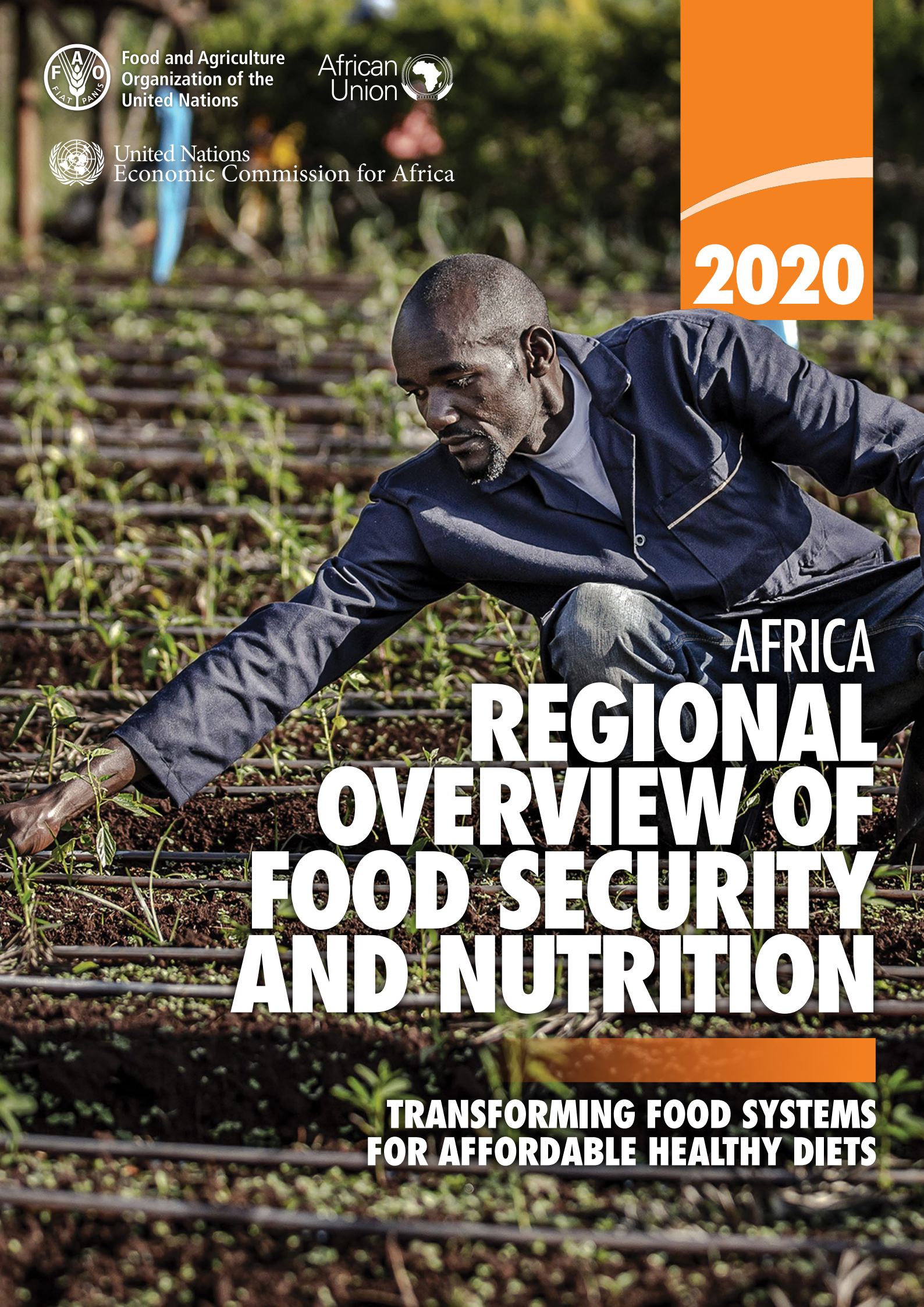
Food and Agriculture Organization of the United Nations
African Union
United Nations Economic Commission for Africa
2020
AFRICA
REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION
TRANSFORMING FOOD SYSTEMS FOR AFFORDABLE HEALTHY DIETS

Recommended citation:
FAO, ECA and AUC. 2021. *Africa regional overview of food security and nutrition 2020: Transforming food systems for affordable healthy diets.* Accra, FAO.
https://doi.org/10.4060/cb4831en

ISBN 978-92-5-134449-1

COVER PHOTOGRAPH ©FAO/Luis Tato

KENYA. A young farmer trained by FAO inspects the watering system at his farm in Kiambu County.

2020

AFRICA REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

TRANSFORMING FOOD SYSTEMS FOR AFFORDABLE HEALTHY DIETS

Food and Agriculture Organization of the United Nations

Accra, 2021

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FOREWORD

Africa is not on track to meeting the Sustainable Development Goal (SDG) 2 targets to end hunger and ensure access by all people to safe, nutritious and sufficient food all year round and to end all forms of malnutrition. The number of hungry people on the continent has risen by 47.9 million since 2014 and now stands at 250.3 million, or nearly one-fifth of the population. Of these, 15.6 million people are in Northern Africa and 234.7 million in sub-Saharan Africa.

The 2017, 2018 and 2019 editions of this report explain that this gradual deterioration of food security was due to conflict, weather extremes, and economic slowdowns and downturns, often overlapping. These shocks frequently affect populations already facing chronic poverty and limited social protection coverage and are exacerbated by policies that do not support equitable growth or poverty reduction.

A continued worsening of food security is also expected for 2020 as the COVID-19 pandemic and the associated containment measures are causing a devastating social and economic crisis in many countries, with the consequences expected to last many years.

In addition to hunger, across all countries in Africa millions of people suffer from widespread micronutrient deficiencies, and in many of these countries overweight and obesity are also emerging as significant health concerns. Overall progress in reducing malnutrition, as measured against the World Health Assembly (WHA) and SDG 2030 global nutrition targets, remains unacceptably slow in Africa. At the country level, progress has been mixed, but mostly mediocre. Only three countries, Eswatini, Kenya and Sao Tome and Principe, are on course to meeting four of the five targets that are measured. Three other countries, Ghana, Lesotho and Rwanda, are on track to meeting three targets.

Progress is weakest for stunting and wasting in children under five and for anaemia in women of reproductive age. Sub-Saharan Africa is the only region in the world where the number of stunted children continues to rise. Although the prevalence of stunting is declining, it is falling only very slowly and despite progress, nearly a third of the children in sub-Saharan Africa are stunted. Today, 40 percent of all stunted children in the world live in Africa, a significant rise from the 18 percent observed in 1990. Progress towards meeting the targets in exclusive breastfeeding and reducing overweight in children is slightly better.

Meeting SDG target 2.1, of ensuring access to safe, nutritious and sufficient food for all people all year round, and target 2.2, of eradicating all forms of malnutrition, will only be possible if we ensure that people are nourished with quality diets that address all forms of malnutrition. However, of all the challenges to achieving this, the cost of food and the affordability of diets are among the most important, particularly in the case of nutritious food that makes the healthiest diets. Nearly 430 million Africans live in extreme poverty and many more work in low-productivity, low wage sectors, in addition to which Africans face some of the highest food costs when compared to other regions of a similar level of development. Furthermore, nutritious foods, such as fruits and vegetables and animal-source foods, are relatively expensive when compared to staples such as cereals and starchy roots, and some of the reasons for this are systemic.

This report presents a broad overview of the food system in Africa and the food consumption patterns across low- and middle-income African

countries. The picture that emerges is that the food system in Africa does not provide food at a cost that makes healthy diets affordable to the majority of the population, and this is reflected in the high disease burden associated with maternal and child malnutrition, high body-mass, micronutrient deficiencies and dietary risk factors.

New evidence, first presented in *The State of Food Security and Nutrition in the World 2020*, shows that "healthy" and "nutrient adequate" diets are considerably more expensive than "energy sufficient" diets. Across all income groups, the "nutrient adequate" and "healthy" diet are three to over five times more expensive than the "energy sufficient" diet, respectively. Nearly three-quarters of the African population cannot afford a "healthy" diet, and more than half cannot afford a "nutrient adequate" diet. Even the "energy sufficient" diet is out of reach for 11.3 percent of the continent's population. Moreover, in low-income African countries the cost of the "energy sufficient" diet amounts to 41 percent of average household food expenditures. For the majority of Africans to gain access to healthy diets, nutritious food must become considerably more affordable.

The situation is particularly dire for the nearly 430 million Africans living in extreme poverty who need about half of their food budget just to purchase the "energy sufficient" diet. Poverty lines reflect basic needs, including food, but they do not provide for having a nutrient adequate or healthy diet in most countries. It may therefore be important to revise national poverty lines upwards to ensure food security and nutrition.

The State of Food Security and Nutrition in the World 2020 report also shows that current food consumption patterns impose high health and environmental costs, which are not reflected in food prices. Including these costs would add USD 0.35 to each dollar spent on food in sub-Saharan Africa. Rebalancing diets towards a higher content of plant-based foods would not only reduce the cost of diets but also lower the health and environmental costs. Compared to current average diets, rebalancing diets in such a way would reduce the full cost (wholesale cost and diet-related health and climate-change costs) of diets by 11–21 percent in low-income countries.

The findings presented in the *2020 Africa Regional Overview of Food Security and Nutrition* highlight the importance of prioritizing the transformation of food systems to ensure access to affordable and healthy diets for all, produced in a sustainable manner. A common vision, strong political leadership and effective cross-sectoral collaboration, including the private sector, are essential to agree on trade-offs and identify and implement sustainable solutions to transform food systems for healthy, affordable diets. Policies and interventions throughout the food system will be needed to raise yields, lower costs, and promote nutritious foods, and to reduce health and environmental costs.

Within the African context, essential interventions are increased investment in research and extension to improve yields, especially of nutritious foods, and in efforts to diffuse the adoption of modern technologies. Production must be intensified in a sustainable manner, and interventions to improve land governance, empower women to reduce the gender gap, reduce post-harvest losses and lower transaction costs by investing in road networks, transportation and market infrastructure are essential. In addition, complementary interventions that are nutrition-specific or

sensitive, such as micronutrient fortification of staple foods, better food safety, improved maternal and child nutrition and care, nutrition education and healthier food environments, are needed. Finally, government policy must promote access to nutritious food through social protection, poverty reduction and income inequality.

