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International Food Security Assessment, 2021–31

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Felix Baquedano, Yacob Abrehe Zereyesus, Constanza Valdes, and Kayode Ajewole

Abstract

This report presents results from the United States Department of Agriculture (USDA), Economic Research Service's (ERS) International Food Security Assessment (IFSA) analysis, which uses a demand-driven framework that evaluates consumer responsiveness to changes in prices and incomes for 76 low- and middle-income countries. Reflecting 2021's anticipated lower income levels, despite anticipated growth for most countries, the number of food insecure people is estimated at 1.2 billion, almost 291 million higher than in 2020. A sharp increase in global food insecurity was experienced in 2020, as compared to 2019, due to the COVID-19 pandemic. Most of the additional food insecure people in 2021 are located in the Central and South Asia (64.1 percent or 186.8 million) sub-region—including India, which drives food security trends in the Asia region. While the Sub-Saharan Africa region is projected to account for 20.6 percent (60 million) of the additional food insecure population. The remaining additional 15.3 percent (44.7 million) food insecure people in 2021 are located in other Asian sub-regions, Latin America and the Caribbean, and North Africa. The prevalence of food insecurity in 2021 for the countries in the assessment is estimated at 30.8 percent of the overall population in the countries, an increase of 6.8 percentage points relative to the 2020 estimate. In 2031, the number of food insecure people is projected to decline from the 2021 estimate by 47.4 percent (637.7 million people), which is 14.0 percent of the projected population of the countries included in this assessment. Given the evolving nature of the impacts from the COVID-19 pandemic and the long-term effects on individual country economies, the estimation results presented in this report contain a high degree of uncertainty. It is important to note the projections do not consider the impacts of unknown future events—such as climate change, armed conflict, and political and economic instability.

Keywords: Calories, Coronavirus, COVID-19, food demand, food insecurity, food prices, food security, income, nutritional target, pandemic, Asia, Latin America and the Caribbean, North Africa, Sub-Saharan Africa, U.S. Department of Agriculture, USDA, Economic Research Service, ERS.

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Preface

This report continues the series of Global Food Assessments (GFA) in developing countries that begun in the late 1970s by USDA's Economic Research Service (ERS). In 1993, the title of the series was changed to Food Aid Needs Assessment (FANA) to reflect the reports' contents more accurately, which assess selected developing countries with recent or ongoing food deficits. However, not all countries experiencing significant food deficits are included due to lack of data on key metrics such as average caloric consumption, prices, or macroeconomic figures. In 1997, ERS widened the analysis beyond the assessment of aggregate food availability to include more dimensions of food security and the title was revised again to Food Security Assessment (FSA). Starting with the report published in July 2011, ERS changed the name to International Food Security Assessment (IFSA) to clarify the geographic scope of the analysis.

Contents

Errata:

On August 3, 2021, the abstract and introduction section was updated to correct typographical errors. No other components of the report were affected by the error.

On August 11, 2021, the abstract and introduction sections were updated to correct errors. No other components of the report were affected by the errors.

USDA Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

A report summary from the Economic Research Service *July 2021*

International Food Security Assessment, 2021–31

Felix Baquedano, Yacob Abrehe Zereyesus, Constanza Valdes, and Kayode Ajewole

What Is the issue?

Millions of people around the world are food insecure and do not consume sufficient calories to sustain an active and healthy life. What factors affect the present and future prevalence of international food security? Agricultural production and market conditions affect the supply of food available in a given country. And, income, food prices, and economic inequality are major factors determining the ability of people to access food. Widespread food availability, rising income, and low food prices improve a country's food security by increasing access, although the extent of these gains are dependent on the distribution of income within countries. On the other hand, adverse income, prices, or food supply shocks can increase food insecurity, as these factors collectively impact low- and middle-income consumers' access to food. Measuring the shifts in consumer demand in response to these factors can help measure progress in food security. Even if demand may be fully met, a person could remain food insecure—as they might not be able to purchase enough calories to sustain an active and healthy life for their level of income. This report uses a demand-driven model that integrates income, price, and food supply shocks to assess current-year levels of food security and projected changes over the next decade for 76 low- and middle-income countries in Sub-Saharan Africa, North Africa, Latin America, the Caribbean, and Asia. The report helps USDA and its stakeholders estimate medium-term projections of food security in the selected countries. The 2021 report also analyzes the combined impact of lower incomes and price shocks associated with the lingering effects of the Coronavirus (COVID-19) pandemic on present and future food security.

What did the study find?

The report's results reflect the country and global level estimates of economic shocks from the COVID-19 pandemic at the time of estimation. The results are based on macroeconomic trends up to August 2020, consumption and production data up to January 2021, and price trends from January 2018 to December 2020. The report's projections do not consider the impacts of certain types of possible unknown events in the future, such as climate change, armed conflict, and political and economic instability.

The main findings for the 76 countries covered by this report are:

- Despite the anticipated overall rebound in per capita gross domestic product (GDP) growth in 2021, income is projected to remain below pre-pandemic levels for most countries in the assessment. This projected lower per capita GDP level in 2021 is the main underlying factor for the continued decline in food security.
- Due to the persistent effects of COVID-19 on income levels, the number of food insecure people in 2021 is estimated at 1.2 billion, an increase of almost 32 percent (291 million people) from the 2020 estimate. This suggests 30.8 percent of the estimated population of the 76 countries is unable to consume 2,100 kilocalories (kcal) a day, an average caloric level necessary to sustain a healthy and active lifestyle.
- Most of the additional 291 million people estimated to be food insecure are in Asia (72 percent of the total)—particularly in Bangladesh, India, Pakistan, and Indonesia—and in Sub-Saharan Africa (21 percent of the total).
- Despite the COVID-19-induced income shocks, food security is projected to improve in all 76 countries over the next 10 years. By 2031, the share of the population that is food insecure in the 76 countries studied is projected to fall to 14 percent (637.7 million people), a 47.4 percent drop in the number of food insecure people from 2021.
- The anticipated improvement in food security over the coming decade is driven by a projected steady income growth, relatively stable prices for major grains, and lower population growth, particularly in Asia, Latin America, and the Caribbean.

How was the study conducted?

The USDA, Economic Research Service (ERS) demand-oriented International Food Security Assessment (IFSA) model (described in the appendix) projects food demand and food gaps in 76 low- and middle-income countries through 2031. Food security is evaluated for each country by estimating the share of the population unable to reach a caloric target of 2,100 kilocalories 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 United Nations' Food and Agriculture Organization (FAO) Food Balance Sheets and FAO's Global Information Early Warning System's (GIEWS) Country Cereal Balance Sheet. Observed domestic prices are from FAO-GIEWS Food Price Monitoring and Analysis Tool. Tariff data are from the World Bank's 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 2030.

International Food Security Assessment, 2021–2031

Introduction

The U.S. Department of Agriculture's Economic Research Service's (ERS) International Food Security Assessment (IFSA) analysis[1] estimates per capita food demand and compares the estimations against a global nutritional target of 2,100 kilocalories[2] (kcal) per person per day. The nutritional target, set by the United Nations,[3] is an average Calorie level necessary to sustain a healthy and active lifestyle. The aim of the IFSA is to help USDA and its stakeholders estimate long-term projections of food insecurity in 76 low- and middle-income countries using income projections from ERS's International Macroeconomic Data Set, international and domestic food prices over the medium term,[4] and international food insecurity projections through 2031.

The current report incorporates current assumptions for key macroeconomic variables (e.g., income growth, inflation, and exchange rates) and population, reflecting the economic consequences of the global COVID-19 pandemic. The economies of the countries included in the assessment sharply contracted in 2020 due to the widespread pandemic, resulting lockdowns, and other control measures impacting business activity,[5] employment, and incomes. Although growth is projected to return to positive rates in 2021, real Gross Domestic Product (GDP) levels are anticipated to remain below levels seen before the global pandemic in 2021 and in years to follow.[6] The medium- to long-term path to economic recovery cannot be known with certainty, and the pace of economic recovery will vary across countries. Therefore, the report's results assume that the macro-economic trends—determined using the 2018–2020 period as a baseline—will not significantly vary from the anticipated trend over the 10-year projection period. In addition, this report's projections do not consider the impacts of possible unknown events in the future. These events could include: catastrophic weather, armed conflict, political and economic instability, as well as the potential for protracted effects from the COVID-19 pandemic.

Reflecting the continued effects of the COVID-19 pandemic on economic growth, food insecurity in 2021 is anticipated to further decline from last year for the population in the 76 countries included in the IFSA.

[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, IFSA cannot be compared directly with evaluations using household-level surveys. It is also difficult to extrapolate our results to Food Security Information Network's (FSIN) 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]A kilocalorie is the same as one Calorie. A kilocalorie is the amount of heat required to raise the temperature of one kilogram of water one degree Celsius.

[3]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).

[4]Medium-term price projections are taken from USDA Agricultural Projections to 2030, long-term projections report OCE-2021-1. These projections are then used to project medium-term domestic price trends, using data from the Global Information and Early Warning System (GIEWS) of the United Nations Food and Agriculture Organization.

[5]Some of the control measures that impacted business included, but not limited to, curfews, closures of large venues, restrictions on operations of hotels and restaurants, closures of borders.

[6]See the macroeconomics assumptions box at the end of this section for more details.

However, over the next decade, the food security status is projected to improve for most countries covered by the assessment. Principal findings for the countries covered by this report are:

- GDP per capita growth is anticipated to rebound in 2021. However, income is projected to remain mostly below levels achieved during the pre-pandemic period of 2017–2019. Moreover in 2021, GDP per capita is projected to be lower than in 2020 in 23 countries covered by the assessment—including India and Indonesia—which account for 40.8 percent of the population covered in the assessment. The projection for lower GDP per capita levels is the main underlying factor for the continued decline in food security in 2021.

- For the 76 countries included in IFSA, the prevalence of food insecurity in 2021 is estimated at 30.8 percent—or 6.8 percentage points higher than the estimate for 2020. The prevalence of food insecurity is estimated to be higher in 2021 than in 2020 in 56 of the 76 countries.

- The high prevalence of food insecurity in 2021 translates to more than 1.2 billion people potentially not having consistent access to the daily caloric target of 2,100 kcal.[7] The number of food insecure people in 2021 is estimated to be almost 291 million higher[8] than the 2020[9] estimate, an increase of 32.0 percent (figure 1).

- Central and South Asia sub-region (186.8 million people)—and in particular India—and Sub-Saharan Africa (60 million people) are estimated to account for almost 85 percent of the additional 291 million people estimated to be food insecure in 2021.

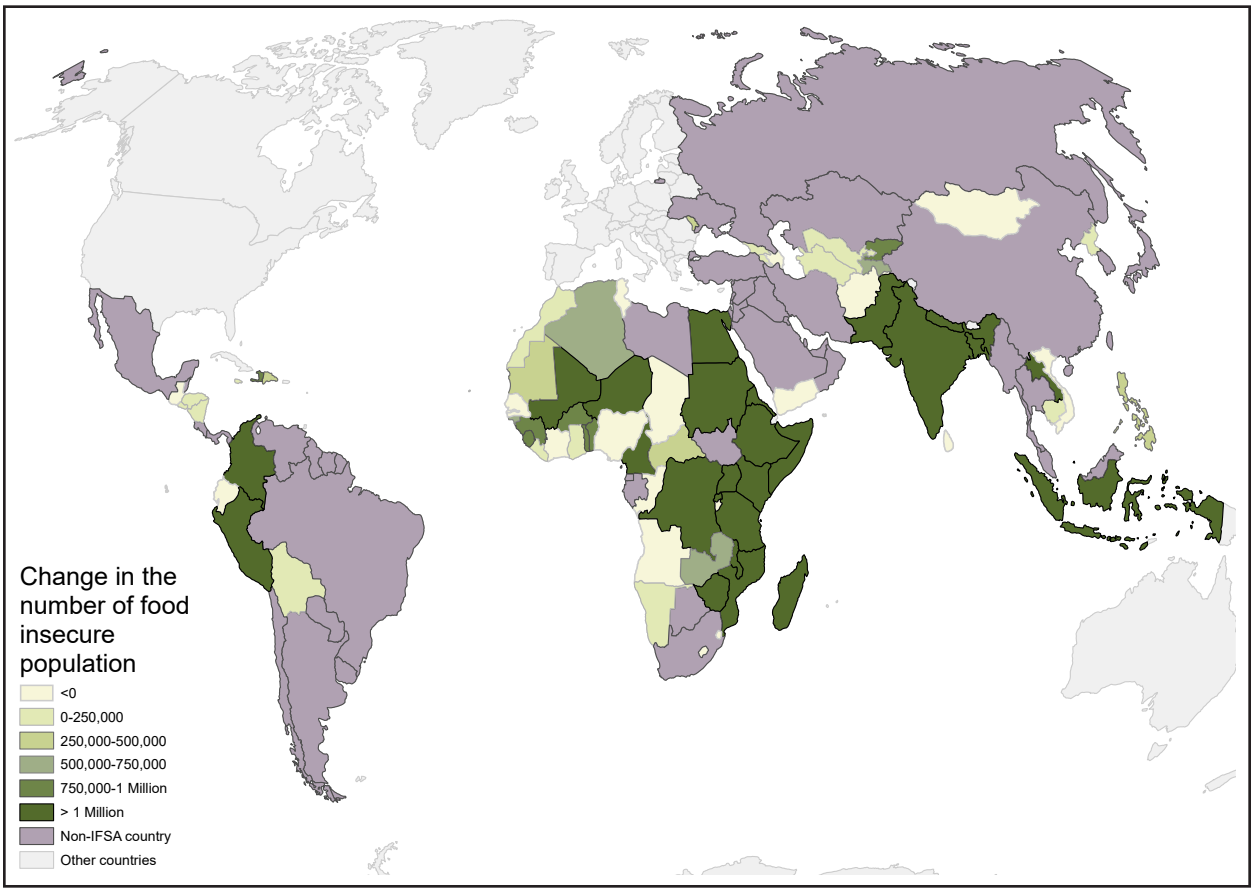
[7]The caloric target considered in the assessment is an average across men and women, age groups, regions, and activity levels.

[8]The United Nations Office for the Coordination of Humanitarian Affairs (2021), estimates a similar trend to the assessment and anticipate that acute food insecurity in 2021 will increase by 235 million people. For more details see: United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2021. Global Humanitarian Overview 2021. Geneva, Switzerland.

[9]For more on the ERS results of the impact of COVID-19 on food insecurity in 2020 see: Baquedano, F., Zereyesus, Y.A., Christensen, C., and Valdes, C., 2021. COVID-19 Working Paper: International Food Security Assessment, 2020–2030: COVID-19 Update and Impacts on Food Insecurity. COVID-19 Working Paper #AP-087, January 2021. U.S. Department of Agriculture, Economic Research Service.

Figure 1

In 2021, as the impacts of the COVID-19 pandemic on income levels linger, the number of food insecure people increases for some countries



Notes: COVID-19 = Coronavirus disease of 2019; IFSA = International Food Security Assessment.

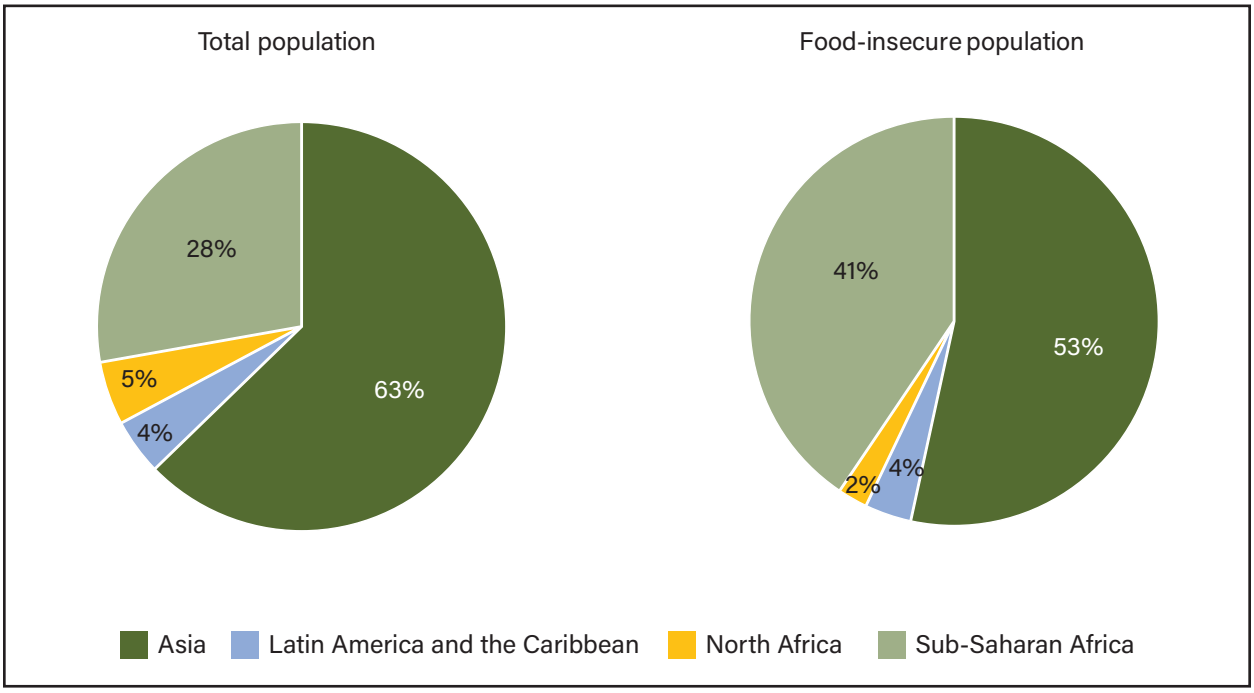
Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

- By 2031, the share of the population that is food insecure in the 76 countries studied is projected to fall to 14.1 percent, a 54.4 percent drop from its 2021 estimate. The number of people considered food insecure is projected to decline by 47.4 percent from 2021 to 637.7 million people.
- The food gap—defined as the amount of food needed for all food insecure to reach the caloric target of 2,100 kcal/day—indicates the intensity of food insecurity. The gap can be expressed in calories per capita per day or in grain-equivalent quantities. In addition, the food gap is used to measure the annual national food shortfall. For the 76 countries examined—on average—the daily caloric food gap is projected to decline by 19 percent, from 380 kcal (18.1 percent of the caloric target) in 2021 to 308 kcal (14.7 percent of the caloric target) in 2031.

Country coverage and observed food security trends

The 76 countries in this study are sub-divided across 4 major regions: 39 countries and 4 sub-regions in Sub-Saharan Africa (SSA), 22 countries and 4 sub-regions in Asia, 11 countries and 2 sub-regions in Latin America and the Caribbean (LAC), and 4 countries in North Africa (NAF). Estimated levels of food insecurity for 2021 vary greatly across these regions. Asia (647 million people) and SSA (491 million people) account for 94 percent of the total number of food insecure people in 2021 (figure 2). However, in 2021, SSA has the highest share of the population that is food insecure of any region at 44.9 percent (figure 3a). By contrast, 26.2 percent of the population in Asia is considered food insecure in 2021—with the prevalence of food insecurity being the highest in Mongolia, North Korea, and Yemen—averaging 72 percent across the 3 countries. The LAC region (with 44.7 million people) and NAF region (with 28.6 million people) account for the remaining 6 percent of food insecure people identified in the 2021 assessment (figures 2 and 3b). The prevalence of food insecurity in the LAC region averaged almost 26 percent in 2021—whereas in the NAF region, the same metric averaged 14.5 percent—making the latter region the most food secure in the study sample (figure 3a).

Figure 2
Asia accounts for 63.0 percent of the population of the 76 countries studied and 53.0 percent of the food insecure people in 2021



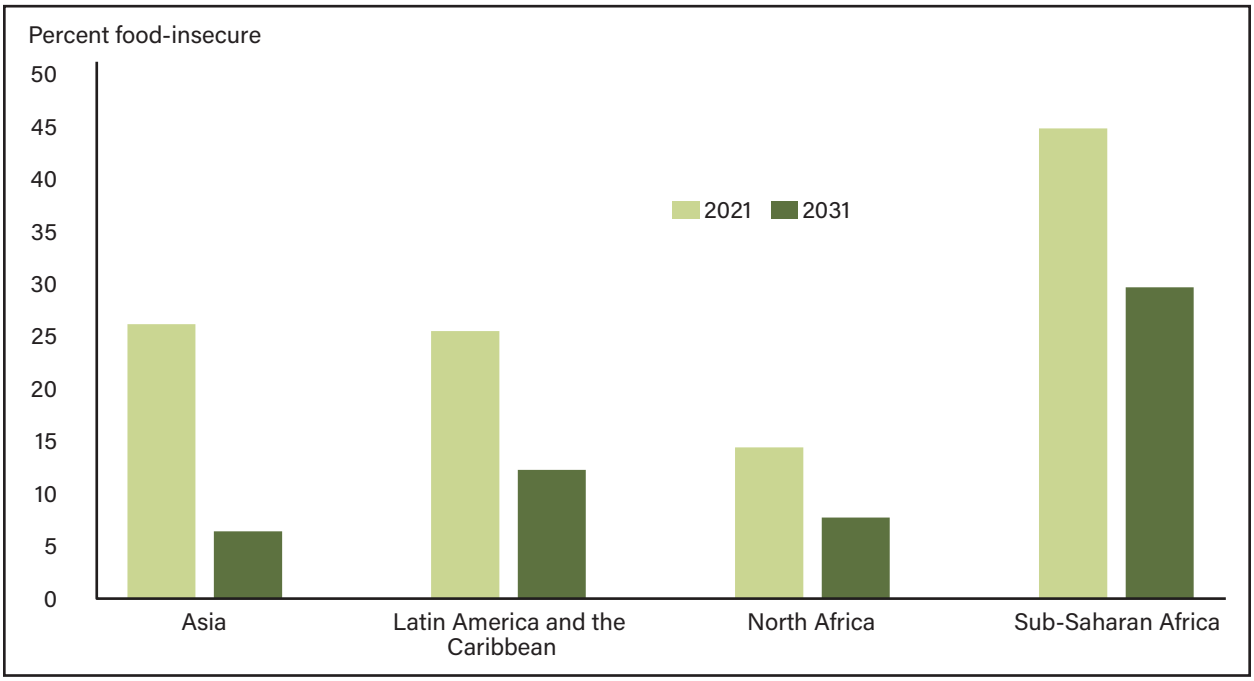
Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

Despite the projected lower income levels in 2021 (resulting from the COVID-19 pandemic), food security is projected to improve across all 76 countries over the next 10 years as GDP growth continues to recover. The share of the population that is food insecure is projected to fall to 14.0 percent (637.7 million people) by 2031, a 54.6 percent drop from the 2021 share of the food insecure population (figures 3a and 3b). By 2031, food security in Asia is projected to improve the most of all regions. The prevalence of food insecurity (6.4 percent of the population) and the number of food insecure people (175.7 million) are projected to decline by 72.9 percent and 75.4 percent, respectively, over 10 years. This projected improvement mainly reflects an estimated strong economic recovery from the COVID-19-induced recessions after 2021 for most of the

region, particularly in India. By contrast, over the next decade, SSA is anticipated to make the least progress at improving its food security metrics. While robust economic growth is projected after 2021 for SSA, population growth[10] is anticipated to outpace income growth over the coming 10-year period. The higher growth in population over income will likely result in lower real purchasing power of the average person in SSA. As a result, the decline in the prevalence of food insecurity in SSA is projected to be moderate. By 2031, in SSA the prevalence of food insecurity is projected to be 29.7 percent—a third lower than in 2021 (figure 3a). Despite the moderate decline in the prevalence of food insecurity by 2031, SSA is projected to reduce the number of food insecure people by 71 million from 2021 (figure 3a). In LAC, the prevalence of food insecurity is projected to decline by more than half to 12.3 percent, and the number of food insecure people will decline by almost half to 23.5 million by 2031. In NAF, food security is projected to improve over the next 10 years, with the prevalence of food insecurity falling below 8.0 percent and the number of food insecure people falling to less than 18 million in 2031 (figures 3a and 3b).

Figure 3a

By 2031, the percent of people food insecure is projected to decrease the most in the Asia region[1]



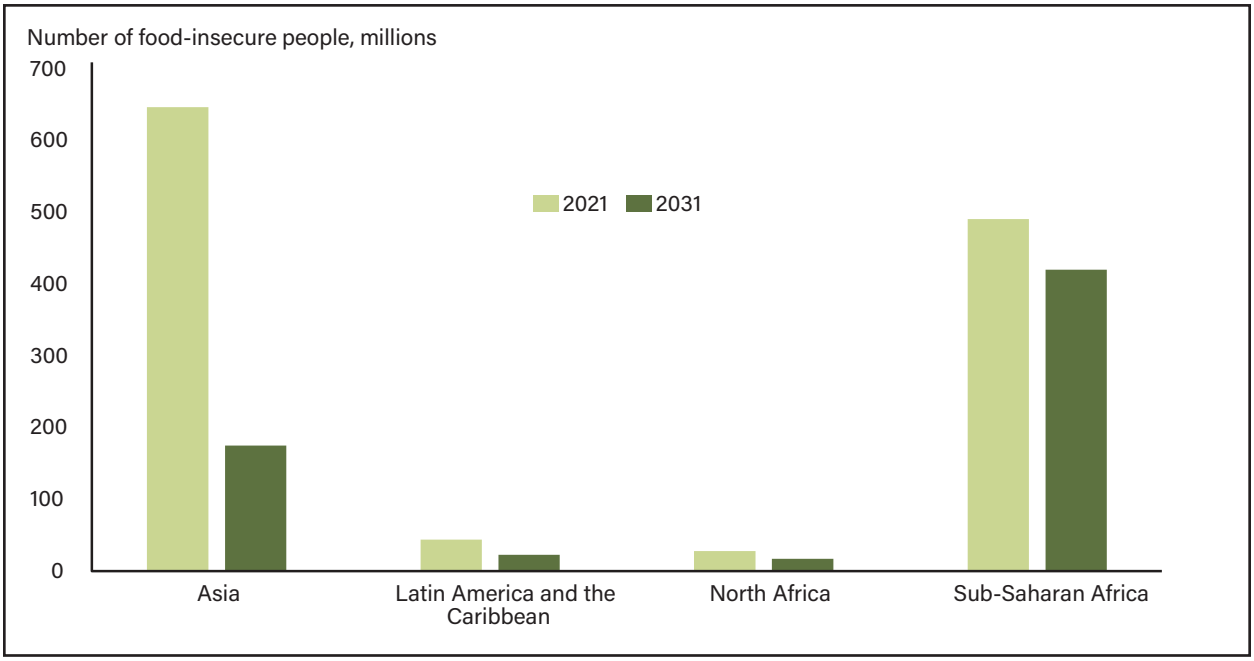
[1]Regions only include countries that are a focus of the International Food Security Assessment.

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

[10] Population growth projections for Sub-Saharan Africa, and all regions in the assessment, are obtained from the International Data Base (IDB) of the U.S. Department of Commerce, Bureau of the Census.

Figure 3b

The number of food insecure people by 2031 is projected to sharply decline for most IFSA regions,[1] as Asia is projected to make the most progress

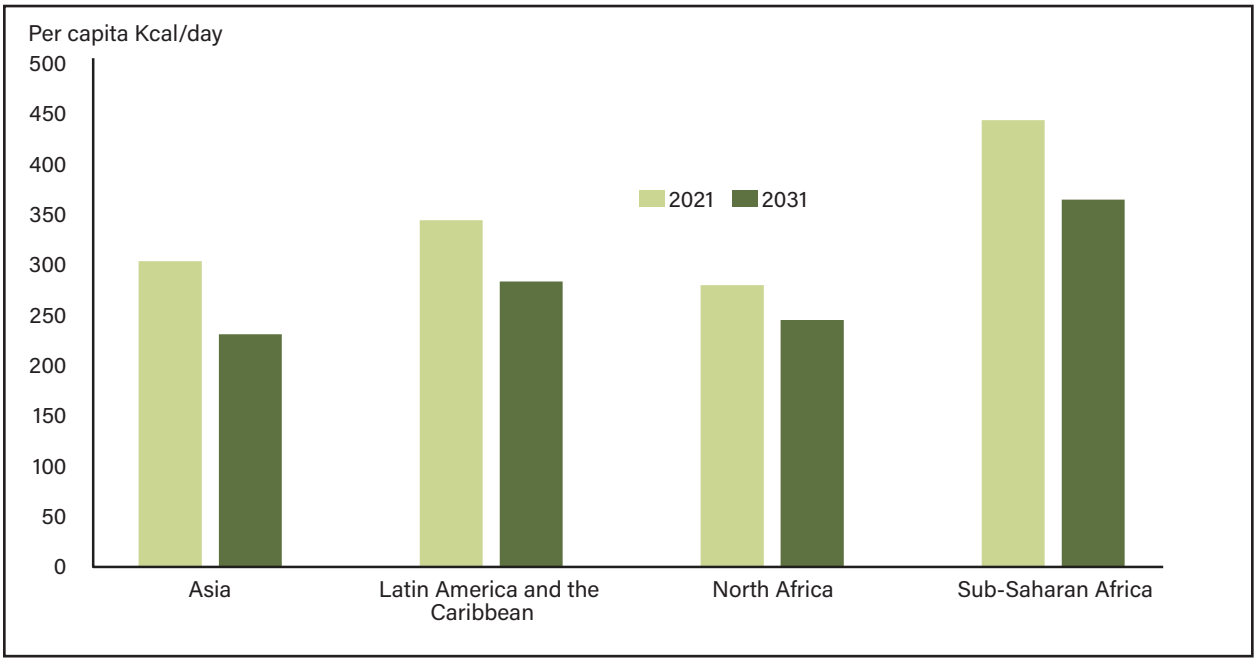


[1]Regions only include countries that are a focus of the International Food Security Assessment.

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

Figure 3c

Food gap projected to decline by 2031 in IFSA regions[1]



[1]Regions only include countries that are a focus of the International Food Security Assessment. A kilocalorie is the same as one Calorie (uppercase C). A kilocalorie is the amount of heat required to raise the temperature of one kilogram of water one degree Celsius.

