131.2
Uganda	43.5	58.5	16.2	12.2	0.9	1.7	37.2	20.8	2.0	2.9	418.0	348.5	8.5	13.1	830.0	519.5	60.8	90.4
Southern Africa	***147.0***	***191.7***	***77.1***	***71.3***	***4.7***	***5.3***	***52.5***	***37.2***	***3.2***	***8.5***	***444.4***	***365.3***	***17.7***	***12.6***	***4787.7***	***3964.8***	***437.4***	***383.3***
Angola	32.5	45.4	19.6	23.2	0.6	0.7	60.4	51.1	1.8	1.5	488.4	443.4	9.3	6.7	1,197.8	1,284.0	58.3	56.5
Lesotho	2.0	2.0	1.4	0.7	0.1	0.0	71.1	33.7	4.8	1.3	505.1	338.6	28.0	4.6	81.2	25.5	9.7	1.3
Madagascar	27.0	33.4	16.2	15.1	0.8	0.7	60.2	45.0	3.1	2.0	460.0	393.1	14.9	7.8	1,058.8	838.6	87.0	52.6
Malawi	21.2	29.3	6.3	2.8	0.6	0.7	29.5	9.7	2.8	2.2	365.4	278.9	11.0	12.8	268.1	92.7	32.3	24.8
Mozambique	28.6	36.6	12.2	9.4	0.5	0.3	42.8	25.8	1.7	0.8	442.3	369.9	7.3	3.5	712.8	459.9	38.7	18.8
Namibia	2.6	3.1	0.9	0.5	0.1	0.0	33.4	15.0	3.9	1.4	292.6	232.9	12.3	4.9	31.9	13.6	4.9	1.5
Swaziland	1.1	1.2	0.3	0.1	0.0	0.0	22.8	10.7	1.3	0.6	279.5	234.2	4.5	2.4	8.4	3.5	0.6	0.2
Zambia	17.4	23.1	11.8	13.5	0.7	1.1	67.9	58.5	3.9	4.8	667.5	604.6	27.2	28.4	939.1	972.6	89.5	122.1
Zimbabwe	14.5	17.6	8.3	5.9	1.4	1.8	57.2	33.6	9.3	10.4	498.4	392.1	44.8	42.7	489.9	274.4	116.5	105.5
West Africa	***401.6***	***512.6***	***111.1***	***60.3***	***12.7***	***9.2***	***27.7***	***11.8***	***6.8***	***3.9***	***348.1***	***275.8***	***11.2***	***6.2***	***5,261.0***	***2,298.6***	***775.3***	***405.9***
Benin	12.0	15.2	1.8	0.5	0.1	0.0	15.1	3.1	0.8	0.3	296.5	226.5	3.8	3.3	72.5	14.5	5.0	1.7
Burkina Faso	1.9	2.5	0.4	0.2	0.1	0.1	21.7	9.2	3.7	2.3	305.2	252.0	14.4	12.3	16.7	7.5	3.5	2.1
Cabo Verde	20.8	26.4	5.6	3.1	0.4	0.2	26.8	11.7	1.8	0.6	439.9	360.7	8.5	3.7	302.0	136.6	25.2	8.4
Côte d'Ivoire	0.6	0.7	0.1	0.0	0.0	0.0	20.1	4.6	4.8	1.1	279.8	210.1	18.0	7.8	4.2	0.8	1.2	0.2
Gambia	27.5	33.9	4.3	2.7	0.4	-0.0	15.5	7.9	1.3	-0.1	374.6	328.6	7.1	-1.0	229.8	126.8	23.4	-2.7
Ghana	2.2	2.6	0.6	0.2	0.0	-0.0	26.9	6.8	1.8	-0.1	314.2	231.3	6.6	-0.5	20.7	4.5	1.8	-0.1
Guinea	29.3	36.1	2.1	0.6	0.3	0.1	7.0	1.7	1.1	0.3	240.5	197.3	6.8	3.6	63.5	15.2	11.8	2.5

Continued—

Appendix table 1-1

Summary information for 76 countries in the International Food Security Assessment—*continued*