Abebe Haile-Gabriel
Assistant Director-General and Regional Representative for Africa Food and Agriculture Organization

William Lugemwa
Director, Private Sector Development and Finance Division Economic Commission for Africa

H.E. Josefa Leonel Correia Sacko
Commissioner for Agriculture, Rural Development, Blue Economy and Sustainable Development

ACKNOWLEDGEMENTS

The 2020 edition of the *Africa Regional Overview of Food Security and Nutrition* has been jointly prepared by FAO's Regional Office for Africa (RAF), the United Nations Economic Commission for Africa (ECA), and the African Union Commission (AUC) in close cooperation with FAO's Agrifood Economics Division (ESA), Food Systems and Food Safety Division (ESN), Inclusive Rural Transformation and Gender Equity Division (ESP), Statistics Division (ESS), Markets and Trade Division (EST), and the Subregional Office for Eastern Africa (SFE).

Andre Croppenstedt (RAF), Medhat El-Helepi (ECA) and Laila Lokosang (AUC) coordinated the preparation of the document and led its production under the overall supervision and guidance of Abebe Haile-Gabriel, Assistant Director-General and Regional Representative for Africa, assisted by Ade Freeman, Regional Programme Leader. The FAO-AUC-UNECA collaboration was supported and facilitated by Kafkas Caprazli (SFE), under the guidance of David Phiri, SFE coordinator.

For FAO, under the overall supervision of Máximo Torero, FAO Assistant Director-General for the Economic and Social Development Stream, the coordination and technical support provided by the Agrifood Economics Division (ESA) was led by Marco Sánchez Cantillo, ESA Deputy-Director, Cindy Holleman and Giovanni Carrasco Azzini.

For ECA, under the overall supervision of Vera Songwe, Executive Secretary of the ECA, contributions were made by the Private Sector Development and Finance Division (PSDF) under the supervision of William Lugemwa, and included Joan Kagwanja and Medhat El-Helepi.

For AUC, contributions were made by Laila Lokosang and Simplice Nouala Fonkou.

Valuable contributions were received from: ESA, including Giovanni Carrasco Azzini, Marco Sánchez Cantillo, Valentina Conti, and Cindy Holleman; ESF, including Siobhan Kelly; ESN, including Diana Carter and Günter Hemrich; ESP, including Susan Kaaria and Erdgin Mane; EST, including Jonathan Pound; ESS, including Juan Feng; RAF, including Sara Abdoulayi, Koffi Amegbeto, Pious Asante, Ade Freeman and Katrien Holvoet, and SFE, including Kafkas Caprazli, Dia Sanou, Yergalem Beraki, Martinus van der Knaap, Orlando Sosa and Martin Ager. Data for Part One were provided by ESS by José Rosero Moncayo, Director, and the Food Security and Nutrition Statistics Team led by Carlo Cafiero, and included Marinella Cirillo, Juan Feng, Filippo Gheri and Sara Viviani.

Christin Campbell copy-edited and proofread the report, and Creatrix Design Group provided the layout. The Office of Communications (OCC) assisted with publishing standards, layout and formatting. Support from the Communication unit of FAO's Regional Office for Africa led by Zoie Jones and including Samuel Creppy is gratefully acknowledged.

ACRONYMS AND ABBREVIATIONS

AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
ASF	Animal-source food
AUC	African Union Commission
BMI	Body mass index
CH	Cadre Harmonisé
CHD	Coronary Heart Disease
DALY	Disability-adjusted life year
ECA	United Nations Economic Commission for Africa
FAO	Food and Agriculture Organization of the United Nations
FBDG	Food Based Dietary Guideline
FIES	Food Insecurity Experience Scale
GBD	Global Burden of Disease
GDD	Global Dietary Database
GDP	Gross Domestic Product
GHG	Green House Gases
ICBT	Informal cross-border trade
IDA	Iron Deficiency Anaemia
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
IPC	Integrated Food Security Phase Classification
IYCF	Infant and Young Child Feeding
M49	Standard Country or Area Codes for Statistical Use (Series M, No. 49) used by the United Nations
MDD	Minimum Dietary Diversity
MDD-W	Minimum Dietary Diversity for Women of Reproductive Age
NCD	Non-communicable disease
PoU	Prevalence of undernourishment
PPP	Purchasing power parity
SDG	Sustainable Development Goal
SPS	Phytosanitary measures
TFP	Total Factor Productivity
UNICEF	United Nations Children's Fund
USD	United States Dollar
VAD	Vitamin A Deficiency
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHA	World Health Assembly
WHO	World Health Organization
YLD	Years Lost due to Disability
YLL	Years of Life Lost

KEY MESSAGES

➔ The number of people that are chronically undernourished continues to rise in Africa, reaching 250.3 million in 2019: nearly one-fifth of the population. Of these, 15.6 million are in Northern Africa and 234.7 million in sub-Saharan Africa. By this measure, the region is not on track to achieving target 2.1 of Sustainable Development Goal 2.

➔ The number of people affected by severe food insecurity, which is another measure that approximates hunger, shows a similar upward trend. In addition to the severely food insecure, though, a further 426 million people also experience moderate food insecurity, i.e. they typically eat low-quality diets and might have been forced, at times during the year, to also reduce the quantity of food they would normally eat.

➔ In 2019, 73 million people, 6 million more than in 2018, in 36 countries in Africa, faced acute food insecurity or hunger and required urgent food assistance: 37 million due to conflict, 26 million due to climate shocks, and 10 million due to economic shocks.

➔ Preliminary estimates indicate that in Africa an additional 25 to 42 million people may be undernourished in 2020 due to the economic recession caused by COVID-19. Furthermore, childhood malnutrition will rise, with perhaps 1.5 million children in sub-Saharan Africa under the age of five suffering from wasting.

➔ Progress towards the WHA and SDG nutrition targets remains poor. For stunting in children under the age of five, only eight African countries are on target, and sub-Saharan Africa is the only region in the world that has experienced rising numbers of stunted children in recent years. For anaemia in women of reproductive age, no country is on target. Only three countries are on track to meeting four of the five WHA nutrition targets, and another three are on track to meet three targets.

➔ In terms of Disability Adjusted Life Years, undernutrition and low birth weight remain the most significant health risk factors contributing to the burden of disease in Africa. However, these factors decline in importance relative to dietary risks and high body-mass in lower- and upper-middle-income countries.

➔ Poor nutrition outcomes are mirrored in poor diets which in turn are a reflection of current food systems which, through the availability, cost and affordability of nutritious food, are key determinants of consumption patterns and therefore also of nutrition outcomes. Broad food consumption patterns for different food groups show that intake of nutritious foods in Africa is relatively low compared to other regions, while intake of energy-dense foods with minimal nutritional value rises rapidly with income growth and is already relatively high compared to other regions.

➔ For Africa, large differences in intake levels for different food groups are observed between urban and rural populations and by household education levels. However, there are no differences in broad consumption patterns by gender.

➔ Access is a key determinant of healthy diets. Nearly three-quarter of Africans cannot afford a "healthy diet," and 51 percent cannot afford a "nutrient adequate" diet. Even an "energy sufficient" diet is beyond the means of 11.3 percent of Africans (where the relevant

reference diets are defined in the report). For the nearly 430 million Africans that live in extreme poverty, the "energy sufficient" diet costs about 50 percent of their food expenditure budgets. No household living in extreme poverty can afford a "nutrient adequate" or "healthy diet." In low-income African countries, the energy sufficient diet costs about 56 percent of the food poverty line, and in lower- and upper-middle-income African countries, the share is 64 percent and 70 percent, respectively. The cost of nutrient adequate and healthy diets significantly exceeds the food poverty line.

➔ Policies and interventions aimed at transforming the food systems to make healthy diets affordable must be based on a careful assessment of the food security and nutrition situation, the food policy environment, and the key drivers of affordability, including food cost drivers. Solutions will be context specific and will involve not only the food systems, but also health, sanitation, education, social protection and other sectors.

➔ A common vision, strong political leadership, and effective cross-sectoral collaboration, including the private sector, are essential to agree on trade-offs and identify and implement sustainable solutions to transform food systems for healthy, affordable diets.

➔ A wide range of policies and interventions throughout the food system will be needed to raise yields, lower transaction costs and promote nutritious foods. Within the African context, essential interventions are in research and extension to improve yields, especially of nutritious foods, and in efforts to diffuse the adoption of modern technologies. Production must be intensified in a sustainable manner, and interventions to improve land governance, empower women and reduce the gender gap, reduce post-harvest losses and lower transaction costs by investing in road networks, transportation and market infrastructure are essential. In addition, complementary interventions that are either nutrition-specific or sensitive are needed to ensure food safety, improve maternal and child nutrition and care as well as change food consumption behaviour and create healthier food environments. Transforming food systems is a long-term goal and so support to the poor and vulnerable in the short term is essential.

➔ Current food production and consumption patterns have hidden health and environmental costs, and if these costs were included in food prices, they would add USD 0.35 to each USD spent on food in sub-Saharan Africa, or 26 percent of the total cost. Rebalancing diets towards a higher content of plant-based foods would lower the full cost (wholesale cost and diet-related health and climate-change costs), of diets by 11 to 21 percent in low-income countries.

➔ The food system is not only key in addressing the food security and nutrition targets of the SDGs, but also plays a role in achieving health and climate related SDGs (SDG 3 and SDG 13, respectively). Transforming the food system for healthy diets for all must consider the relevant trade-offs and synergies with other SDGs and in particular includes provisions for the environmental sustainability of food systems.

NIGER
Women grind grains in a village in Zinder region.
©FAO/Luis Tato

PART 1
REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

PART 1

REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

FOOD SECURITY CONTINUES TO WORSEN IN AFRICA

Africa has seen the food security situation worsen over the past few years, and in 2019, there were 250.3 million undernourished people in Africa: 15.6 million in Northern Africa and 234.7 million in sub Saharan Africa (Figure 1).[1] While the prevalence of undernourishment[2] fell over the 2000 to 2014 period, rapid population growth meant that the number of undernourished people remained at about 200 million. However, after 2014, the situation deteriorated, and the prevalence of undernourishment rose from 17.6 in 2014 to 19.1 percent in 2019. As a consequence, the number of undernourished people in Africa increased by 47.9 million between 2014 and 2019, accounting for most of the 58.9 million global increase in the undernourished.