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

Gross Domestic Product and international food price trends

The macroeconomic assumptions underlying the 2021–-2031 IFSA reflect the economic impact from the global spread of the COVID-19 pandemic, that began during the last quarter of 2019. Nearly all 76 IFSA countries were affected by decreased economic growth in 2020. Although, growth is projected to return to positive rates in 2021 for most IFSA countries, real per capita Gross Domestic Product (GDP) is expected to remain below levels seen before the global pandemic in 2021 and in years to follow. GDP per capita in 2021 is estimated to sharply increase[11] from 2020 in Asia and estimated to moderately improve in LAC (table 1). By contrast, in NAF, GDP per capita is estimated to decline from 2020. GDP is projected to remain relatively unchanged in SSA for 2021. For all regions, however, GDP per capita in 2021 remains below its pre-pandemic level of 2019 (table 1). Between 2021 and 2031, strong to moderate annual growth in GDP per capita is projected for Asia and LAC. Conversely, between 2021 and 2031, NAF and SSA are anticipated to have moderate income growth. By 2031, SSA is projected to lag the other IFSA regions in terms of GDP per capita, as GDP growth is outpaced by population growth.

Table 1
Inflation-adjusted per capita Gross Domestic Product (GDP) in IFSA regions, 2021 and 2031

	2019 (pre-COVID-19)	2021	2031	Change 2021/2020	Per capita GDP: Annual growth rate (2021-31)
	U.S. Dollars			Percent	
Asia	2,279	2,221	3,400	3.7	4.3
Latin America and Caribbean	5,395	4,936	6,222	1.8	2.3
North Africa	3,864	3,537	4,240	-4.6	1.8
Sub-Saharan Africa	1,378	1,311	1,505	0.7	1.4

Notes: Value in 2015 U.S. dollars to adjust for inflation. Regions only include countries that are a focus of the International Food Security Assessment.

Source: USDA, Economic Research Service based on results from the USDA, ERS International Macroeconomic Data Set.

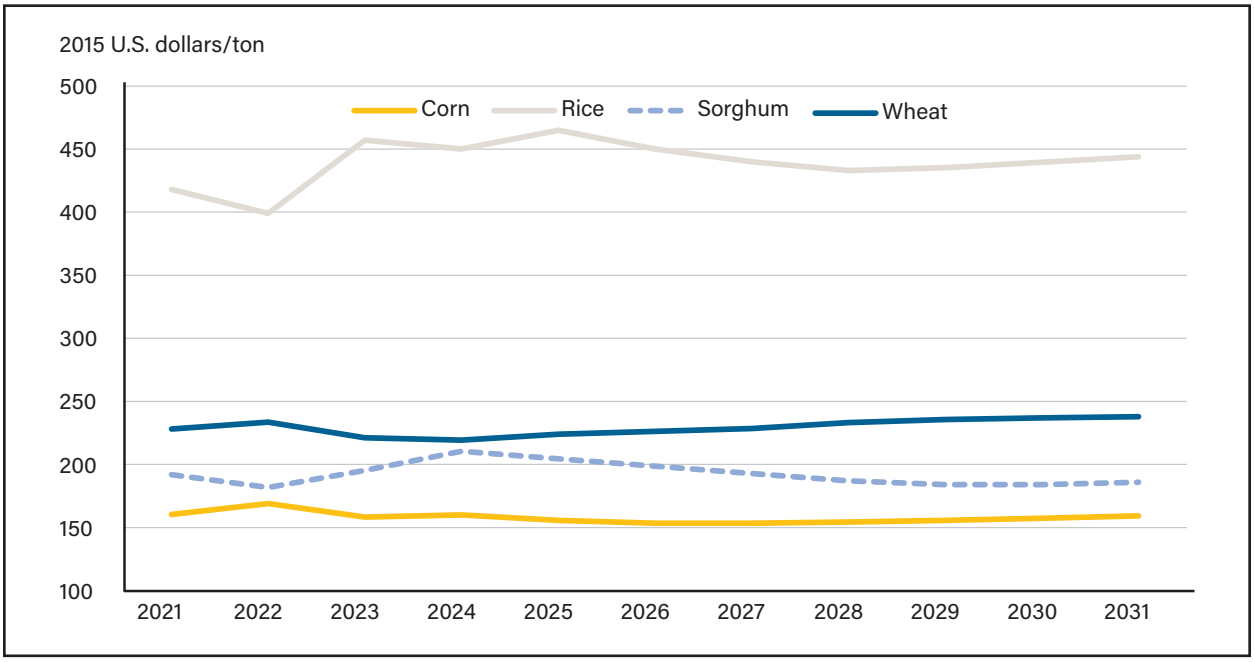
International food commodity prices are expected to remain relatively stable in inflation-adjusted terms over the coming decade[12] (figure 4). The price for sorghum is the only commodity price projected to decline over the coming 10-year period. In contrast, the projected prices for rice from 2021 to 2026 are anticipated to increase before stabilizing towards the end of the 10-year period. The relative price stability mainly reflects ample food supplies in world markets that will outweigh global demand (USDA, OCE, 2021). In some markets, world and domestic food prices are integrated through trade. In other cases, barriers to trade can cause domestic prices to move independently of world prices. Twenty-six of the 76 countries[13] covered in IFSA are projected to have rising real domestic prices of their major grain between 2021 and 2031. Fifteen of these countries are in SSA.

[11]Macroeconomic projections come from the USDA, ERS International Macroeconomic Data Set, which uses data from the World Bank Development Indicators, International Monetary Fund's International Financial Statistics, IHS Global Insight, and Oxford Economic Forecasting, as well as estimated and projected values developed by USDA, ERS. Appendix III provides the country, subregional, and regional macroeconomic projections that are used to model food insecurity in this year's assessment.

[12]Price projections come from USDA's long-term agricultural projections to 2030, (USDA, OCE, 2021) and are converted to prices in 2015 to adjust for inflation.

[13]The full set of projections at the country, subregional, and regional level of anticipated price changes of their major grain are presented in Appendix III.

Figure 4
Inflation-adjusted international prices of major grains, 2021–31



Note: Value in 2015 U.S. dollars to adjust for inflation.

Source: USDA Agricultural Projections to 2030, Long-term Projections report OCE-2021-1.

Grain demand, production trends, and the Implied Additional Supply Required (IASR)

In 2021, total grain demand for IFSA countries is estimated at 1 billion tons. The demand for grains is projected to grow to 1.3 billion tons by 2031 (table 2). Food demand is the largest component of total grain demand. Asia accounts for most of the food demand in 2021, as Asia has the largest share of the population of the 4 major regions defined in IFSA. From 2021 to 2031, grain demand is projected to increase by 2.7 percent per year across all 76 countries. Demand for grains is expected to increase the most in SSA (3.5 percent per year) and Asia (2.5 percent per year). Food demand is also projected to grow faster than grain demand for other uses (including feed) over the 10-year period. Across the 76 countries in the study, food demand is projected to grow at an annual rate of 2.8 percent over the coming decade. Grain demand for other uses is projected to grow at a pace of 2.5 percent per year from 2021 to 2031. But at the regional level, the SSA region's demand for food (3.8 percent per year) is projected to grow faster than demand for other grains (3.2 percent per year). However, in LAC and NAF, demand for grains for other uses are projected to grow faster on an annual basis than food demand between 2021 and 2031. In Asia, demand for food and grains for other uses is projected to grow evenly year-to-year over the next decade.

From 2021 to 2031, grain production is expected to increase by 2.5 percent per year (table 2). This projected increase is slightly below the growth rate for total grain demand and the demand for food grains. The annual rate of growth for grain demand for other uses is on par with the growth in production. Over the decade, the LAC region is projected to see the highest annual growth-rate of grain production relative to all other IFSA regions. Moreover, the annual rate of growth of grain production in LAC is projected to surpass both the rate of annual growth for food grains and grains for other uses. By contrast Asia is projected to see the lowest rate of growth in grain production (2 percent a year) of any region. Asia's anticipated annual grain-production growth will fall below the growth of demand for grains for food and other uses (table 2). The NAF region's grain production is projected to grow 2.5 percent year, a rate that is almost 10 percent higher than the rate of growth for total grain demand and grain demand for other uses. The SSA region is projected to see grain production grow 3.6 percent a year from 2021 to 2031, mostly on par with the growth-rate of demand for grains for food and other uses.

Despite the projected robust growth in production—in absolute terms—the gap between domestic grain production and demand for grain is anticipated to widen for the 76 countries in the assessment over the coming decade (table 2). The Implied Additional Supply Required (IASR)—which provides an estimate of the gap between demand and supply for grains—is projected to increase by 3.3 percent per year between 2021 and 2031. Through the upcoming decade, IASR will annually grow the fastest in the Asia (4.9 percent) and Sub-Saharan Africa (3.4 percent) regions. By 2031, these same two regions are also projected to have the highest IASR of any other regions included in IFSA.

Table 2

Demand for grains is projected to outpace grain production over the 2021–2031 period, driven mainly by demand from Asia and Sub-Saharan Africa regions

Region	Food demand		Other demand*		Total grain demand		Grain production		Implied additional supply required**	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions of tons									
Total IFSA Countries	**695**	**911**	**332**	**424**	**1,027**	**1,336**	**770**	**982**	**257**	**354**
Asia	481	618	163	209	644	827	547	669	98	158
Latin America and the Caribbean	24	29	22	29	46	58	20	29	26	29
North Africa	48	60	44	55	92	115	36	46	56	69
Sub-Saharan Africa	141	204	97	133	239	337	167	238	71	99

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

How food security is assessed: Method and definitions (for more detailed information on the model, see appendix I)

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 crops, and (4) all other food. The IFSA model's projections of food demand are expressed in grain equivalent, based on the caloric content of food items to allow for aggregation across food groups; this grain equivalent may be expressed in either kilograms or kilocalories. For example, grains have roughly 3.5 Kcal 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 analyzes the gap between projected food demand, which is a function of per capita income and food prices, and a nutritional target of 2,100 Kcal 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 significantly 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 Kcal per day), or as an aggregate measure (the total tons of food needed to fill the gap in each 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:

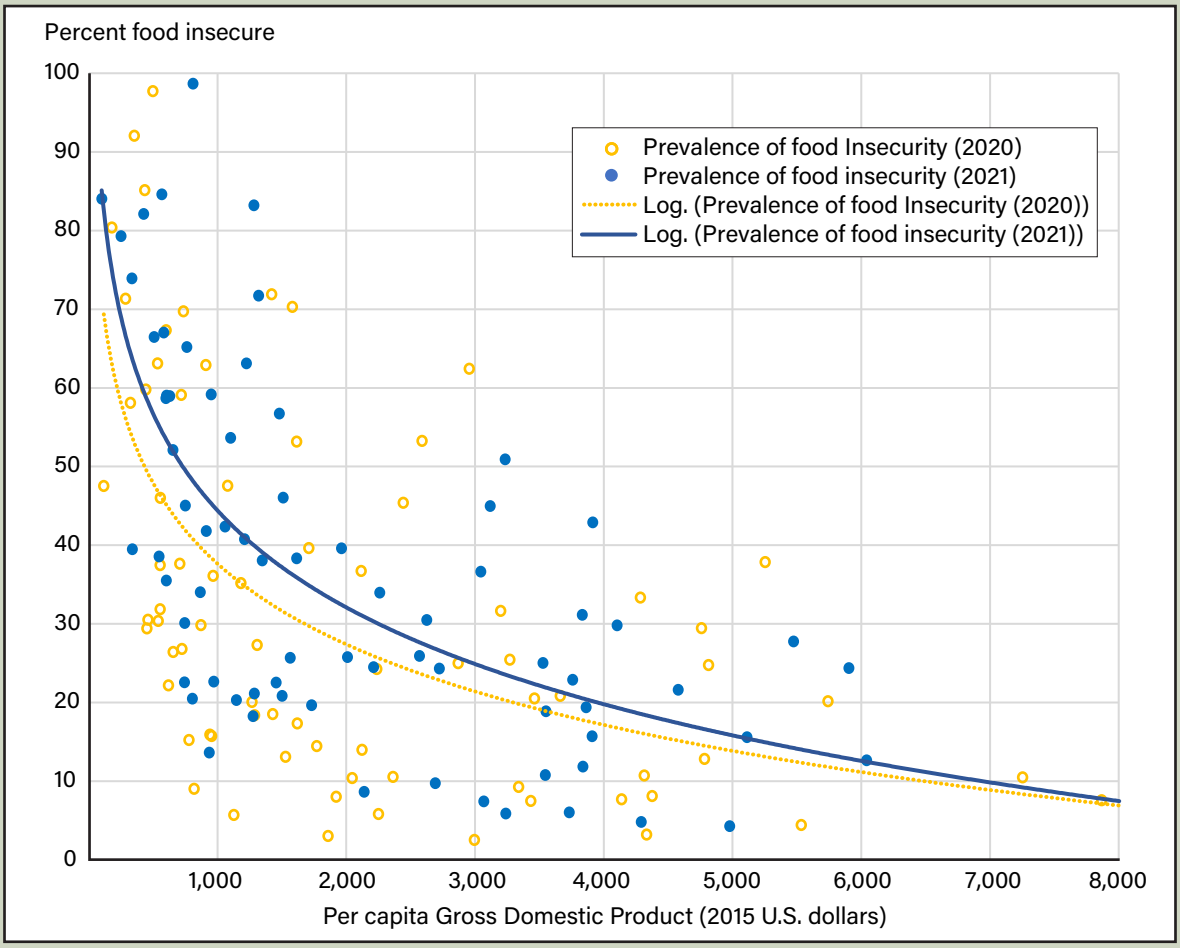
Food consumption-equal to food demand if we assume that the demand is met.

Food access-depends on a consumer's 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 Kcal per person per day.

In 2021 the continued impacts on income from the COVID-19 pandemic are anticipated to increase food insecurity at a higher rate in low-income countries

The Prevalence of Food Insecurity (PFI) for 2021 across the 76 countries included in the assessment is estimated at 30.8 percent, 6.8 percentage points higher than the 2020 estimate. The distributions of the PFI relative to GDP per capita for the 2021 and 2020 estimates is shown in the graph below. The 2021 and 2020 trend lines are indicated by the solid and broken lines, respectively. Two points are clear, based on the information contained in the graph. First, the PFI has on average increased in 2021 for all income levels relative to 2020. Second, the combined effect of the per capita income and price shocks due to the pandemic is not uniform across the countries in the assessment. More specifically, the increase in food insecurity is more prevalent in low-income countries compared to high-income countries. The trends for 2020 and 2021 reveal that the gap between the two trendlines for high-income countries is significantly smaller, relative to low-income countries.



Note: A linear-logarithmic (Log.) regression curve is fitted to show the relationship between the estimated GDP per capita and prevalence of food insecurity.

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

Macroeconomic assumptions for the International Food Security Assessment, 2021–2031

The macroeconomic assumptions underlying the 2021–2031 International Food Security Assessment (IFSA) reflect the economic consequences from the global spread of the COVID-19 pandemic, that began in 2019. Nearly all 76 IFSA countries were affected by decreased economic growth in 2020. Although, growth is projected to return to positive rates in 2021, real gross domestic product (GDP) is expected to remain below levels seen before the global pandemic in 2021 and in years to follow.

The macroeconomic assumptions are taken from multiple forecast services, U.S. Government projections, international agency projections, and ERS regional and country experts. The projections assume no policy changes and no additional shocks (e.g., political crises, conflicts, disease outbreaks, weather events). The macroeconomic projections were completed in August 2020 and were based on expectations at that time.

Worsening fiscal and external accounts brought on by the pandemic have impacted government and private consumption, resulting in weaker economic growth. Pandemic-related restrictions have exacerbated unemployment, food supply shortages, and increased inflation. Most countries are showing real depreciation against the U.S. dollar (in the near term) but weak agricultural sectors, market, and port lockdowns restrict exports in the longer term. In addition, the collapse in global oil demand has reduced oil production and revenue for oil-dependent IFSA countries. Continued uncertainty in a few IFSA countries in 2021 could generate future economic recessions.

The economic projections suggest the recovery will be gradual and uneven, with economic growth across all 76 countries projected at 2.3 percent over the 2021–31 period. On a regional basis, Asian countries are projected to average 3 percent per capita income growth annually during the 2021–31 period, followed by Latin American and Caribbean (LAC) countries at 2.3 percent. In North Africa, per capita income is projected to grow at an average rate of 2.2 percent, whereas in Sub-Saharan Africa per capita income growth is projected to average 1.7 percent per year. Despite the slower economic growth, the share of global real GDP by IFSA countries is projected to increase from 12 percent to 14 percent between 2021 and 2031.

Asia is projected to have the most rapid long-term growth than any other IFSA region. Based on continued investment in infrastructure, India is expected to recover after 2021. Economic recovery in Georgia is less encouraging due to the weakened outlook for export demand, whereas in Kyrgyzstan's and Turkmenistan' loss of labor remittance inflows impacts GDP growth.

In contrast, in LAC, North Africa, and Sub-Saharan Africa growth rates are projected to remain below what is needed to restore 2020 pandemic losses. In Sub-Saharan Africa, lower external donor support and internal trade are factors behind the GDP contraction and Congo and Sudan (oil-dependent economies) are adversely impacted by decreasing global oil prices. Landlocked Mali's economy is severely hit by being denied access to ports in neighboring countries.

The LAC region was severely affected by the COVID-19 pandemic, on account of strict lockdowns and limited government support to counter reduced incomes. Both Bolivia and Colombia face a challenging recovery, given the slowdown in the hydrocarbons sector. Slow recovery reflects the halt in tourism in Jamaica. In El Salvador, Guatemala, Honduras, and Nicaragua the drop in family remittances reduced private-sector domestic consumption. Within the LAC region, the major exception is Peru where projections indicate a modestly fast recovery in the near term based on export revenues.

Regional Overview

The food security indicators and model projections presented here (for 2021 to 2031) are based on historical macroeconomic data and projections from the ERS International Macroeconomic data set. The macroeconomic assumptions underlying the 2021–2031 IFSA reflect the economic consequences of the COVID-19 pandemic throughout the world. All 76 countries were affected by significantly lower economic growth in 2020, but growth is projected to return to positive rates in 2021. However, real GDP growth is expected to remain below pre-pandemic levels in nearly all countries covered by the assessment in 2021 and in years to follow. The production and consumption data are from January 2021. This means events since January 2021—including droughts, flooding, and any shocks to supply or demand—are not reflected in these data or the following analysis.

Changes in food security vary across regions. In Sub-Saharan Africa (SSA), food security is projected to slowly improve due to rapid population growth and relatively low per capita income growth. Nonetheless by 2031, SSA is anticipated to remain the most food insecure region in the assessment, as SSA is projected to have the highest prevalence of food insecurity of any region. Reflecting the impact of the COVID-19 pandemic on the economies of Asia, the region is estimated to have the highest number of food insecure people in IFSA for 2021. However, the estimated prevalence of food insecurity in Asia is only slightly more than half the same metric for SSA. By 2031, the 22 countries in Central Asia, East Asia, Other Asia and Southeast Asia included in this assessment— collectively referred to in this report as Asia—are projected to experience the fastest food security improvement, as the region's largest economies continue to benefit from rapid income growth. The 4 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 the Caribbean (LAC) region—8 in Central America and the Caribbean and 3 in South America—the share of population experiencing food insecurity is projected to fall by more than half by 2031.

Sub-Saharan Africa

The population of Sub-Saharan Africa (SSA) in 2021—currently estimated at 1 billion—is projected to reach 1.4 billion by 2031. The anticipated increase in the region's population (2.6 percent a year) over the next decade makes it the fastest growing region in the assessment. Countries in SSA continue to face significant food security challenges. Since the outbreak of the COVID-19 pandemic—conflict, reduced agricultural output (due to weather events and pest infestations) and lower per-capita income—continue to generate high levels of severe food insecurity in SSA (Food and Agriculture Organization of the United Nations (FAO), 2020).

The COVID-19 pandemic has further aggravated food insecurity in the SSA region by limiting income generating activities and restricting access to agricultural inputs. In 2021, GDP in the SSA region is estimated to grow 3.4 percent to $1.4 trillion USD, a 0.4 percent increase from its 2019 level (table 3). The anticipated slow economic recovery of the SSA region has a significant effect on the estimates of its food security metrics. For 2021, SSA is estimated to have the highest share (44.9 percent) of its population considered food insecure among the 4 regions covered by the assessment (table 4). The SSA region has the second highest number of food insecure people (491.5 million). The 2021 estimate of the number food insecure people is 62 million higher than the 2020 estimate, highlighting the lingering effects of the COVID-19 pandemic on local economies (figure 5). However, the change in the number of food insecure people in 2021, relative to 2020, varies across countries in SSA. Compared to the 2020 assessment, several countries are estimated to see an increase in the number of food insecure people. For example, in Uganda, the Democratic Republic of the Congo, and Kenya, the number of food insecure people is estimated to increase by more than 10 million in 2021 in each country compared to 2020. By contrast, countries—such as the Sudan, Nigeria, Angola, and Burundi—will experience a moderate reduction in their estimated food insecure people in 2021, relative to 2020.

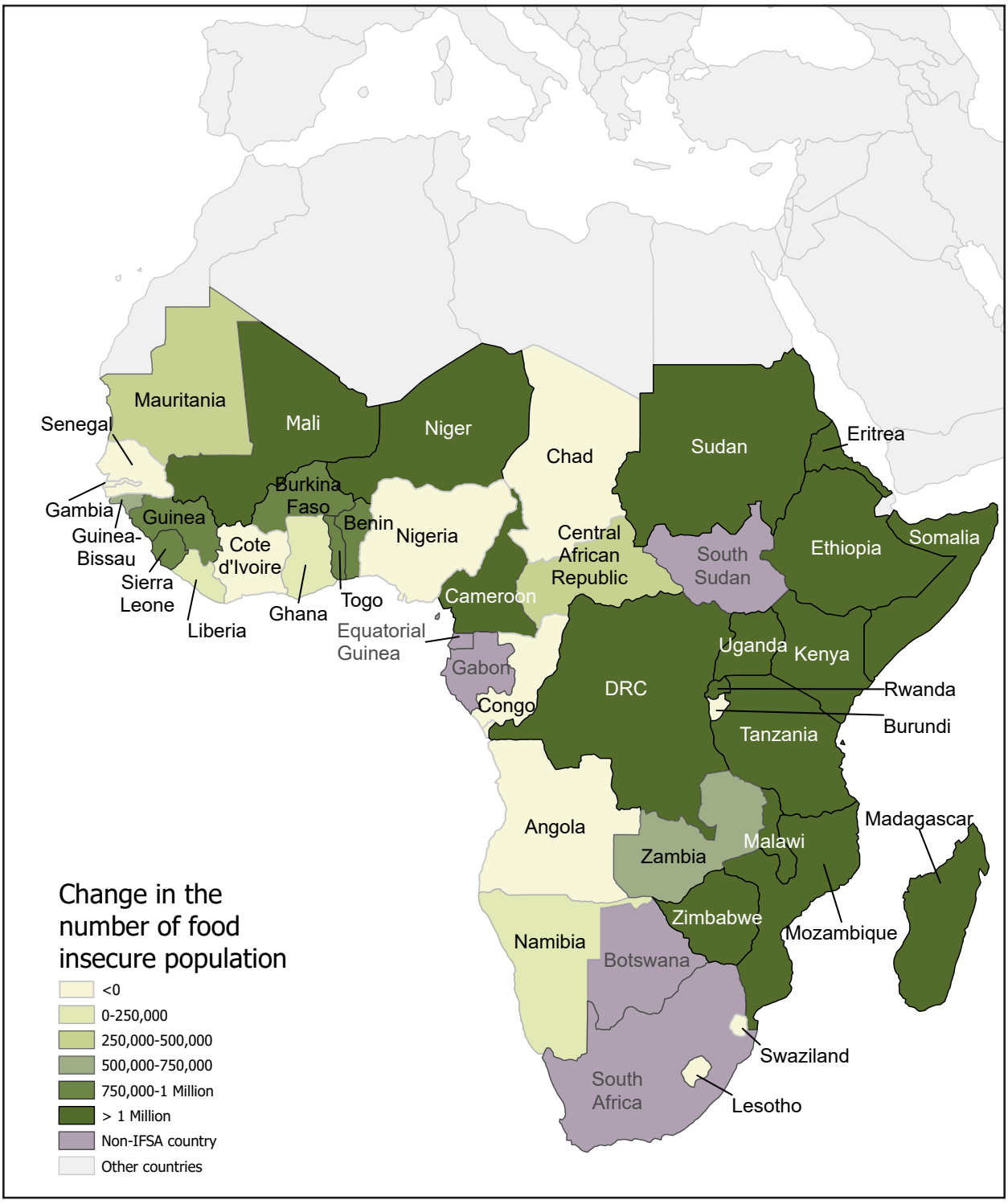
Table 3
Inflation adjusted per capita income for Sub-Saharan Africa region, 2021 and 2031

Region/subregion	2019 (pre-COVID-19)	2021	2031
	Dollars (2015 U.S.)		
Sub-Saharan Africa	1,378	1,311	1,505
Central Africa	666	630	710
East Africa	1,042	1,025	1,267
Southern Africa	1,462	1,367	1,479
West Africa	1,905	1,794	2,024

Source: USDA, Economic Research Service International Macroeconomic Dataset.

Figure 5

Sub-Saharan Africa: Change in the number of food insecure people in 2021, from 2020



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

Despite the economic contraction from the COVID-19 pandemic, GDP per capita over the next decade is projected to annually grow by 1.4 percent in the SSA region (an improvement from -1.1 percent during the 2015–2020 period from $1,311 in 2021 to $1,505 in 2031 (table 3). By 2031, West Africa is projected to have the highest GDP per capita in SSA at $2,024, surpassing the SSA regional average. However, despite the anticipated growth in SSA's GDP per capita over the next decade (both in absolute and relative terms), the region will still have the lowest estimated income of the four regions included in IFSA. Moreover, SSA is projected to have the highest population growth of any region, countering the impact of income gains on food security. As a result, by 2031, the SSA region is expected to make the least progress in its food insecurity metrics (table 4). From 2021 to 2031, the share of food insecure people is projected to decline from 44.9 percent to 29.7 percent (or by 420.8 million people). Driven by trends in Nigeria, the West African sub-region is projected to make the most gains in its food security metrics by 2031. However, the Central Africa sub-region is projected to make the least progress. Over the next decade, the share of the population that is food insecure is projected to decline in Central Africa. However, because of an anticipated high population growth, there will be more food insecure people in Central Africa in 2031 than in 2021 (table 4). Over the next decade, the daily caloric food gap –the difference between estimated consumption and the daily consumption target-- is projected to decline by 17.8 percent from 444 kcal in 2021 to 365 kcal in 2031.

Table 4

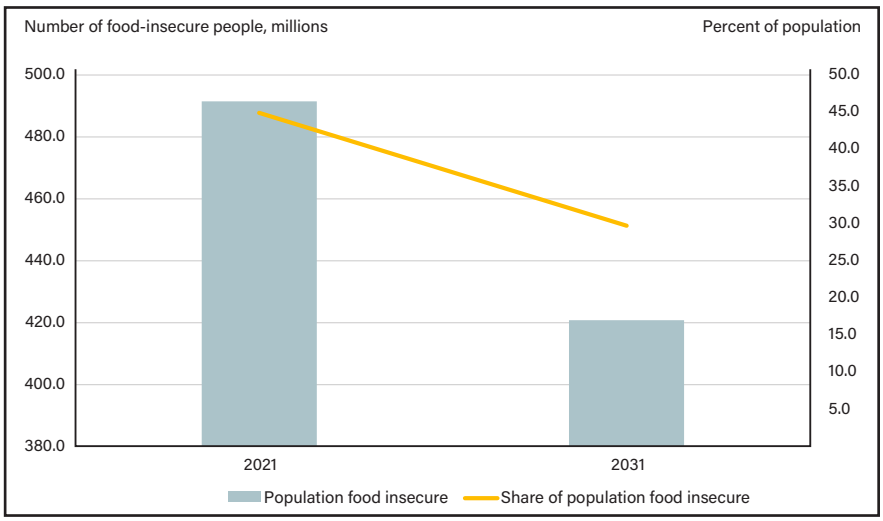
Food security indicators for Sub-Saharan Africa, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	141	97	239	167	71
2031	204	133	337	238	99

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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
(1.1 billion people in 2021)

Sub-Saharan Africa (SSA) has the highest prevalence of food-insecurity, with 44.9 percent of the population not able to consume a diet of 2100 kcal/day. SSA also has the second highest number of food-insecure people at almost 492 million. ERS projects a 14.4 percent reduction in the number of food-insecure people by 2031. And the prevalance of food insecurity declining to less than 30 percent by 2031.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Sub-Saharan Africa	**1,094.7**	**1,415.6**	**491.5**	**420.8**	**44.9**	**29.7**	**444**	**365**	**31,158**	**25,653**
Central Africa	145.1	194.5	99.9	114.2	68.8	58.7	538	437	9,633	10,084
East Africa	382.4	489.7	177.2	134.9	46.3	27.6	487	407	9,493	6,988
Southern Africa	152.6	199.1	89.7	88.2	58.8	44.3	471	391	6,006	5,163
West Africa	414.7	532.3	124.7	83.5	30.1	15.7	379	306	6,025	3,417

Note: *Measured in grain equivalents.

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

Grain demand in SSA for both food and other uses (including feed) is projected to increase by 45.0 percent in the next decade, from 141.2 million tons to 204.1 million tons, which is the highest of the four regions (table 4). This increase in demand is driven mainly by the anticipated growth in population and improved per capita income (tables 3 and 4). From 2021 to 2031, grain demand is projected to increase 41.0 percent and reach 337 million tons. Demand for food grain is projected to grow at a higher rate (3.8 percent a year) relative to the demand for grain for other uses (3.2 percent a year). Moreover, the share of food demand (60.0 percent) of total grain demand is anticipated to remain relatively unchanged over the 10-year period. From 2021 to 2031, grain production is projected to grow (3.6 percent a year), on par with total grain demand (3.5 percent a year). However, driven by population growth, in absolute terms total grain demand will outpace production by 99.4 million tons by 2031, a projected increase of 39.0 percent in the gap between production and demand from 2021.