	Population		Current projection: Population food insecure		Difference from pre-COVID-19 estimate: Population food insecure		Current projection: Share of population food insecure		Difference from pre-COVID-19 estimate: Share of population food insecure		Current projection: Food gap (per capita)		Difference from pre-COVID-19 estimate: Food gap (per capita)		Current projection: Food gap (total)		Difference from pre-COVID-19 estimate: Food gap (total)	
	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030	2020	2030
	Million		*Million*		*Million*		*Percent*		*Percent*		*Kilo-calories/day*		*Kilo-calories/day*		*1,000 metric tons*		*1,000 metric tons*	
Guinea-Bissau	12.5	16.5	1.8	0.8	0.1	-0.0	14.0	4.9	1.1	-0.2	317.5	263.0	5.5	-1.4	78.5	29.7	7.4	-1.2
Liberia	5.1	6.6	2.9	1.7	0.1	0.0	57.3	25.0	2.7	0.5	608.8	440.0	16.3	2.6	200.8	82.7	14.7	2.2
Mali	19.6	26.0	2.6	2.0	0.3	0.2	13.5	7.5	1.4	0.9	298.1	266.4	6.6	5.9	100.7	66.4	12.2	9.6
Mauritania	4.0	4.9	0.5	0.1	0.1	0.0	13.1	2.6	2.9	0.9	287.4	222.0	13.9	10.5	18.6	3.5	4.8	1.3
Niger	21.2	28.4	6.2	1.7	0.7	0.1	29.4	6.0	3.3	0.4	414.7	293.4	14.9	3.5	360.3	70.2	52.0	6.0
Nigeria	214.0	274.0	74.9	43.2	9.2	7.8	35.0	15.8	4.3	2.8	354.5	281.7	15.8	12.0	3,433.1	1,571.7	554.5	337.7
Senegal	15.7	19.5	2.6	0.8	0.3	0.2	16.5	4.0	2.1	0.8	257.1	198.4	7.8	6.3	95.1	21.8	14.4	5.1
Sierra Leone	6.6	8.5	2.4	1.9	0.3	0.3	36.7	22.7	4.8	4.1	457.6	393.6	21.9	19.4	172.6	118.1	29.6	25.9
Togo	8.6	11.0	2.3	0.9	0.3	0.2	26.5	8.4	3.1	1.9	323.2	248.2	11.6	10.4	91.9	28.6	13.7	7.2

Notes: *Measured in grain equivalent. COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service.

Appendix II: Macroeconomic Measures for International Food Security Assessment Countries, 2020–2030

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Armenia	3.0	2.9	-0.2	-0.5	13,352	19,975	4.0	4.1	4,419	6,927	4.2	4.6	1.7	2.9	2.9	-0.9	-1.6	-3.7
Change (percent) from pre-COVID-19 estimate					-5.3	-4.2	-	3.2	-5.3	-4.2	-	2.8	-	-	-	-	-	-
Azerbaijan	10.2	10.8	0.9	0.6	58,432	71,393	0.5	2.0	5,725	6,622	-0.4	1.5	6.7	3.1	11.2	-0.7	-1.4	2.2
Change (percent) from pre-COVID-19 estimate					-5.0	-8.8	-	-16.9	-5.0	-8.8	-	-21.9	-	-	-	-	-	-
Georgia	4.9	4.9	-0.0	-0.1	16,667	23,286	3.9	3.4	3,381	4,748	3.9	3.5	3.7	3.4	7.0	-0.8	-1.5	-0.7
Change (percent) from pre-COVID-19 estimate					-7.3	-8.7	-	-4.2	-7.3	-8.7	-	-4.2	-	-	-	-	-	-
Kyrgyzstan	6.0	6.4	1.1	0.8	6,831	10,014	4.0	3.9	1,145	1,557	2.9	3.1	2.5	3.8	4.5	0.1	-0.8	-2.5