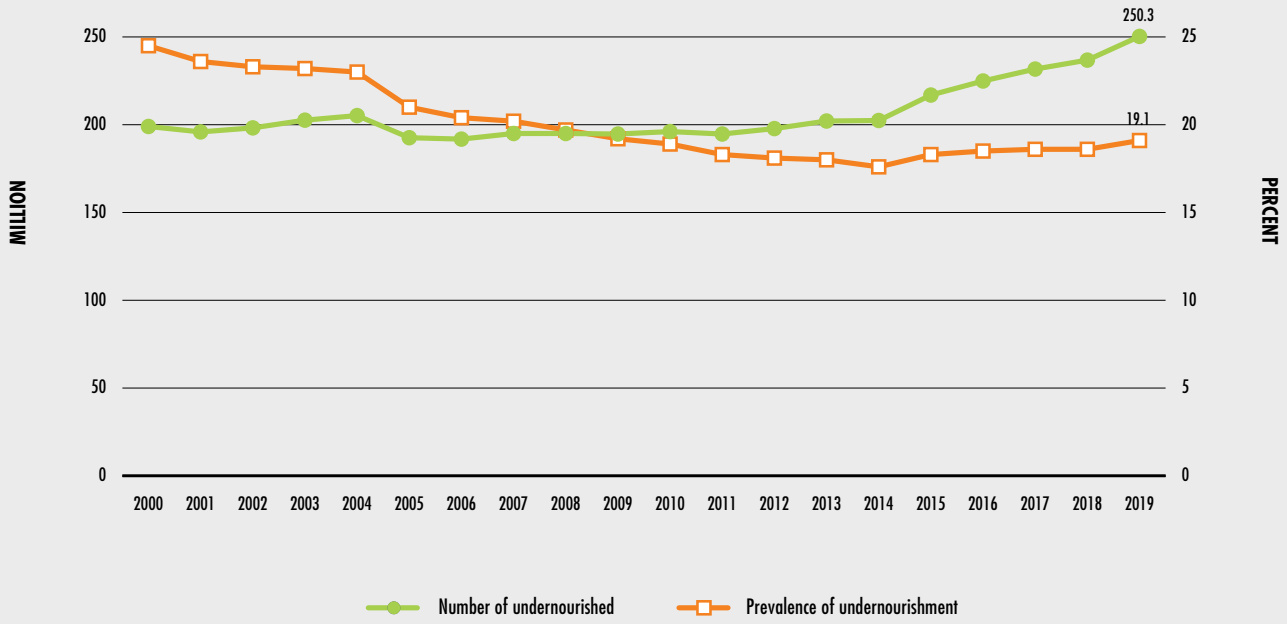
This gradual deterioration of food security was due to weather extremes, conflict and economic slowdowns and downturns, often overlapping. These shocks frequently aggravate the situation of populations already facing chronic poverty and which lack capacity to recover. In addition, the impact is exacerbated by limited social protection coverage and by policies that do not support equitable growth or poverty reduction. These factors continue to be the main causes of food insecurity in the region.[3] The economic downturn many countries are facing due to the COVID-19 pandemic, as well as disruptions to food supply chains, will most likely be reflected in a further deterioration in food security in 2020.

Not only are millions of Africans food insecure, but many more suffer from one or more forms of malnutrition. Part two of this report provides an overview of the levels of malnutrition in Africa, structured along country income groups, i.e. low-, lower- and upper-middle-income, which reflect broad levels of economic development. The picture that emerges is that in nearly all countries, multiple forms of malnutrition are now public health concerns and that these contribute very significantly to the burden of disease. In low-income countries, child undernutrition remains the most significant risk factor. However, in lower- and upper-middle-income countries, dietary risk factors and overweight gain in importance. These developments show that many African countries have started into the nutrition transition as they enter structural transformation.[4]

The review of the food consumption patterns and how these are aligned with nutrition outcomes suggests relatively low levels of fruit and vegetable consumption and, especially in low-income countries, very low consumption of animal-source food helps explain high levels of stunting and micronutrient deficiencies. However, the consumption of energy-dense foods of minimal nutritional value[5] is, relative to other developing countries, disproportionately high in lower- and upper middle income countries. Consumption patterns are also a reflection of the relative cost of different foods, and in Africa, cereals, fats and sugars are relatively cheap when compared to more nutritious foods such as fruit, vegetables and animal-source foods. As a result, three-quarter of Africans cannot afford a "healthy" diet and 51 percent cannot afford a "nutrient adequate" diet.[6] A reassessment of policy priorities is needed to address this imbalance.

However, the problem is deeper in that not only are prices of nutritious food high, but the cost of food in general is relatively high in Africa

FIGURE 1
THE PREVALENCE OF UNDERNOURISHMENT IN AFRICA HAS BEEN ON THE RISE SINCE 2014, MARKING A SHARP UPWARD TREND IN THE NUMBER OF UNDERNOURISHED FROM THAT YEAR ONWARDS



SOURCE: FAO.

compared to the rest of the world (Figure 2). A recent study calculates that food prices in sub-Saharan Africa are 30 to 40 percent higher compared to other countries at comparable income levels.[7] Addressing the widespread malnutrition in Africa requires rethinking how the food system can be transformed to provide more nutritious food at a lower cost, as well as addressing the underlying structural constraints that make food more expensive in Africa, relative to other countries at comparable levels of development.

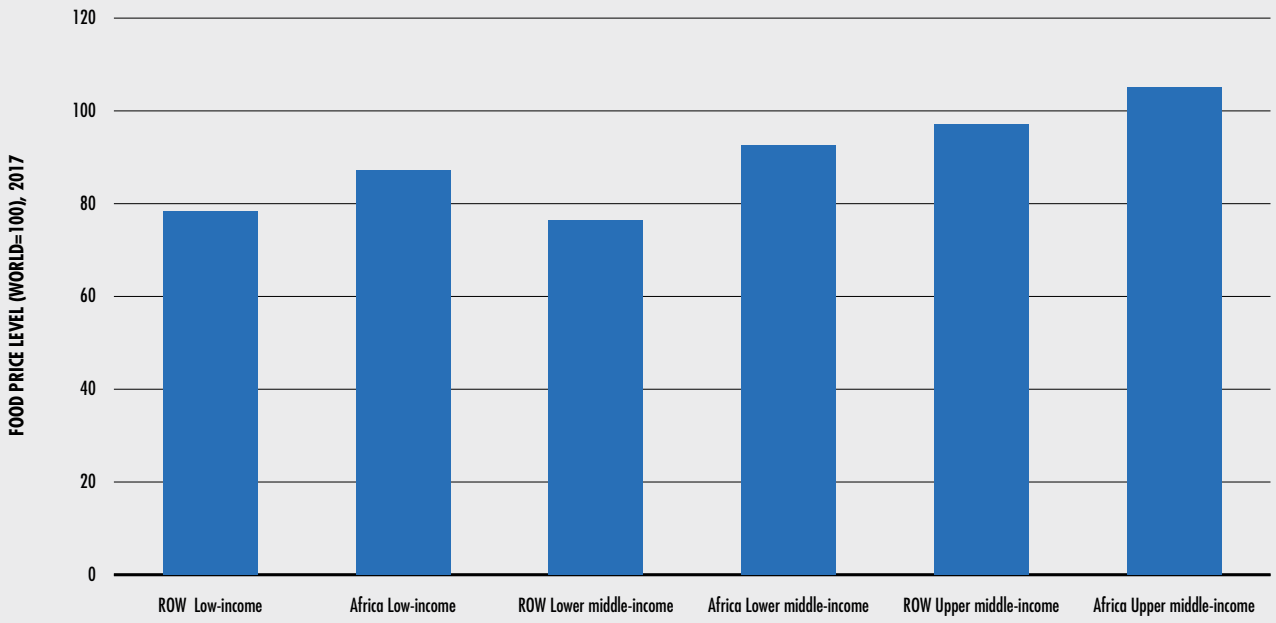
Because food systems in Africa, as elsewhere, are a major driver of environmental change by contributing to climate change and the unsustainable use of natural resources,[8] transformation must also consider the trade-offs involved with eradicating hunger and malnutrition whilst making the food system environmentally sustainable. ■

TRENDS IN FOOD SECURITY AND NUTRITION IN AFRICA

Each year, the *Africa Regional Overview of Food Security and Nutrition* reports on what progress has been made towards achieving the Sustainable Development Goal (SDG) 2: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture." Progress towards food security and improved nutrition is assessed with reference to: Target 2.1, which captures progress towards ensuring access to food for all, and Target 2.2, which measures progress towards eliminating all forms of malnutrition. Both targets are assessed using specific indicators. With regard to Target 2.1, these are SDG indicators 2.1.1 and 2.1.2, the prevalence of undernourishment (PoU) and the prevalence of moderate or severe food insecurity in the population (based on the Food Insecurity Experience Scale - FIES), respectively.[9]

FAO's prevalence of undernourishment (PoU) indicator is an estimate of the proportion of the population whose habitual food consumption

FIGURE 2
THE FOOD PRICE LEVEL BY INCOME GROUP FOR AFRICA AND REST OF THE WORLD (ROW), ICP 2017



SOURCE: **World Bank**. 2020. World Bank Data Bank. ICP 2017. In: *The World Bank* [online]. Washington DC. [Accessed June 2020]. https://databank.worldbank.org/source/icp-2017

over the course of a year is insufficient to provide the dietary energy intake levels that are required to maintain a normal, active and healthy life (Box 1). The FIES-based prevalence of moderate or severe food insecurity is constructed from data collected directly from representative samples of individuals. Food insecurity as measured by this indicator refers to limited access to food, at the level of individuals or households, due to lack of money or other resources. The resulting FIES indicator is an estimate of the proportion of the population who face moderate or severe constraints on their ability to obtain sufficient food over the course of a year. Moderate food insecurity describes the situation when individuals face uncertainties about their ability to obtain food and have been forced to reduce, at times during the year, the quality and/or quantity of food they consume due to lack of money or other resources. On the other hand, severe food insecurity refers to situations when individuals have likely run out of food, experienced hunger and, at the most extreme, gone for days without eating, putting their health and well-being at grave risk. The FIES-based prevalence of severe food insecurity is conceptually comparable to the PoU indicator. Both the prevalence of moderate or severe food insecurity and the prevalence of severe food insecurity are reported below.