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Central Africa (CAF)

In 2021, the Central Africa (CAF) sub-region is estimated to have the highest prevalence of food-insecurity in Sub-Sahara Africa region (SSA). Ninety-nine million people (i.e., 69.0 percent of the population) in CAF are estimated to be food insecure in 2021 (table 5). These substantial levels of food insecurity for 2021 in CAF are underpinned by continued armed conflicts, the COVID-19 pandemic, and incomes that are still below their pre-pandemic levels. The Democratic Republic of the Congo (DRC) accounts for 86.4 percent of the food insecure population in the CAF sub-region. However, Cameroon is estimated to have the lowest prevalence of food insecurity of any country in the CAF sub-region at 21.1 percent of the population. The estimated number of food insecure people in CAF for 2021 is 11.8 million higher than last year's calculation. The 2021 increase in food insecurity in the sub-region is largely driven by the anticipated rise in the number food insecure people in the DRC. In 2021, GDP per capita in the sub-region is estimated to remain stagnant (-0.1 percent growth) and 3.4 percent lower than the average for the 2018–2020 period. The CAF sub-region is also estimated to have the lowest GDP per capita of the 4 regions in the assessment, $630 annually, compared to the SSA average of $1,311 (table 3).

Table 5

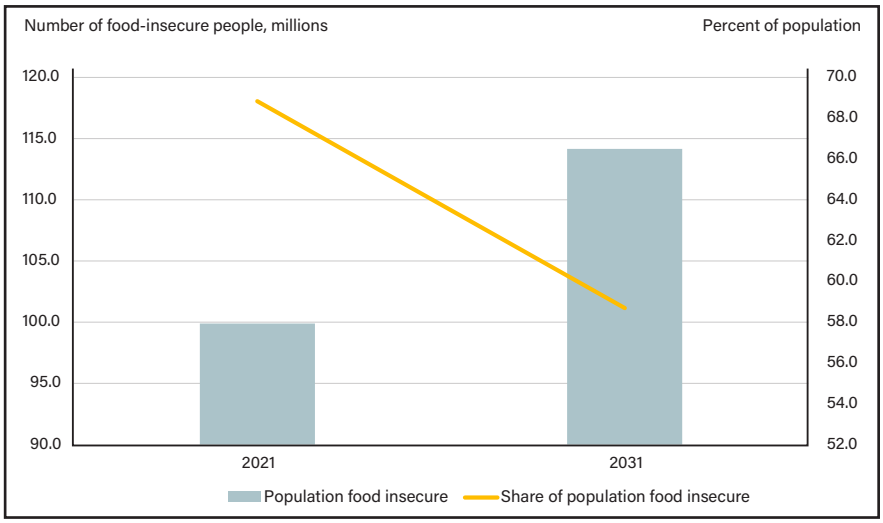
Food security indicators for Central Africa (Sub-Saharan Africa), 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	7.8	7.7	15.5	7.0	8.5
2031	11.3	9.3	20.6	8.5	12.1

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Central Africa indicators of food insecurity



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

Central Africa
(145 million people in 2021)

Central Africa has the highest prevalence of food-insecurity within Sub-Saharan Africa, with 68.8 percent of the population not being able to consume a diet of 2100 Kcal/day. It is estimated that almost 100 million people will be food-insecure. Central Africa is the only sub-region in the assesment that despite a projected improvement of the prevalance of food insecurity by 2031, will see an increase in the number of food-insecure people.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Central Africa	**145.1**	**194.5**	**99.9**	**114.2**	**68.8**	**58.7**	**538**	**437**	**9,633**	**10,084**
Cameroon	28.5	37.2	6.0	4.3	21.1	11.7	303	264	238	150
Central African Republic	6.1	7.5	4.5	2.3	73.9	31.2	555	351	283	92
Congo	5.4	6.8	3.1	2.7	56.7	39.6	402	337	162	120
Congo, DR	105.1	143.0	86.3	104.8	82.1	73.3	892	798	8,949	9,722

Note: *Measured in grain equivalents.

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

By 2031, GDP per capita is anticipated to grow 1.2 percent a year, reversing the negative trend during the 2015–2020 period, possibly reaching $710 in the CAF sub-region (table 3). However, at the projected level, CAF will continue to have the lowest GDP per capita of any sub-region in IFSA. As a result of the projected slow growth in GDP per capita, the CAF sub-region is projected to see small improvements in its food security metrics by 2031. By 2031, the prevalence of food insecurity is anticipated to decline by 14.7 percent to 58.7 percent of the population, the highest of any sub-region (table 5). Excluding the DRC—the most food insecure and largest country in CAF—the prevalence of food insecurity by 2031 is projected to decline by 46.4 percent to 18.2 percent of the population of the sub-region. The Central African Republic (CAR) is expected to reduce the prevalence of food insecurity the most, declining by 58.0 percent over the decade. But Cameroon is projected to have the lowest share (11.7 percent) of its population experiencing food insecurity by 2031.

By 2031, the number of food insecure people in the sub-region is projected to be 114 million, about 14.3 million higher than in 2021. The anticipated increase in the number of food insecure people in CAF is mainly driven by trends in DRC, where population growth is projected to outpace GDP per capita growth. Excluding DRC, CAF is expected to see a decline in the number of food insecure people by 45.1 percent to 9.4 million by 2031. Over the next decade, the daily caloric food gap—the difference between observed consumption and the daily consumption target—is projected to decline by 18.6 percent from 538 kcal in 2021 to 437 kcal in 2031. However, there is significant variation in the sub-regional projections. By 2031, DRC is anticipated to see a 10 percent decline in the daily caloric food gap. By contrast, CAR is projected to see a 36.8 percent decline in its daily food Calorie gap, the highest in the sub-region by 2031.

Total grain demand in Central Africa—mainly driven by population growth—is projected to increase by 45.0 percent in the next 10 years, from 7.8 million tons in 2021 to 11.3 million tons in 2031. During the same period, the demand for feed and other uses will increase by 21.0 percent and the demand for food grain production will increase by 22.0 percent. Given the projected growth trends for grain demand and production for both food and other uses, the gap between supply and demand is anticipated to grow throughout the decade. The additional supply required to meet sub-regional demand, either from imports or stocks, is projected to increase by 42.0 percent, reaching 12.1 million tons in 2031.

Cameroon is the most food-secure country in the CAF sub-region. However, the country's food security environment continues to be challenged by ongoing conflict and the COVID-19 pandemic (Global Network Against Food Crises (GNAFC), 2020). Cameroon's ability to respond to the pandemic has been limited by decreased oil prices—the country's main export—and continued internal conflict (GNAFC, 2020; FAO, 2020; World Food Programme (WFP), 2020). In 2021, Cameroon's GDP per capita is estimated to remain stagnant and 2.5 percent below the average for the 2018–2020 period. In 2021, the share of the population estimated to be food insecure is 21.1 percent (6 million people). From 2021 to 2031, GDP per capita is projected to grow by 1.2 percent a year, lower than the anticipated growth for population (2.7 percent a year). However, real domestic prices of major grains are expected to steadily decline by an annual rate of 0.8 percent over the decade. By 2031, the share of food insecure people is projected to decline 44.7 percent to 11.7 percent, and the number of food insecure people is projected to be 4.3 million. Over the next decade, the daily caloric per capita food gap is expected to decline from 303 kcal in 2021 to 264 kcal in 2031.

The Central Africa Republic's (CAR) increasing insecurity due to armed conflict and economic impacts of the COVID-19-related restrictions are likely drivers of acute food insecurity (FAO and WFP, 2020). The CAR has the lowest GDP per capita in the CAF sub-region, making the population less resilient to income shocks. The CAR's GDP per capita is estimated to grow 1.1 percent to $335.50 in 2021. However, GDP per capita is estimated to remain unchanged from the 2018–2020 period average of $335.20. Reflecting the low-income levels in CAR, the country has the second highest estimated prevalence of food insecurity in the

CAF sub-region. In 2021, the prevalence of food insecurity is estimated at 73.9 percent of the population. The number of food insecure people in 2021 is estimated at 4.5 million. From 2021 to 2031, GDP per capita is projected to grow 2.4 percent a year, slightly higher than the anticipated population growth (2.0 percent a year) during the same period. By 2031, CAR's prevalence of food insecurity is projected to decline by 58.0 percent to 31.0 percent. The number of food insecure people is anticipated to decline by 48.0 percent to 2.3 million. By 2031, the daily caloric food gap is expected to decline by 37.0 percent from 555 kcal in 2021.

The Democratic Republic of the Congo (DRC) is the largest country in Sub-Saharan Africa in terms of area and is the largest economy in the CAF sub-region. The Global Food Network Against Food Crises (GNAFC; 2020) estimates classify the DRC as the country that has the largest food crisis in absolute terms of any country globally. The DRC's food security situation continues to be affected by conflict and large numbers of internally displaced people. The COVID-19 restrictions have compounded the negative effects of the protracted economy and armed conflicts. Urban and peri-urban[14] areas—which are areas more dependent on labor markets for their livelihood—were the most affected by the pandemic (GNAFC, 2020). In 2021, GDP per capita is estimated to marginally decline 0.2 percent from 2020 and remain 3.6 percent below the 2018–2020 period average. In 2021, it is estimated that the DRC has the highest prevalence of food insecurity (82.0 percent of the population) and the most food insecure people (86.3 million) of any country in the CAF sub-region.

From 2021 to 2031, GDP per capita is projected to grow 1.5 percent a year, less than half the anticipated population growth rate (3.1 percent) over the same period. Given the anticipated slow growth of income, the DRC is not expected to see a significant improvement of its food security metrics by 2031. In 2031, the share of the population considered food insecure is projected to decline by 10.8 percent to 73.3 percent of the population. However, the number of food insecure people is anticipated to increase by 18.5 million in 2031. The projected increase in the absolute number of food insecure people is mainly supported by the anticipated high population growth rate that outpaces income growth. Over the next decade, the daily per capita caloric food gap is expected to decline by 10.6 percent from 892 kcal in 2021 to 798 kcal in 2031—the highest projected daily per capita caloric food gap of any country in IFSA.

The Republic of the Congo (COG) has the smallest economy and population of any country in the CAF sub-region. The Republic of the Congo's food security situation is continually affected by the conflicts in neighboring DRC and CAR, as COG is a major recipient of large refugee populations. Moreover, COG's small economy was particularly impacted by the pandemic, as the country's GDP was estimated to have declined by 4.5 percent in 2020 (Baquedano et al., 2021). In 2021, GDP per capita is estimated to marginally decline from 2020 (-0.2 percent) and remain 5.8 percent below the 2018–2020 period average. The prevalence of food insecurity for 2021 is estimated at 56.7 percent of the population. In 2021, the number of food insecure people is estimated at 3.1 million in COG.

From 2021 to 2031, GDP per capita in COG is projected to grow at a rate of 0.2 percent a year, below the anticipated rate of growth of population (2.3 percent a year). As a result of the projected slow income growth, only moderate improvement in the country's food security metrics is anticipated over the next decade. By 2031, the share of the population considered food insecure is expected to decline by 30.2 percent and reach almost 40 percent. The number of food insecure people is projected to decline by 11.9 percent from its 2021 level and reach 2.7 million. Over the next decade, the daily caloric food gap is projected to decline by 16.2 percent from 402 kcal in 2021 to 337 kcal in 2031.

[14]Relating to an area immediately surrounding a city or town.

Baquedano, F., Zereyesus, Y.A., Christensen, C., and Valdes, C. 2021. *COVID-19 Working Paper: International Food Security Assessment, 2020–2030: COVID-19 Update and Impacts on Food Insecurity*. COVID-19 Working Paper #AP-087, U.S. Department of Agriculture, Economic Research Service.

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East Africa (EAF)

In East Africa (EAF) the overlap of shocks has exacerbated food insecurity and poverty conditions in the EAF sub-region (FAO and WFP, 2020). These shocks include reduced agricultural output, protracted conflicts in some countries, the socio-economic effects of the COVID-19 pandemic and the effects of pandemic containment efforts. In 2020, EAF's GDP per capita declined by 2.9 percent from 2019. In 2021, it is estimated that EAF's GDP will grow by 4.0 percent and be 5.3 percent above the 2018–2020 period average. There is some variation from this trend as GDP growth in Burundi, Chad, and Eritrea is estimated to grow marginally in 2021 and remain below the 2018–2020 period average. In Sudan, GDP is estimated to grow 5.1 percent in 2021, but growth is anticipated to remain below the 2018–2020 average. As a result of the variation of GDP growth across countries in the EAF sub-region and continued population growth, GDP per capita in 2021 is estimated to be 1.6 percent below its 2019 level.

In 2021, because of the estimated GDP per capita levels for EAF, 46.3 percent of the population in the sub-region is anticipated to be food insecure (table 6). The number of food insecure people in EAF is estimated at 177.2 million people in 2021. Ethiopia, with a population of 111 million people, is estimated to have 37.7 million of its population considered food insecure. Uganda is estimated to have the second highest number of food insecure people in EAF, with 26.5 million food insecure people.

Table 6

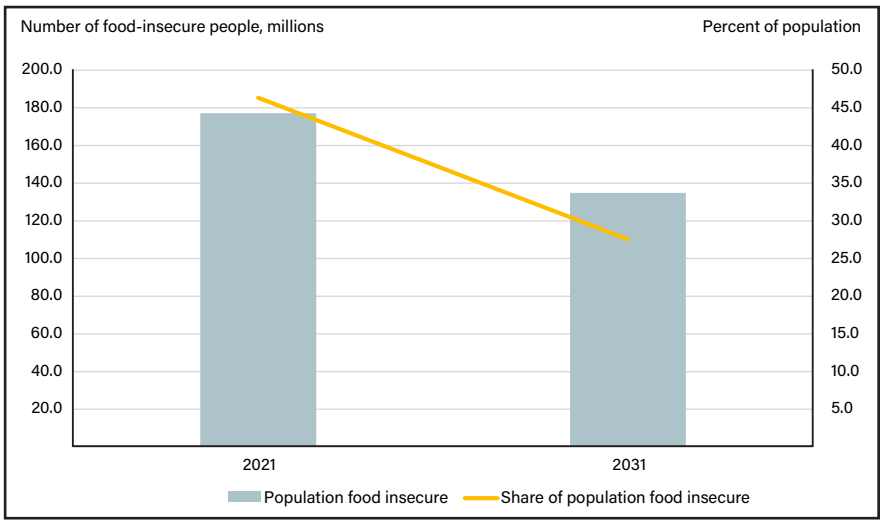
Food security indicators for East Africa (Sub-Saharan Africa), 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	50.6	23.3	73.9	61.3	12.7
2031	73.4	30.0	103.4	84.2	19.2

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

East Africa indicators of food insecurity



East Africa
(382.4 million people in 2021)

East Africa is estimated to have a prevalence of food insecurity of almost 46.3 percent in 2021 and to have 177.2 million people who are food insecure. By 2031 the prevalence of food insecurity in the total population of East Africa will decline by 40.5 percent and reach 27.6 percent. The number of people who are food insecure is projected to decline to less than 135 million by 2031.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
East Africa	**382.4**	**489.7**	**177.2**	**134.9**	**46.3**	**27.6**	**487**	**407**	**9,493**	**6,988**
Burundi	12.3	16.5	9.7	13.0	79.3	78.9	580	577	657	874
Chad	17.4	23.4	11.7	13.7	67.0	58.4	607	554	895	958
Eritrea	6.1	6.9	3.8	1.3	62.5	19.0	442	276	211	45
Ethiopia	110.9	139.6	37.7	16.0	34.0	11.4	318	239	1,093	304
Kenya	54.7	66.9	25.2	9.9	46.0	14.7	372	260	1,166	319
Rwanda	12.9	15.2	5.4	2.7	41.8	18.0	413	317	264	102
Somalia	16.4	21.8	13.7	16.8	84.0	77.2	727	659	1,146	1,271
Sudan	46.8	60.5	17.9	12.5	38.3	20.6	390	320	822	469
Tanzania	60.2	78.0	25.5	27.6	42.4	35.3	495	461	1,574	1,587
Uganda	44.7	60.9	26.5	21.5	59.2	35.2	522	410	1,665	1,060

Note: *Measured in grain equivalents.

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

Over the next decade, the population of EAF will increase from 382.4 million to 489.7 million people, a projected growth rate of 2.5 percent a year (table 6). By contrast, GDP is anticipated to grow by 4.7 percent a year from 2021 to 2031 and reach $620 billion. Reflecting the anticipated trends in population and GDP growth, GDP per capita is projected to grow at a rate 2.1 percent a year and increase from $1,025 in 2021 to $1,267 in 2031 (table 3). East Africa's projected GDP per capita growth rate is the fastest in the SSA region. Due to the anticipated income growth, the prevalence of food insecurity is projected to decline by 40.5 percent by 2031. In addition, the number of food insecure people is projected to decline by almost 24.0 percent to 134.9 million (table 6). In absolute terms, Tanzania and Uganda are anticipated to have the highest numbers of food insecure people in the EAF sub-region for 2031. Over the next decade all countries in the sub-region are expected to see an improvement in their daily per capita caloric food gap—defined as the difference between the estimated level of consumption and the recommended target of 2,100 kcal per day. In 2031, the daily Calorie food gap for the sub-region is projected at 407 kcal, a 16.3 percent decline from 2021.

Food grain demand in EAF—mainly driven by population growth—is projected to increase from 50.6 million tons in 2021 to 73.4 million tons in 2031 (table 6). Grain demand for feed and other uses is projected to increase moderately from 23.3 million tons in 2021 to 30 million tons in 2031. Although projected growth for total grain demand and production are both anticipated to average 3.3 percent over the next decade, demand is expected to outpace production in absolute terms. By 2031 an additional 19.2 million tons, either from imports and/or stocks, are projected to be required to meet the sub-regions consumption needs (table 6).

For 2021, Burundi is estimated to have the second-lowest GDP per capita in EAF, after Somalia. From 2021 to 2031, Burundi's population is projected to grow at a rate of 3.0 percent a year, an increase from the 2.3 percent annual rate of growth over the 2015–2020 period. By contrast, GDP is anticipated to grow at a rate of 2.0 percent a year over the next decade. Given population and GDP growth trends, GDP per capita is projected to decline in the coming decade, by an annual rate of 1.0 percent from $250 to $226. As a result of the projected macroeconomic and population trends, the prevalence of food insecurity in Burundi is expected to remain high at 78.9 percent of the population by 2031. Over the coming decade, the country is anticipated to make little progress in reducing the per capita food gap in kcal, which is projected to decline by less than 1.0 percent from 580 kcal in 2021 to 577 kcal in 2031.

In Chad, an expected decline in population growth, increase in per capita GDP, and downward trend in real domestic prices of major grains are expected to contribute to the country's improved food-security metrics. However, the improvement in the country's food security situation over the next decade is projected to be moderate. Over the next decade, the share of the population projected to be food insecure is expected to decline from 67.0 percent 2021 to 58.4 percent in 2031. Moreover, the projected prevalence of food insecurity for 2031 is anticipated to be more than double the projected sub-regional average for the same year. The per capita Calorie per day food gap is projected to decline by 8.7 percent from 607 kcal in 2021 to 554 kcal in 2031.

Eritrea's population is expected to grow annually by 1.2 percent in the next 10 years, an increase from 0.9 percent a year during the 2015–2020 period. Eritrea is among the countries with higher prevalence of food insecurity in the EAF sub-region. In 2021, 3.8 million people (62.5 percent) of the country are estimated to be food insecure. The per capita daily Calorie food gap is projected to decline from 442 kcal in 2021 to 276 kcal in 2031.

In Ethiopia, the impacts of the Tigray conflict and heightened insecurity in other regions are expected to continually hamper access to key income and food sources, such as labor migration and livestock sales in 2021 (FAO, 2020 and Famine Early Warning Systems Network (FEWS NET), 2020). Moreover, according to the African Center for Diseases Control and Prevention (2021), Ethiopia is the country with the highest number of reported COVID-19 cases in the sub-region. The country is also estimated to see only moderate

growth in its economy in 2021. With an annual growth rate of 2.4 percent, Ethiopia's population is projected to reach 140 million by the end of 2031. However, Ethiopia's GDP is projected to grow at a faster pace of 6.1 percent a year, among the highest in the sub-region and on par with Uganda. As a result of income and population trends, per capita GDP is anticipated to grow by 3.7 percent during the 2021–2031 period. The real domestic price for major grains is projected to follow a declining trend, decreasing at a rate of 1.4 percent a year. By 2031, Ethiopia is expected to have the lowest prevalence of food insecurity (11.0 percent) in the EAF sub-region. The number of food insecure people is projected to decline by almost 60.0 percent over the next decade. However, given that Ethiopia has the largest population in EAF, the country will still account for the largest number of food insecure people (16 million) by 2031.

In Kenya, GDP per capita is anticipated to increase 1.8 percent in 2021 from its sharply reduced 2020 level, but income is expected to remain below its pre-pandemic level. It is estimated that 46.0 percent of the country's population could be food insecure in 2021. However, by 2031, the prevalence of food insecurity is projected to decline by 68.0 percent because of a decline in real domestic prices for major grains and annual GDP per capita growth of 2.5 percent. The daily caloric food gap is projected to decline from 372 Kcal in 2021 to 260 Kcal by 2031.

Rwanda is among the fastest growing economies in the sub-region and is expected to maintain its pace of sustained GDP growth (4.4 percent, annually) in the coming decade. Moreover, in 2021, GDP per capita is estimated to be above the period average of 2018–2020. The prevalence of food insecurity in 2021 is estimated at 41.8 percent and is projected to decline by 56.8 percent to 18.0 percent by 2031. The estimated daily Calorie food gap in 2021 is projected to decline by 23.3 percent over the next decade and remain below the EAF sub-regional average.

Somalia is estimated to have the lowest GDP per capita of all countries included in the assessment, at $101 in 2021. This figure is projected to slightly increase, at a rate of 0.4 percent a year during the next 10 years and reach $105 in 2031. With real domestic price of major grain commodities expected to remain unchanged, Somalia's prevalence of food insecurity is projected to fall by 8.1 percent to 77.2 percent of the population by 2031. The estimated daily Calorie food gap in the country for 2021 is among the highest in the sub-region. By 2031, the daily Calorie food gap is projected to decline by 9.4 percent from 727 kcal in 2021 to 659 kcal in 2031.

In Sudan, food and transport prices have followed an upward trend since the last quarter of 2020, and grain prices (e.g., sorghum and millet) were approximately seven times higher than the 5-year average at the end of the year 2020 (FEWS NET, 2020). In addition, persistently low foreign currency reserves and high-import demand for essential food and non-food items led to a sharp depreciation of the Sudanese pound relative to the U.S. dollar (FEWS NET, 2020). The current projection for Sudan estimates a 4.6 percent decline in GDP per capita from 2021 to 2031, and prices for major grains are expected to increase at an annual rate of 1.2 percent. However, the anticipated rate of decline in GDP per capita (-0.5 percent a year) over the period of 2021–2031 is an improvement over the rate (-3.5 percent a year) observed during the 2015–2020 period. The population growth rate is projected to decline from 2.9 percent in 2021 to 2.6 percent in 2031. As a result of an anticipated slowed growth rate and a less rapid decline in per capita income, some improvement is expected for Sudan's food security metrics over the next decade. The prevalence of food insecurity is projected to decline by 46.0 percent from its 2021 estimate to 20.6 percent of the population. By 2031, the number of food insecure people is anticipated to decline by 30.0 percent from the 2021 estimate to 12.5 million.

The United Republic of Tanzania has the second-highest population in EAF, after Ethiopia, with an estimated 60 million people in 2021. At a projected annual rate of growth of 2.6 percent year, the country's population is expected to reach to 78 million by 2031. The rate of growth of GDP per capita is expected to slow to 1.0 percent a year during the 2021–2031 period from 2.5 percent for the 2015–2020 period. The prev-

alence of food insecurity is projected to decline by 16.6 percent from its 2021 estimate, to 35.3 percent of the population. This projected decline reflects an anticipated higher population growth and lower income growth over the next decade. However, the number of food insecure people is projected to grow by 8.0 percent from 2021 to 2031. The daily Calorie food gap is anticipated to decline by 6.8 percent from 495 kcal in 2021 to 461 kcal in 2031.

Uganda's GDP is projected to grow at an annual rate of 6.1 percent in the coming decade, on par with Ethiopia, and the highest in the sub-region. Uganda's population is expected to grow by 3.1 percent a year from 2021 to 2031, lower than the rate of growth (3.7 percent) for the 2015–2020 period. The share of the food insecure population in Uganda is projected to decline by 23.9 percentage points, from 59.2 percent in 2021 to 35.2 percent in 2031, the second-highest decline in the EAF sub-region. The number of food insecure people is expected to decline by 19 percent from its 2021 estimate, to 21.5 million in 2031. Over the next decade the daily per capita Calorie food gap is projected to decline by 21.5 percent from 522 kcal in 2021 to 410 kcal.

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Southern Africa (SAF)

In 2021 the food security environment in the Southern Africa (SAF) sub-region continues to be affected by a number of factors including but not limited to natural hazards, pest infestations such as locust, and the slowdown in economic activities due to COVID-19-related restrictions (FAO and WFP, 2020). Although food-supply chains have remained functional, COVID-19-related border closures and movement restrictions, combined with reduced harvests in some countries, have led to above-average food prices and hindered food access (FAO and WFP, 2020).

Notwithstanding the difficult food security environment, in 2021, SAF's economy is estimated to grow 2.8 percent, but GDP is anticipated to remain below the 2018–2020 period average. Moreover, GDP per capita in 2021 is estimated to remain unchanged from 2020 and below the 2018–2020 period average. However, there is some variation in the estimates of economic growth across the SAF sub-region. For example, the estimates for GDP per capita growth in 2021 for Madagascar, Malawi, and Mozambique are anticipated to be above the 2020 values and the 2018–2020 period average. But only in Madagascar is the GDP per capita estimated to follow the same trend as GDP in 2021. By contrast, Zambia and Zimbabwe are anticipated to see moderate growth of GDP, but a contraction of GDP per capita in 2021.

The SAF sub-region is estimated to have the second-highest prevalence of food insecurity in SSA after CAF. In 2021, 58.8 percent of the population (89.7 million people) of the SAF sub-region is estimated to be food insecure (table 7). The most food insecure country in the SAF sub-region is estimated to be Zimbabwe (83.2 percent of the population) and the most food-secure country is estimated to be Eswatini, formerly known as Swaziland (31.1 percent of the population).

Table 7

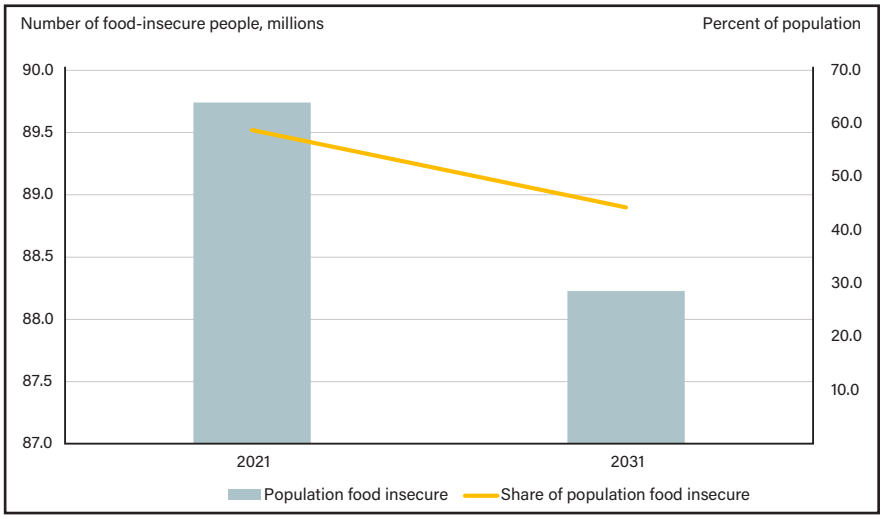
Food security indicators for Southern Africa sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	19.1	21.7	40.8	24.3	16.5
2031	27.1	29.8	57.0	34.1	22.9

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Southern Africa indicators of food insecurity



Southern Africa
(152.6 million people in 2021)

Southern Africa is estimated to have a prevalance of food insecurity of almost 59 percent in 2021. And to have 89.7 milliom people who are food insecure. By 2031 the prevalance of food insecurity in Southern Africa will decline by almost 25 percent, and reach 44 percent. The number of people who are food insecure is projected to decline to 88 million by 2031.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Southern Africa	**152.6**	**199.1**	**89.7**	**88.2**	**58.8**	**44.3**	**471**	**391**	**6,006**	**5,163**
Angola	33.6	46.9	17.1	23.6	50.9	50.4	443	440	965	1,323
Lesotho	2.0	1.9	0.8	0.2	40.7	12.5	364	259	34	7
Madagascar	27.6	34.1	18.3	17.4	66.5	51.0	493	418	1,295	1,039
Malawi	21.9	30.2	8.6	5.7	39.5	18.8	405	322	408	213
Mozambique	30.9	39.9	18.1	14.8	58.7	37.0	519	417	1,214	795
Namibia	2.7	3.2	1.1	0.8	42.9	26.2	323	270	46	28
Eswatini	1.1	1.2	0.3	0.2	31.1	17.2	308	260	12	6
Zambia	17.9	23.8	12.9	15.4	71.7	64.9	697	646	1,065	1,186
Zimbabwe	14.8	18.0	12.3	10.1	83.2	55.9	685	492	967	565

Note: *Measured in grain equivalents.