Change (percent) from pre-COVID-19 estimate					-7.0	-1.0	-	20.0	-7.0	-1.0	-	26.1	-	-	-	-	-	-
Moldova	3.4	3.0	-1.0	-1.2	8,025	11,253	3.2	3.4	2,385	3,770	4.3	4.7	5.9	4.3	0.9	-2.9	-3.1	-2.7
Change (percent) from pre-COVID-19 estimate					-6.2	-5.4	-	2.7	-6.2	-5.4	-	2.0	-	-	-	-	-	-
Tajikistan	8.9	10.1	1.7	1.3	10,340	15,038	6.5	3.8	1,165	1,488	4.8	2.5	6.0	4.3	9.2	0.1	-0.9	0.8
Change (percent) from pre-COVID-19 estimate					-3.7	-2.3	-	4.0	-3.7	-2.3	-	6.2	-	-	-	-	-	-
Turkmenistan	5.5	6.0	1.1	0.9	48,455	70,777	6.3	3.9	8,764	11,744	5.2	3.0	8.7	6.3	-2.7	-0.7	-0.9	-5.3
Change (percent) from pre-COVID-19 estimate					-3.7	-1.3	-	7.0	-3.7	-1.3	-	9.2	-	-	-	-	-	-
Uzbekistan	30.6	32.9	0.9	0.7	73,567	111,910	6.3	4.3	2,407	3,406	5.3	3.5	9.9	6.7	20.2	-0.4	-1.2	7.9
Change (percent) from pre-COVID-19 estimate					-4.3	-3.0	-	3.3	-4.3	-3.0	-	3.9	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Commonwealth of Independent States	72.5	77.0	0.8	0.6	235,668	333,646	4.2	3.5	3,253	4,335	3.3	2.9	N/A	N/A	N/A	N/A	N/A	N/A
Change (percent) from pre-COVID-19 estimate					-4.7	-4.4	-	1.0	-4.7	-4.4	-	1.2						
Afghanistan	37	46	2.4	2.2	20,498	30,884	2.1	4.2	559	676	-0.3	1.9	2.4	5.7	5.7	0.5	-0.5	-1.7
Change (percent) from pre-COVID-19 estimate					-7.0	-6.2	-	1.9	-7.0	-6.2	-	4.2	-	-	-	-	-	-
Bangladesh	163	177	1.0	0.9	211,682	381,329	7.3	6.1	1,301	2,153	6.2	5.2	5.8	6.5	-2.4	0.4	-0.4	-3.4
Change (percent) from pre-COVID-19 estimate					-4.0	0.41	-	8.6	-4.0	0.41	-	10.1	-	-	-	-	-	-
India	1,326	1,461	1.2	1.0	3,079,261	5,660,058	7.4	6.3	2,322	3,875	6.1	5.3	4.3	4.8	0.1	-2.0	-2.2	-2.2
Change (percent) from pre-COVID-19 estimate					-4.6	-4.2	-	0.8	-4.6	-4.2	-	1.0	-	-	-	-	-	-
Nepal	30	32	1.2	0.7	25,030	38,186	4.6	4.3	825	1,176	3.4	3.6	5.6	4.8	-1.0	-2.0	-2.1	-2.9
Change (percent) from pre-COVID-19 estimate					-1.7	-0.4	-	3.2	-1.7	-0.4	-	3.8	-	-	-	-	-	-
Pakistan	214	243	1.4	1.3	254,760	396,970	5.0	4.5	1,192	1,635	3.5	3.2	4.7	5.0	4.0	-1.4	-1.8	-2.7
Change (percent) from pre-COVID-19 estimate					-4.8	-7.1	-	-5.5	-4.8	-7.1	-	-7.5	-	-	-	-	-	-
Sri Lanka	23	24	0.8	0.5	83,254	127,150	3.8	4.3	3,637	5,272	3.0	3.8	4.4	4.6	3.5	-0.8	-1.1	0.3
Change (percent) from pre-COVID-19 estimate					-9.1	-9.3	-	-0.7	-9.1	-9.3	-	-0.7	-	-	-	-	-	-
Central and South Asia	1,792	1,983	1.2	1.0	3,674,485	6,634,577	7.0	6.1	2,050.1	3,345.8	5.7	5.0	N/A	N/A	N/A	N/A	N/A	N/A
Change (percent) from pre-COVID-19 estimate					-4.7	-4.2	-	0.9	-4.7	-4.2	-	1.1						