The relevant indicators for Target 2.2 are the prevalence of stunting, wasting and overweight of children under the age of five. In addition, the report assesses progress towards the World Health Assembly (WHA) and SDG global nutrition targets.[10]

BOX 1
THE PREVALENCE OF UNDERNOURISHMENT

The Food and Agriculture Organization of the United Nations (FAO) prevalence of undernourishment (PoU) indicator has been published by FAO since 1974, and from 1999 onwards, FAO has reported it in the annual *State of Food Security and Nutrition in the World* (SOFI) report for almost all the countries in the world. The PoU has been used to monitor both the World Food Summit Target, which called for a 50 percent reduction in the number of undernourished people by 2015, and the Millennium Developments Goals' target 1C of "halving, between 1990 and 2015, the proportion of people who suffer from hunger."

The PoU estimates are derived from official country data on food supply, food consumption and energy needs (taking into consideration demographic characteristics such as age, sex and levels of physical activity). FAO strives to always improve the reliability of the PoU estimates, and the entire series is updated for each report. For this reason, they are not comparable backwards in time and only the current estimates should be used.

For example, the population data for all countries are regularly revised when new data become available, and this revision also affects earlier years. FAO also regularly updates the Food Balance Sheet series used to estimate the average Dietary Energy Supply. This data has changed also because since May 2019, the Statistics Division of FAO has used improved methods for compiling Food Balance Sheets. As a result, the Food Balance Sheets have been substantially revised for a number of countries, pointing to even tighter food supplies in recent years than previously thought. Finally, as new food consumption data from household surveys become available, the coefficient of variation (CV), a parameter accounting for inequality in food consumption, is updated. Since the last edition of this report, 25 new surveys from 13 countries have been processed to update their CV.

Particularly important this year has been the availability of new data for China, which has led to considerable revisions in that country's PoU series, as well as the global PoU estimates presented in this report. For a more detailed explanation and the complete data sets for all regions, the reader may refer to the *2020 State of Food Security and Nutrition in the World*.[11]

SDG TARGET 2.1

"By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round."

SDG INDICATOR 2.1.1
Prevalence of undernourishment (PoU)

In 2019, 687.8 million people were undernourished globally, or 8.9 percent of the world's population (see also Box 1). Although the prevalence of undernourishment has been steady, the number of undernourished people has risen by 58.9 million since 2014 (Table 1).

For Africa, the prevalence of undernourishment had fallen over the 2000 to 2014 period but has since risen by 1.5 percentage points to 19.1 percent in 2019: more than twice the global rate and higher than any other region. This rising prevalence translates into an additional 47.9 million undernourished people in Africa, mostly in sub-Saharan Africa, with the rise amplified by the rapidly rising population. In 2019, there were 250.3 million people undernourished on the continent (Table 1).[12] For sub-Saharan Africa and Northern Africa, the number and prevalence of undernourishment are 235 million (22 percent) and 15.6 million (6.5 percent), respectively in 2019.

TABLE 1
THE NUMBER OF UNDERNOURISHED IN THE WORLD, AFRICA, AND ITS SUBREGIONS, 2000–2019 (MILLION)

Regions/subregions	2000	2010	2014	2015	2016	2017	2018	2019	Change from 2014 to 2019 (million)
World	808.6	668.2	628.9	653.3	657.6	653.2	678.1	687.8	58.9
Africa	199.0	196.1	202.4	216.9	224.9	231.7	236.8	250.3	47.9
Northern Africa	17.3	17.8	13.4	13.8	14.4	15.5	15.0	15.6	2.2
Sub-Saharan Africa	181.7	178.3	189.0	203.0	210.5	216.3	221.8	234.7	45.7
Central Africa	40.1	40.0	40.1	43.5	45.8	47.2	49.1	51.9	11.8
Eastern Africa	100.9	98.1	99.3	104.9	108.4	110.4	112.9	117.9	18.6
Southern Africa	3.1	3.2	3.9	4.4	5.1	4.5	5.2	5.6	1.7
Western Africa	37.6	37.0	45.7	50.3	51.2	54.2	54.7	59.4	13.7

NOTES: Differences in percentage change are due to the rounding of figures to the nearest decimal point. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping. The groupings are: Northern Africa = Algeria, Egypt, Libya, Morocco, Sudan, Tunisia; Eastern Africa = Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania, Zambia, Zimbabwe; Central Africa = Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe; Southern Africa = Botswana, Eswatini, Lesotho, Namibia, South Africa; Western Africa = Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo.
SOURCE: FAO.

Since 2014, the PoU has risen in all subregions, and the rise was strongest in Western Africa (0.9 percentage points), and Central Africa (0.8 percentage points) (Table 2). In terms of the number of undernourished, the greatest deterioration between 2014 and 2019, occurred in Eastern Africa (18.6 million), followed by Western Africa (13.7 million) and Central Africa (11.8 million). In Northern Africa, there was an increase of 2.2 million people from 2015 to 2019, while in Southern Africa the number of undernourished rose by 1.7 million people over the same period.

The rise in the prevalence of undernourishment in sub-Saharan Africa over the 2014–2019 period was widespread, and the past three editions of this report identified conflict, climate extremes and economic slowdowns and downturns as the main drivers of rising food insecurity during that period. The 2017 edition of this report detailed how conflicts in the region primarily affected rural areas, damaging activities across the food system.[13] The resulting disruption or destruction of livelihoods constituted a major cause of acute and chronic food insecurity[14] and malnutrition. The 2018 edition focused on climate variability and extremes as key drivers of the recent rise in food insecurity and two of the leading causes of the severe food crises that have affected the continent. They undermine, directly and indirectly, food availability, access, utilization, and stability with grave consequences for immediate and long-term food security and nutrition outcomes, especially for children. And the 2019 edition focused on economic slowdowns and downturns and the channels through which they impact food security and nutrition. Very often, economic slowdowns and downturns are driven by falling demand and falling prices of the commodities that very many African countries are highly dependent on for exports.

Often conflict, climate extremes and economic slowdowns and downturns overlap, and disentangling the impact of the main drivers is difficult. However, last year's edition of this report found that over the 2014–2018 period: economic slowdowns and/or downturns were the main drivers of the rise in the prevalence of undernourishment in the Republic of the Congo and Gabon; climate shocks and economic slowdowns and/or downturns were the main drivers of the rise in the prevalence of undernourishment in Benin, Botswana, Burkina

TABLE 2
PREVALENCE OF UNDERNOURISHMENT IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2000–2019 (%)

Regions/subregions	2000	2010	2014	2015	2016	2017	2018	2019	Percentage point change from 2014 to 2019
World	13.2	9.6	8.6	8.9	8.8	8.7	8.9	8.9	0.3
Africa	24.5	18.9	17.6	18.3	18.5	18.6	18.6	19.1	1.5
Northern Africa	10.1	8.8	6.3	6.2	6.3	6.6	6.3	6.5	0.2
Sub-Saharan Africa	28.4	21.3	21.4	21.2	21.4	21.4	21.4	22.0	0.6
Central Africa	41.7	30.4	29.0	28.2	28.8	28.7	29.0	29.8	0.8
Eastern Africa	39.2	28.9	26.7	26.9	27.1	26.8	26.7	27.2	0.5
Southern Africa	5.9	5.4	7.9	7.0	8.0	7.0	7.9	8.4	0.5
Western Africa	16.0	12.1	14.3	14.3	14.2	14.6	14.3	15.2	0.9

NOTES: Differences in percentage change are due to rounding of figures to the nearest decimal point. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: FAO.

Faso, the Gambia, Mauritania, Mozambique, the Niger, South Africa, Zambia and Zimbabwe; conflict and/or insecurity and economic slowdowns and/or downturns were interrelated factors driving the rise in the prevalence of undernourishment in Burundi, Cameroon, the Central African Republic and Nigeria; conflict and/or insecurity, economic slowdowns and/or downturns and climate shocks were interrelated factors driving the rise in the prevalence of undernourishment in Guinea-Bissau; and in Guinea, the rise in the prevalence of undernourishment was due to economic slowdowns and/or downturns exacerbated by Ebola Virus Disease.

SDG INDICATOR 2.1.2
Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

The prevalence of moderate or severe food insecurity within the population in Africa has, similarly to the prevalence of undernourishment, risen over the 2014–2019 period (Table 3). The largest increase was observed for Western Africa, followed by Eastern Africa. For 2018–2019, most subregions experienced a rise, but the prevalence fell in Northern Africa and marginally fell in Southern Africa.[15]

Although obtained using different data and methods, the prevalence of severe food insecurity is conceptually comparable to the PoU, and the estimates for the two indicators are quite similar at the continental level.[16] At the subregional level, the two indicators are close, but the PoU estimates indicate a considerably lower level of hunger (8.4 percent) in Southern Africa than that indicated by the FIES based measure (19.8 percent). It is possible that access to food is not as high in Southern Africa as the PoU, which gives greater weight to availability, would suggest.

The indicator of moderate or severe food insecurity also shows that in addition to the 248.5 million people in Africa who are severely food insecure, there are 426.0 million people who are moderately food insecure, i.e. they typically eat low-quality diets and might have also been forced, at times during the year, to reduce the quantity of food they would normally eat (Table 4).

A recent study found that women all over the world are more likely to be food insecure than men even after controlling for a set of individual or household characteristics. The gender gap is higher for the poorest, the least educated, individuals out of the workforce, the widowed, and those living in suburbs of the large cities.

TABLE 3
PREVALENCE OF MODERATE OR SEVERE FOOD INSECURITY (MEASURED USING FIES) IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2014 TO 2019 (%)

	Prevalence of severe food insecurity in the total population (%)						Prevalence of moderate or severe food insecurity in the total population (%)					
Regions/subregions	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
World	8.3	7.9	8.1	8.6	9.4	9.7	22.4	22.4	23.2	24.8	25.8	25.9
Africa	16.7	16.8	18.2	18.5	18.3	19.0	46.3	46.5	49.4	51.4	50.6	51.6
Northern Africa	10.2	9.0	10.4	11.0	9.3	8.7	29.7	26.4	30.0	36.8	31.1	28.6
Sub-Saharan Africa	18.2	18.6	20.0	20.2	20.3	21.3	50.3	51.2	53.9	54.8	55.1	56.8
Central Africa	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eastern Africa	23.5	23.8	25.2	24.5	23.9	24.7	58.0	57.9	61.7	61.1	60.2	61.4
Southern Africa	19.4	19.5	19.7	19.9	19.7	19.8	44.1	44.4	44.6	44.8	44.8	44.7
Western Africa	11.7	12.5	13.8	14.9	15.8	17.2	42.1	44.3	46.4	48.6	50.5	53.2

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: FAO.