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

From 2021 to 2031, the SAF's GDP is projected to expand 3.5 percent a year, a reversal of the previous trend of a contraction of 0.6 a year during the 2015–2020 period. With a projected annual population growth rate of 2.7 percent—a slight decline from 2.8 percent a year during the 2015–2020 period—the population in Southern Africa will increase from 153 million in 2021 to 199 million people in 2031. The anticipated population and GDP growth trends imply that, over the same period, annual GDP per capita is anticipated to slightly expand by 0.8 percent a year, which is an improvement from -3.3 percent a year during the 2015–2020 period. GDP per capita in SAF is estimated to grow from $1,367 in 2021 to $1,479 in 2031. Reflecting the projected income growth by 2031, the prevalence of food insecurity is expected to decline by 25.0 percent from its 2021 level to 44.3 percent (table 7).

By 2031, Lesotho and Malawi are projected to make the most progress at reducing the prevalence of food insecurity, reducing food insecurity by 69.4 percent and 52.3 percent, respectively. By contrast, Zambia is projected to make the least progress over the decade, reducing its share of its population considered food insecure by 9.0 percent. Both Zambia (65.0 percent) and Zimbabwe (56.0 percent) are projected to have the highest share of their population considered food insecure in 2031. The number of food insecure people in the SAF sub-region is expected to marginally decline, going from 89.7 million people in 2021 to 88.2 million people in 2031. The projection of a small decline in the number of food insecure people mainly reflects the anticipated slight decline in the population growth rate. Angola and Zambia are anticipated to follow an opposite trend from the sub-regional trend and see an increase in the number of food insecure people between 2021 and 2031. All countries in the SAF are projected to see an improvement in their daily per capita Calorie food gap in the next decade. The daily per capita Calorie food gap—which represents the difference between estimated consumption and the daily requirement of 2,100 kcal—is projected to decline 16.8 percent, from 471 kcal in 2021 to 391kcal in 2031 (table 7).

Over the next decade, grain demand in SAF is projected to increase by 36.6 percent, from 40.8 million tons in 2021 to 57 million tons in 2031(table 7). From 2021 to 2031, demand for food is projected to grow (3.6 percent a year) at a faster pace than demand for grain for other uses (3.2 percent a year). In absolute terms demand for grain for other uses in 2031 is projected to be 2.7 million tons higher than the demand for food grains. Over the decade production is projected to increase almost 40.0 percent, growing 3.4 percent a year on par with the projected annual growth of grain demand. In absolute terms demand is anticipated to exceed production by almost 23 million tons (table 7).

Angola has the third largest economy in Sub-Saharan Africa, with an estimated GDP of $108 billion in 2021. With a projected annual growth rate of 3.2 percent, GDP is expected to reach $149 billion by 2031. Angola is also among the countries with the highest projected population growth rates in the sub-region. Although lower than the 2015-2020 period average (3.6 percent), the annual population growth rate between 2021 and 2031 is expected to be 3.4 percent. Reflecting projected population growth trends over the decade GDP per capita is anticipated to experience a net decline (-0.2 percent a year). GDP per capita is projected to decline from its 2021 estimate of $3,233 in 2021 to $3,177 in 2031. The real domestic price of major grains in the country is also projected to increase by an annual rate of 4.0 percent, reversing the annual downward trend of the 2015-2020 period (-0.2 percent). More than half of Angola's population (51.0 percent) in 2021 is estimated to be food insecure. By 2031, this metric is projected to remain relatively unchanged. Half of Angola's population (23.6 million) is projected to fall short of the daily Calorie requirement by 2031, the highest number in the SAF sub-region. The daily per capita Calorie food gap is also anticipated to remain relatively unchanged, from 442 kcal in 2021 to 440 kcal in 2031.

Lesotho has the second smallest population in the SAF sub-region, and it is the only country in SSA whose population is anticipated to decline over the next decade. Lesotho's population is projected to hover around 2 million between 2021 and 2031, declining annually by 0.1 percent. The country's GDP is projected to

expand annually by 2.9 percent, resulting in an expected increase in GDP per capita from $1,209 in 2021 to $1,629 in 2031. The real domestic price of major grains is projected to decline between 2021 and 2031, at a rate of -0.9 percent a year. The combined effects of the projected population, income, and price trends over the next decade are anticipated to reduce the prevalence of food insecurity by 69.4 percent. The number of food insecure people is projected to also decline sharply, from about 800,000 people in 2021 to 200,000 in 2031. By 2031, Lesotho is projected to be the least food insecure country in SAF.

The Republic of Madagascar—an island country in the Indian Ocean—is projected to grow in population from 28 million in 2021 to 34 million in 2031, at an annual growth rate of 2.1 percent. Surpassing the anticipated population growth rate, Madagascar's GDP is anticipated to grow by 3.5 percent a year and reach $20.1 billion by 2031. Although GDP per capita is projected to grow by 1.5 percent a year by 2031, the expected growth in income is dampened by an anticipated trend of increasing real domestic prices for major grains (0.5 percent a year). These macroeconomic trends are expected to lead to a moderate decline in the prevalence of food insecurity over the next decade. The share of the population considered food insecure is projected to decline from its estimate of 66.5 percent in 2021 to 51.0 percent in 2031. After Angola, the Republic of Madagascar is projected to have the second highest number of food insecure people (17.4 million) in SAF by 2031. The daily per capita Calorie food gap is expected to decline 15.0 percent, from 493 kcal in 2021 to 418 kcal in 2031.

Malawi—a landlocked country—has the lowest estimated GDP per capita in SAF for 2021. Driven by projections of annual population and GDP growth rates of 3.3 percent and 4.1 percent, respectively, Malawi's GDP per capita is anticipated to increase from $338 in 2021 to $366 in 2031. The increasing income trend is complemented by an anticipated declining trend in real domestic price of major grains (-2.6 percent annually) between 2021 and 2031. The anticipated income and price trends are expected to sharply reduce food insecurity in the country over the coming decade. The prevalence of food insecurity is projected to decline from 39.5 percent to 18.8 percent in the next 10 years, the third lowest after Eswatini and Lesotho.

Over the coming decade, Mozambique's GDP is projected to grow at the fastest rate of any country in SAF, growing by 5.2 percent annually. However, Mozambique's population is projected to grow at half that rate. As a result of these trends, GDP per capita in the country is projected to increase significantly, from $599 in 2021 to $774 in 2031. Reflecting the projected income trend, the share of the population considered food insecure is expected to decline by 36.9 percent to 37.0 percent in 2031. The number of food insecure people is projected to decline by 18.5 percent to 14.8 million people. By 2031, the daily per capita Calorie food gap is expected to decline by 19.6 percent, from 519 kcal in 2021 to 417 kcal in 2031.

Namibia's population over the next decade is projected to hover around 3 million, growing at 1.8 percent a year. Accounting for population and GDP growth rates of 1.8 percent and 2.7 percent, respectively, the country's GDP per capita is projected to increase by 0.9 percent from $3,914 in 2021 to $4,288 in 2031. The real domestic price of major grains in Namibia is projected to decline annually by 0.6 percent. As a result of the anticipated income and price trends, the prevalence of food insecurity in Namibia's population is expected to decline from 42.9 percent to 26.2 percent, i.e. from 1.2 million to 800,000 people by 2031.

Eswatini—formerly known as Swaziland until 2018—has the lowest population in SAF, estimated at 1 million in 2021. Over the next decade, Eswatini's economy is projected to expand (GDP growth of 2.0 percent a year) at more than 3 times the pace of population growth (0.6 percent a year). As a result, the country is expected to make significant income gains, with GDP per capita anticipated to grow at a pace of 1.4 percent a year between 2021 to 2031. Eswatini's GDP per capita is projected to be the highest in Southern Africa at $4,396 in 2031. The anticipated macroeconomic trends, coupled with declining real domestic prices of major grains (-0.5 percent a year between 2021 to 2031), are expected to support Eswatini's improved food security conditions. By 2031, the prevalence of food insecurity is projected to decline by 44.7

percent to 17.2 percent of the population. By 2031, the country is projected to have the second lowest per capita per day Calorie food gap in Southern Africa after Lesotho. The per capita daily Calorie food gap is projected to decline 16.0 percent over the decade, going from 308 kcal in 2021 to 260 kcal in 2031.

Zambia is estimated to have the second-highest share of its population, after Zimbabwe, considered food insecure in the SAF sub-region. In 2021, 71.7 percent of Zambia's population is considered food insecure. The estimated high prevalence of food insecurity for 2021 is driven by an expectation of GDP per capita to remain about 7.5 percent below its 2019 levels. By 2031, the prevalence of food insecurity is projected to remain high at 64.9 percent. The anticipated high level of food insecurity at the end of the decade mainly reflects slower projected per capita GDP growth (0.7 percent a year from 2021 to 2031) and an increasing price trend for major grains (1 percent a year). The number of food insecure people is projected to increase by 2.6 million from 2021 to 2031.

Zimbabwe is Southern Africa's most food insecure country in 2021, with an estimated 83.2 percent of its population unable to meet the daily caloric requirement. Continued macroeconomic crises, coupled with the socioeconomic impacts of the COVID-19 pandemic, will drive the acute food insecurity situation in the country in 2021 (FAO and WFP, 2020). Over the next decade, GDP per capita growth is projected to recover from a declining trend of 2.8 percent a year during the 2015–2020 period to growth of 1.9 percent a year. As a result of the anticipated improvements in income, the prevalence of food insecurity by 2031 is projected to decline a third to 55.9 percent of the population. Over the next decade the daily per capita food gap is anticipated to decline 28.2 percent, from 685 kcal in 2021 to 492 kcal in 2031.

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West Africa (WAF)

Food insecurity across West Africa (WAF) and the Sahel has risen dramatically, due to increasing conflict and the impact of COVID-19-related restrictions (FAO and WFP, 2020). COVID-19 decreased income, increased poverty, disrupted regional trade, supply chains, and cross-border pastoralist activities, and inflated food prices in the Sahel (e.g., Burkina Faso, Niger, and Nigeria) and some coastal countries (e.g., Sierra Leone and Liberia) (FSIN and GNFAC, 2020). In high-conflict zones (such as the Central Sahel and northern Nigeria) civilians are increasingly affected by violence and conflict, with rising levels of displacement (FAO and WFP, 2020).

In 2020, the GDP of the WAF sub-region declined by 4 percent (Baquedano et al., 2021). In 2021, GDP is estimated to grow by 3.3 percent and be 1.6 percent above the SSA average for the period 2018–2020. However, GDP per capita in 2021 is estimated to remain 5.8 percent below its pre-pandemic level of $1,905 in 2019 (table 3). The number of food insecure people in 2021 is estimated at 124.7 million, an increase of 8.6 million from last year's estimate (table 8). The largest estimated increase in the number of food insecure people are in Cote d'Ivoire (2.1 million people) and Niger (2.9 million people). By contrast, Gambia (-0.2 million people) and Nigeria (-4.1 million people) are estimated to experience a decline in the number of food insecure people from 2020's values. Despite the anticipated high numbers of food insecure people, in 2021, the WAF sub-region is estimated to have the lowest prevalence of food insecurity in SSA. The share of the population considered food insecure is estimated at 30.1 percent, 1.2 percentage points higher than last year's estimate. Guinea is estimated to be the most food secure country in the sub-region—with a prevalence of food insecurity of 8.6 percent—and Liberia the least food secure (table 8).

Table 8

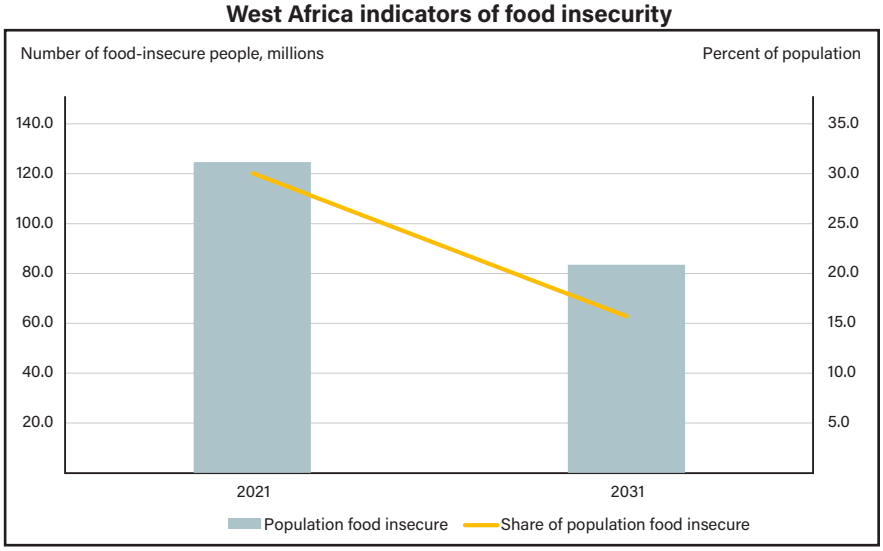
Food security indicators for West Africa sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	63.7	45.8	109.5	74.7	34.8
2031	92.3	65.8	158.1	111.3	46.8

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

West Africa indicators of food insecurity



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

West Africa
(414.7 million people in 2021)

West Africa has the largest population of the SSA sub-regions in the assessment. West Africa is also the most food secure, in 2021 the prevalence of food insecurity is estimated at 30.1 percent in 2021. And the number of food insecure peole in the sub-region is estimated at less than 125 million in 2021. By 2031 the prevalance of food insecurity in West Africa will decline by almost 48 percent, and reach 15.7 percent. The number of people who are food-insecure is projected to decline to less than 84 million by 2031.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
West Africa	**414.7**	**532.3**	**124.7**	**83.5**	**30.1**	**15.7**	**379**	**306**	**6,025**	**3,417**
Benin	13.3	18.4	2.7	1.1	20.3	6.1	319	250	116	38
Guinea-Bissau	2.0	2.5	1.0	0.7	52.1	26.5	422	323	57	29
Burkina Faso	21.4	26.9	6.4	4.3	30.1	15.9	456	385	364	205
Cabo Verde	0.6	0.7	0.2	0.1	36.6	9.6	338	238	10	2
Côte d'Ivoire	28.1	34.6	6.9	5.9	24.5	16.9	420	382	414	321
Gambia	2.2	2.6	0.5	0.1	22.5	4.4	298	216	17	3
Ghana	30.0	36.8	2.6	0.7	8.6	1.9	249	201	82	18
Guinea	12.9	16.9	2.9	2.0	22.6	11.8	356	306	162	95
Liberia	5.2	6.8	3.1	2.2	59.0	32.0	619	475	213	116
Mali	20.1	26.8	4.1	4.0	20.5	14.9	329	305	172	154
Mauritania	4.1	4.9	0.8	0.3	19.6	5.6	316	246	32	9
Niger	23.6	34.0	9.1	5.6	38.5	16.5	456	355	582	280
Nigeria	219.5	280.5	74.5	51.0	33.9	18.2	351	291	3,287	1,870
Senegal	16.1	19.9	3.6	1.3	22.5	6.7	278	215	143	41
Sierra Leone	6.8	8.7	3.1	2.7	45.0	31.3	497	433	235	183
Togo	8.8	11.2	3.1	1.6	35.5	14.2	356	275	139	55

Note: *Measured in grain equivalents.

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

By 2031, the population of WAF is projected to increase by 118 million from its 2021 estimate, growing annually at a rate of 2.5 percent. From 2021 to 2031, GDP is expected to expand at a rate of 3.8 percent a year and reach close to $1.1 trillion. Given the anticipated fast pace of expansion in WAF's economy, relative to population growth, GDP per capita is projected to increase from $1,794 in 2021 to $2,024 in 2031 (table 3). The WAF sub-region is projected to see a 47.8 percent decline in its prevalence of food insecurity, with the share of the population considered food insecure dropping to 15.7 percent by 2031 (table 8). By 2031, Benin, Ghana, Guinea, Mauritania, and Senegal are projected to be among the least food insecure countries in the WAF sub-region. By contrast, Sierra Leone is projected to be the most food insecure country in the sub-region, with 31.3 percent of the country's population projected to be food insecure by 2031. Over the next decade, the number of food insecure people in WAF is projected to decline by 41.2 million people, with Nigeria accounting for more than half of this estimated decline. Mali is projected to make the least progress over the next decade, with the country's number of food insecure people remaining relatively unchanged at around 4 million. All WAF countries included in IFSA are anticipated to see an improvement in their daily per capita Calorie food gap in the next decade (table 8). By the end of the decade, the per capita daily Calorie food gap is projected to decline 19.2 percent, from 379 kcal in 2021 to 306 kcal in 2031.

Total grain demand in the WAF sub-region is projected to increase by an additional 48.6 million tons over the next 10 years, from an estimate of 109.5 million tons in 2021, to 158.1 million tons in 2031 (table 8). Demand for food grain is anticipated to account for 59.0 percent of the growth in grain demand and increase by 28.6 million tons by 2031. By contrast, over the next decade, the demand for grain for other uses (including feed) is projected to increase by a lower amount, 20 million tons. Grain production is projected to increase less than total grain demand, increasing by 36.6 million tons by 2031. To cover the estimated growth in the gap between grain demand and production by 2031, the WAF sub-region is projected to need an additional supply of 12 million tons of grain.

Nigeria is the largest economy and the most populous country in the WAF sub-region. The country is highly susceptible to global economic shocks, as it is highly dependent on export revenues from crude oil sales. In addition to the widespread socioeconomic effects from the COVID-19 pandemic, conflict in the north-eastern and north-central parts of the country continue to impact food security (FSIN and GNFAC, 2020). Over the next decade, Nigeria's economy is expected to expand at an annual rate 3.4 percent, a reversal of the declining trend in GDP growth rate of -0.5 percent a year during the 2015–2020 period. Over the next decade, Nigeria's population is projected to grow at a rate of 2.5 percent a year, to add 61 million people. Given that the growth rate of the Nigerian economy is anticipated to outpace population growth rate by 2031, GDP per capita is expected to increase from an estimated $2,259 in 2021 to $2,475 in 2031. Driven by anticipated income growth over the coming decade, the prevalence of food insecurity is projected to decline, from 33.9 percent of the population in 2021 to 18.2 percent in 2031. The number of food insecure people by 2031 is expected to decline by roughly 30 percent, to 51 million.

Ghana and Côte d' Ivoire have the second- and third-largest economies, respectively, and together account for 14 percent of the WAF sub-region's population. While the economies of both countries were estimated to have shrunk by less than 2.0 percent in 2020, their GDP is expected to grow by more than 5.0 percent in 2021, and, in absolute terms, remain above the 2018–2020 period average. Moreover, GDP per capita in 2021 is estimated to be marginally below their pre-COVID-19 pandemic levels. Both countries are anticipated to see real income gains over the next decade, as GDP growth is projected to outpace population growth. By 2031, Ghana is projected to make the most gains in its food-security metrics, with both the prevalence of food insecurity in the population and the number of food insecure people projected to decline by more than 70.0 percent. Over the next decade, Côte d' Ivoire's progress is anticipated to be more moderate, with the share of the population considered food insecure projected to decline by almost a third and the number of food insecure people declining by 15.0 percent.

The food security environment of the Central Sahelian countries of the WAF sub-region—including Burkina Faso, Mali, and Niger—continues to be impacted by protracted armed conflicts, as well as the socioeconomic effects from the COVID-19 pandemic. Burkina Faso and Mali were also impacted by decreased cotton prices in 2020, a major source of export revenues for both economies. In the conflict areas of the Central Sahelian countries, displaced populations face limited access to food (FSIN and GNFAC, 2020). Moreover, severe disruptions to marketing chains have also been reported because of the pandemic, affecting price levels of the general populations of Central Sahelian countries. Despite the challenging macroeconomic and food security environment in 2021, all countries are projected to see a moderate rebound in their economic growth prospects over the next decade. By 2031, the prevalence of food insecurity across the 3 countries is projected to decline by 47.5 percent to less than 16.0 percent, with the sharpest declines projected in Burkina Faso and Niger. The number of food insecure people in these 3 countries in 2031 is projected at 13.9 million, 29.3 percent lower than in 2021.

In Liberia and Sierra Leone, the COVID-19 pandemic put further pressure on their already declining economic environment. The economies of the two countries continue to be impacted by high inflation and a strong depreciation of the local currency (Food Security Information Network (FSIN) and GNFAC, 2020). Moreover, shortages of inputs in 2020—particularly fertilizers—depressed crop outputs (FAO and WFP, 2020). In 2021, Liberia and Sierra Leone are estimated to have a large share of their population considered food insecure. However, by 2031, the prevalence of food insecurity is projected to decline by at least 30.0 percent in both countries, which would likely be driven by an anticipated recovery in the economic prospects of both countries. By 2031, the number of food insecure people across both countries is expected to decline by 38.0 percent, to less than 5 million.

Gambia and Guinea-Bissau have the smallest economies in the WAF sub-region and account for 1.0 percent of the sub-region's population. Before the COVID-19 pandemic, the two countries faced an already challenging macroeconomic and food security environment. Decreased oil prices in 2020—Gambia's main export—and an anticipated decline in remittances for Gambia and Guinea-Bissau, both limited their responses to the COVID-19 pandemic and may have increased poverty levels (FSIN and GNFAC, 2020). By 2031, GDP per capita in Gambia is projected to make a strong recovery and grow at a rate of 3 percent a year. Guinea-Bissau's income growth is anticipated to be more moderate than Gambia's, with GDP per capita growth projected at 1.1 percent per year from 2021 to 2031. Given the expected robust income gains in Gambia, the prevalence of food insecurity is projected to decline by 81.0 percent and the number of food insecure people by 77.0 percent. By contrast, Guinea-Bissau is anticipated to make less progress over the same period. The share of the country's population considered food insecure, and the number of food insecure people, are projected to decline by 49.0 percent and 34.0 percent, respectively.

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North Africa

North Africa (NAF) is the most food-secure region in the IFSA analysis, with only 14 percent of its regional population estimated to be food insecure in 2021. However, the countries of the region continue to be affected by the economic slowdown due to the COVID-19 pandemic. The impact on the energy and tourism sectors of North Africa—both main sources of government revenues and employment for low-income workers—continues to affect the purchasing power of households, especially in urban areas (Food and Agriculture Organization of the United Nations (FAO), 2021). Continued subsidies for basic food commodities have mitigated income decline, while also buffering consumers from recent international food price increases (FAO, 2021). Driven by an estimate of incomes that are still lower than 2019 (table 9), the prevalence of food insecurity is anticipated to increase sharply for 2021. The share of the population estimated to be food insecure in the NAF region (for 2021) increased by 5.5 percent from its 2020 value (table 10 and figure 6). Egypt is estimated to have both the highest prevalence of food insecurity (18.9 percent) and the highest number of food insecure people (20.1 million) in the region (table 10). By contrast, Tunisia is estimated to have the lowest levels of food insecurity in both relative (6.0 percent of the population) and absolute terms (less than 1 million people).

Table 9
Inflation adjusted per capita income for the North Africa region, 2021 and 2031

	2019 (pre-COVID-19)	2021	2031
	Dollars (2015 U.S.)		
North Africa	**3,864**	**3,537**	**4,240**
Algeria	4,190	3,838	4,367
Egypt	3,950	3,551	4,194
Morocco	3,188	3,068	3,945
Tunisia	3,973	3,732	5,144

Source: USDA, Economic Research Service International Macroeconomic Dataset.

Table 10

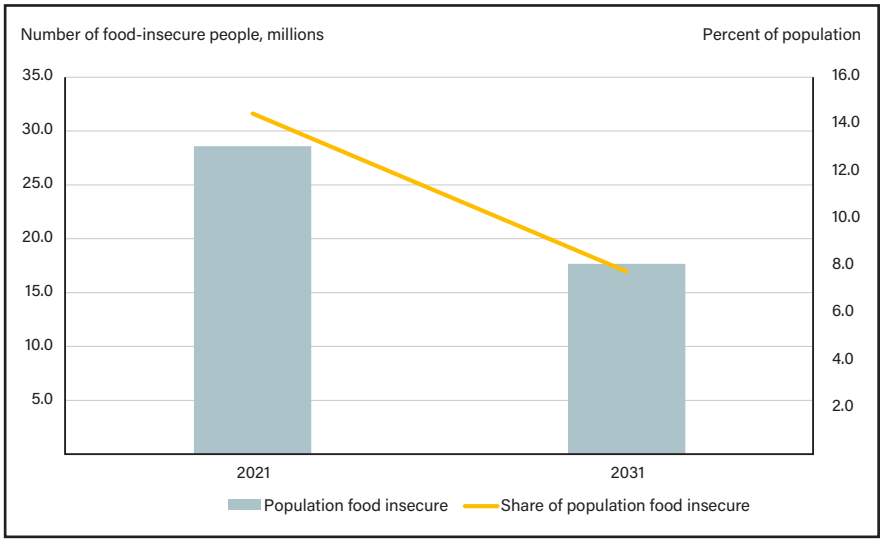
Food security indicators for North Africa region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	47.9	44.3	92.1	36.1	56.1
2031	59.5	55.4	114.9	46.0	68.9

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

North Africa indicators of food insecurity



North Africa
(197.8 million people in 2021)

North Africa is the most food secure region in the assessment. The prevalence of food insecurity in 2021 is estimated at 14.5 percent and the number of food-insecure people at 28.6 million. By 2031, the prevalence of food insecurity in North Africa is projected to decline by 46 percent to less than 8 percent. The number of food-insecure people in 2031 is projected to be 18 million a decline of 38 percent from 2021.

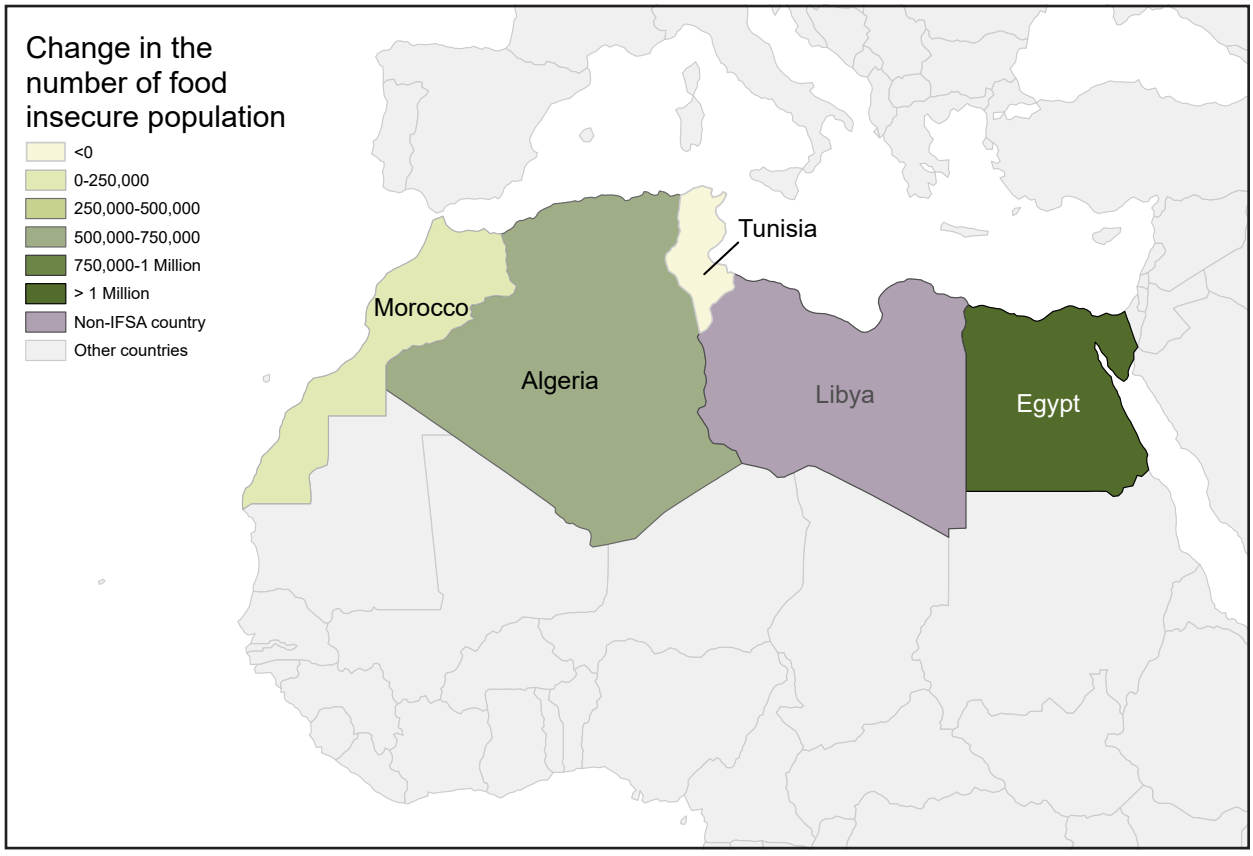
Source: USDA, Economic Research Service based on results from the International Food Security Assessment model.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
North Africa	**197.8**	**228.0**	**28.6**	**17.7**	**14.5**	**7.8**	**280**	**245**	**1,116**	**613**
Algeria	43.6	48.6	5.2	2.3	11.8	4.8	282	241	189	73
Egypt	106.5	128.3	20.1	13.7	18.9	10.7	331	292	811	490
Morocco	35.9	38.8	2.7	1.4	7.4	3.5	266	238	93	43
Tunisia	11.8	12.4	0.7	0.3	6.0	2.3	242	211	22	7

Note: *Measured in grain equivalents.

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

Figure 6
North Africa: Change in the number of food insecure people in 2021, from 2020



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

The NAF region's GDP is projected to annually expand by 3.3 percent (an improvement from 2.3 percent during the 2015–20 period), from $699.5 billion in 2021 to $966.8 billion in 2031. With an anticipated annual growth rate of 1.4 percent—a decline from 1.9 percent during the 2015–20 period—the population in the NAF region is projected to increase from 198 million to 228 million people over the next decade. During the same period, GDP per capita is anticipated to expand by 1.8 percent (an improvement from 0.4 percent from the 2015–2020 period) annually from $3,537 to $4,240 (table 9). By 2031, reflecting income and population trends over the decade, 17.7 million people are projected to be food insecure in the NAF region, a 38 percent decline from 2021 (table 10). Egypt is expected to account for most of the region's food insecure population in 2031. The per capita daily Calorie food gap, defined as the difference between estimated consumption and the daily nutrional target of 2,100 kcal, in the NAF region is projected to decline from 280 kcal in 2021 to 245 kcal in 2031 (table 10).