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Democratic People's Republic of Korea	26	27	0.5	0.4	14,376	16,497	-0.4	1.4	561	618	-0.9	1.0	3.0	3.8	0.0	0.0	-0.9	-2.4
Change (percent) from pre-COVID-19 estimate					-0.8	-1.9	-	-7.7	-0.8	-1.9	-	-10.5	-	-			-	-
Mongolia	3	3	1.2	0.7	14,073	21,961	4.3	4.6	4,442	6,454	3.0	3.8	5.0	5.5	4.4	-0.1	-1.0	-2.5
Change (percent) from pre-COVID-19 estimate					-4.3	-1.0	-	8.4	-4.3	-1.0	-	10.2	-	-	-	-	-	-
Yemen	30	36	2.4	1.8	19,282	31,310	-7.8	5.0	645	878	-9.9	3.1	32.6	8.9	-8.8	-2.0	-2.3	-13.0
Change (percent) from pre-COVID-19 estimate					-1.2	-0.8	-	1.0	-1.2	-0.8	-	1.6	-	-	-	-	-	-
Other Asia	59	66	1.5	1.1	47,731	69,768	-2.8	3.9	813	1,061	-4.2	2.7	N/A	N/A	N/A	N/A	N/A	N/A
Change (percent) from pre-COVID-19 estimate					-2.0	-1.1	-	2.5	-2.0	-1.1	-	3.6						
Cambodia	17	19	1.5	1.2	20,589	36,684	7.1	5.9	1,216	1,928	5.5	4.7	2.5	3.2	-0.8	-0.7	-1.1	-2.5
Change (percent) from pre-COVID-19 estimate					-7.7	-8.1	-	-0.9	-7.7	-8.1	-	-1.1	-	-	-	-	-	-
Indonesia	267	285	0.9	0.7	1,210,696	2,058,582	5.0	5.5	4,534	7,219	4.1	4.8	4.0	3.1	1.2	-2.2	-0.2	-0.1
Change (percent) from pre-COVID-19 estimate					-4.4	-0.7	-	8.0	-4.4	-0.7	-	9.2	-	-	-	-	-	-
Laos	7	8	1.5	1.3	13,558	23,948	6.8	5.9	1,820	2,827	5.2	4.5	1.6	3.9	1.2	-1.1	-1.5	-1.3
Change (percent) from pre-COVID-19 estimate					-5.4	-6.4	-	-1.9	-5.4	-6.4	-	-2.4	-	-	-	-	-	-
Philippines	109	126	1.6	1.4	343,787	582,258	6.4	5.4	3,149	4,633	4.7	3.9	2.6	3.0	2.2	-1.6	-1.0	-0.3
Change (percent) from pre-COVID-19 estimate					-5.1	-2.9	-	4.6	-5.1	-2.9	-	6.3	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Vietnam	99	105	0.9	0.7	205,286	364,427	6.7	5.9	2,079	3,455	5.7	5.2	2.9	4.3	0.5	-0.9	-1.5	-1.9
Change (percent) from pre-COVID-19 estimate					-3.6	-2.7	-	1.7	-3.6	-2.7	-	1.9	-	-	-	-	-	-
Southeast Asia	499	544	1.1	0.9	1,793,916	3,065,899	5.5	5.5	3,593	5,638	4.4	4.6	N/A	N/A	N/A	N/A	N/A	N/A
Change (percent) from pre-COVID-19 estimate					-4.5	-1.5	-	6.3	-4.5	-1.5	-	7.5						
Asia	**2,423**	**2,670**	**1.2**	**1.0**	**5,751,800**	**10,103,889**	**6.3**	**5.8**	**2,374**	**3,785**	**5.1**	**4.8**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Change (percent) from pre-COVID-19 estimate					-4.6	-3.4	-	2.4	-4.6	-3.4	-	2.9						
Bolivia	12	13	1.5	1.3	29,375	41,239	4.3	3.5	2,524	3,110	2.8	2.1	3.0	3.7	-1.4	0.0	-0.4	-3.0
Change (percent) from pre-COVID-19 estimate					-6.4	-7.3	-	-2.8	-6.4	-7.3	-	-4.5	-	-	-	-	-	-
Colombia	49	53	1.0	0.8	383,988	520,326	2.4	3.1	7,823	9,824	1.4	2.3	4.6	3.0	6.6	-0.6	-0.6	1.3
Change (percent) from pre-COVID-19 estimate					-4.7	-2.8	-	7.2	-4.7	-2.8	-	9.8	-	-	-	-	-	-
Dominican Republic	10	11	0.1	0.8	85,861	129,676	6.1	4.2	8,177	11,362	6.0	3.3	2.2	3.6	2.4	1.3	0.1	-0.2
Change (percent) from pre-COVID-19 estimate					-5.7	-6.9	-	-3.1	-5.7	-6.9	-	-3.8	-	-	-	-	-	-
Ecuador	17	19	1.3	1.0	82,856	110,387	0.5	2.9	4,901	5,889	-0.8	1.9	1.3	2.7	-	-	-0.7	-5.0
Change (percent) from pre-COVID-19 estimate					-6.5	-2.8	-	16.2	-6.5	-2.8	-	27.6	-	-			-	-
El Salvador	6	6	0.25	0.20	21,924	27,230	2.4	2.2	3,526	4,295	2.2	2.0	0.6	2.4	-	-	-0.8	-1.8
Change (percent) from pre-COVID-19 estimate					-7.4	-4.3	-	18.1	-7.4	-4.3	-	20	-	-			-	-
Guatemala	17	20	2.9	1.5	55,130	80,367	3.3	3.8	3,214	4,044	0.4	2.3	3.8	3.7	-2.3	-0.8	-1.0	-2.6
Change (percent) from pre-COVID-19 estimate					-4.8	-1.9	-	8.8	-4.8	-1.9	-	15.2	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Haiti	11	12	1.7	1.1	8,002	10,097	1.3	2.4	723	814	-0.4	1.2	13.5	5.7	1.5	-0.8	-1.5	-1.1