TABLE 4
NUMBER OF PEOPLE EXPERIENCING AT SEVERE LEVEL ONLY, OR MODERATE OR SEVERE LEVEL, IN THE WORLD, AFRICA AND ITS SUBREGIONS, MEASURED WITH THE FOOD INSECURITY EXPERIENCE SCALE, 2014 TO 2019 (%)

	Number of people experiencing severe food insecurity						Number of people experiencing moderate or severe food insecurity					
Regions/subregions	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
World	602.0	586.0	605.5	646.4	717.5	746.0	1633.5	1649.5	1735.2	1874.5	1969.6	2001.1
Africa	192.0	198.7	220.5	230.0	233.1	248.5	534.1	549.5	599.6	640.0	646.2	674.5
Northern Africa	22.4	20.2	23.7	25.6	22.0	21.0	65.1	59.1	68.6	85.6	73.7	69.1
Sub-Saharan Africa	141.2	148.8	163.6	168.9	174.1	187.8	391.3	409.5	443.1	460.7	476.2	504.3
Central Africa	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eastern Africa	89.3	92.6	101.1	100.9	101	107.2	219.9	225.8	247.0	251.4	254.2	266.4
Southern Africa	12.0	12.3	12.6	12.9	12.9	13.2	27.4	28.0	28.5	29.1	29.4	29.8
Western Africa	39.9	43.9	49.9	55.1	60.2	67.4	144.0	155.7	167.6	180.2	192.6	208.1

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: FAO.

The study finds that the gender gap in food security still persists even when income levels, education, age, employment, marital status, and locality are controlled for. The authors note that this suggests that the gender gap might also be driven by a set of unobserved factors such as access to resources, social norms and intra-household relations.[17]

SDG TARGET 2.2

"By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.""

Achieving good nutrition outcomes is not possible without achieving several other SDG goals, and vice versa. For example, ending poverty (SDG 1) is key to improving nutrition, but good nutrition is also needed to enable children to reach their full potential and for adults to work productively. Women play a central role in childcare, feeding and promoting gender equality (SDG 5). Gender equality and good nutrition are also essential to ensuring quality education (SDG 4). Finally, in part, poor nutrition outcomes are driven by inequalities in access to basic services such as health, water and sanitation, as well as quality education, and therefore reducing inequalities (SDG 10) is fundamental to eliminating poverty, food insecurity and malnutrition.

Most countries in Africa, particularly in sub-Saharan Africa, suffer multiple burdens of malnutrition, mainly in the form of undernutrition and micronutrient deficiencies,[18] but in addition, overweight and obesity are emerging as significant health concerns in a number of countries. This section reports on six nutrition indicators – three that form part of the SDG monitoring framework and the global nutrition targets agreed to by the WHA in 2012, i.e. stunting, wasting and overweight in children under the age of five, and three that are specific to the six WHA global nutrition targets, i.e. anaemia in women of reproductive age, low birth weight, and exclusive breastfeeding in the first six months.

SDG INDICATOR 2.2.1 Prevalence of stunting in children under 5 years of age

Stunting refers to low height-for-age in children under five years of age[19] and causes impairment to cognitive and physical development that can lower educational attainment, reduce adult productivity, income, and impose considerable economic costs.[20,21,22] Stunting is an irreversible condition due to inadequate infant and young child feeding practices, poor health conditions, infection and maternal undernutrition and health status before, during and after pregnancy that lead to growth failure during the first 1 000 days (i.e. from conception to a child's second birthday).

Globally, there are 144 million stunted children under the age of five, a figure that has fallen over time (Table 5). In Africa, 57.5 million children are stunted, and of these, 91 percent, i.e. 52.4 million live in sub-Saharan Africa. While African countries are making progress in reducing the prevalence of stunting, high population growth and, in some countries, a lack of coordinated and effective interventions, often due to limited resources, mean that sub-Saharan Africa is the only region in the world where the number of stunted children has been rising over time (Table 6).[23] Today, 40 percent of all stunted children in the world live in Africa, a significant rise from the 18 percent observed in 1990.

The prevalence of stunting is highest in Eastern Africa (34.5 percent) and lowest in Northern Africa (17.6 percent), with the other subregions experiencing prevalence rates between 27.7 to 31.5 percent. While the average prevalence of stunting is quite similar across sub-Saharan Africa's subregions, there is considerable variation between countries, and there is evidence that levels of stunting can vary considerably within a country.[24] In general, stunting is higher in rural areas.[25]

Despite some progress made by many countries in reducing the prevalence of stunting, only eight countries are actually on course to meeting the WHA target for 2025 of a 40 percent reduction in the number of children under five who are stunted. The WHA targets have also been updated and revised to be aligned with

TABLE 5
NUMBER OF STUNTED CHILDREN UNDER THE AGE OF FIVE IN THE WORLD, AFRICA AND ITS SUBREGIONS, 1990–2019 (MILLION)

Regions/subregions	1990	2000	2010	2015	2016	2017	2018	2019
World	252.8	199.5	169.8	155.0	152.1	149.3	146.7	144.0
Africa	46.3	49.7	55.2	57.3	57.5	57.6	57.6	57.5
Northern Africa	6.0	5.0	4.9	5.3	5.4	5.3	5.2	5.1
Sub-Saharan Africa	40.3	44.7	50.3	52.0	52.2	52.3	52.3	52.4
Central Africa	5.8	7.0	8.5	9.2	9.3	9.4	9.4	9.5
Eastern Africa	19.0	21.1	23.0	23.2	23.2	23.2	23.1	23.1
Southern Africa	2.2	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Western Africa	13.2	14.8	16.8	17.5	17.7	17.7	17.8	17.8

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.

SOURCE: **UNICEF, WHO & International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/resources/jme-report-2020/.

TABLE 6
PREVALENCE OF STUNTED CHILDREN UNDER THE AGE OF FIVE IN THE WORLD, AFRICA AND ITS SUBREGIONS, 1990–2019 (PERCENT)

Regions/subregions	1990	2000	2010	2015	2016	2017	2018	2019
World	39.3	32.4	26.0	23.1	22.6	22.1	21.7	21.3
Africa	42.2	37.9	33.3	30.9	30.4	30.0	29.5	29.1
Northern Africa	28.3	24.2	20.5	18.8	18.5	18.2	17.9	17.6
Sub-Saharan Africa	45.6	40.5	35.5	33.0	32.5	32.1	31.6	31.1
Central Africa	44.3	39.7	35.2	33.1	32.7	32.3	31.9	31.5
Eastern Africa	52.1	45.8	39.7	36.8	36.2	35.6	35.1	34.5
Southern Africa	34.9	32.8	30.8	29.8	29.6	29.4	29.2	29.0
Western Africa	40.8	36.0	31.5	29.4	29.0	28.5	28.1	27.7

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.

SOURCE: **UNICEF, WHO & International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/resources/jme-report-2020/.

the SDG 2030 timeframe. The new target for stunting is a 50 percent reduction by 2030 in the number of children under five who are stunted. Africa and all the subregions have made some progress but are not on track to meet the WHA 2025 and the SDG 2030 target for the reduction of stunted children.[26]

SDG INDICATOR 2.2.2
Prevalence of wasting and overweight in children under 5 years of age

Wasting (or thinness), measured by low weight-for-height for children under the age of five, indicates recent and severe weight loss.[27] The leading underlying causes of wasting include

poor household food security, inadequate feeding and care practices, and/or limited access to health, water, hygiene, and sanitation services. Furthermore, suboptimal breastfeeding and poor feeding practices can lead to rapid weight loss or growth failure. Wasting raises the risk of infection, which in turn leads to more significant weight loss due to reduced appetite and poor intestinal absorption.[28]

In 2019 nearly 47 million children under the age of five (6.9 percent) suffered from moderate to severe wasting worldwide (Table 7). In Africa, the number was 12.7 million (6.4 percent of children on the continent) and most of these wasted children were in Western Africa (4.8 million) and in Eastern Africa (3.6 million). The prevalence of wasting is just slightly lower in Africa compared to the world average, and it is highest in Northern Africa and Western Africa.

The WHA target for 2025 and 2030 are to reduce and maintain childhood wasting to less than 5 percent and 3 percent, respectively. The average prevalence of wasting in children under five is 6.4 percent for Africa, with only Southern Africa (3.3 percent) falling below 5 percent. A majority of countries is above this threshold, and progress toward the WHA wasting target has been poor.[29]

It is important to acknowledge that, similar to stunting, many data gaps exist.