Total grain demand in the NAF region is projected to increase, from 92.1 million tons in 2021 to 114.9 million tons in 2031, driven mainly by Egypt's growing demand for grains (table 10). Over the next decade, the annual growth rate of grain production (2.5 percent a year) is projected to outpace the growth rate in total grain demand (2.2 percent a year). In absolute terms, total grain demand is expected to be 2.5 times higher than production by 2031, resulting in an anticipated 23.0 percent increase in the implied additional supply requirement.

In 2021, Algeria is NAF's second most food insecure country, with estimated food insecurity rate at 12 percent and this figure is projected to decline to 5 percent by 2031. The number of Algerian food insecure people is projected to decline by more than half from its 2021 estimate, from 5.2 million to 2.3 million.

Considering the economic fallout from the COVID-19 pandemic, and as a country that is dependent on petroleum and natural gas exports for export earnings, Algeria's GDP contracted by an average of 0.9 percent during the 2015–20 period. Over the next decade the country's economy is projected to grow by 2.4 percent a year, the lowest anticipated GDP growth among the NAF countries. The food gap expressed as a percentage of the daily per capita nutritional target of 2,100 kcal is projected to decline from 13.4 percent (281.5 kcal) in 2021 to 11.5 percent (240.3 kcal) to 2031.

Egypt in 2021, is estimated to have the highest share and the greatest number of food insecure people in the NAF region. The Egyptian GDP per capita in 2021 is estimated at $3,551 and projected to grow at an annual rate of 1.7 percent during the next decade. The real domestic price of major grains is projected to decline at annual rate of 0.9 percent over the decade, the smallest decline in the NAF region. Reflecting income and price trends over the next decade, the number of food insecure people is projected to decline by a third, to 13.7 million by 2031. The prevalence of food insecurity is projected to decline from an estimated 18.9 percent of the population in 2021 to 10.7 percent in 2031. The depth of food insecurity in the country in 2021 is also estimated to be the highest in the region, with an average food gap of 331 kcal per capita per day. By 2031, the daily Calorie food gap is projected to decline to 292 kcal but remain the highest in the NAF region.

Morocco is the second most food secure country in the NAF region, with the estimated prevalence of food insecurity estimated at 7.4 percent of the population in 2021, and it is projected to decline to 3.5 percent by 2031. Some 2.7 million people are estimated to be food insecure in 2021, and over the next decade, this number is anticipated to decline by 48 percent. The daily per capita Calorie food gap is estimated at 266 kcal in 2021, the second lowest in the NAF region. By 2031, the per capita per day Calorie food gap is projected to decline 10.6 percent to 238 kcal.

Tunisia, a lower middle-income country, is the least food insecure country in the NAF region with an estimated 6 percent of its population food insecure in 2021. By 2031, the prevalence of food insecurity is projected to decline to 2.3 percent of the population. The anticipated improvement in the country's food security status over the next decade is supported by anticipated sustained growth in income and lower food prices. Tunisia's GDP per capita is projected to grow from $3,732 to $5,144 in the coming decade. The real domestic price of major grains is expected to steadily decline at a rate of 2.0 percent a year.

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Latin America and the Caribbean

The COVID-19 pandemic's effect on the economies of Latin America and the Caribbean (LAC)[15] region was unprecedented in 2020. The real gross domestic product (GDP) contracted by 9.1 percent, making it the "worst recession in the region in a century" (Food and Agriculture Organization of the United Nations (FAO) and World Food Programme (WFP), 2020). A rebound in economic activity is anticipated to sustain 2.9 percent growth in real GDP in 2021 and 3.2 percent growth by 2031 (table 11). However, economic growth for LAC will remain below the projections made prior to the global COVID-19 pandemic (USDA, ERS, 2021). The speed of the economic recovery remains uneven across countries—as Bolivia, Dominican Republic, Guatemala, and Honduras experienced less pronounced collapses at the height of the crisis in 2020 than other LAC countries. By contrast, Colombia, Ecuador, El Salvador, Haiti, Jamaica, Nicaragua, and Peru suffered large contractions—and estimated long-term recovery remains limited through 2031.

Table 11
Inflation adjusted per capita income for the Latin America and the Caribbean region, 2021 and 2031

	2019 (pre-COVID-19)	2021	2031
	Dollars (2015 U.S.)		
Latin America and the Caribbean	**5,395**	**4,936**	**6,222**
Central America and the Caribbean	3,935	3,789	4,831
South America	5,395	5,602	7,041

Source: USDA, Economic Research Service International Macroeconomic Dataset.

To counter the effects of COVID-related restrictions, all countries in LAC—as was the case for various other countries around the globe—implemented several comprehensive policy responses to support households' and businesses' incomes. These fiscal support expenditures have included subsidies, grants, loans, guarantees, and forgone tax revenue. In 2020, the emergency fiscal support granted by all 11 LAC countries amounted to about 5.0 percent of GDP, on average (International Monetary Fund (IMF), 2021). Although these fiscal measures have successfully mitigated some of the COVID-19 impacts on the most vulnerable, the pandemic has exacerbated the structural problems the LAC region has historically suffered from, including narrow fiscal space, high inequality, limited social protection, a high degree of labor informality, and high prevalence of food insecurity.

The current food-security assessment estimates 25.6 percent of the LAC population is food insecure in 2021, 4.5 percentage points higher than in 2020 (table 12 and figure 7). The estimated prevalence of food insecurity during 2021 ranged from 11.2 percent in the Dominican Republic to 65.2 percent in Haiti. Food-insecurity levels and rates differ across countries in the LAC region due to their populations, economic conditions, and policies. The population of the LAC region in 2021 is estimated at nearly 175 million and is projected to reach to 191 million by 2031. The average population growth rate for LAC countries is projected to decline from 1.1 percent during 2015–2020, to 0.9 percent from 2021 to 2031. Slowing population growth is associated with rising incomes, literacy rates, and life expectancy—all of which tend to lower birth rates.

[15]The countries studied include four Central American countries: El Salvador, Guatemala, Honduras, and Nicaragua; three Caribbean countries: the Dominican Republic, Haiti, and Jamaica; and four South American countries: Bolivia, Colombia, Ecuador, and Peru.

Table 12

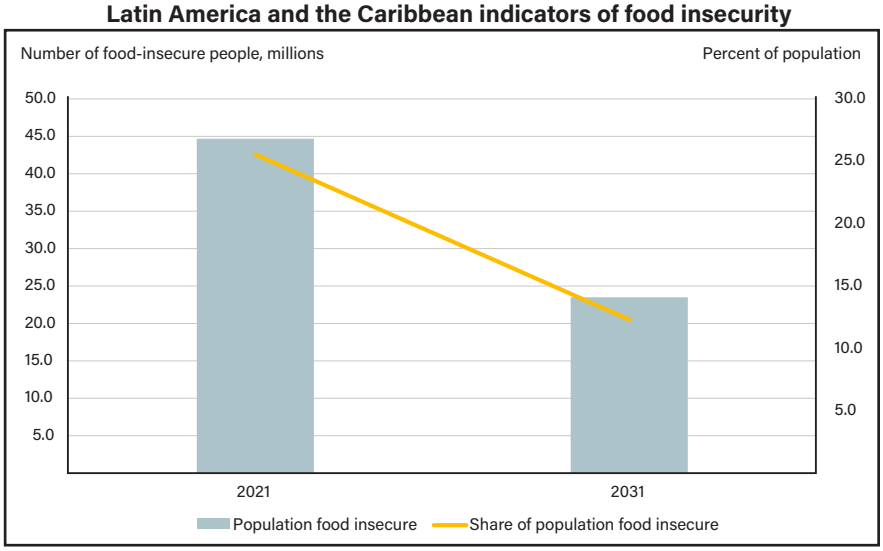
Food security indicators for Latin America and the Caribbean, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	24.4	37.0	61.4	20.1	41.3
2031	11.7	23.6	35.3	27.1	8.2

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Latin America and the Caribbean indicators of food insecurity



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

Latin America and the Caribbean
(174.8 million people in 2021)

The prevalence of food insecurity in Latin America and the Caribbean is estimated at 25.6 percent for 2021 and some 44.7 million people are estimated to be food-insecure. By 2031, the region is projected to make significant improvements in its food security indicators, mainly driven by improvements in South America. The prevalence of food insecurity is projected to fall almost 52 percent by 2031 and reach 12.3 percent. The number of food-insecure people is projected to decline by almost half to 23.5 million people.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Latin America and the Caribbean	**174.8**	**191.0**	**44.7**	**23.5**	**25.6**	**12.3**	**345**	**284**	**2,236**	**1,152**
Central America and the Caribbean	64.2	70.8	20.5	13.6	32.0	19.2	376	315	1,261	833
South America	110.6	120.2	24.2	9.9	21.8	8.3	290	229	975	320

Note: *Measured in grain equivalents.

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

Figure 7

Latin America and the Caribbean: Change in the number of food insecure people in 2021, from 2020

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

Across LAC countries, population growth rates vary inversely with per capita income. Colombia, Dominican Republic, and Peru all have relatively higher incomes and are projected to have an annual population growth rate near 0.7 during 2021–2031 (table 12). Lower income countries, including Guatemala (1.4 percent), Bolivia (1.3 percent), Ecuador (1 percent), and Nicaragua (0.8 percent) have higher projected annual population growth rates. Population growth rates in Haiti and Honduras, two countries with the lowest income in the LAC region, are projected to average 1.1 percent of growth per year during 2021–2031. In El Salvador, population growth for 2021–2031 is at its lowest level (0.23 percent) because of the country's continued emigration rates. In most all cases, population growth is projected to slow during 2021–2031, compared to previous decades. The exception is Jamaica, where population is projected to continue to decline.

The COVID-19 pandemic has resulted in an erosion in income levels. LAC's real income per capita growth for the 2021–2031 period is projected to reach 2.3 percent per year, an improvement over the 0.9 decline in per capita GDP experienced in 2015–2020. Colombia, Dominican Republic, and Peru are all expected to drive much of the aggregate per capita GDP growth in the LAC region. Growth in Colombia and Peru is supported by fiscal spending and exports. On the aggregate for the region, per capita income increases from $4,936 in 2021 to $6,222 in 2031 (table 11). Despite the positive impact from fiscal packages and other measures implemented to boost economic activity, LAC's income per capita will remain below pre-COVID-19 levels until 2025, returning to its long-term trend levels through 2031.

The pandemic has dramatically increased food insecurity in the LAC region in 2021, compared to 2020. This situation is reflected in the region's increased share of the food insecure people among all four regions in 2021 and the region's increase in its food insecure population. In 2021, the LAC region accounts for more than a quarter (25.6 percent) of global food insecure people, slightly below Asia's global share (26.2 percent), but nearly double that of North Africa's (14.5 percent).

In 2021, the number of people in the LAC region estimated to have consumed less than the per capita daily recommended caloric target of 2,100 kcal is 44.7 million (table 12). Stricter lockdowns and high levels of informal employment impact economic activity and per-capita incomes. This situation—compounded by the resurgence of inflation—changes the sustained food security gains of past years. As a result of the pandemic, an additional 2.4 million LAC people are estimated to be food insecure in 2021—which represents about a 6.0 percent increase from the 2020 estimate. Food insecurity in the LAC region is also aggravated by the almost 9.6 million Venezuelans who emigrated within the region—principally to neighboring Colombia (3.3 million), Ecuador (2 million), and Peru (4.3 million)—and are disproportionally affected by unemployment and the lack of access to food safety nets (FAO and WFP, 2020).

Looking ahead, as the LAC economies recover from the COVID-19 induced economic recession, all 11 countries in the region improve their food availability during the next decade. Rising per capita demand for diversified diets and protein support increases in LAC's food grain demand, which rises from 24.4 million tons in 2021 to 29.4 million tons in 2031 (table 12). Demand for grain for other uses (including feed use and seed use) is projected to increase from 21.9 million tons in 2021 to 29 million tons by 2031. The combined grain demand (food and other uses) is projected to increase from 46.3 million tons in 2021 to 58.3 million tons in 2031. As a result of the strong demand growth, the production of grains is expected to increase from an estimate of 20.1 million tons in 2021, to 29.4 million tons in 2031. The projected difference between overall demand and domestic production is anticipated to grow by 2.8 million tons to 29 million tons by 2031.

Under this scenario, on a regional basis, the food gap—the difference between estimated consumption and the nutritional target of 2,100 kcal—is estimated at 345 kcal per capita, per day in 2021.But this figure is projected to decrease to 284 kcal per capita, per day by 2031 (table 12).

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Central America and the Caribbean (CAC)

The Dominican Republic has a population of 10.6 million in 2021, which is projected to rise to 11.5 million by 2031 (table 13). Results from the food security assessment model indicate that, in 2021, 11.2 percent of the country's population is estimated to be food insecure, or less than half the LAC's regional average of 25.6 percent of food insecure people. The Dominican Republic is estimated to have 1.2 million food insecure people in 2021, a number projected to fall to just 0.3 million food insecure people in 2031. Results in this study indicate that the Dominican Republic has the lowest estimated food gap in the LAC region, with 227 kcal per capita, per day. The daily per capita calorie gap is projected to decline to 179 kcal by 2031.

Table 13

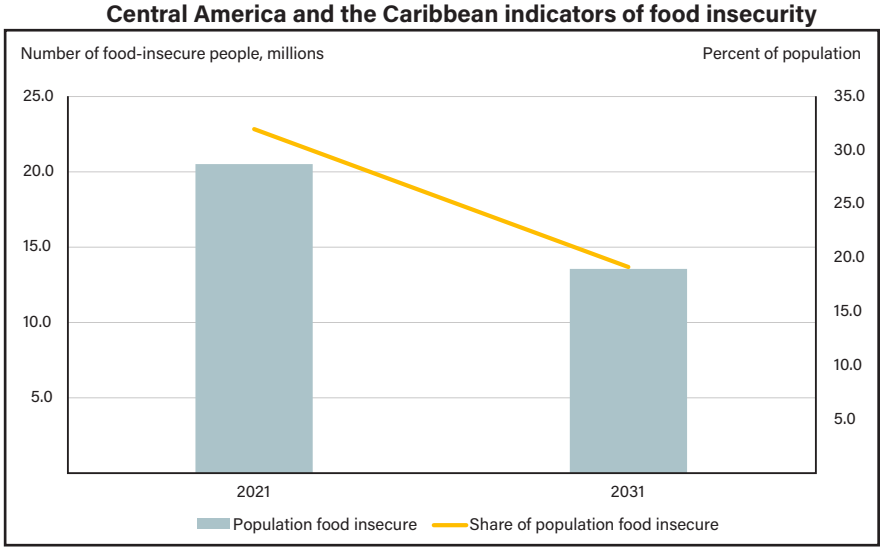
Food security indicators for the Central America and the Caribbean sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	8.4	13.1	21.5	5.8	15.6
2031	10.1	18.1	28.3	8.0	20.3

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Central America and the Caribbean indicators of food insecurity



Central America and the Caribbean
(64.2 million people in 2021)

The prevalence of food insecurity in Central America and the Caribbean is estimated at 32 percent for 2021 and some 20.5 million people are estimated to be food-insecure. By 2031, the prevalence of food insecurity is projected to fall some 40 percent to less than 20 percent. The number of food-insecure people is projected to decline by more than a third to less than 14 million people.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Central America and the Caribbean	**64.2**	**70.8**	**20.5**	**13.6**	**32.0**	**19.2**	**376**	**315**	**1,261**	**833**
Dominican Republic	10.6	11.5	1.2	0.3	11.2	2.4	227	179	39	7
El Salvador	6.5	6.7	1.5	0.8	22.9	11.4	290	246	49	21
Guatemala	17.4	20.1	5.2	3.0	29.8	15.1	356	297	211	103
Haiti	11.2	12.5	7.3	6.7	65.2	53.7	753	673	722	593
Honduras	9.4	10.4	2.4	1.1	25.9	10.4	341	274	93	33
Jamaica	2.8	2.7	0.4	0.1	15.6	2.8	235	175	13	2
Nicaragua	6.3	6.8	2.5	1.6	39.6	23.6	428	361	134	73

Note: *Measured in grain equivalents.

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

The economy of the Dominican Republic is largely reliant on the service and tourism sectors and, as a result, its economy was severely impacted by the COVID-19 pandemic in 2020. After contracting 4.7 percent in 2020, economic activity is projected to recover to 3.3 percent growth in 2021. Annual GDP growth is projected to average 4.2 percent in the next decade, the highest anticipated economic growth in the region. GDP per capita income in the Dominican Republic is also the highest in the region, estimated at $8,295 in 2021 and is projected to grow to $11,571 in 2031. Unfavorable weather conditions in the Dominican Republic in 2020 led to a reduction in the area of planted rice—a key component of the Dominican diet—and lower yields, which aggravated the food security situation. However, with improved weather and yields in 2021, rice production and consumption are projected to resume their normal growth rate (FAO, 2020; USDA, FAS, 2021a).

El Salvador, with a total population of 6.5 million, is the only country in the region where the population growth rate is projected to decline between 2021 and 2031 (which reflects emigration rates). In 2021, 22.9 percent of the population is estimated to be food insecure (table 13). However, this number is anticipated to decline by 50.1 percent, to 11.4 percent by 2031. Food consumption levels in El Salvador have worsened since the pandemic, with the number of food insecure people estimated at 1.5 million in 2021, a 7 percent increase from the 2020 estimate. The number of food insecure people, however, is projected to fall to about 800,000 by 2031. The daily per capita Calorie food gap in El Salvador is projected to fall from 290 kcal in 2021 to 246 kcal by 2031.

Annual GDP per capita growth through the next 10 years is projected to be 1.5 percent, which is an improvement over the 2015–2020 period, when per capita income declined 0.5 percent. GDP per capita in El Salvador in 2021 is estimated at $3,758 in 2021 and projected to increase to $4,354 by 2031.

During the COVID-19 pandemic, El Salvador's economy experienced a decline in export and tourism revenues. However, this decline was compensated with larger flows of family remittances. Moreover, the El Salvadorian government provided fiscal support to low-income households. Family remittances contributed the most to support incomes and totaled $4.8 billion in 2020. The torrential rains from hurricanes Eta and Iota affected cereal and bean crops in El Salvador. However, the adverse effects in El Salvador were not as severe as the effects experienced in Nicaragua, Honduras, and Guatemala, where food and commercial crops and livestock productions suffered devastating losses. The reduction in agricultural production—further hindered by the lack of operational credit—led to high food inflation, further aggravating food insecurity (Economic Commission for Latin America and the Caribbean (ECLAC), 2020).

Guatemala is the largest economy and most populous country in the CAC region. With 17.4 million people in 2021, Guatemala's population is projected to increase by 2.7 million by 2031 (table 13). The country's annual population growth rate is estimated at 1.4 percent between 2021 and 2031, compared to 1.8 percent annual growth during 2015 and 2020. Indigenous people make up more than half of Guatemala's population and are disproportionally affected by persistent income inequality and poverty (World Bank, 2021). In 2021, 29.8 percent of Guatemala's population is considered food insecure, but the prevalence of food insecurity is projected to fall to 15.1 percent by 2031. The number of food insecure people in Guatemala is estimated to have increased by 2.0 percent from 2020, to 5.2 million people in 2021. The number of food insecure people, however, is projected to fall to 3 million people by 2031. The daily per capita Calorie food gap in Guatemala is anticipated to decline moderately over the decade, from 356 kcal in 2021 to 297 kcal by 2031.

Although Guatemala is the largest economy in Central America, it is also the fifth poorest economy in the LAC region. Guatemala's GDP per capita is estimated at $4,104 in 2021 and projected to increase to $4,987 by 2031—equivalent to a 2.0 percent annual growth in per capita income over the next decade, compared to the 0.3 percent annual growth in income during the 2015–2020 period. The COVID-19 pandemic impacted

the Guatemalan economy considerably, contracting 2.4 percent in 2020. In 2021, Guatemala is projected to experience a 4 percent increase in economic recovery and the county's longer-term growth is projected at 3.5 percent in 2031 (USDA, ERS, 2021). Prior to the pandemic, Guatemala experienced economic stability and relatively higher real GDP growth rates, compared to neighboring economies. This economic stability was anchored by conservative fiscal management, inflation targeting, and a managed floating exchange rate (World Bank, 2021). The COVID-19 lockdown measures resulted in falling demand, disruptions to supply chains, and lower fiscal revenues. The government has been able to provide fiscal support, to expand social programs for families, and to supplement family remittances.

Agriculture is one of Guatemala's largest economic sectors, and the participation of multinational companies in the sector ensured less disruption to supply chains during the pandemic. The impact of Hurricanes Eta and Iota, which made landfall in neighboring Nicaragua and caused heavy rainfall, damaged bean and cereal crops, as well as coffee and sugarcane plantations. Although the damage was less extensive than in Nicaragua and Honduras, substantial crop losses aggravated the food insecurity situation, particularly in rural areas of the country (FAO, 2020).

Haiti is estimated to have the highest share of food insecure people in the LAC region (table 13). Since 2019, Haiti has been named among the 10 countries experiencing acute food crises in the world (FAO and WFP, 2020). Of the 11.2 million people in Haiti, 65.2 percent are estimated to be food insecure in 2021. The prevalence of food insecurity in Haiti is 39.6 percentage points higher than the regional average of 25.6 percent. Over the next 10 years, Haiti is projected to make the least progress in terms of its food security metrics, despite an anticipated drop in the prevalence of food insecurity to 53.7 percent by 2031.

About 7.3 million people in Haiti are estimated to be food insecure in 2021 and this figure is projected to decline to 6.7 million by 2031. Haiti also has the highest estimated per capita Calorie food gap in the LAC region, estimated at 753 kcal per capita per day. By 2031, Haiti's food gap is projected to fall 10.6 percent to 673 kcal per capita, per day.

Haiti's GDP per capita in 2021 is estimated at $761 in 2021 and is projected to increase to $832 by 2031, equivalent to a 0.9 percent annual growth in per capita income, reversing the 1.8 percent annual decline in income in the 2015–2020 period. Although Haiti produces small quantities of food for domestic consumption, the combination of irregular rains and low agricultural productivity constrain the country's ability to supply a greater share of its own food.

Haiti has been facing challenging macroeconomic conditions since 2019, as real GDP contracted 0.9 percent. The economic recession was further complicated by the COVID-19 pandemic and—in 2020—GDP contracted for a second year in a row, by more than 4.4 percent. Since 2020, the economy has been sustained by an increase in the flow of family remittances (FAO, 2020). Despite dire fiscal conditions, the government was able to provide cash transfers and food assistance to some of the most vulnerable, which partly helped alleviate the food insecurity condition in Haiti.

Honduras—with more than 9.4 million people—is Central America's second most populous country, after Guatemala (table 13). In 2021, Honduras is estimated to have 26 percent of its population experiencing food insecurity, which is similar to the LAC regional average. The prevalence of food insecurity in 2031 is projected to fall by 60.0 percent to 10.4 percent, surpassing the regional average reduction of 51.8 percent. About 2.4 million people are estimated to be food insecure in 2021, which is projected to decline to 1.1 million by 2031. Honduras also has the third highest daily per-capita Calorie food gap in the region, estimated at 341 kcal per capita per day in 2021.. By 2031, the food gap in Honduras is projected to fall by 19.6 percent to 274 kcal per capita, per day.

Honduras was the only country among the four Central American countries included in IFSA to register the highest sustained economic growth for the past decade and be above the LAC regional average. The economy of Honduras is projected to sustain an annual 3.7 percent GDP growth in the 2021–2031 period, well above the LAC average of 3.3 percent growth for the region. However, Honduras faces high levels of poverty and inequality, and the COVID-19 pandemic aggravated the situation of the most vulnerable. As a result of the pandemic-related declines in trade, investment, and consumption—further aggravated by a fall in family remittances—real GDP fell 3.7 percent in 2020. In 2021, the economy in Honduras is projected to rebound to 2.5 percent annual GDP growth.

GDP per capita is projected to grow annually by 2.5 percent in the 2021–2031 period, a much higher rate than the 0.9 percent annual growth in GDP per capita in the 2015–2020 period. Honduras was able to authorize new borrowing from the World Bank for $2.5 billion, equivalent to 10 percent of the country's GDP (World Development Indicators (WDI), 2021), to support households and businesses in order to counteract the pandemic's impact. The economy of Honduras is based mostly on agriculture, accounting for about 15.0 percent of the country's GDP (World Bank, 2021). Honduras is a leading exporter of coffee and bananas. In recent years, agricultural diversification has led to increased plantings of sugarcane, horticultural crops, pineapples, palm oil, and aviculture production. In late 2020, Hurricanes Eta and Iota severely affected agricultural production in Honduras, causing substantial crop losses, particularly bean crops, coffee and palm oil plantations, as well as horticulture crops, further aggravating the food security situation in the country.

Jamaica, with 2.8 million people, is the Caribbean and Central America's tenth most populous country. In 2021, Jamaica is estimated to have 15.6 percent of its population experiencing food insecurity, to represent the third least food insecure country in the LAC region (after Colombia and the Dominican Republic) (table 13). The important tourism sector—which contributes about 35.0 percent to GDP income—was significantly impacted by pandemic-related border closures. Economic activity contracted 7.2 percent. However, the contraction was less than what would have been expected, had it not been for Jamaica's strong fiscal position at the beginning of the pandemic, which allowed the economy to provide an additional fiscal stimulus in 2020 (equivalent to 1.2 percent of GDP). As the economy reopens and tourism restarts, the economy is expected to recover in 2021–22 and maintain sustained growth of 2.5 percent through 2031.

Jamaica is expected to make the most progress in its food security status over the next decade. From the estimated 15.6 percent in 2021, the prevalence of food insecurity is projected to decline by 81.9 percent—the highest decline in the region—to 2.8 percent by 2031. The daily per capita Calorie food gap in Jamaica is among the lowest in the world and the second lowest in the LAC region, after the Dominican Republic, estimated at 235 kcal for 2021.. By 2031, the food gap is projected to drop by nearly 26 percent to 175 kcal per capita per day, the highest reduction in the LAC region.

Nicaragua—with 6.3 million people—is Central America's smallest economy and 40 percent of Nicaragua's population is estimated to be food insecure in 2021 (table 13). The prevalence of food insecurity in 2031 is projected to decline 40.4 percent, to 24 percent. About 2.5 million people are estimated to be food insecure in 2021, which is projected to decline to 1.6 million people by 2031. In addition, Nicaragua has the highest daily Calorie per capita food gap in the region. With the Calorie food deficit of 428 kcal per capita per day in 2021. By 2031, Nicaragua's food gap is projected to fall 15.7 percent to 361 kcal per capita per day.

The COVID-19 pandemic crisis impacted both GDP per capita and remittance inflows, significantly reduced trade and tourism, and disrupted food distribution. Nicaragua's economy, which has been experiencing a recession since 2018, registered an 8.2 percent decline in 2020. Nicaragua's economy is projected to recover in 2021, with GDP growth of 3.9 percent. GDP per capita is projected to grow annually by 2.2 percent in the 2021–2031 period, a recovery from the 2.5 percent decline in per-capita income in the 2015–2020 period.

Nicaragua's economy is primarily driven by the agricultural sector. The landfall of Hurricanes Eta and Iota in late 2020, resulted in flooding and landslides that were responsible for severe damage to an estimated 80.0 percent of standing crops and Nicaragua's agricultural infrastructure. Farmers reported significant losses of food grains and legumes, coffee, sugarcane, fruits, vegetables, and grazing areas for livestock. These loses threaten the country's food security situation and the prospects for exports. Both hurricanes also destroyed homes, roads, bridges, and communications infrastructure.

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South America (SA)

Bolivia is the second highest food insecure country in the LAC region—after Haiti—and the most food insecure among the South American countries considered in this assessment (table 14). Bolivia was also the country in the LAC region most affected by the pandemic as measured by the high prevalence of food insecurity in 2021, which was estimated at 45.0 percent. The South American countries saw an increase of 1.2 million food insecure people in 2021, compared to a year earlier. The prevalence of food insecurity in Bolivia is projected to decline to 19.7 percent by 2031, 25.3 percentage points lower than in 2021, the sharpest decline in the South American sub-region. The daily per capita Calorie food gap is projected to fall from 343 kcal in 2021 to 259 kcal by 2031.

Table 14

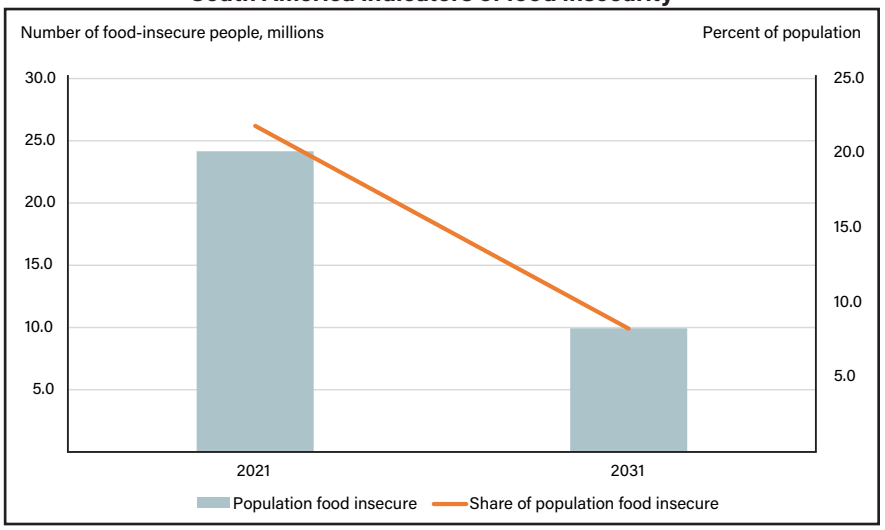
Food security indicators for the South America sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	16.0	22.0	38.0	14.3	23.7
2031	19.2	29.7	48.9	21.3	27.5

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

South America indicators of food insecurity



South America
(110.6 million people in 2021)

The prevalence of food insecurity in South America is estimated at 21.8 percent for 2021 and some 24.2 million people are estimated to be food-insecure. By 2031, the prevalence of food insecurity is projected to fall some 62 percent to 8 percent. The number of food-insecure people is projected to decline by almost 69 percent to less than 10 million people.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
South America	**110.6**	**120.2**	**24.2**	**9.9**	**21.8**	**8.3**	**290**	**229**	**975**	**320**
Bolivia	11.8	13.4	5.3	2.6	45.0	19.7	343	259	239	90
Colombia	49.5	53.3	6.3	1.6	12.6	3.0	260	205	235	47
Ecuador	17.1	18.9	4.7	2.4	27.7	12.8	264	216	175	73
Peru	32.2	34.6	7.8	3.3	24.4	9.5	295	237	326	110

Note: *Measured in grain equivalents.