Change (percent) from pre-COVID-19 estimate					-5.4	-6.6	-	-5.1	-5.4	-6.6	-	-9.4	-	-	-	-	-	-
Honduras	9	11	1.6	1.3	21,475	31,039	3.9	3.8	2,269	2,878	2.25	2.41	3.8	5.8	0.9	-0.4	-1.0	-1.6
Change (percent) from pre-COVID-19 estimate					-5.5	-4.9	-	1.6	-5.5	-4.9	-	2.4	-	-	-	-	-	-
Jamaica	3	3	-0.8	-0.2	13,659	16,957	1.4	2.2	4,863	6,160	2.2	2.4	3.6	4.1	1.3	-1.6	-2.1	-5.0
Change (percent) from pre-COVID-19 estimate					-7.2	-5.0	-	11.7	-7.2	-5.0	-	10.6	-	-	-	-	-	-
Nicaragua	6	7	1.0	0.9	10,859	13,303	1.2	2.1	1,750	1,970	0.2	1.2	4.2	6.0	2.0	1.2	0.0	-0.3
Change (percent) from pre-COVID-19 estimate					-5.1	-9.2	-	-18.1	-5.1	-9.2	-	-27	-	-	-	-	-	-
Peru	32	34	1.0	0.8	204,674	297,409	3.5	3.8	6,413	8,634	2.5	3.0	2.7	2.5	2.1	-0.2	-0.6	-0.4
Change (percent) from pre-COVID-19 estimate					-8.0	-6.3	-	5.2	-8.0	-6.3	-	6.6	-	-	-	-	-	-
Latin America and the Caribbean	**173**	**190**	**1.2**	**0.9**	**917,803**	**1,278,030**	**2.9**	**3.4**	**5,306**	**6,736**	**1.6**	**2.4**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Change (percent) from pre-COVID-19 estimate					-5.9	-4.4	-	5.3	-5.9	-4.4	-	7.4						
Algeria	43	48	1.7	1.1	196,217	254,038	2.5	2.6	4,566	5,276	0.7	1.5	5.0	6.0	4.5	0.1	-0.8	-2.5
Change (percent) from pre-COVID-19 estimate					-6.5	0.1	-	35.8	-6.5	0.1	-	88.2	-	-	-	-	-	-
Egypt	104	126	2.5	1.9	301,731	442,949	4.7	3.9	2,898	3,509	2.2	1.9	15.6	4.2	5.2	-1.0	-1.5	-1.9
Change (percent) from pre-COVID-19 estimate					-3.3	-6.1	-	-7.3	-3.3	-6.1	-	-13.6	-	-	-	-	-	-
Morocco	35	38	1.0	0.8	121,699	177,375	3.1	3.8	3,481	4,682	2.1	3.0	1.4	2.2	2.9	-0.2	-0.8	-3.0
Change (percent) from pre-COVID-19 estimate					-7.2	-6.2	-	2.9	-7.2	-6.2	-	3.7	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Tunisia	12	12	1.0	0.5	49,839	71,706	1.8	3.7	4,252	5,804	0.8	3.2	5.2	4.3	8.4	1.1	-0.1	0.3
Change (percent) from pre-COVID-19 estimate					-7.1	-6.4	-	1.9	-7.1	-6.4	-	2.3	-	-	-	-	-	-
North Africa	**194**	**225**	**2.0**	**1.5**	**669,486**	**946,068**	**3.5**	**3.5**	**3,455**	**4,212**	**1.5**	**2.0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Change (percent) from pre-COVID-19 estimate					-5.2	-4.6	-	2.1	-5.2	-4.6	-	3.7						
Cameroon	27	34	2.6	2.4	38,920	57,499	4.4	4.0	1,443	1,674	1.8	1.5	1.5	2.5	3.4	-1.5	-2.3	-1.1
Change (percent) from pre-COVID-19 estimate					5.8	6.4	-	1.6	5.8	6.4	-	4.2	-	-	-	-	-	-
Central African Republic	6	7	2.1	2.0	1,725	2,579	4.6	4.1	288	352	2.4	2.0	20.9	3.8	-13.2	-2.7	-3.4	-14.0
Change (percent) from pre-COVID-19 estimate					-3.4	-4.7	-	-3.2	-3.4	-4.7	-	-6.1	-	-	-	-	-	-
Congo	5	7	2.1	2.3	14,021	18,486	0.2	2.8	2,649	2,770	-1.9	0.4	2.5	2.0	2.4	-1.1	-1.7	-4.0
Change (percent) from pre-COVID-19 estimate					-5.1	-4.3	-	3.0	-5.1	-4.3	-	22.1	-	-	-	-	-	-
Democratic Republic of the Congo	89	109	2.4	2.0	36,278	59,305	4.8	5.0	406	545	2.3	3.0	18.0	1.6	-3.2	1.2	-1.0	-6.0
Change (percent) from pre-COVID-19 estimate					-6.5	-7.7	-	-2.7	-6.5	-7.7	-	-4.4	-	-	-	-	-	-
Central Africa	***128***	***157***	***2.4***	***2.1***	***90,945***	***137,870***	***3.8***	***4.2***	***713***	***877***	***1.4***	***2.1***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***
Change (percent) from pre-COVID-19 estimate					-5.8	-6.5	-	-1.9	-5.8	-6.5	-	-3.8						
Burundi	13	17	3.3	3.2	2,242	2,914	-0.3	2.7	177	169	-3.5	-0.5	6.5	7.2	-0.8	-0.5	-0.6	-1.5
Change (percent) from pre-COVID-19 estimate					-6.7	-4.4	-	10.5	-6.7	-4.4	-	-33.4	-	-	-	-	-	-