Overweight and obesity are increasing trends in children across the continent.[30] Childhood obesity is a health concern as obese children may experience breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance, and psychological effects. In addition, there is evidence to indicate that when children are overweight early on, they are at higher risk of obesity and the associated non-communicable diseases (NCDs) in adulthood.[31,32]

Globally, overweight affected 38.3 million children under the age of five (5.6 percent) in 2019. Of these, 9.3 million children are in Africa, and the continental prevalence, at 4.7 percent, is slightly below the global one. At the subregional level, the prevalence is below the continental average in Eastern Africa (3.7 percent) and Western Africa (1.9 percent), while it is higher than average in Central Africa (5.1 percent), Northern Africa (11.3 percent) and Southern Africa (12.7 percent). In the latter three regions, the trend is clearly upwards (Figure 3). Although the prevalence in Southern Africa is much higher than the global world average, the

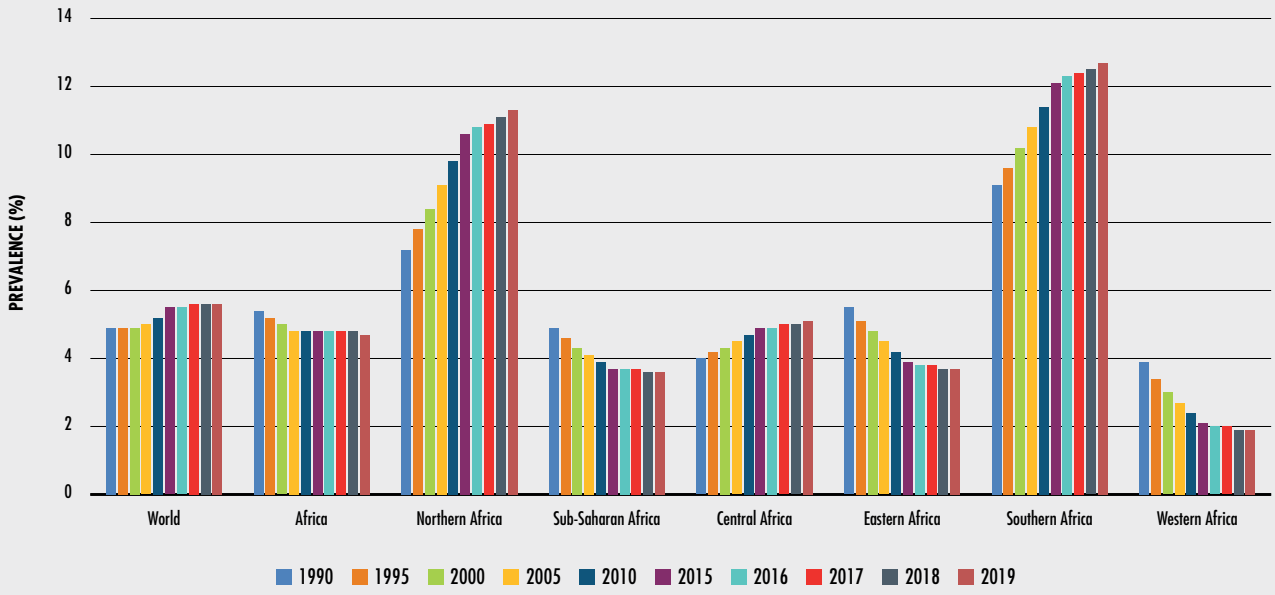
TABLE 7
PREVALENCE AND NUMBER OF CHILDREN UNDER THE AGE OF FIVE THAT ARE SEVERELY OR MODERATELY WASTED IN THE WORLD, AFRICA AND ITS SUBREGIONS (MILLION), 2019

Regions/subregions	Moderate and severe wasting		Severe wasting	
	%	millions	%	millions
Global	6.9	47.0	2.1	14.3
Africa	6.4	12.7	1.8	3.5
Northern Africa	7.2	2.1	3.1	0.9
Sub-Saharan Africa	6.3	10.6	1.5	2.6
Central Africa	6.7	2.0	2.2	0.7
Eastern Africa	5.3	3.6	1.1	0.7
Southern Africa	3.3	0.2	0.9	0.1
Western Africa	7.5	4.8	1.8	1.1

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.

SOURCE: **UNICEF, WHO & International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/resources/jme-report-2020/.

FIGURE 3
PREVALENCE OF OVERWEIGHT IN CHILDREN UNDER THE AGE OF FIVE IN THE WORLD, AFRICA AND ITS SUBREGIONS, 1990–2019 (%)



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **UNICEF, WHO & International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/resources/jme-report-2020/

average elevated level reflects an exceptionally high prevalence in South Africa, while the prevalence in Namibia and Lesotho is much lower. In Northern Africa, the prevalence of overweight is particularly high in Egypt, Libya and Tunisia, while it is low (3 percent) in Sudan.

The prevalence of overweight has fallen over consecutive five-year periods in Eastern and Western Africa (Figure 4). However, in the other regions, the prevalence of overweight has been rising at a steady rate. The Central, Northern and Southern Africa subregions are not on track to meet the WHA 2025 and SDG 2030 targets for child overweight. On the other hand, Western Africa is on track to meet both targets while Eastern Africa is on track to meet the WHA 2025 target and has made some progress towards the SDG 2030 target. For some countries, the progress towards the WHA target for overweight in children appears to have been quite remarkable and a majority of countries, for which data is available, is on track to meet the target. However, for this indicator it is also important to note that there are many countries without data.

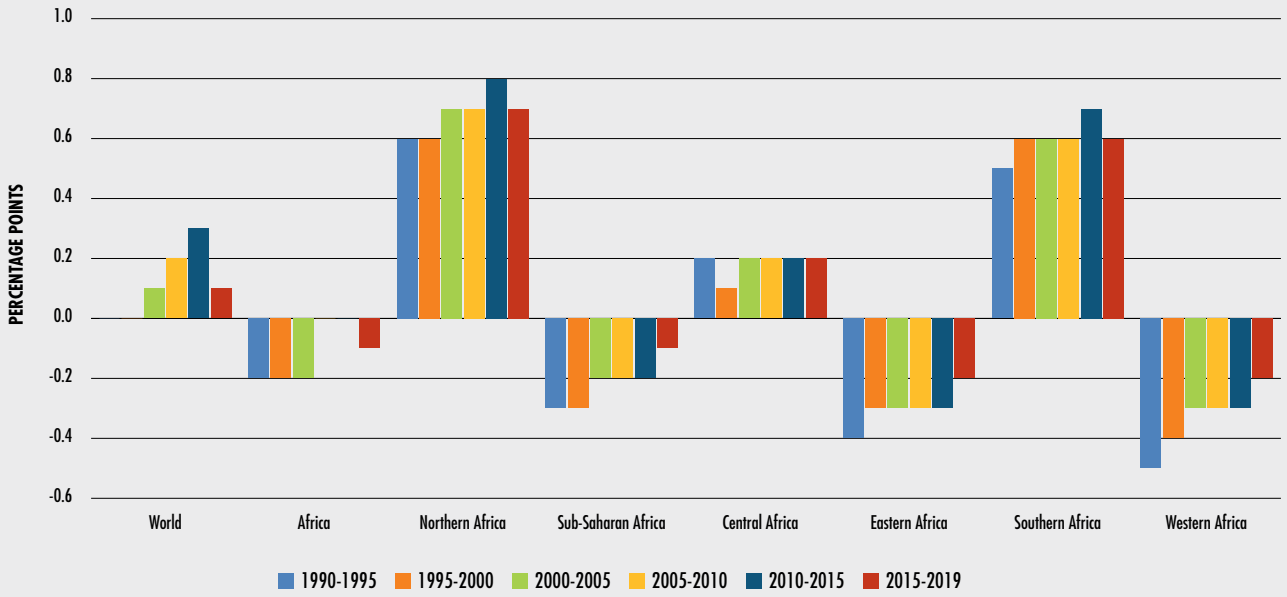
World Health Assembly global nutrition targets

To facilitate the tracking of progress towards reducing malnutrition by 2025, the WHO Member States adopted a set of global nutrition targets for improving maternal, infant and young child nutrition. Three of these targets, stunting, wasting and overweight in children under the age of five, refer to specific SDG indicators, while the overall SDG 2 goal of "ending all forms of malnutrition" is broader and refers to all forms of malnutrition in all population groups. The six WHA global nutrition targets for 2025 and the revised targets for 2030 are given in Table 8.

Overall progress towards these WHA global nutrition targets remains unacceptably slow in Africa, as it has remained elsewhere in the world. The number of countries on track to meeting the WHA targets are as follows:

- 8 out of 34 countries (for another 20 countries the data are missing) are on course to meeting the target for stunting: Burkina Faso, Côte

FIGURE 4
CHANGE IN THE PREVALENCE OF OVERWEIGHT IN CHILDREN UNDER THE AGE OF FIVE, 1990–1995, 1995–2000, 2000–2005, 2005–2010, 2010–2019 (PERCENTAGE POINTS)



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **UNICEF, WHO & International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/resources/jme-report-2020/

d'Ivoire, Egypt, Eswatini, Ghana, Kenya, Liberia, Sao Tome, and Principe (Burkina Faso is a new entrant).

- No country (no country is missing data) is on course to meeting the target for anaemia in women of reproductive age.

- 20 out of 32 countries (22 countries are missing data) are on course to meeting the target on overweight: Burundi, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Egypt, Eswatini, Ghana, Guinea-Bissau, Kenya, Lesotho, Malawi, the Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, South Africa, Uganda, the United Republic of Tanzania (Niger and Rwanda are new entrants, while Burkina Faso and Cameroon where on track last year but are no longer);

- 20 out of 32 countries (22 countries are missing data) are on course to meeting the target on exclusive breastfeeding: Burkina Faso, Burundi, Cameroon, the Congo, Democratic Republic of the Congo, Eswatini, the Gambia, Guinea, Guinea-Bissau, Kenya, Lesotho, Mali, Mauritania, Rwanda, Sao Tome and Principe, Sierra Leone, Sudan, Togo, Zambia, Zimbabwe (Togo is a new entrant; Benin and Côte d'Ivoire where on track last year but are no longer).

- 12 out of 34 (20 countries are missing data) are on course to meeting the target on wasting: Angola, Eswatini, Ghana, Kenya, Lesotho, Malawi, Rwanda, Sao Tome and Principe, South Africa, Uganda, the United Republic of Tanzania, Zimbabwe (Benin was on track last year but is no longer).

At country level, progress has been mixed, but mostly mediocre. Only three countries, Eswatini, Kenya, and Sao Tome and Principe, are on course to meeting four of the five targets that are measured (in all cases stunting, wasting, overweight and exclusive breastfeeding). A further three countries are on track to meeting three targets: Ghana for stunting, wasting and overweight, and Lesotho and Rwanda for wasting, overweight and exclusive breastfeeding. However, the majority

TABLE 8
THE GLOBAL NUTRITION TARGETS ENDORSED BY THE WORLD HEALTH ASSEMBLY AND THEIR EXTENSION TO 2030

	2025 Target	2030 Target
Stunting	40 percent reduction in the number of children under 5 who are stunted	50 percent reduction in the number of children under 5 who are stunted
Anaemia in women of reproductive age	50 percent reduction in anaemia in women of reproductive age	50 percent reduction in anaemia in women of reproductive age
Low birth weight	30 percent reduction in low birth weight	30 percent reduction in low birth weight
Childhood overweight	No increase in childhood overweight	Reduce and maintain childhood overweight to less than 3 percent
Breastfeeding	Increase the rate of exclusive breastfeeding in the first six months up to at least 50 percent	Increase the rate of exclusive breastfeeding in the first six months up to at least 70 percent
Wasting	Reduce and maintain childhood wasting to less than 5 percent	Reduce and maintain childhood wasting to less than 3 percent

NOTES: The baseline year against which the targets were set is 2012.
SOURCE: **WHO and UNICEF.** 2017. *The extension of the 2025 Maternal, Infant and Young Child nutrition targets to 2030*. Discussion paper. (also available at www.who.int/nutrition/global-target-2025/discussion-paper-extension-targets-2030.pdf).

of countries are on track to meeting only one or two targets. Progress towards the targets on exclusive breastfeeding and anaemia in women of reproductive age is presented below, while for stunting, wasting and overweight, this was presented at regional and subregional level in the preceding section.