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

The COVID-19 pandemic affected both GDP per capita and remittances. However, with an anticipated economic recovery GDP per capita is projected to grow annually by 1.9 percent during the 2021–2031 period, a much higher rate than the 0.2 percent annual growth in GDP per capita in the 2015–2020 period. Bolivia is one of the few countries in the region able to sharply increase its fiscal expenditures to counteract the effects of the pandemic, which supported sustained economic activity. While food prices remained stable during most of 2020, emerging food supply problems in 2021 are projected to lead to rising food prices in the longer term. As a result, food prices are projected to increase rapidly (5.5 percent annually) over the 2021–2031 period.

Colombia is the most populous country of the LAC countries covered in IFSA, with 49.5 million people in 2021 (table 14). By 2031, the country is projected to gain an additional 3.7 million people to reach a population of 53.3 million people. A large share of the projected population increase is driven by more than 3 million migrants from Venezuela who were granted residence status in 2021. In 2021, Colombia accounts for the third highest number of food insecure people (6.3 million) in the region, and the prevalence of food insecurity is estimated at 12.6 percent, significantly below the regional average for LAC of 25.6 percent. By 2031, Colombia is projected to have 3.0 percent of its population considered food insecure. The daily per capita Calorie food gap is projected to fall from 260 kcal in 2021 to 205 kcal by 2031.

Although Colombia has experienced many economic crises and the country's history is punctuated by economic volatility, the recession arising from the COVID-19 pandemic and subsequent lockdowns has been labeled the country's worst in decades. As a result, in 2020, the pandemic-related recession shrank Colombia's GDP by 9.5 percent. Ample fiscal measures (geared to support the most vulnerable households and businesses) were successful in softening the impact of the drastic reduction in economic activity. The Colombian economy is projected to recover in 2021, with GDP growth anticipated to reach 2.8 percent. This growth rate is projected to be generated from an expansion in public spending, a faster pace of economic activity, and reduced unemployment. Although oil prices are projected to remain below pre-pandemic levels, after 2021, export revenues are anticipated to be boosted by a recovery in external markets, higher projected oil prices, and a heightened import demand from major trading partners. Colombia's economy is estimated to sustain 3.2 percent real GDP annual growth over the next decade (USDA, ERS, 2021).

Colombia is a significant agricultural producer and exporter. Unlike other sectors, the agricultural sector was less impacted by the pandemic and had recorded positive growth for 2020. Although food production faced fewer operational restrictions, the marketing and distribution of food was significantly impaired by extended lockdowns to contain the pandemic. A large depreciation of Colombia's currency and the increased price of coffee—the country's principal export—boosted export revenues. Colombia's daily per capita Calorie food gap is projected to substantially shrink from 260 kcal in 2021 to 205 kcal in 2031, as the country continues to improve food production and distribution.

Ecuador is the third most populous country among the South American countries included in IFSA, with 28 percent of its population (17 million people) estimated to be food insecure in 2021 (table 14). By 2031, Ecuador is expected to see a reduction of 53.7 percent in food-insecurity prevalence, to nearly 12.8 percent of the population—which is projected to be driven by anticipated increases in GDP per capita, higher export revenues, and increased food production. Agriculture has traditionally employed a large proportion of the population in the production of subsistence food crops—including food grains, potatoes, beans, and cassava. Commercial production of tropical crops (such as coffee, cacao, and bananas) provide Ecuador with foreign exchange to buy rice and wheat imports. Ecuador has a daily per capita Calorie food gap of 264 kcal, which is projected to see a moderate decline to 216 kcal by 2031.

Ecuador derives an important share of its GDP from crude oil exports. The recent slump in oil and energy prices have considerably affected Ecuador's economy—as was the case for other countries like Colombia and Bolivia— who also depend on energy exports. In all three countries, negative terms-of-trade for energy products hampered economic growth in 2020. Ecuador (which was facing economic challenges before the pandemic and with less room to increase fiscal expenditures), suffered large contractions in economic activity compared to other countries in the South American region. Over the next 10 years (2021-31), per capita GDP is projected to grow 1.4 percent a year, the second slowest growth rate in the LAC region and comparable to Haiti.

Peru is classified by the World Bank as a middle-income country. Agricultural production in Peru has been hindered in the near term by low market prices, which has resulted in reduced 2021 plantings (FAO, 2021). However, with an anticipated increase in production over the medium term, food insecurity is estimated to drop significantly—also reducing the number of food insecure people from 7.8 million in 2021 to just over 3.3 million in 2031 (table 14). With a total population of 32 million in 2021, Peru is estimated to have 24 percent of its population considered food insecure in 2021. By 2031, the prevalence of food insecurity will drop by 60.9 percent to 9.5 percent. The daily per capita Calorie food gap is projected to fall from 295 kcal in 2021 to 237 kcal by 2031.

In the LAC region, Peru experienced the largest economic decline by the COVID-19 induced recession. After contracting more than 14.0 percent during 2020, GDP growth is projected to recover to 3.5 percent in 2021, with a sustained annual growth of 3.1 percent through 2031. As a result, GDP per capita is projected to annually increase 2.5 percent during the 2021–2031 period, compared to a 1.6 percent decline in the 2015–2020 period. Peru had better economic fundamentals than all other countries in the LAC region, which allowed for an unprecedented expansion of fiscal and monetary transfers to counter the effects of strict lock-downs, which lasted for several months and resulted in massive job losses. The depreciation of the currency also helped increase foreign exchange revenues from agricultural exports.

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Asia

In 2021, food security of the Asian countries covered by the assessment is anticipated to deteriorate further from 2020. In the Asia region, the main driver for the estimated increase in food insecurity is incomes that remain below their pre-pandemic levels (table 15). The COVID-19 pandemic caused significant income losses and reduced remittances, resulting in the deterioration of food-security for a large segment of the population (Food and Agriculture Organization of the United Nations (FAO), 2020). In 2020, GDP in Asia declined by more than 5.0 percent and the decline in per capita income was more than double at 10.6 percent (Baquedano et al., 2021). While robust growth for GDP per capita (4.0 percent) in 2021 is anticipated for most countries in the region, in absolute terms income will be 2.5 percent lower than in 2019 for most countries.

Table 15
Inflation adjusted per capita income for the Asia region, 2021 and 2031

	2019 (pre-COVID-19)	2021	2031
	Dollars (2015 U.S.)		
Asia	**2,279**	**2,221**	**3,400**
Commonwealth of Independent States	3,591	3,502	4,584
Central and Southern Asia	1,923	1,861	2,914
Other Asia	1,092	1,068	1,233
South East Asia	3,516	3,484	5,304

Source: USDA, Economic Research Service International Macroeconomic Dataset.

In 2021, the Asia region is estimated to have 647 million people (26.4 percent of its population) considered food insecure, the most of any region (table 16). The Central and South Asia (CSA) sub-region, which includes India, accounts for 78.6 percent of the food insecure population in the Asia region. In 2021, the number of food insecure people within the Asia region is estimated to have increased by 48.0 percent from 2020,[16] a year that also saw a sharp increase in the region's food-insecurity metrics after the onset of the COVID-19 pandemic (figure 8).

[16]The food insecurity metrics for 2020 are reported in Baquedano et al. (2021).

Table 16

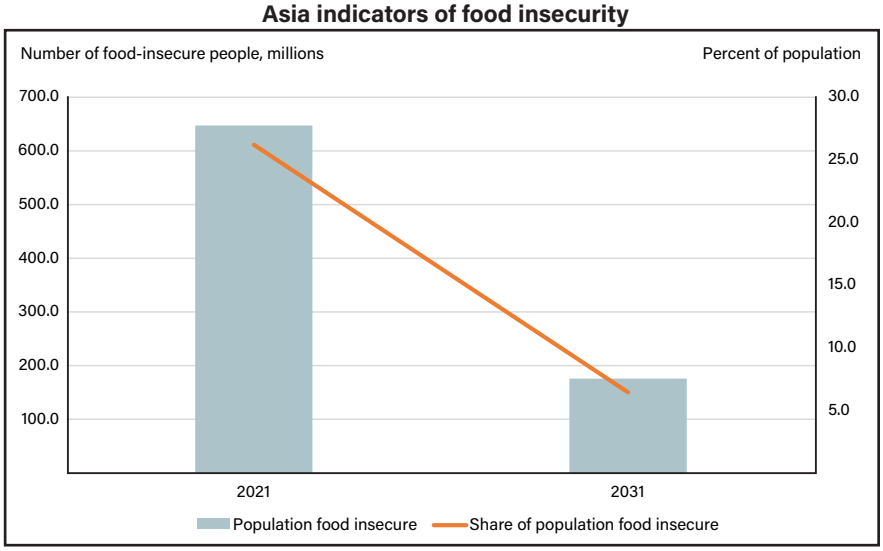
Food security indicators for Asia region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	481.0	163.4	644.4	546.5	97.9
2031	618.2	208.8	827.0	668.6	158.4

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Asia indicators of food insecurity



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

Asia
(4.9 billion people in 2021)

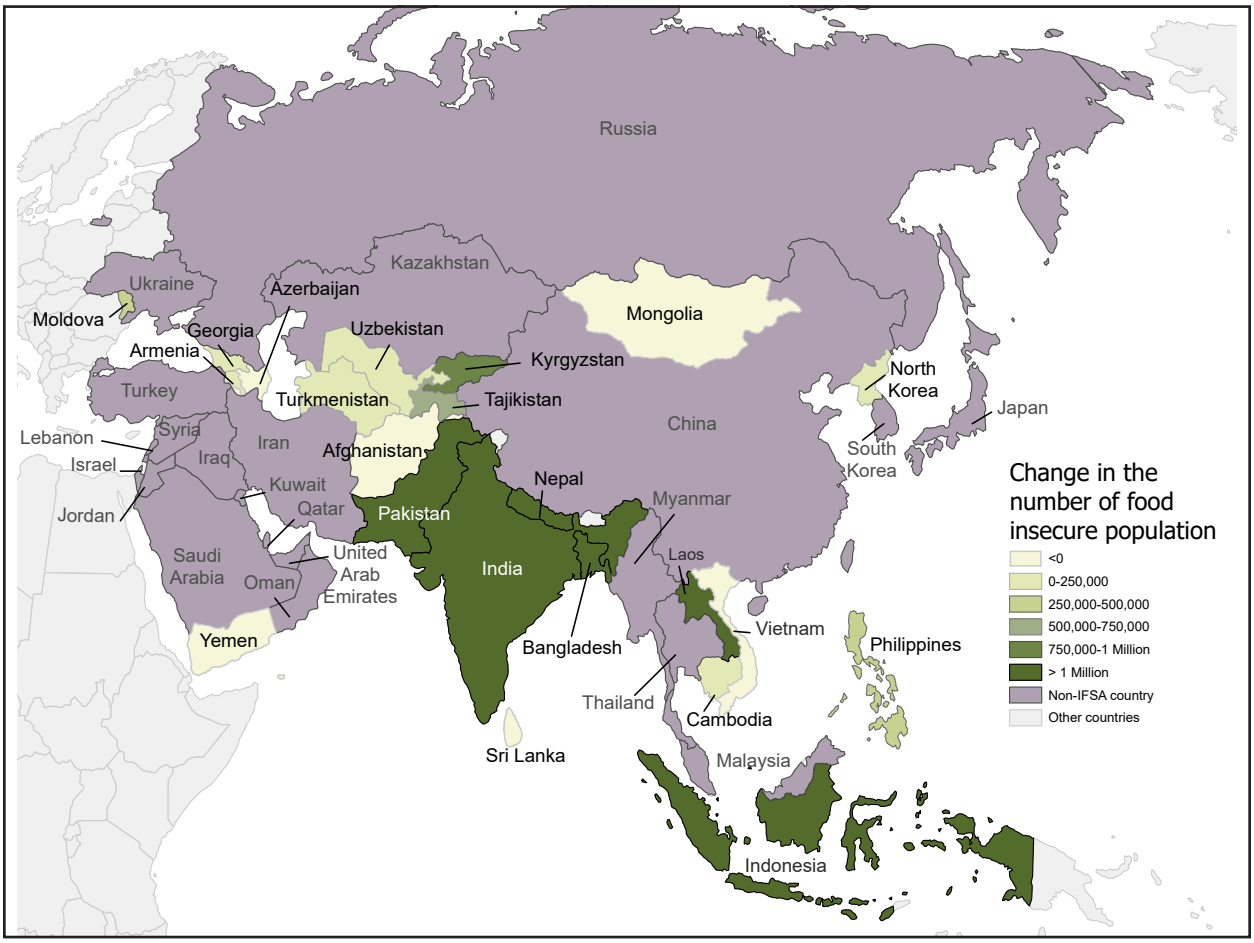
In 2021, ERS estimates that 647 million people are food-insecur in Asia, mainly reflecting the large numbers in the Central and Southern Asia sub-region, which includes India. The prevalence of food insecurity in Asia is estimated at 26.2 percent . By 2031, ERS projects that the prevalence of food insecurity will decline by three fourths to 6.4 percent. The number of food-insecure people in 2031 is projected to be 176 million, 73 percent less than 2021.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Asia	**2,470.8**	**2,731.4**	**647.3**	**175.7**	**26.2**	**6.4**	**304**	**231**	**28,285**	**6,992**
Commonwealth of Independent States	73.0	77.3	10.1	4.7	13.8	6.1	244	187	414	202
Central and Southern Asia	1,834.1	2,039.9	508.9	107.3	27.7	5.3	315	229	20,889	3,505
Other Asia	59.6	66.3	42.8	39.0	71.9	58.7	457	375	3,109	2,372
South East Asia	504.1	547.7	85.5	24.7	17.0	4.5	296	220	3,873	912

Note: *Measured in grain equivalents.

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

Figure 8
Asia, change in the number of food insecure people from 2020 to 2021



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

By 2031—driven by an expectation for sustained economic growth (5.4 percent annually) coupled with low population growth rates (1.0 percent annually)—the Asia region is projected to see a 75.4 percent reduction in its prevalence of food insecurity to 6.4 percent, and the number of food insecure people is anticipated to decline to less than 176 million (table 16). Moreover, the per capita daily Calorie food gap—the difference between estimated consumption and a nutritional target of 2,100 kcal—is projected to decline by 23.9 percent, from 304 kcal in 2021 to 231 kcal in 2031. Most of the food-security improvements over the next decade are driven by trends in the CSA sub-region, where the number of food insecure people is projected to decline by 78.9 percent over the next decade, to less than 108 million. Moreover, the CSA's prevalence of food insecurity is anticipated to decline by 81.0 percent to 5.3 percent. By contrast, Other Asia (OA), which includes North Korea and Yemen, is projected to make little progress in its food-insecurity metrics over the next decade. By 2031, OA is anticipated to reduce the prevalence of food insecurity by 18.3 percent (to 58.7 percent of the total population) and the number of food insecure people by 9.0 percent (to less than 43 million people).

Because of productivity gains for most countries, Asia has experienced strong growth in grain output. In 2020, Asia recorded a 1.6 percent growth in grain production, and early prospects are favorable for 2021 (FAO, 2020). Grain production over the next decade is projected to annually grow by 2.0 percent (table 16). By contrast, the total demand for grains—both for food and other uses, including feed—will grow at a rate of 2.5 percent a year. The anticipated stronger growth in total grain demand will increase the region's implied additional supply requirements (accounting for both the need of stocks and imports) by almost 62.0 percent over the next decade.

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Commonwealth of Independent States (CIS)

In 2021, the CIS is estimated to be the most food secure sub-region in Asia. The number of food insecure people is estimated at 10.1 million, or 13.8 percent of the CIS population (table 17). Relative to 2020, it is estimated that the CIS sub-region may see an increase of 27.6 percent in the number of food insecure people. The increase (in the estimated number of food insecure people) mainly reflects incomes that are 2.5 percent lower than their 2019 levels. Tajikistan accounts for close to half of the population estimated to be food insecure in the CIS sub-region. Tajikistan is also estimated to have the highest rate of food insecurity (53.6 percent of the population) in the sub-region. The pandemic-related global economic slowdown resulted in a strong decline in prices for the sub-region's main commodity exports—particularly energy products—and resulted in a decline of 4.0 percent in GDP in 2020. Although economic activity is expected to recover in 2021, the effects of the COVID-19 pandemic will linger, with both GDP and GDP per capita anticipated to remain below the 2019 levels.

Table 17

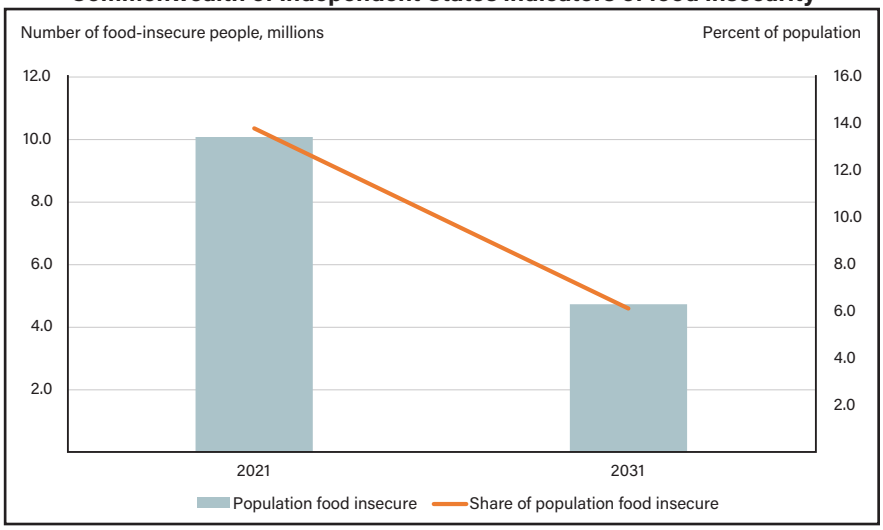
Food security indicators for the Commonwealth of Independent States sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	13.5	23.8	37.3	21.0	16.3
2031	16.2	31.8	48.1	33.0	15.1

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Commonwealth of Independent States indicators of food insecurity



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

Commonwealth of Independent States (CIS)
(73 million people in 2021)

The prevalence of food insecurity in CIS is estimated at 13.8 percent in 2021 and is driven by the high levels of food insecurity in Tajikistan. In 2021 we estimate close to 10.1 million people who are food-insecur in CIS. By 2031 we project that the prevalence of food insecurity will decline by more than half to 4.7 percent. The number of food-insecure people in 2031 is projected to decline by 53 percent to less than 5 million. Tajikistan, however, will make the least progress.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Commonwealth of Independent States	**73.0**	**77.3**	**10.1**	**4.7**	**13.8**	**6.1**	**244**	**187**	**414**	**202**
Armenia	3.0	2.9	0.1	0.0	4.8	0.2	189	137	3	0
Azerbaijan	10.3	10.8	0.4	0.1	4.3	0.6	170	135	9	1
Georgia	4.9	4.9	0.5	0.1	10.8	1.7	234	178	16	2
Kyrgyzstan	6.0	6.5	1.1	0.4	18.3	5.6	263	209	37	10
Moldova	3.3	2.9	0.8	0.04	24.3	1.2	243	146	26	1
Tajikistan	9.0	10.2	4.8	3.9	53.6	38.2	442	378	265	183
Turkmenistan	5.6	6.1	0.4	0.1	7.6	1.0	212	162	12	1
Uzbekistan	30.8	33.0	1.8	0.2	5.9	0.7	195	150	46	4

Note: *Measured in grain equivalents.

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

By 2031, the prevalence of food insecurity (6.1 percent of the population) and the number of food insecure people (4.7 million) in the CIS sub-region is projected to decline by more than half (table 17). The anticipated improvement in the sub-region's food security metrics over the decade are linked to a projected acceleration in income growth. During the 2021–2031 period, GDP per capita is projected to grow at an annual rate of 4.6 percent, almost double the rate of the 2015–2020 period. By 2031, the per capita daily Calorie food gap is projected to decline by 23.3 percent, from 244 kcal in 2021 to 187 kcal in 2031. However, relative to the sub-regional food security trends over the coming decade, Tajikistan is anticipated to make the least progress in absolute terms (i.e., number of food insecure people) and relative terms (i.e., prevalence of food insecurity). Over the coming decade, Tajikistan's population growth rate (1.3 percent a year) is projected to be more than double the CIS average (0.6 percent a year), resulting in GDP per capita growth that is less than half the regional average—1.2 per cent a year for Tajikistan, versus 2.7 percent a year for the CIS sub-region).

The CIS sub-region is a large producer and exporter of grains, particularly wheat. By 2031, the sub-region is projected to make productivity gains, with grain output growing 4.6 percent a year (table 17). Although most of the CIS sub-region's future demand growth for grains is projected to come from other uses (including feed), the anticipated growth in output far exceeds the annual growth of 2.6 percent in total grain demand. And while the sub-region is not anticipated to be self-sufficient in grain production by 2031, the implied additional supply requirement—which includes stocks and imports—will be lower than in 2021.

Central and Southern Asia (CSA)

The CSA sub-region accounts for 47 percent of the total population of the Asia region in IFSA, as it includes India. Because of its population size, India tends to distinctly influence food-insecurity trends in the Asia region. In 2021, it is estimated that the CSA will have a larger population of food insecure people than the Sub-Saharan Africa (SSA) region, with the current estimate for 2021 reaching almost 509 million people who are food insecure (table 18). India is estimated to account for 68 percent of the food insecure population in 2021 in the sub-region. By contrast, Afghanistan has the highest estimated prevalence of food insecurity in 2021 in CSA. Almost 59 percent of Afghanistan's population is estimated to be unable to meet the daily Calorie requirement of 2,100 kcal. Sri Lanka is estimated to be the most food-secure country in the CSA sub-region in 2021. Because of the lingering effects of the COVID-19 pandemic on income levels and economic activity, the CSA sub-region is estimated to have 58 percent more people considered food insecure in 2021 than in 2020. Like the rest of the world, the CSA saw a sharp decline in GDP as a result of the global COVID-19 pandemic, with economic growth declining by an average 5.9 percent at a sub-regional level and by 6.9 percent in India (Baquedano et al., 2021). While strong economic growth is estimated in 2021 for the CSA sub-region (5.4 percent), in absolute terms both GDP and GDP per capita will remain below the 2018–2020 trend for most countries in the sub-region.

Table 18

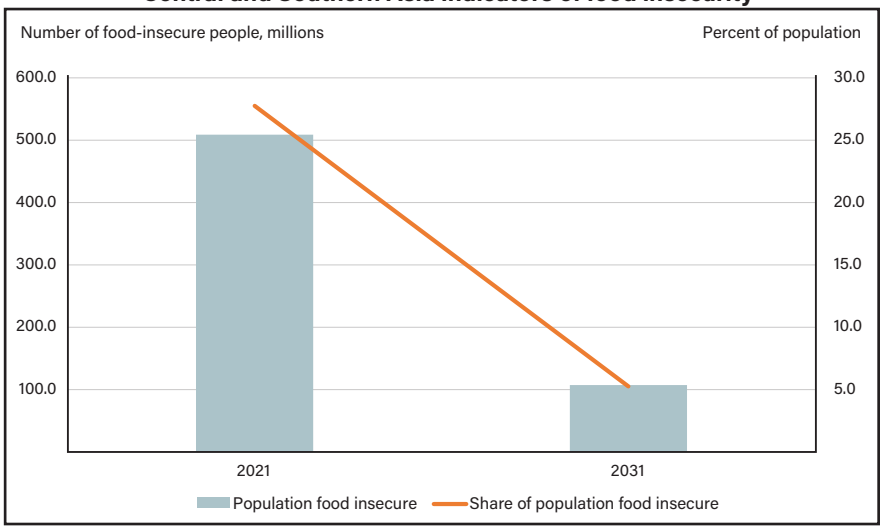
Food security indicators for the Central and Southern Asia sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	334.6	79.1	413.7	394.8	18.9
2031	440.4	109.3	549.7	468.5	81.2

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Central and Southern Asia indicators of food insecurity



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

Central and Southern Asia
(1.8 billion people in 2021)

The prevalence of food insecurity in Central and Southern Asia is estimated at 27.7 percent in 2021. In 2021, 509 million people are estimated to be food-insecure in Asia, with two thirds accounted by India. By 2031 we project that the prevalence of food insecurity will decline by 81 percent to 5.3 percent. However, the prevalance of food-insecurity is projected to remain high in Afghanistan. The number of food-insecure people in 2031 is projected to decline by 78.9 percent to less than 108 million.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Central and Southern Asia	**1,834.1**	**2,039.9**	**508.9**	**107.3**	**27.7**	**5.3**	**315**	**229**	**20,889**	**3,505**
Afghanistan	37.5	46.6	22.1	18.1	58.9	38.8	397	322	1,044	692
Bangladesh	164.2	178.3	42.1	10.5	25.7	5.9	300	218	1,856	336
India	1,340.5	1,473.0	345.4	32.1	25.8	2.2	289	183	13,400	789
Nepal	30.6	32.6	4.2	0.1	13.6	0.3	255	157	150	2
Pakistan	238.3	285.2	90.7	45.6	38.1	16.0	389	301	4,268	1,659
Sri Lanka	23.0	24.2	4.5	1.0	19.4	4.0	258	191	171	28

Note: *Measured in grain equivalents.

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

By 2031, the prevalence of food insecurity in the CSA sub-region is projected to decline by about 81 percent from 2021 to 5.3 percent (table 18). The improvement in food security is largely driven by an anticipated stronger recovery in GPD per capita growth after 2021, slower population growth, and stability in food prices. In the CSA sub-region, Bangladesh, India, and Pakistan are projected to account for most of the improvement in the food-security metrics by 2031. By contrast Afghanistan—relative to its CSA peers—is anticipated to make the least progress over the next decade. By 2031, CSA's food insecure population is projected to decline by 78.9 percent to just over 107 million people. Pakistan, India, and Afghanistan are projected to account for most of the food insecure people in 2031 in the region. However, Afghanistan is projected to have the highest prevalence of food insecurity in the coming decade. The daily per capita Calorie food gap in CSA –defined as the difference between estimated consumption and the nutritional target of 2,100 kcal—is projected to decline by 27.3 percent, from 315 kcal in 2021 to 229 kcal in 2031.

Grain demand over the next decade in CSA is projected to grow at a faster pace (2.9 percent a year) than production (1.7 percent a year) (table 18). Between 2021 and 2031, most of the growth in grain demand is projected to come from demand for other grain use, including feed. The demand for other grain use is projected to grow at a rate of 3.3 percent a year, 0.5 percentage points higher than the growth for food grain demand over the same period. In absolute terms, the demand for food (440 million tons) will be 4 times greater in 2031 than the demand for other grain use (109 million tons). This increased demand will require a significant growth in the sub-region's implied additional supply requirements.

India, as the largest country in the CSA sub-region of all countries included in IFSA, plays a major role in shaping the Asia's food-security indicators. The COVID-19 pandemic led to the worst economic slump in four decades for India (World Food Programme (WFP), 2020). The pandemic is expected to revert poverty levels in India to their 2016 estimate, with the poverty rate reaching 10.4 percent (World Bank, 2020). Per capita GDP for 2021 is estimated at $2,009, roughly 3.0 percent below its 2019 level. As a result of the estimated macroeconomic trends, 25.8 percent of the population (345.4 million) is estimated to be food insecure in 2021.

Despite the pandemic-induced decline in India's GDP growth in 2020 (-6.9 percent), the country's GDP per capita is projected to grow at an annual rate of 4.9 percent between 2021 and 2031. The anticipated higher income prospects are projected to result in a marked improvement in the country's food-security metrics. The number of food insecure people in India is projected to decrease to 32.1 million by the year 2031, or 2.2 percent of India's population. The per capita daily Calorie food gap is projected to decline by 36.6 percent, from 289 kcal in 2021 to 183 kcal in 2031.

Afghanistan continues to be one of the most food insecure countries in IFSA. The COVID-19 pandemic, coupled with an intensification of the armed conflict that began in 2001, has resulted in at least 3.4 million people being considered in an emergency acute food insecurity[17] situation (Global Network Against Food Crises (GNAFC), 2020). Protracted armed conflict and generally deteriorating macroeconomic conditions, coupled with increasing food prices, will continue to drive food insecurity in Afghanistan in 2021 (FAO, 2020; GNAFC, 2020). In 2021, more than 22 million people are estimated to be considered food insecure, representing 58.9 percent of the Afghan population (table 14). Afghanistan is projected to make the least progress in its food security metrics in the CSA sub-region. By 2031, the prevalence of food insecurity is projected to decline by 34 percent to 38.8 percent of Afghanistan's population (table 18). By 2031, the total number of food insecure people in Afghanistan is expected to decline by 18.2 percent to 18.1 million, the lowest decline of any CSA country. The ability of the food insecure population to meet its daily per capita

[17]According to IPC Global Partners (2019) an acute food insecurity situation identifies areas or populations with food deprivation that threatens livelihoods, regardless of the causes, context, or duration.

Calorie requirement is projected to improve by 2031, as the per capita food gap declines from 397 kcal in 2021 to 322 kcal in 2031.