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Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Chad	17	23	7.5	3.0	12,983	18,977	-0.2	3.9	769	833	-7.1	0.8	1.3	2.5	3.6	-1.5	-2.3	-0.6
Change (percent) from pre-COVID-19 estimate					-3.5	0.1	-	10.9	-3.5	0.1	-	84.4	-	-	-	-	-	-
Eritrea	6	7	0.9	1.2	3,113	4,296	3.2	3.3	512	628	2.3	2.1	9.1	7.8	-7.2	-5.2	-3.8	-10.8
Change (percent) from pre-COVID-19 estimate					-3.2	0.1	-	11.8	-3.2	0.1	-	19.8	-	-	-	-	-	-
Ethiopia	115	149	2.9	2.7	61,860	110,530	8.7	6.0	540	741	5.7	3.2	10.6	7.6	-0.4	1.4	-0.5	-2.4
Change (percent) from pre-COVID-19 estimate					-4.6	-8.9	-	-7.5	-4.6	-8.9	-	-12.8	-	-	-	-	-	-
Kenya	50	57	1.8	1.3	66,026	110,929	5.7	5.3	1,324	1,962	3.9	4.0	6.1	4.8	-1.5	0.1	-0.7	-2.3
Change (percent) from pre-COVID-19 estimate					-4.5	-3.8	-	1.3	-4.5	-3.8	-	1.8	-	-	-	-	-	-
Rwanda	13	15	2.2	1.7	11,238	18,734	7.3	5.2	884	1,251	4.9	3.5	3.9	3.4	3.3	0.8	-0.3	-3.5
Change (percent) from pre-COVID-19 estimate					-3.1	-2.9	-	0.5	-3.1	-2.9	-	0.8	-	-	-	-	-	-
Somalia	12	15	2.0	2.5	1,320	1,715	2.7	2.7	112	114	0.7	0.2	1.7	2.9	1.5	1.4	-0.9	-2.0
Change (percent) from pre-COVID-19 estimate					-5.3	-5.4	-	-0.4	-5.3	-5.4	-	-6.8	-	-	-	-	-	-
Sudan	46	59	4.6	2.6	73,423	87,431	2.7	1.8	1,612	1,482	-1.8	-0.8	33.3	14.4	16.4	-8.1	-2.7	4.0
Change (percent) from pre-COVID-19 estimate					-9.1	-15.4	-	-29	-9.1	-15.4	-	570	-	-	-	-	-	-
Tanzania	59	76	2.8	2.7	56,657	87,604	6.2	4.5	968	1,152	3.3	1.8	4.6	3.0	3.6	1.7	-0.3	-0.6
Change (percent) from pre-COVID-19 estimate					-3.7	-4.9	-	-2.9	-3.7	-4.9	-	-6.8	-	-	-	-	-	-
Uganda	44	58	3.3	3.0	30,970	53,166	5.2	5.6	712	909	1.8	2.5	4.5	4.3	4.7	2.1	-0.3	-0.3
Change (percent) from pre-COVID-19 estimate					-2.4	-5.0	-	-4.8	-2.4	-5.0	-	-9.8	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
East Africa	***372***	***476***	***3.1***	***2.5***	***319,832***	***496,297***	***5.1***	***4.5***	***859***	***1,042***	***2.0***	***2.0***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***
Change (percent) from pre-COVID-19 estimate					-5.2	-7.3	-	-5.0	-5.2	-7.3	-	-10.5						
Angola	33	45	3.6	3.4	98,762	135,480	-0.7	3.2	3,037	2,985	-4.1	-0.2	22.0	10.4	5.9	-1.4	-2.1	0.3
Change (percent) from pre-COVID-19 estimate					-2.4	-2.0	-	1.3	-2.4	-2.0	-	-18.8	-	-	-	-	-	-
Lesotho	2	2	0.2	-0.1	2,829	3,965	1.2	3.4	1,437	2,031	1.0	3.5	4.9	4.4	1.9	-0.5	-2.2	-2.5
Change (percent) from pre-COVID-19 estimate					-6.2	-2.1	-	14.9	-6.2	-2.1	-	14.5	-	-	-	-	-	-
Madagascar	27	33	2.6	2.2	11,872	17,398	4.2	3.9	440	521	1.6	1.7	7.1	5.6	3.1	1.2	0.1	0.1
Change (percent) from pre-COVID-19 estimate					-3.7	-2.5	-	3.4	-3.7	-2.5	-	8.1	-	-	-	-	-	-
Malawi	21	29	3.4	3.3	9,867	14,736	3.4	4.1	466	503	0.0	0.8	15.0	5.5	-1.5	-3.1	-3.8	-5.0
Change (percent) from pre-COVID-19 estimate					-3.8	-7.6	-	-9.4	-3.8	-7.6	-	-34.2	-	-	-	-	-	-
Mozambique	29	37	2.5	2.5	16,575	26,883	3.9	5.0	579	734	1.3	2.4	8.6	4.9	7.4	1.4	-0.4	0.6
Change (percent) from pre-COVID-19 estimate					-2.2	-1.4	-	1.6	-2.2	-1.4	-	3.4	-	-	-	-	-	-
Namibia	3	3	2.0	1.8	14,491	19,530	1.2	3.0	5,510	6,222	-0.8	1.2	5.2	4.8	0.5	-0.6	-2.3	-3.5
Change (percent) from pre-COVID-19 estimate					-4.4	-2.7	-	6.3	-4.4	-2.7	-	16.9	-	-	-	-	-	-
Swaziland	1	1	-5.0	0.6	5,487	6,722	1.4	2.1	4,968	5,723	6.8	1.4	5.8	4.6	1.0	-0.5	-2.2	-3.2
Change (percent) from pre-COVID-19 estimate					-2.2	-1.8	-	2.1	-2.2	-1.8	-	3.0	-	-	-	-	-	-
Zambia	17	23	3.0	2.9	28,721	42,776	3.3	4.1	1,648	1,849	0.3	1.2	10.1	4.8	6.1	1.0	-1.0	0.5