Of the countries for which there is data, a majority was on track to meeting the WHA target for **exclusive breastfeeding**. Early initiation of breastfeeding within one hour of birth protects the newborn from acquiring infections and reduces newborn mortality. Exclusive breastfeeding for six months has many benefits for the mother and her infant. Breast milk is safe and contains antibodies and vitamin A which help protect infants from common childhood illnesses and improve growth and cognitive development. In Africa, some progress has been made towards increasing the rate of exclusive breastfeeding in the first six months, rising from 35.5 percent (13.1 million) in 2012 to 43.7 percent (17.8 million) in 2019. Nevertheless, the region is on track to meet the WHA 2025 target but not the SDG 2030 target. Northern and Western Africa are off track for both targets but have made some progress. Eastern Africa is on track to meet the WHA 2025 and the SDG 2030 targets. For Central and Southern Africa, the data is insufficient to report progress at the subregional level. No country in Africa is on track to meeting the target for reducing **anaemia[33] in women of reproductive age**, which affects women's overall health and raises the risk of adverse maternal and neonatal outcomes. In Africa, anaemia continues to affect nearly 110 million women of reproductive age (37.7 percent), a worsening from the 99 million (37.7 percent) affected in 2012.

The latest **low-birth-weight** estimates for Africa show that the prevalence of low-birth-weight babies has fallen from 14.1 percent in 2012 to 13.7 percent in 2015, and over the same period, the number of low-birth-weight babies has risen from 5.6 million to 5.7 million.[34] No subregion is on track to meet the WHA 2025 and the SDG 2030 targets, although some progress has been made. ■

SPECIAL FOCUS ON 2019 FOOD CRISES[35]

This section presents a brief overview of the 2019 hot spots of acute food insecurity in Africa. The analysis draws on information presented in the 2020 Global Report on Food Crises[36] using the Integrated Food Security Phase Classification/ Cadre Harmonisé (IPC/CH) classification.[37] This indicator differs from chronic food insecurity due

to the persistent or seasonal inability to consume adequate diets for a healthy and active life, mainly due to structural causes, as measured by the PoU, in that it indicates food insecurity found in a specified area at a specific point in time and of a severity that threatens lives or livelihoods, or both, regardless of the causes, context or duration.[38,39] The IPCCH classification is only determined for countries experiencing food crises and is designed to provide strategic guidance to actions that focus on short-term objectives to prevent, mitigate or decrease severe food insecurity that threatens lives or livelihoods.

In 2019, 73 million Africans in 36 countries faced acute food insecurity (IPC/CH category 3 or above), representing over 50 percent of the global population that face acute food insecurity. This marks an increase of 6 million over 2018, which is in part due to the addition of countries for which there was previously no data.[40] However, even without these countries' data included, the situation worsened over 2018.

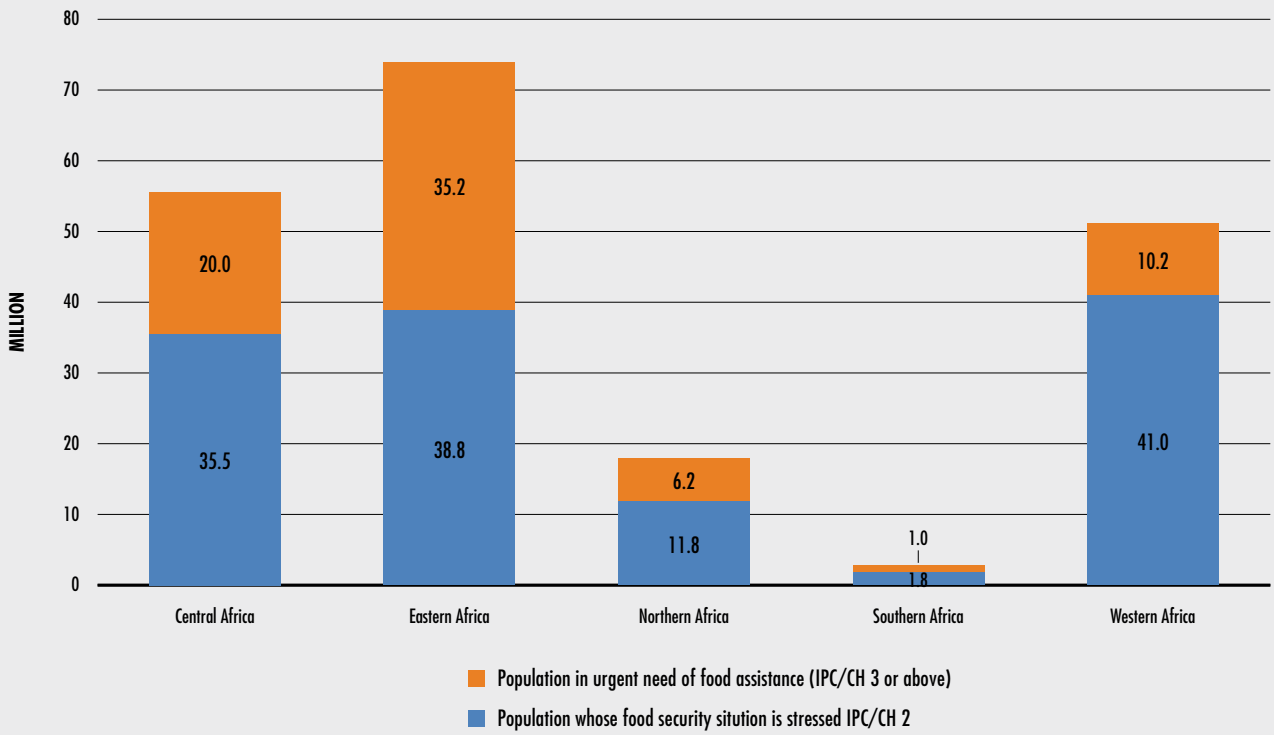
In 2019, conflict, climate extremes and economic shocks remained the main drivers of the worst food crises observed.[41] In most cases, countries experienced multiple shocks, sometimes at subnational levels. Frequently, pest and animal diseases were an additional factor, and nearly always, countries in crises saw the displacement of large numbers of people internally and often the arrival of numerous refugees. In Africa in 2019, conflict left 37 million people in 12 countries in need of urgent humanitarian assistance, i.e. classified as being in IPC/CH category three or higher. Another 26 million people in 20 countries were in need of urgent assistance due to climate shocks, while just over 10 million people in four countries were acutely food insecure due to economic shocks.[42]

In Central Africa, 20 million people faced acute food insecurity and were in need of urgent food assistance (Figure 5). The main drivers of food insecurity were conflict, displacement of people, adverse weather and pests. The countries with the largest number of acutely food insecure people were the Democratic Republic of the Congo (15.6 million), the Central African Republic (1.8 million) and Cameroon (1.4 million). In the Democratic Republic of the Congo, conflict and, in North Kivu, an outbreak of Ebola Virus Disease led to massive disruption in livelihoods, higher food prices and a disruption of basic services. Plant disease and pests further undermined agricultural production, especially in maize growing areas. The conflict and insecurity left 5 million people internally displaced, while 524 000 refugees fled conflict from neighbouring countries. The situation has worsened considerably in the DRC over the last few years, rising from 5.9 million acutely food insecure people in 2016, to 7.7 million in 2017 and 13.1 million in 2018. The Central African Republic continues to suffer from conflict and insecurity, despite a peace agreement reached earlier in 2019. Agricultural and other economic activities, including trade, remain disrupted and have left 687 200 internally displaced people in need of humanitarian assistance. In addition, the country hosts 594 000 refugees. In Cameroon, conflict and insecurity disrupted economic activities in the Far North, North, and South West regions. An estimated 950 300 people are internally displaced and 416 200 refugees, most of whom are suffering high levels of acute food insecurity, are hosted in the country.

In addition, also suffering high rates of acute food insecurity in Central Africa were Angola (562 000) and Chad (600 000). In Angola, food insecurity was driven by poor rainfall and, in southern regions, high temperatures and drought that reduced fodder and caused the loss of livestock. In addition, Fall Armyworm contributed to lower maize yields and overall cereal harvests were estimated to be below the previous five-year average.[43] In Chad, the conflict in the Lake Chad Basin area has disrupted economic activities and led to the displacement of many people. Additionally, pests and floods caused widespread damage in parts of the country. The country also hosts 438 000 refugees, many of whom suffer from acute food insecurity.