Bangladesh has the third largest population in the CSA sub-region. Bangladesh's economy has been significantly impacted by the COVID-19 pandemic, as the economy is highly dependent on remittances from migrants residing abroad and a main exporter of garments. According to estimates compiled by GNAFC (2020), remittances are estimated to have declined some 27.8 percent in 2020, as migrants returned to Bangladesh or the economies that hosted them also saw pandemic-induced economic downturns. Of more concern to the country is the garment industry—which is both a source of export revenue and of employment for low-skilled workers. Some early estimates indicate a loss in revenue of at least $3 billion for the garment industry (GNAFC, 2020). Bangladesh was estimated to experience a GDP growth of less than 1 percent in 2020 (Baquedano et al., 2021). Its GDP is predicted to decline almost 2.7 percent in 2021 and GDP per capita will likely remain 3.6 percent below its 2019 level. The weakened macroeconomic environment is anticipated to further affect the country's food-security metrics. In 2021, the prevalence of food insecurity is estimated to be 25.7 percent and the total food insecure population is estimated to reach 42 million people. Driven by an improvement of economic growth and incomes by 2031, the prevalence of food insecurity is projected to decline by 77.1 percent to 5.9 percent of the population. By 2031, the number of food insecure people in Bangladesh is projected to be 10.5 million, which is 75.1 percent lower than at the beginning of the decade. The intensity of food insecurity, indicated by the daily per capita Calorie food gap, is projected to decline by 27.1 percent, from 300 kcal in 2021 to 218 kcal in 2031.

Pakistan is projected to be the second most food insecure country in the CSA sub-region. Pakistan—like the other countries in the CSA sub-region—has been severely impacted by the COVID-19 pandemic. In addition, even though floods in 2020 did not cause significant food shortages, they did put upward pressure on local food prices (FAO, 2020). Moreover, an estimated sharp decline in remittances (26.8 percent) has severely affected incomes of vulnerable populations (GNAFC, 2020). Baquedano et al. (2021) reported that Pakistan's economy shrank by almost 2.4 percent in 2020. Even though GDP is anticipated to grow almost by 2.1 percent in 2021, GDP per capita is anticipated to remain 4.3 percent below its 2019 level. The prevalence of food insecurity in the country is estimated at 38.1 percent of the population in 2021, whereas the food insecure population in Pakistan is estimated to be 90.7 million (table 18). From 2021 to 2031, GDP per capita is projected to grow faster (2.5 percent a year) than population numbers (1.8 percent a year). The projected steady income growth, coupled with anticipated price stability over the next decade, is expected to result in a sharp decline in the prevalence of food insecurity. In 2031, the share of the population considered food insecure is anticipated to be 16.0 percent, a decline of 58.0 percent from 2021 (table 18). The number of food insecure people in 2031 is projected at 45.6 million, a 49.7 percent decline from the 2021 estimate. The intensity of food insecurity, indicated by the daily per capita Calorie food-gap, is projected to decline by 22.7 percent, as the food gap changes from 389 kcal in 2021 to 301 kcal in 2031.

Baquedano, F., Zereyesus, Y.A., Christensen, C., and Valdes, C. 2021. *COVID-19 Working Paper: International Food Security Assessment, 2020–2030: COVID-19 Update and Impacts on Food Insecurity*. COVID-19 Working Paper #AP-087, U.S. Department of Agriculture, Economic Research Service.

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Other Asia (OA)

The Other Asia sub-region is estimated to be the most food insecure of any sub-region in the assessment, as it includes both Yemen and North Korea. In 2021, it is estimated that almost 72 percent of the almost 60 million people in OA are food insecure (table 19). Yemen is estimated to account for 60.2 percent of the food insecure population in OA in 2021. Continued conflict—coupled with the effects of the COVID-19 pandemic on Yemen's economy—are expected to further deteriorate per capita income in 2021, putting pressure on Yemen's food security. The Democratic People's Republic of Korea (DPRK) is estimated to account for 38.2 percent of the food insecure population in the OA sub-region.

Table 19

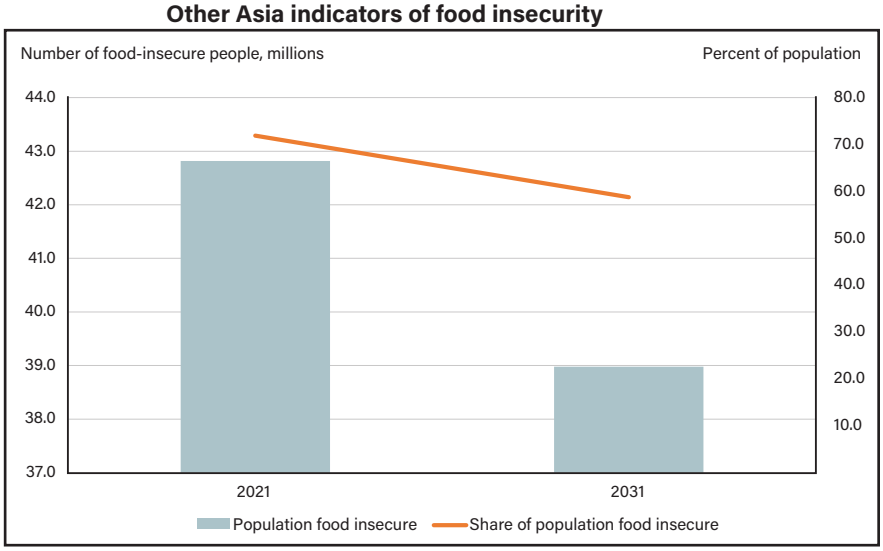
Food security indicators for the Other Asia sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	9.6	14.9	24.5	16.5	7.9
2031	11.7	23.6	35.3	27.1	8.2

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

Other Asia indicators of food insecurity



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

Other Asia
(59.6 million people in 2021)

The prevalence of food insecurity in Other Asia is estimated at 71.9 percent in 2021 and is driven by the high levels of food insecurity in North Korea and Yemen. In 2021 we estimate 42.8 million food-insecure people in Other Asia, mainly reflecting the large numbers in Yemen. By 2031, it is projected that the prevalence of food insecurity will decline by 18.3 percent to 58.7 percent. The number of food-insecure people in 2031 is projected to decline by 9 percent to 39 million. Most of the food-insecure population in Other Asia will continue to be in North Korea and Yemen.

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
Other Asia	**59.6**	**66.3**	**42.8**	**39.0**	**71.9**	**58.7**	**457**	**375**	**3,109**	**2,372**
Korea, Democratic People's Rep. of	25.9	26.7	16.3	14.0	63.1	52.3	446	397	1,041	792
Mongolia	3.2	3.4	0.7	0.2	21.6	5.4	295	223	25	5
Yemen	30.5	36.2	25.8	24.8	84.6	68.5	631	505	2,043	1,575

Note: *Measured in grain equivalents.

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

By 2031, the sub-region is projected to see moderate income growth, helping improve the OA's food security metrics. The prevalence of food insecurity in OA is projected to decrease by 18.3 percent by 2031 (table 19). However, the prevalence of food insecurity is projected to remain high at the end of the decade at 58.7 percent. These results largely reflect trends in Yemen, as a greater improvement is anticipated in DPRK and Mongolia. The number of food insecure people in the OA sub-region is projected to decline by 9.0 percent in 2031 to 39 million. The anticipated moderate decline in the number of food insecure people over the next decade mainly reflects trends in DPRK. However, by 2031, the number of food insecure people in both DPRK and Yemen is projected to remain close to their 2021 levels. By 2031, the daily per capita Calorie food gap for OA is projected to decline by almost 18.0 percent, from 457 kcal in 2021 to 375 kcal in 2031.

Yemen—with an estimated 25.8 million food insecure people and a prevalence of food insecurity of 84.6 percent in 2021—is the most food insecure country in the OA sub-region (table 19). Continued and intensified civil conflict has only compounded the effects of the COVID-19 pandemic and increased humanitarian assistance needs within the country (GNAFC, 2020). According to GNAFC (2020), at least 3.2 million people in Yemen are in acute food insecurity crisis.[18] In 2020, the dual shock from the COVID-19 pandemic and the ongoing armed conflict reduced Yemen's GDP by an estimated 12.3 percent at the macro level (Baquedano et al., 2021). A marginal increase in GDP growth (1.5 percent) is anticipated for 2021. However, in absolute terms, GDP is estimated to be 24.0 percent below the 2018–2020 average. Over the next decade, if current trends continue, modest progress is expected in the country's food-security metrics. By 2031, the prevalence of food insecurity is projected to decline by 19.0 percent to 68.5 percent. In absolute terms, the number of food insecure people is anticipated to decline by 3.7 percent to 24.8 million. By 2031, the daily per capita Calorie food gap is projected to improve by 19.9 percent, declining from 631 kcal in 2021 to 505 kcal in 2031.

In the Democratic People's Republic of Korea (DPRK), large numbers of people have low levels of food consumption and poor dietary diversity (FAO, 2020). The economic constraints, exacerbated by the impact of the COVID-19 pandemic, have increased the vulnerability to food insecurity of the local population (FAO, 2020). North Korean economic growth estimates for 2021 point to a modest 3.7 percent recovery of GDP. However, DPRK's food insecurity indicators are estimated to be high for 2021. The prevalence of food insecurity for 2021 is estimated at 63.1 percent of the population and the estimate for the number of food insecure people is projected to reach 16.3 million. By 2031, projections for DPRK point to modest improvements in the country's food-security metrics. The improvements in the DPRK's food-security prospects over the next decade are mainly driven by an expectation that GDP growth per capita (1.4 percent) exceeds population growth (1.1 percent). By 2031, the prevalence of food insecurity is projected to decline by 17.2 percent, but more than half of the population will continue to be considered food insecure. In absolute terms, the number of food insecure people is projected to decline by 14.5 percent to 14 million. The daily per capita Calorie food gap is projected to decline by 10.9 percent, from 446 kcal in 2021 to 397 kcal in 2031.

[18]According to IPC Global Partners (2019) an acute food insecurity situation identifies areas and populations with food deprivation that threatens livelihoods, regardless of the causes, context or duration.

Baquedano, F., Zereyesus, Y.A., Christensen, C., and Valdes, C. 2021. *COVID-19 Working Paper: International Food Security Assessment, 2020–2030: COVID-19 Update and Impacts on Food Insecurity*. COVID-19 Working Paper #AP-087, U.S. Department of Agriculture, Economic Research Service.

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Southeast Asia (SEA)

South East Asia (SEA) is estimated to be the second most food secure sub-region in Asia, with an average prevalence of food insecurity of 17.0 percent and less than 86 million people considered food insecure in 2021 (table 20). Almost half of the food insecure population in SEA is located in Indonesia (42 million), which represents 53.4 percent of the sub-region's population. However, the most food insecure country in the sub-region is Laos, which has the highest estimated prevalence of food insecurity in 2021. GDP per capita in the sub-region is expected to recover in 2021, growing 3.6 percent from 2020 and almost on par with 2019 levels. However, Indonesia and the Philippines are the only two countries where incomes in 2021 are estimated to remain below their 2019 levels.

Table 20

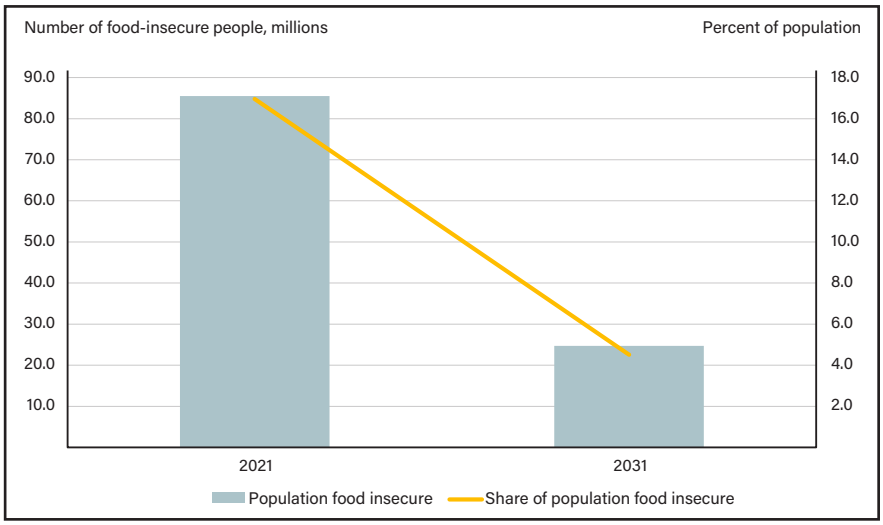
Food security indicators for the South East Asia sub-region, 2021 and 2031

Year	Food grain demand	Other grain demand*	Total grain demand	Grain production	Implied additional supply required**
	Million tons				
2021	123.2	53.5	176.7	114.2	62.5
2031	149.8	62.5	212.3	140.1	72.3

Notes: *Other grain demand includes seed, feed, waste, and processing. **The gap between grain demand and domestic grain production.

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

South East Asia indicators of food insecurity



South East Asia
(504.1 million people in 2021)

The prevalence of food insecurity in South East Asia is estimated at 17 percent in 2021. In 2021 close to 85.5 million people are estimated to be food-insecure in South East Asia. By 2031, the prevalence of food insecurity is projected to decline by 73.4 percent to 4.5 percent. The number of food-insecure people in 2031 is projected to decline by 71.1 percent to less than 25 million.

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

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)*	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Millions		Millions		Percent		Kilo-calories/day		1,000 Metric tons	
South East Asia	**504.1**	**547.7**	**85.5**	**24.7**	**17.0**	**4.5**	**296**	**220**	**3,873**	**912**
Cambodia	17.2	19.2	3.6	0.6	20.8	3.0	292	205	159	18
Indonesia	269.1	286.6	42.2	10.6	15.7	3.7	281	218	1,765	341
Laos	7.6	8.6	2.3	0.6	30.5	6.7	294	207	110	19
Philippines	110.8	127.3	27.7	12.1	25.0	9.5	347	278	1,454	506
Viet Nam	99.5	106.0	9.7	0.9	9.7	0.9	263	190	384	27

Note: *Measured in grain equivalents.

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

For the SEA sub-region's growth rate of GDP per capita over the next decade is projected to be 4.3 percent a year. By contrast, population growth is anticipated to be much lower, averaging less than 1.0 percent a year from 2021 to 2031. As a result of the anticipated robust income growth in SEA, the prevalence of food insecurity is projected to decline by 73.4 percent to 4.5 percent of the population (table 20). The number of food insecure people is also projected to decline sharply (by 71.1 percent) to less than 25 million. By 2031, the daily per capita Calorie food gap is projected to decline by 25.7 percent, from 296 kcal in 2021 to 220 kcal in 2031.

In the Laos People's Democratic Republic (LAO), a reduction in remittances in 2020 from migrants returning from Thailand—due to the COVID-19 pandemic—is likely to severely affect incomes and livelihoods of the most vulnerable populations (GNAFC, 2020). Moreover, in northern parts of the country, cereal production shortfalls (for the second consecutive year) have limited the availability of food for households' own consumption and have reduced income from crop sales, further constraining access to food (Food and Agriculture Organization of the United Nations Global Information Early Warning Systems (FAO GIEWS), 2020). It is estimated that almost 31 percent of the LAO population (2.3 million) is considered food insecure in 2021 (table 20). By 2031, LAO's GDP per capita is projected to grow (3.6 percent a year) at a greater pace than population growth (1.3 percent a year). As a result, the prevalence of food insecurity is projected to decline by 77.9 percent and reach 6.7 percent by 2031. The number of food insecure people over the next decade is also projected to decline by almost three fourths to less than 600,000. By 2031, the daily per capita Calorie food gap is anticipated to decline by 29.6, from 294 kcal in 2021 to 207 kcal in 2031.

Indonesia experienced a sharp decline of its economy in 2020, due to the COVID-19 pandemic, with GDP shrinking by 3.0 percent (Baquedano et al., 2021). In 2021, GDP is estimated to grow by 3.3 percent and may reach $1.05 trillion, 2.9 percent higher than the 2018–2020 average. However, GDP per capita in 2021 is estimated to be 1.3 percent below its 2019 level. The prevalence of food insecurity for 2021 is estimated at 15.7 percent and about 42 million people are estimated to be food insecure (table 20). From 2021 to 2031, Indonesian GDP per capita is projected to grow 4.3 percent a year. By contrast, over the same period, Indonesia population growth is anticipated to be 0.6 percent a year. As a result of the anticipated robust income growth over the next decade, the prevalence of food insecurity is projected to decline by 76.5 percent to 3.7 percent, with the food insecure population to decline to below 11 million. By 2031, the daily per capita Calorie food gap is expected to decline by 22.6 percent, from 281 kcal in 2021 to 218 kcal in 2031.

In the Philippines, the COVID-19 pandemic severely affected livelihoods and the ability of households to purchase food (FAO, 2021). The food-security environment improved towards the end of 2020—as the Government of the Philippines refined its COVID-19 containment approach, maximized the operation of local food systems, and provided cash transfers to the most vulnerable populations (FAO, 2021). However, Baquedano et al. (2021) reported that in 2020, the Philippines economy shrank by 8.3 percent. For 2021, GDP is estimated to grow by 7.7 percent, to $391 billion, 3.7 percent higher than the average for the period 2018–2020. But GDP per capita in 2021 is estimated to remain some 4.2 percent below its 2019 level. As a result of the anticipated lower incomes levels for 2021, the prevalence of food insecurity is estimated at 25.0 percent and the number of food insecure people is estimated to reach 27.7 million (table 20). From 2021 to 2031, the country's GDP per capita growth (3.6 percent a year) is projected to outpace population growth (1.4 percent a year). The expected strong economic growth over the next decade is projected to lead to a 62.1 percent decline in the prevalence of food insecurity to 9.5 percent. The number of food insecure people is projected to decline by 56.5 percent from a decade earlier and reach 12.1 million. By 2031, the daily per capita Calorie food gap is expected to decline by 20.0 percent, from 347 kcal in 2021 to 278 kcal in 2031.

In Vietnam—early preparedness, contact tracing, isolation and testing, coupled with timely border closures, physical distancing and community adherence—have been key in controlling and mitigating the effects on

the economy and health of the population of the COVID-19 pandemic (Tan, 2021). Despite early and proactive action by the country, Vietnam's economy was significantly impacted by the COVID-19 pandemic. GDP growth in 2020 was reported at just above 1.0 percent, but this is down from the 2018–2020 average of 5.1 percent (Baquedano et al. 2021). The decline in economic growth mainly reflects the early impacts of closures of business and mobility restrictions.

Economic growth in 2021 is estimated at 5.5 percent and in absolute terms GDP is expected to reach almost $268 billion, well above the average of $247 billion for the period of 2018–2020. Despite the setbacks from the COVID-19 pandemic, Vietnam remains the most food secure country in the SEA sub-region. In addition, in 2021, it is estimated that the prevalence of food insecurity will be less than 9.7 percent and 9.7 million people will be food insecure (table 20). From 2021 to 2031, GDP per capita growth (5.9 percent a year) is projected to outpace population growth (0.6 per cent a year). Moreover, the price of the main staple food, rice, is anticipated to remain relatively stable over the next decade. As a result, by 2031, the prevalence of food insecurity is projected to decline by 90.9 percent to 0.9 percent. The number of food insecure people is expected to decline by 90.3 percent by 2031 to less than 1 million people. By 2031, the daily per capita Calorie food gap is projected to decline by 27.6 percent, from 263 kcal in 2021 to 190 kcal in 2031.

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Appendix I: Food Security Assessment Model: Definitions and methodology

The IFSA model[19] used in this report projects food consumption (food demand), food access, and food gaps in 76 low- and middle-income countries. Each country's food security metrics are estimated for the 2021 and projected to 2031. 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 estimated domestic food consumption (food demand) and a caloric target, which is set at 2,100 kcal 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, allowing this grain equivalent to be easily expressed in either kilograms or kcal.

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. (2015) 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 (Deaton & Muellbauer, 1980; Muellbauer, 1975). The demand system is calibrated on a 3-year-average of prices and incomes (2018–20), 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 this 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.

[19]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

The demand q_i^h for a given food group i, for income-decile h is specified as:

1. $$q_i^h = (x\, q_i^h / p_i)(A_i(p_i) + B_i(p_i) \ln(x^h))$$

where p_i is the price (expressed in real local currency), and x^h is the decile-level income.
And: $A_i(p_i) = a_{i0} + a_{i1}p_i$ 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 as shown in (2).

2. $$\bar{q}_i = (\frac{x_i}{p_i})((a_{i0} + a_{i1}p_i) + (b_{i0} + b_{i1}p_i)(\ln(\bar{x}) + \ln(\frac{10}{z}))$$

The latter in equation (2) is a function of average per capita income $\bar{x}$ and Theil's entropy measure of income inequality z.

The average expenditure share for good category i is also defined as:

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

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

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

The own-price elasticity of the average demand is:

5. $$\varepsilon_{q_ip_i} = -1 + (\frac{p_i}{\overline{w}_i})(a_{i1} + b_{i1}(\ln(\bar{x}) + \ln(\frac{10}{z})))$$

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 b_{i0} is pinned down 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 $\tilde{a}_{i0}$, $\tilde{a}_{i1}$, $\tilde{b}_{i0}$, 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 to be constant across the income distribution.

For each country, a demand system is calibrated for each of the four food groups—based on income, consumption levels, and prices from the three years preceding the projection period (2018–20).The *major grain* (which varies across countries) is determined, 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, domestic food prices are either observed (including the components of a price index for other grains that is weighted by caloric share) or synthetic prices are created.

For the food prices not observed in the calibration stage, a synthetic domestic price, p_i^{ds} , that is linked to the world price, p_i^w , is created and expressed in local currency. The parameter θ is the price transmission slope, which is assumed 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 are assumed 10 percent, and trc^{dom} are domestic trade costs, which are assumed $20 per ton in real terms:

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

At this stage, the calibration also includes 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:

7. $$p_i^{dom} = \theta * P_i^w + \hat{I}$$

During the calibration stage, the intercept, *I*, is solved in real terms, and is held 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, the demand parameters and projected income, x_t, and prices, p_{it}, are used to project food demand, q_{it}, for each of the four food groups *i* in each year *t* so that $q_{it} = \hat{A}_i(x_t/P_{it})((P_{it}) + B_i(P_{it})\ln(x_t))$. The demand for the four food groups is aggregated into total food demand expressed in Calories, so that $\sum q_{it} = Q_t$, which is also referred as food or calorie consumption. This measure of total demand is used to calculate food security indicators.

The FAO (2019) is followed 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 $CV = (\sqrt{v} / m)$.[20] Given the CV and the projected mean caloric consumption (Q_t), the variance, *v*, of the empirical distribution for a given year *t* can be recovered.

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

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

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

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 kcal 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 2018–20. Prices are expressed in real local currency units. Quantities are expressed in grain-equivalent units.

Calibrated parameters and variables:

Demand parameters ($\tilde{a}_{i0}$, $\tilde{a}_{i1}$, b_{i0}, and b_{i1}), price intercepts, domestic prices (synthetic) projections are based on data from the *ERS International Macroeconomic Data Set* and the *USDA Agricultural Projections to 2030*. They 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:

Average Consumption per capita – Food and Agriculture Organization (FAO) of the United Nations Food Balance Sheet (most recent available).[21]

Grain Shares – FAO Food Balance Sheet.[22]

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).[23]

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

[21]Food Balance Sheets (FBS) are for 2018. There are no current FBS for Somalia, Eritrea, Burundi, and Democratic Republic of the Congo. Grain consumption levels share of grains are used in total Calories, as reported in the FAO-GIEWS *Cereal Supply and Demand Balance for Sub-Saharan African Countries: situation as of November 2020* report, to generate per capita consumption for each food group. We use grain consumption levels and share of grains in total Calories, as reported in the Food Agriculture Organization of the United Nations-Global Information Early Warning Systems *Cereal Supply and Demand Balance for Sub-Saharan African Countries: situation as of November 2020* 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.

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

[23]Elasticities are not available for all countries. Estimates used from neighboring countries (Somalia-Ethiopia; Eritrea-Ethiopia; Algeria – average Tunisia and Morocco; Afghanistan - average Tajikistan and Pakistan; Turkmenistan- average Tajikistan, Kyrgyzstan, Kazakhstan; Uzbekistan-average 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.

Tariffs – World Bank's World Integrated Trade Solution (WITS).[24]

Exchange Rates and Consumer Price Indices (CPIs) – *ERS International Macroeconomic Data Set*.[25]

Population – U.S. Census Bureau.

World Prices – *USDA Agricultural Projections to 2027*.[26]

Per Capita Income – generated using GDP and population from *ERS International Macroeconomic Data Set*.[27]

Income Distribution – World Bank Data Bank.[28] 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.

Modeling Staple Cereal Production

The current production module of the IFSA model aggregates a panel of agricultural production data for all 76 countries in the assessment to provide a model-based estimation for the current year and a projection 10 years out for yield and area dynamics.

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 2021–2031, based on producer price projections in local currency units and world price projections from the USDA Agricultural Projections.

Yield

Yield parameters are estimated econometrically, using panel data consisting of observations for each country and are calibrated to observed yields for the immediate past 3 years (e.g. 2017–2019). Yields). The calibration procedure involves in-sample prediction using observed yield data and consensus estimates for expected return ratio—an indicator of the relative profitability of fertilizer use. Yields respond to expected relative

[24]Tariff rates are available through 2018. Tariff rates for Somalia, Turkmenistan, Eritrea, and North Korea 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 there are zero tariffs and do not quantify other trade frictions.

[25]Ecuador and El Salvador are modelled in the currency of U.S. dollars (instead of local currency) as in the ERS International Macroeconomic Dataset, based on data from the International Monetary Fund (IMF), and Oxford Economics. Projections constructed for: Somalia, North Korea, and Zimbabwe—using data from International Monetary Fund (IMF), IHS Markit, and Oxford Economics.

[26]The world price series are maize (U.S. gulf #2 yellow); rice (Thai, B, fob Bangkok); sorghum (U.S. Gulf, #2 yellow); wheat (gulf, #2 Hard Red Wheat); barley (E.C., French, Rouen); Oats (U.S. 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 Food and Agriculture Organization of the United Nations (FAO) Food Balance Sheets and the FAO Global Information Early Warning System price database. We use the world price of wheat to represent rye; and sorghum to represent all other cereals (e.g. millet, teff, fonio).

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

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

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—revenue from yield divided by the price of fertilizer, $RR_{ct} = ((yp_{ct} * Y_{ct}) / fp_{ct})$ where *yp* and *fp* are yield and fertilizer prices, respectively. The expected return ratios include a current-year component and a long-term expectation component, expressed in real local currency unit (*rlcu*). USDA Agricultural Projection (to 2030) prices for superphosphate and the major grain by production volume (for grain) are used.

The domestic price for each grain is linked to its world reference price, expressed in real local currency unit, through the following price transmission equation:

$$P^{domestic} = 0.7 \times pworld + 0.3 \times I$$

The expected domestic price is a weighted average of 70 percent of the current-year world price (*pworld*) and 30 percent of the mean domestic price (*I)* over the analysis time period. The grain production data used in the estimation come from USDA's Production Supply and Demand (PSD) database and from the Food and Agriculture Organization of the United Nations (FAO).The intercept, I, is the mean of the price over the regression time period (1985–2020).

Modeling Area

Crop area, AR_{ct}, is modeled with the widely used Nerlovian specification—in which lagged area, expected crop and fertilizer prices, and a time trend—enter into the equation as follows:

$$AR_{ct} = f\,(yp_{ct}, fp_{ct}, AR_{ct-1}, T)$$

The expected prices are averages of contemporaneous and lagged relative prices. A time trend is included in the area equation to capture non-price factors in area, and a country fixed effect. The area equation is numerically calibrated to the base year average of the preceding 3 years of the report (e.g. 2018–20), using consensus estimates for price and lagged acreage responses. Regional and sub-regional models are fitted to allow for heterogeneity among diverse countries included in the IFSA model. The regional specification disaggregates the estimation of area and yield by the four regional classifications of the IFSA countries: Sub-Saharan Africa (SSA), Asia, Latin America and the Caribbean (LAC), and North Africa (NAF). The sub-regional specification disaggregates the model to 10 sub-regions of the IFSA countries: Central Africa (CAF), East Africa (EAF), Southern Africa (SAF), West Africa (WAF), North Africa (NAF), Latin America and Caribbean (LAC), Commonwealth of Independent States (CIS), Central and South Asia (CSA), Southeast Asia (SEA), and Other Asia (OA).

Model-based projection performance is assessed in terms of how well the specified model can be expected to perform on an independent (out-of-sample) data set, often assessed by the actual estimate of the out-of-sample Mean Squared Error (MSE). When an independent out-of-sample dataset is not available, a Cross-Validation (CV) approach (used in this report) can be used to choose the best model—by estimating the out-of-sample MSE, using an in-sample data set . The out-of-sample error (often referred to as the test-error) is the average error that results from using the regression method to predict the response on a new observation that was not used in regression estimation. Given an in-sample dataset, the choice of a particular specification (in this report, the regional and sub-regional model specifications) is warranted if the model results in a low test error (James et al., 2017). The models are assessed with a "leave-one-out-cross-validation" (LOOCV) to simulate their out-of-sample prediction performance (James et al. 2017).

The performances of regional and sub-regional model specifications are assessed using the overall out-of-sample MSE scores. The model with the smallest out-of-sample MSE is selected for estimation.

Modeling 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 nonfood use (NFD)—which is comprised of seed, feed, processing, and other uses. The IASR for grains thus can be expressed as: IASR=TD-PR.

The demand for grain for processing, seed, and other uses, is assumed to grow at the same rate as production. The demand for grain feed grows at the average rate observed during 2006–20.