Change (percent) from pre-COVID-19 estimate					-6.5	-7.9	-	-3.8	-6.5	-7.9	-	-12.0	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Zimbabwe	15	18	1.5	2.0	14,510	21,488	1.7	4.0	998	1,218	0.2	2.0	2.3	4.3	-	-	-1.9	-3.9
Change (percent) from pre-COVID-19 estimate					-10.6	-15.0	-	-11.6	-10.6	-15.0	-	-20.3	-	-			-	-
Southern Africa	***147***	***192***	***2.7***	***2.7***	***203,115***	***288,978***	***1.0***	***3.6***	***1,382***	***1,507***	***-1.6***	***0.9***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***
Change (percent) from pre-COVID-19 estimate					-3.9	-4.3	-	-1.1	-3.9	-4.3	-	-4.4						
Benin	12	15	2.8	2.5	11,427	20,129	5.0	5.8	956	1,320	2.2	3.3	0.3	1.0	4.60	-0.04	-0.8	1.1
Change (percent) from pre-COVID-19 estimate					-1.7	-2.5	-	-1.6	-1.7	-2.5	-	-2.7	-	-	-	-	-	-
Guinea-Bissau	2	2	2.1	2.6	1,200	1,670	5.3	3.4	623	672	3.1	0.8	1.9	2.8	3.00	-1.88	-1.9	-0.0
Change (percent) from pre-COVID-19 estimate					-5.7	-7.1	-	-4.5	-5.7	-7.1	-	-16.6	-	-	-	-	-	-
Burkina Faso	21	26	2.0	2.4	15,086	23,919	5.6	4.7	724	907	3.5	2.3	0.6	2.0	4.26	-1.06	-2.2	-0.6
Change (percent) from pre-COVID-19 estimate					-3.0	-1.9	-	2.6	-3.0	-1.9	-	5.3	-	-	-	-	-	-
Cabo Verde	1	1	1.3	1.1	2,062	3,177	3.9	4.4	3,535	4,873	2.5	3.3	0.2	1.5	5.03	-0.26	-1.1	1.5
Change (percent) from pre-COVID-19 estimate					-8.0	-6.5	-	4.1	-8.0	-6.5	-	5.5	-	-	-	-	-	-
Côte d'Ivoire	27	34	3.3	2.1	46,496	69,217	7.7	4.1	1,692	2,041	4.3	1.9	0.8	0.9	4.05	0.34	-0.6	0.7
Change (percent) from pre-COVID-19 estimate					-3.4	0.6	-	11.7	-3.4	0.6	-	28.1	-	-	-	-	-	-
Gambia	2	3	2.1	1.6	1,276	2,007	4.5	4.6	587	786	2.4	3.0	6.7	4.5	-0.81	-0.05	-0.9	-3.1
Change (percent) from pre-COVID-19 estimate					-2.2	0.3	-	6.0	-2.2	0.3	-	9.6	-	-	-	-	-	-
Ghana	29	36	2.2	2.1	58,090	91,237	5.3	4.6	1,980	2,526	3.0	2.5	13.1	7.2	0.30	0.09	-0.3	-0.7
Change (percent) from pre-COVID-19 estimate					-3.9	-3.1	-	1.9	-3.9	-3.1	-	3.6	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
Guinea	13	16	1.2	2.8	12,365	20,060	7.8	5.0	987	1,218	6.5	2.1	8.9	6.9	-0.48	-0.05	-0.8	-2.5
Change (percent) from pre-COVID-19 estimate					-2.4	0.8	-	7.3	-2.4	0.8	-	18.3	-	-	-	-	-	-
Liberia	5	7	2.6	2.7	1,663	2,233	0.6	3.0	328	337	-1.9	0.27	14.8	17.7	0.95	-6.47	-5.3	-1.6
Change (percent) from pre-COVID-19 estimate					-3.8	-1.1	-	10.8	-3.8	-1.1	-	-2947	-	-	-	-	-	-
Mali	20	26	3.1	2.9	15,770	22,887	5.4	3.8	807	879	2.2	0.9	0.2	1.0	4.68	-0.14	-0.6	0.7
Change (percent) from pre-COVID-19 estimate					-3.0	-3.3	-	-1.0	-3.0	-3.3	-	-4.0	-	-	-	-	-	-
Mauritania	4	5	2.2	1.9	6,125	10,238	3.0	5.3	1,529	2,111	0.8	3.3	2.5	2.0	2.54	-0.16	-1.0	-4.1
Change (percent) from pre-COVID-19 estimate					-6.6	-8.5	-	-4.0	-6.6	-8.5	-	-6.2	-	-	-	-	-	-
Niger	21	28	3.3	3.0	9,559	20,140	5.0	7.7	452	710	1.7	4.6	1.7	1.4	3.14	-0.44	-0.9	-0.5
Change (percent) from pre-COVID-19 estimate					-4.8	-2.1	-	4.0	-4.8	-2.1	-	6.7	-	-	-	-	-	-
Nigeria	214	274	3.3	2.5	462,353	660,337	1.1	3.6	2,160	2,410	-2.1	1.1	12.9	9.4	2.71	-3.47	-0.9	-0.1
Change (percent) from pre-COVID-19 estimate					-5.3	-6.2	-	-2.7	-5.3	-6.2	-	-8.2	-	-	-	-	-	-
Senegal	16	19	2.4	2.2	26,907	40,825	6.6	4.3	1,710	2,095	4.1	2.1	0.9	2.1	3.99	-1.18	-1.6	0.7
Change (percent) from pre-COVID-19 estimate					-3.5	-4.8	-	-3.4	-3.5	-4.8	-	-6.6	-	-	-	-	-	-
Sierra Leone	7	9	2.4	2.5	3,720	5,629	-0.9	4.2	562	662	-3.2	1.7	13.6	11.5	1.25	0.08	-0.8	-1.3
Change (percent) from pre-COVID-19 estimate					-7.1	-8.3	-	-3.1	-7.1	-8.3	-	-7.4	-	-	-	-	-	-
Togo	9	11	2.7	2.4	5,639	8,538	5.0	4.2	655	780	2.3	1.8	1.0	2.3	3.87	-1.31	-2.6	-1.0
Change (percent) from pre-COVID-19 estimate					-4.0	-6.1	-	-5.0	-4.0	-6.1	-	-11.1	-	-	-	-	-	-

Continued—

Appendix table 2-1

Summary Macroeconomic information for 76 countries in the International Food Security Assessment—continued

Country	Population (million)		Population: Annual growth rate (pct)		Gross Domestic Product (GDP, million 2010 USD)		GDP: Annual growth rate (pct)		Per capita GDP (2010 USD)		Per capita GDP: Annual growth rate (pct)		CPI: Annual growth rate (pct)		RER: Annual growth rate (pct)		Real domestic price of major grain: Annual growth rate (pct)	
	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2020	2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030	2014-2019	2020-2030
West Africa	***402***	***513***	***3.0***	***2.5***	***679,738***	***1,002,241***	***2.4***	***4.0***	***1,693***	***1,955***	***-0.5***	***1.5***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***	***N/A***
Change (percent) from pre-COVID-19 estimate					-4.8	-5.0	-	-0.6	-4.8	-5.0	-	-1.6						
Sub-Saharan Africa	**1,048**	**1,338**	**2.9**	**2.5**	**1,293,629**	**1,925,386**	**2.9**	**4.1**	**1,234**	**1,439**	**0.0**	**1.6**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Change (percent) from pre-COVID-19 estimate					-4.8	-5.6	-	-2.1	-4.8	-5.6	-	-5.2						
World	**3,838**	**4,422**	**1.7**	**1.4**	**8,632,719**	**14,253,373**	**5.1**	**5.1**	**2,249**	**3,224**	**3.4**	**3.7**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Change (percent) from pre-COVID-19 estimate					-4.8	-3.9	0.0	2.1	-4.8	-3.9	0.0	3.0						

Note: COVID-19 = Coronavirus disease of 2019.

Source: USDA, Economic Research Service.