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Appendix II: Food Security Measures for International Food Security Assessment Countries, 2021–2031

Appendix table 1-1

Summary food security indicators for 76 countries in the International Food Security Assessment

	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Million		Million		Percent		Calorie/day		1,000 Metric tons	
Total for IFSA countries	**3,938.1**	**4,566.1**	**1,212.0**	**637.7**	**30.8**	**14.0**	**380**	**308**	**62,794**	**34,410**
ASIA	**2,470.8**	**2,731.4**	**647.3**	**175.7**	**26.2**	**6.4**	**304**	**231**	28,285	6,992
Commonwealth of Independent States	73.0	77.3	10.1	4.7	13.8	6.1	**244**	**187**	**414**	**202**
Armenia	3.0	2.9	0.1	0.0	4.8	0.2	189	137	3	0
Azerbaijan	10.3	10.8	0.4	0.1	4.3	0.6	170	135	9	1
Georgia	4.9	4.9	0.5	0.1	10.8	1.7	234	178	16	2
Kyrgyzstan	6.0	6.5	1.1	0.4	18.3	5.6	263	209	37	10
Moldova	3.3	2.9	0.8	0.0	24.3	1.2	243	146	26	1
Tajikistan	9.0	10.2	4.8	3.9	53.6	38.2	442	378	265	183
Turkmenistan	5.6	6.1	0.4	0.1	7.6	1.0	212	162	12	1
Uzbekistan	30.8	33.0	1.8	0.2	5.9	0.7	195	150	46	4
Central and Southern Asia	**1,834.1**	**2,039.9**	508.9	107.3	27.7	5.3	**315**	**229**	**20,889**	**3,505**
Afghanistan	37.5	46.6	22.1	18.1	58.9	38.8	397	322	1,044	692
Bangladesh	164.2	178.3	42.1	10.5	25.7	5.9	300	218	1,856	336
India	1,340.5	1,473.0	345.4	32.1	25.8	2.2	289	183	13,400	789
Nepal	30.6	32.6	4.2	0.1	13.6	0.3	255	157	150	2
Pakistan	238.3	285.2	90.7	45.6	38.1	16.0	389	301	4,268	1,659
Sri Lanka	23.0	24.2	4.5	1.0	19.4	4.0	258	191	171	28
Other Asia	**59.6**	66.3	42.8	39.0	71.9	58.7	**457**	**375**	**3,109**	**2,372**
Korea, Democratic People's Republic of	25.9	26.7	16.3	14.0	63.1	52.3	446	397	1,041	792
Mongolia	3.2	3.4	0.7	0.2	21.6	5.4	295	223	25	5
Yemen	30.5	36.2	25.8	24.8	84.6	68.5	631	505	2,043	1,575
South East Asia	**504.1**	**547.7**	85.5	24.7	17.0	4.5	**296**	**220**	**3,873**	**912**
Cambodia	17.2	19.2	3.6	0.6	20.8	3.0	292	205	159	18
Indonesia	269.1	286.6	42.2	10.6	15.7	3.7	281	218	1,765	341
Laos	7.6	8.6	2.3	0.6	30.5	6.7	294	207	110	19
Philippines	110.8	127.3	27.7	12.1	25.0	9.5	347	278	1,454	506
Viet Nam	99.5	106.0	9.7	0.9	9.7	0.9	263	190	384	27

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	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Million		Million		Percent		Calorie/day		1,000 Metric tons	
LATIN AMERICA AND THE CARIBBEAN	**174.8**	**191.0**	**44.7**	**23.5**	**25.6**	**12.3**	**345**	**284**	**2,236**	**1,152**
South America	110.6	120.2	24.2	9.9	21.8	8.3	**290**	**229**	**975**	**320**
Bolivia	11.8	13.4	5.3	2.6	45.0	19.7	343	259	239	90
Colombia	49.5	53.3	6.3	1.6	12.6	3.0	260	205	235	47
Ecuador	17.1	18.9	4.7	2.4	27.7	12.8	264	216	175	73
Peru	32.2	34.6	7.8	3.3	24.4	9.5	295	237	326	110
Central America and the Caribbean	**64.2**	**70.8**	20.5	13.6	32.0	19.2	**376**	**315**	**1,261**	**833**
Dominican Republic	10.6	11.5	1.2	0.3	11.2	2.4	227	179	39	7
El Salvador	6.5	6.7	1.5	0.8	22.9	11.4	290	246	49	21
Guatemala	17.4	20.1	5.2	3.0	29.8	15.1	356	297	211	103
Haiti	11.2	12.5	7.3	6.7	65.2	53.7	753	673	722	593
Honduras	9.4	10.4	2.4	1.1	25.9	10.4	341	274	93	33
Jamaica	2.8	2.7	0.4	0.1	15.6	2.8	235	175	13	2
Nicaragua	6.3	6.8	2.5	1.6	39.6	23.6	428	361	134	73
NORTH AFRICA	**197.8**	**228.0**	**28.6**	**17.7**	**14.5**	**7.8**	**280**	**245**	**1,116**	**613**
Algeria	43.6	48.6	5.2	2.3	11.8	4.8	282	241	189	73
Egypt	106.5	128.3	20.1	13.7	18.9	10.7	331	292	811	490
Morocco	35.9	38.8	2.7	1.4	7.4	3.5	266	238	93	43
Tunisia	11.8	12.4	0.7	0.3	6.0	2.3	242	211	22	7
SUB-SAHARAN AFRICA	**1,094.7**	**1,415.6**	**491.5**	**420.8**	**44.9**	**29.7**	**444**	**365**	**31,158**	**25,653**
Central Africa	145.1	194.5	99.9	114.2	68.8	58.7	**538**	**437**	**9,633**	**10,084**
Cameroon	28.5	37.2	6.0	4.3	21.1	11.7	303	264	238	150
Central African Republic	6.1	7.5	4.5	2.3	73.9	31.2	555	351	283	92
Congo, Republic of the	5.4	6.8	3.1	2.7	56.7	39.6	402	337	162	120
Congo, Democratic Republic of the	105.1	143.0	86.3	104.8	82.1	73.3	892	798	8,949	9,722
East Africa	**382.4**	**489.7**	**177.2**	**134.9**	**46.3**	**27.6**	**487**	**407**	**9,493**	**6,988**
Burundi	12.3	16.5	9.7	13.0	79.3	78.9	580	577	657	874
Chad	17.4	23.4	11.7	13.7	67.0	58.4	607	554	895	958
Eritrea	6.1	6.9	3.8	1.3	62.5	19.0	442	276	211	45
Ethiopia	110.9	139.6	37.7	16.0	34.0	11.4	318	239	1,093	304
Kenya	54.7	66.9	25.2	9.9	46.0	14.7	372	260	1,166	319
Rwanda	12.9	15.2	5.4	2.7	41.8	18.0	413	317	264	102
Somalia	16.4	21.8	13.7	16.8	84.0	77.2	727	659	1,146	1,271
Sudan	46.8	60.5	17.9	12.5	38.3	20.6	390	320	822	469
Tanzania	60.2	78.0	25.5	27.6	42.4	35.3	495	461	1,574	1,587
Uganda	44.7	60.9	26.5	21.5	59.2	35.2	522	410	1,665	1,060

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	Population		Population food insecure		Share of population food insecure		Food gap (per capita)		Food gap (total)	
	2021	2031	2021	2031	2021	2031	2021	2031	2021	2031
	Million		Million		Percent		Calorie/day		1,000 Metric tons	
Southern Africa	**152.6**	**199.1**	89.7	88.2	58.8	44.3	**471**	**391**	**6,006**	**5,163**
Angola	33.6	46.9	17.1	23.6	50.9	50.4	443	440	965	1,323
Lesotho	2.0	1.9	0.8	0.2	40.7	12.5	364	259	34	7
Madagascar	27.6	34.1	18.3	17.4	66.5	51.0	493	418	1,295	1,039
Malawi	21.9	30.2	8.6	5.7	39.5	18.8	405	322	408	213
Mozambique	30.9	39.9	18.1	14.8	58.7	37.0	519	417	1,214	795
Namibia	2.7	3.2	1.1	0.8	42.9	26.2	323	270	46	28
Eswatini	1.1	1.2	0.3	0.2	31.1	17.2	308	260	12	6
Zambia	17.9	23.8	12.9	15.4	71.7	64.9	697	646	1,065	1,186
Zimbabwe	14.8	18.0	12.3	10.1	83.2	55.9	685	492	967	565
West Africa	**414.7**	**532.3**	125	83.5	30.1	15.7	**379**	**306**	**6,025**	**3,417**
Benin	13.3	18.4	2.7	1.1	20.3	6.1	319	250	116	38
Guinea-Bissau	2.0	2.5	1.0	0.7	52.1	26.5	422	323	57	29
Burkina Faso	21.4	26.9	6.4	4.3	30.1	15.9	456	385	364	205
Cabo Verde	0.6	0.7	0.2	0.1	36.6	9.6	338	238	10	2
Côte d'Ivoire	28.1	34.6	6.9	5.9	24.5	16.9	420	382	414	321
Gambia	2.2	2.6	0.5	0.1	22.5	4.4	298	216	17	3
Ghana	30.0	36.8	2.6	0.7	8.6	1.9	249	201	82	18
Guinea	12.9	16.9	2.9	2.0	22.6	11.8	356	306	162	95
Liberia	5.2	6.8	3.1	2.2	59.0	32.0	619	475	213	116
Mali	20.1	26.8	4.1	4.0	20.5	14.9	329	305	172	154
Mauritania	4.1	4.9	0.8	0.3	19.6	5.6	316	246	32	9
Niger	23.6	34.0	9.1	5.6	38.5	16.5	456	355	582	280
Nigeria	219.5	280.5	74.5	51.0	33.9	18.2	351	291	3,287	1,870
Senegal	16.1	19.9	3.6	1.3	22.5	6.7	278	215	143	41
Sierra Leone	6.8	8.7	3.1	2.7	45.0	31.3	497	433	235	183
Togo	8.8	11.2	3.1	1.6	35.5	14.2	356	275	139	55

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

Appendix III: Macroeconomic measures for the International Food Security Assessment Countries, 2021-2031

Appendix table 2-1

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

Country	Population (million)			Population: Annual growth rate (percentage)		Gross Domestic Product (GDP, million 2015 USD)			GDP: Annual growth rate (percentage)		Per capita GDP (2015 USD)			Per capita GDP: Annual growth rate (percentage)		CPI: Annual growth rate (percentage)		RER: Annual growth rate (percentage)		Real domestic price of major grain: Annual growth rate (percentage)	
	2018-2020	2021	2031	2015-2020	2021-2031	2018-2020	2021	2031	2015-2020	2021-2031	2018-2020	2021	2031	2015-2020	2021-2031	2015-2020	2021-2031	2015-2020	2021-2031	2015-2020	2021-2031
Total IFSA Countries	**3,814**	**3,938**	**4,566**	**1.7**	**1.5**	**8,341,232**	**8,486,164**	**13,572,641**	**2.8**	**4.8**	**2,187**	**2,155**	**2,973**	**1.1**	**3.3**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
ASIA	**2,414**	**2,471**	**2,731**	**1.2**	**1.0**	**5,328,449**	**5,488,042**	**9,286,748**	**3.6**	**5.4**	**2,207**	**2,221**	**3,400**	**2.4**	**4.3**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Commonwealth of Independent States	72	73.0	77.3	0.8	0.6	250,517	255,647	354,404	2.5	3.3	3,484	3,502	4,584	1.7	2.7	N/A	N/A	N/A	N/A	N/A	N/A
Armenia	3	3.0	2.9	-0.2	-0.5	12,419	12,918	19,318	3.3	4.1	4,099	4,290	6,739	3.6	4.6	0.9	2.5	1.7	-1.2	-0.6	-1.1
Azerbaijan	10	10.3	10.8	0.9	0.5	52,105	51,174	63,641	-1.0	2.2	5,145	4,978	5,880	-1.8	1.7	6.6	3.7	5.7	-3.4	-0.9	-0.1
Georgia	5	4.9	4.9	0.0	-0.1	17,191	17,484	24,736	2.4	3.5	3,489	3,545	5,050	2.4	3.6	4.5	3.5	0.8	-0.8	-0.4	-1.1
Kyrgyzstan	6	6.0	6.5	1.0	0.7	7,654	7,676	10,544	2.3	3.2	1,296	1,275	1,630	1.2	2.5	2.6	4.6	2.3	0.8	-0.2	-1.3
Moldova	3	3.3	2.9	-1.1	-1.2	8,916	9,062	12,696	2.5	3.4	2,622	2,723	4,309	3.6	4.7	5.1	4.3	-3.7	-2.2	-2.2	-4.0
Tajikistan	9	9.0	10.2	1.6	1.3	9,923	9,923	12,714	4.3	2.5	1,135	1,102	1,244	2.7	1.2	7.0	4.3	5.2	0.5	-0.3	-0.3
Turkmenistan	5	5.6	6.1	1.1	0.8	44,721	47,577	70,580	4.9	4.0	8,176	8,517	11,635	3.7	3.2	9.2	5.3	-6.9	0.0	-0.6	-6.6
Uzbekistan	30	30.8	33.0	0.9	0.7	97,588	99,832	140,175	3.3	3.5	3,221	3,238	4,244	2.3	2.7	13.8	7.1	17.6	0.0	-0.8	6.2
Central and Southern Asia	1,790	1,834	2,040	1.3	1.1	3,323,526	3,412,580	5,945,202	3.8	5.7	1,857	1,861	2,914.4	2.5	4.6	N/A	N/A	N/A	N/A	N/A	N/A
Afghanistan	36	38	47	2.4	2.2	21,944	23,551	35,310	2.6	4.1	613	628	758	0.2	1.9	3.3	5.6	4.3	0.6	-0.3	-0.8
Bangladesh	161	164	178	1.0	0.8	255,803	257,065	446,858	6.2	5.7	1,588	1,565	2,506	5.2	4.8	5.6	6.2	-1.9	0.2	-1.1	-1.2
India	1,311	1,340	1,473	1.2	0.9	2,611,040	2,693,426	4,784,872	3.8	5.9	1,991	2,009	3,248	2.6	4.9	5.2	5.2	-0.3	-3.5	-3.5	-0.2
Nepal	30	31	33	1.1	0.6	26,180	28,620	54,985	4.8	6.7	872	935	1,685	3.6	6.1	5.4	5.3	-0.5	-3.5	-3.4	-0.3
Pakistan	229	238	285	2.1	1.8	318,511	320,957	491,860	3.1	4.4	1,393	1,347	1,725	0.9	2.5	6.6	5.6	4.9	-1.3	-1.5	-0.7
Sri Lanka	23	23	24	0.7	0.5	90,047	88,961	131,317	1.7	4.0	3,961	3,862	5,422	1.0	3.5	4.3	4.7	4.0	-0.8	-1.6	2.3
Other Asia	58	60	66	1.4	1.1	66,536	63,614	81,820	-5.0	2.5	1,146	1,068	1,233	-6.3	1.4	N/A	N/A	N/A	N/A	N/A	N/A
Korea, Democratic People's Republic of	26	26	27	0.5	0.3	29,986	31,698	36,769	0.3	1.5	1,168	1,224	1,377	-0.2	1.2	3.8	4.7	1.2	1.7	-0.3	0.9
Mongolia	3	3	3	1.1	0.7	13,718	14,634	21,902	3.0	4.1	4,374	4,577	6,403	1.8	3.4	4.6	5.5	4.5	-0.1	-0.5	-0.6
Yemen	29	30	36	2.3	1.7	22,831	17,281	23,148	-14.4	3.0	780	567	639	-16.3	1.2	28.6	8.3	-3.3	-2.8	-1.1	-3.4

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	2018-2020	2021	2031	2015-2020	2021-2031	2018-2020	2021	2031	2015-2020	2021-2031	2018-2020	2021	2031	2015-2020	2021-2031	2015-2020	2021-2031	2015-2020	2021-2031	2015-2020	2021-2031
South East Asia	494	504	548	1.0	0.8	1,687,870	1,756,202	2,905,323	3.8	5.2	3,414	3,484	5,304	2.7	4.3	N/A	N/A	N/A	N/A	N/A	N/A
Cambodia	17	17	19	1.5	1.1	23,429	25,750	46,640	6.2	6.1	1,404	1,501	2,427	4.6	4.9	2.5	3.0	-0.7	-0.6	-1.8	-0.5
Indonesia	265	269	287	0.8	0.6	1,022,108	1,051,848	1,712,723	3.4	5.0	3,858	3,909	5,975	2.5	4.3	3.1	4.4	0.4	-1.5	-1.0	0.1
Laos	7	8	9	1.5	1.3	18,211	19,818	31,618	5.5	4.8	2,481	2,624	3,690	4.0	3.5	2.1	4.1	1.0	-1.1	-0.9	0.3
Philippines	108	111	127	1.6	1.4	377,487	390,948	637,547	3.5	5.0	3,510	3,527	5,008	1.9	3.6	2.9	3.0	0.8	-0.8	-1.0	0.3
Vietnam	98	100	106	0.9	0.6	246,635	267,837	476,796	5.6	5.9	2,520	2,691	4,498	4.7	5.3	3.2	3.7	0.0	-0.2	-1.7	0.0
LATIN AMERICA AND THE CARIBBEAN	**171**	**175**	**191**	**1.1**	**0.9**	**887,251**	**862,972**	**1,188,685**	**0.2**	**3.3**	**5,185**	**4,936**	**6,222**	**-0.9**	**2.3**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Central America and the Caribbean	63	64	71	1.3	1.0	240,441	243,190	342,013	2.0	3.5	3,835	3,789	4,831	0.7	2.5	N/A	N/A	N/A	N/A	N/A	N/A
Dominican Republic	10	11	11	1.0	0.8	86,468	87,907	132,994	3.6	4.2	8,315	8,295	11,571	2.6	3.4	2.7	3.5	3.7	1.1	-0.3	1.2
El Salvador	6	7	7	0.87	0.23	24,956	24,533	29,074	0.4	1.7	3,884	3,758	4,354	-0.5	1.5	0.5	2.5	-	-	-0.4	-0.7
Guatemala	17	17	20	1.8	1.4	69,074	71,568	100,371	2.0	3.4	4,095	4,104	4,987	0.3	2.0	3.6	3.7	-1.7	-0.6	-0.7	-1.5
Haiti	11	11	13	1.5	1.1	8,899	8,525	10,426	-0.3	2.0	814	761	832	-1.8	0.9	14.6	5.6	2.3	-1.0	-0.6	0.5
Honduras	9	9	10	1.3	1.1	23,816	24,020	34,410	2.2	3.7	2,612	2,569	3,299	0.93	2.53	3.9	4.9	0.5	0.5	-0.5	-0.9
Jamaica	3	3	3	-0.1	-0.2	14,522	14,346	18,114	-0.5	2.4	5,167	5,112	6,606	-0.4	2.6	3.7	4.8	2.2	-1.4	-2.0	-2.9
Nicaragua	6	6	7	1.0	0.8	12,706	12,291	16,626	-1.5	3.1	2,068	1,963	2,445	-2.5	2.2	3.9	6.2	2.5	1.0	-0.4	0.9
South America	108	111	120	1.1	0.8	646,809	619,782	846,672	-0.4	3.2	5,965	5,602	7,041	-1.5	2.3	N/A	N/A	N/A	N/A	N/A	N/A
Bolivia	11	12	13	1.5	1.3	37,153	36,799	50,423	1.7	3.2	3,238	3,117	3,758	0.2	1.9	2.5	5.5	-0.5	-1.0	-0.4	-1.3
Colombia	49	50	53	1.0	0.7	308,028	299,255	415,860	-0.2	3.3	6,334	6,042	7,806	-1.1	2.6	4.2	3.1	3.6	-0.8	-1.0	1.3
Ecuador	17	17	19	1.3	1.0	98,674	93,606	119,346	-1.4	2.5	5,908	5,473	6,313	-2.6	1.4	0.4	2.3	-	-	-0.7	-3.3
Peru	32	32	35	0.9	0.7	202,954	190,122	261,044	-0.7	3.2	6,418	5,904	7,534	-1.6	2.5	2.3	2.0	1.2	0.3	-0.6	0.4
NORTH AFRICA	**191**	**198**	**228**	**1.9**	**1.4**	**723,720**	**699,519**	**966,847**	**2.3**	**3.3**	**3,791**	**3,537**	**4,240**	**0.4**	**1.8**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Algeria	42	44	49	1.7	1.1	170,751	167,336	212,083	-0.9	2.4	4,035	3,838	4,367	-2.5	1.3	4.4	4.5	2.2	-0.8	-1.5	-2.7
Egypt	102	106	128	2.4	1.9	398,453	377,987	538,178	4.4	3.6	3,915	3,551	4,194	1.9	1.7	14.5	4.4	3.4	-1.3	-0.8	-0.9
Morocco	35	36	39	1.0	0.8	109,550	110,109	152,858	1.0	3.3	3,111	3,068	3,945	0.0	2.5	1.0	2.1	0.1	2.1	0.4	-2.8
Tunisia	12	12	12	1.0	0.5	44,967	44,087	63,728	-0.1	3.8	3,870	3,732	5,144	-1.0	3.3	5.8	3.6	3.3	3.0	1.3	-2.0
SUB-SAHARAN AFRICA	1,038	1,095	1,416	2.8	2.6	1,401,812	1,435,631	2,130,361	1.6	4.0	1,351	1,311	1,505	-1.1	1.4	N/A	N/A	N/A	N/A	N/A	N/A
Central Africa	137	145	194	3.1	3.0	89,157	91,445	138,004	2.3	4.2	652	630	710	-0.8	1.2	N/A	N/A	N/A	N/A	N/A	N/A
Cameroon	27	29	37	2.8	2.7	35,557	36,652	53,631	2.8	3.9	1,317	1,285	1,441	0.0	1.2	1.5	2.9	-0.5	0.2	-0.3	-0.8
Central African Republic	6	6	7	2.1	2.0	1,967	2,052	3,176	3.2	4.5	335	335	425	1.1	2.4	4.8	6.8	-2.7	-5.1	-1.0	-1.3
Congo, Republic of the	5	5	7	2.2	2.3	8,125	8,018	10,344	-1.7	2.6	1,570	1,480	1,515	-3.8	0.2	1.8	2.2	0.3	-0.7	-1.4	-4.1

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Congo, Democratic Republic of the	99	105	143	3.3	3.1	43,509	44,723	70,853	2.7	4.7	441	426	496	-0.6	1.5	22.9	2.9	-4.5	1.5	-0.3	-2.9
East Africa	**363**	**382**	**490**	**2.8**	**2.5**	**372,194**	**391,882**	**620,517**	**3.9**	**4.7**	**1,026**	**1,025**	**1,267**	**1.1**	**2.1**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Burundi	12	12	17	2.3	3.0	3,142	3,065	3,728	-0.3	2.0	272	250	226	-2.5	-1.0	3.7	5.2	2.3	0.2	-0.5	-0.2
Chad	16	17	23	3.3	3.0	10,258	10,153	13,830	-1.7	3.1	627	583	590	-4.8	0.1	0.5	2.3	1.6	-0.9	-1.7	-2.3
Eritrea	6	6	7	0.9	1.2	5,010	4,976	6,186	2.3	2.2	831	810	892	1.4	1.0	-5.3	7.7	7.0	-5.1	-3.8	0.6
Ethiopia	105	110.9	140	2.7	2.3	88,214	96,042	173,112	7.4	6.1	837	866	1,240	4.6	3.7	13.1	9.6	-0.2	2.1	0.0	-1.4
Kenya	52	55	67	2.3	2.0	78,145	82,550	142,214	4.4	5.6	1,492	1,509	2,126	2.1	3.5	5.9	4.0	-2.4	0.5	-0.6	-2.1
Rwanda	12	13	15	2.2	1.6	10,988	11,812	18,123	6.0	4.4	882	912	1,192	3.6	2.7	5.5	5.6	1.7	0.9	-0.5	-0.6
Somalia	15	16	22	2.9	2.9	1,629	1,647	2,289	2.2	3.3	105	101	105	-0.6	0.4	3.6	4.5	2.7	0.1	0.0	0.0
Sudan	44	47	60	2.9	2.6	76,080	75,480	93,117	-0.7	2.1	1,716	1,614	1,539	-3.5	-0.5	46.8	15.1	11.7	-7.6	-2.2	1.2
Tanzania	57	60	78	2.8	2.6	59,597	63,678	90,782	5.3	3.6	1,046	1,059	1,164	2.5	1.0	4.2	2.8	0.6	1.9	-0.1	-1.0
Uganda	42	45	61	3.7	3.1	39,131	42,479	77,135	4.9	6.1	934	950	1,267	1.1	2.9	4.1	4.4	0.4	2.0	-0.1	-1.4
Southern Africa	**144**	**153**	**199**	**2.8**	**2.7**	**208,742**	**208,528**	**294,587**	**-0.6**	**3.5**	**1,445**	**1,367**	**1,479**	**-3.3**	**0.8**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Angola	31	34	47	3.6	3.4	108,655	108,761	148,953	-1.9	3.2	3,456	3,233	3,177	-5.3	-0.2	24.5	7.2	10.9	-0.8	-0.2	0.4
Lesotho	2	2	2	0.2	-0.1	2,421	2,385	3,172	-0.4	2.9	1,232	1,209	1,629	-0.6	3.0	5.0	4.4	2.1	-0.2	-1.7	-0.9
Madagascar	26	28	34	2.5	2.1	13,251	14,019	20,148	3.6	3.7	503	508	592	1.1	1.5	7.2	5.8	0.7	1.3	-0.6	0.5
Malawi	21	22	30	3.4	3.3	7,205	7,402	11,040	2.7	4.1	351	338	366	-0.6	0.8	12.8	5.4	-2.3	-2.9	-1.9	-2.6
Mozambique	29	31	40	2.7	2.6	17,912	18,513	30,873	2.2	5.2	611	599	774	-0.4	2.6	8.3	4.7	4.2	1.3	-0.3	0.3
Namibia	3	3	3	1.9	1.8	10,944	10,484	13,684	-1.6	2.7	4,239	3,914	4,288	-3.5	0.9	4.6	4.5	2.5	-0.3	-0.2	-0.6
Swaziland	1	1	1	0.8	0.6	4,282	4,265	5,189	0.5	2.0	3,907	3,833	4,396	-0.3	1.4	5.0	4.7	1.0	-0.4	-0.5	-0.5
Zambia	17	18	24	3.0	2.9	23,687	23,666	33,572	1.8	3.6	1,399	1,319	1,411	-1.2	0.7	11.0	5.2	5.3	1.0	-0.7	1.0
Zimbabwe	14	15	18	1.6	1.9	20,385	19,032	27,956	-1.2	3.9	1,427	1,283	1,554	-2.8	1.9	59.6	6.3	13	(3)	-1.4	2.3
West Africa	**394**	**415**	**532**	**2.6**	**2.5**	**731,720**	**743,776**	**1,077,252**	**1.0**	**3.8**	**1,858**	**1,794**	**2,024**	**-1.5**	**1.2**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Benin	12	13	18	3.5	3.3	14,013	15,248	27,024	5.1	5.9	1,127	1,146	1,467	1.5	2.5	0.8	2.6	1.29	-1.12	-1.0	0.4
Guinea-Bissau	2	2	3	2.5	2.6	1,253	1,291	1,863	3.7	3.7	666	653	731	1.1	1.1	1.7	2.8	0.34	-1.30	-2.4	0.2
Burkina Faso	20	21	27	2.8	2.3	14,856	15,924	22,767	5.3	3.6	732	745	846	2.4	1.3	0.7	2.3	1.03	-1.18	-2.2	-1.6
Cabo Verde	1	1	1	1.3	1.1	1,809	1,798	2,950	1.3	5.1	3,142	3,044	4,484	-0.1	4.0	0.7	1.5	1.33	-0.08	-0.7	0.5
Côte d'Ivoire	27	28	35	2.4	2.1	58,530	62,150	90,278	5.2	3.8	2,178	2,212	2,611	2.8	1.7	0.8	1.1	0.26	1.99	-0.1	0.1
Gambia	2	2	3	2.0	1.6	1,587	1,644	2,590	3.2	4.6	744	743	1,000	1.1	3.0	7.0	5.5	-0.73	0.02	-1.7	-0.6
Ghana	29	30	37	2.2	2.1	59,920	64,106	99,262	4.5	4.5	2,086	2,139	2,694	2.3	2.3	11.0	10.0	-0.53	-0.51	-0.8	-0.2
Guinea	12	13	17	2.8	2.8	11,822	12,498	19,132	6.4	4.3	970	970	1,131	3.5	1.5	9.0	6.6	-1.99	-0.01	-0.7	-0.8
Liberia	5	5	7	2.6	2.7	3,155	3,143	4,212	-0.8	3.0	639	603	619	-3.3	0.27	17.5	17.1	3.40	-5.57	-3.3	1.8
Mali	19	20	27	3.0	2.9	15,703	16,213	23,382	3.8	3.7	827	805	874	0.7	0.8	-0.2	1.1	1.26	2.01	-0.1	0.6
Mauritania	4	4	5	2.2	1.9	6,815	7,073	11,400	2.1	4.9	1,737	1,730	2,310	0.0	2.9	2.4	2.5	2.24	-0.06	-0.4	-1.2
Niger	22	24	34	3.8	3.7	11,966	12,908	24,109	4.9	6.4	545	546	709	1.0	2.6	1.2	1.4	0.86	0.05	-1.0	-2.0
Nigeria	209	219	281	2.5	2.5	498,102	495,955	694,450	-0.5	3.4	2,386	2,259	2,475	-2.9	0.9	13.7	7.2	1.60	-1.37	-0.8	0.4
Senegal	15	16	20	2.4	2.1	22,223	23,424	38,049	4.7	5.0	1,445	1,455	1,915	2.2	2.8	1.3	2.1	-0.26	1.02	-0.5	-0.1
Sierra Leone	6	7	9	2.4	2.5	4,943	5,088	7,524	3.1	4.0	764	749	864	0.7	1.4	14.9	10.4	1.91	0.10	-0.8	0.8
Togo	8	9	11	2.7	2.4	5,023	5,314	8,259	4.3	4.5	599	602	737	1.6	2.0	0.3	2.3	1.76	-0.89	-1.1	-0.6

Source: USDA, Economic Research Service, International Macroeconomic Dataset.