In Eastern Africa, 35.2 million were in urgent need of food assistance, the largest number of any region. Most countries were negatively impacted by extreme and/or adverse weather conditions, but insecurity/conflict and pests also contributed to the difficult food security situation. The countries with the largest number

FIGURE 5
THE NUMBER OF PEOPLE WHOSE FOOD SECURITY IS STRESSED OR WHO ARE IN NEED OF URGENT FOOD AND OTHER ASSISTANCE IN AFRICA, BY SUBREGION, 2019 (MILLION)



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping. The subregional aggregates may differ from those in the 2020 Global Report on Food Crises because the regional groupings used in this report may be different.
SOURCE: **Food Security Information Network (FSIN)**. 2020. 2020 Global Report on Food Crises. Joint Analysis for Better Decisions. Rome and Washington, DC, FAO, WFP & IFPRI. (also available at https://www.fsinplatform.org/sites/default/ files/resources/files/GRFC%200NLINE%20FINAL%202020. pdf)

of acutely food insecure were Ethiopia (8 million), South Sudan (7 million), Zimbabwe (3.6 million), Malawi (3.3 million) and Kenya (3.1 million). Parts of Eastern Africa, in particular eastern Ethiopia, central Somalia and northern Kenya, suffered substantial losses from the worst desert locust outbreak in 25 years that resulted from the combination of uncontrolled reproduction in the Arabian Peninsula and unusual weather and climate conditions in East Africa.[44]

By July 2020, some progress was made in reducing the infestation in Kenya, although the threat of reinfestation remained. At the same time, Ethiopia remained infested with a second breeding generation and was partly reinfested by swarms from Kenya. By September 2020, despite large-scale control operations that prevented a more significant impact on crop production, concerns still remained about the effects of desert locusts on rural livelihoods in parts of Somalia, Kenya and Ethiopia.[45]

In Ethiopia, erratic and below average rains led to a fall in cereal production, which, together with currency depreciation, pushed up cereal prices. In addition, inter- and intra-communal violence left 3.2 million people internally displaced and in need of humanitarian assistance. Although the number of acutely food insecure people is very high, this represents a decline from 9.7 and 8.5 million in 2016 and 2017. In South Sudan, where 6.1 million people were acutely food insecure in 2017 and 2018, the security situation has improved, but insecurity and inter- and intra-communal violence continues to disrupt economic activities. The country continues to experience an economic crisis, and the depreciation of the currency has contributed to very high food prices. In addition, abnormally heavy rainfall led to flooding in parts of the country, reducing cereal production below the previous five-year average and adding to upward pressure on prices. In Zimbabwe, a continuing severe economic crisis led to spiralling inflation

and lowered capacity to import food. In addition, sharply reduced domestic supplies exerted further upward pressure on prices. The situation has worsened compared to 2018, but the number of acutely food insecure people remains below the 4.1 million in 2016 and 2017. Malawi has suffered from poor rainfall as well as the adverse effects of cyclone Idai, causing a drop in maize production and pushing up prices. Over the past four years, the number of acutely food insecure people has ranged from 3.3 to 6.7 million people, compared to a population of just over 18 million.[46] In Kenya, late and erratic rains, flash floods and landslides have undermined crop and livestock production. The worst affected were pastoralists and agro-pastoralist households, which made up most of the population with acute food insecurity.

Also suffering high rates of acute food insecurity in Eastern Africa were Zambia (2.3 million), Somalia (2.1 million), Mozambique (1.7 million), Uganda (1.5 million), Madagascar (1.3 million) and the United Republic of Tanzania (1 million). In Zambia, cereal production fell in the face of adverse weather conditions, leading to steep price rises for some staple foods. Also, in Somalia adverse weather conditions contributed to a reduced cereal harvest and higher prices. In addition, the country experienced widespread flooding towards the end of 2019. While the abundant rains were generally positive for agriculture, the flooding displaced 370 000 people, adding to the already high number of internally displaced persons. Continued insecurity further disrupted economic activities, even as households were struggling to recover from the 2016/17 drought. The number of acutely food insecure fluctuated between 2.1 million and 3.3 million in the last four years, out of a population of 15 million. In Mozambique, acute food insecurity was due to poor rains, two cyclones, rising staple food prices, and widespread infestation with Fall Armyworm. In Uganda, most of the acutely food insecure are part of the 1.4 million refugees that the country hosts. In addition, a below average 2018 harvest contributed to high and volatile prices in 2019, while a failed sorghum harvest undermined food security in the Karamoja region. In Madagascar, poor rainfall, four cyclones and flooding affected large parts of the country and led to a significantly reduced maize harvest. Adding to the strain were Fall Armyworm infestations, currency depreciation, and significant structural weaknesses. The United Republic of Tanzania suffered prolonged dry spells and erratic rainfall, including heavy rainfall, lowered cereal output, raised transport costs, and disrupted trade, leading to higher prices. Infestations of Fall Armyworm also contributed to poor harvests.

In Northern Africa, 6.2 million people were in need of urgent food assistance, mostly due to the economic crisis. Of these people, 5.85 million were located in Sudan and 0.3 million in Libya. Sudan is suffering from an economic crisis that saw per capita GDP fall in 2018 and 2019 and the currency depreciate, pushing up food prices. Erratic weather, pests and insecurity in some parts left 2.1 million people internally displaced and contributed to the difficult food security situation. In addition, the country hosts 1 million refugees.

In Southern Africa, over 1 million people were in need of urgent food assistance. Adverse weather conditions left about 400 000 people acutely food insecure in Lesotho and Namibia and 232 000 acutely food insecure in Eswatini. Erratic and poor rainfall led to a shortfall in staple food production and pushed up prices.

In Western Africa, 10.2 million people were in need of urgent food assistance, primarily due to conflict and adverse weather conditions. The countries with the largest number of acutely food insecure were Nigeria (5 million), the Niger (1.4 million) and Burkina Faso (1.2 million). In Nigeria, conflict and insecurity disrupted economic activity and trade in the north and left 2 million people displaced in the north east and 540 000 in north-eastern, north-western and north-central states. Also, in the Niger, conflict and insecurity in the Lake Chad Basin and other regions led to the disruption of agriculture and other activities and left about 190 000 people internally displaced. In addition, erratic rainfall and pests, flooding in some locations, and in the Diffa region, drought, disrupted farming and destroyed crops and livestock. In Burkina Faso armed conflict in the northern and eastern regions has left 560 000 people displaced, disrupted agriculture and destroyed livelihoods.

Also suffering high rates of acute food insecurity in Western Africa was Mali, with nearly 650 000 people affected. Conflict and insecurity disrupted agriculture, market activities and trade in some regions and left about 200 000 people internally displaced.

The overview of food emergencies in 2019 highlights that conflict, climate extremes and economic downturns continue to be the key drivers in food insecurity hot spots. It is worrying that their impact appears to be strengthening, indicating that food security in Africa may continue to worsen, a trend that will be exacerbated by the impact of COVID-19. ■

IMPACTS OF THE COVID-19 PANDEMIC ON FOOD SECURITY AND NUTRITION IN SUB-SAHARAN AFRICA

In response to the COVID-19 pandemic, countries in Africa have taken various measures, such as lockdowns, curfews, closure of borders, movement restrictions including quarantines, roadblocks and closing of markets to contain the virus. Actors in all parts of the food system are impacted by this pandemic, from primary supply and production, to processing, to trade as well as national and international logistics systems, to food environments and consumer behaviour. Food security and nutrition are affected through the pandemic's impact on food availability and people's ability to have access to food and healthy diets. Food availability addresses the "supply side" and is determined by production, stocks and net trade while food access represents the "demand side" and is determined by incomes, expenditure, markets and prices. The pandemic may also negatively affect utilization by lowering dietary quality and worsening access to childcare, sanitation, access to clean water and health care.

The disruption to the food system and the economic repercussions of the COVID-19 containment measures are discussed in greater detail below. A preliminary assessment by FAO indicates that the COVID-19 pandemic may add between 25 million and 42 million people to the total number of undernourished people in Africa in 2020 depending on the economic growth scenario.[47] Greater food insecurity will also translate into worsening diet quality[48] for millions of individuals. When incomes fall and/or prices rise, many households will adjust food consumption patterns by reducing the variety of foods consumed and may even reduce the amount of food consumed. Evidence from across the world shows that reducing consumption and dietary diversity leads to reduced calorie, protein and micronutrient intake, increasing the risk of undernutrition and micronutrient deficiencies, which, in turn, leads to stunting and maternal undernutrition, poor foetal growth, low birth weight and poor baby growth. Undernutrition and micronutrient deficiencies are also associated with higher child and maternal morbidity as well as impaired cognitive and physical development, poor performance in school, and ultimately lower productivity and wages in adulthood.[49,50,51,52,53,54]

Impact on food availability and stability

Production and supply chains: Most farming systems in Africa are highly labour-intensive, and the widespread outbreak of COVID-19 may, through a curbing of labour movement, lead to labour shortages, leading to less production and instability of supplies. Transport restrictions and quarantine measures are likely to impede farmers' access to input and output markets, curbing productive capacities and denying a point of sale for produce. In countries where crop and livestock production are affected by emergencies such as the desert locust outbreak, the restrictions on movement may hinder interventions and relief operations.

Restrictions may disrupt the transport of food and other critical goods, increasing delivery times and reducing availability and/or increasing instability of supply of even the most basic food items. Particularly, the restrictions could obstruct fresh food supply chains and result in increased levels of food loss and ultimately higher and more volatile prices. Border closures disrupting livestock migration routes will negatively affect nomadic and semi-nomadic pastoralists.

However, despite fears of reduced agricultural production,[55] at the time of writing, there have not been significant impacts of COVID-19 on production in Africa where many countries had exempted agriculture from restrictions, which are also already being relaxed. In 2019, weather related shocks caused production declines in Eastern and Southern Africa, but, while the risk of desert locust infestation remained high in Eastern Africa, cereal production in Southern Africa recovered strongly in 2020. The cereal production outlook for 2020 appears mostly favourable in Western and Central Africa, while in Northern Africa, adverse weather resulted in a below average output.[56]

Food imports: Africa remains a net food importer and 37 African countries (out of 51, for which data are available) are classified as low-income food deficit countries.[57] Africa's agricultural imports, mostly food, amounted to roughly USD 80 billion in 2015–2017, having more than doubled since 2005–2007, when it was USD 39 billion.[58] These imports are basic food products such as cereals, vegetable oils, sugar, meat and dairy products. The high dependence on extra-regional imports for food products can increase producers and consumers' exposure to shocks from the pandemic, bringing greater instability to availability of and access to food. Trade with other countries outside Africa could decrease considerably because of travel bans affecting the movement of aircraft, shipping, rail and road transport. According to the WTO, world trade volumes are expected to fall by 13 to 32 percent in 2020, also affecting formal and informal trade channels across all Africa.[59]

Intra-regional trade: While it has grown over the last decade, intra-regional trade currently makes up only 27 percent of total agri-food exports and 17 percent of total agri-food imports.[60] While there is hope that the 2019 African Continental Free Trade Area (AfCFTA) Agreement will ensure the free flow of goods and services for over one billion African producers, traders and consumers, the health shock caused by COVID-19 has already delayed plans for the launch of the agreement. Governments are now preoccupied with protecting their citizens from rising coronavirus infections and safeguarding critical supplies. Border closures, quarantine measures and other restrictions have contributed in different degrees to disruptions in food systems and the normal functioning of markets and intra-regional trade, leading to greater instability in the supply and prices of food. Evidence from the East Africa Community shows very dramatic reductions in trade between Kenya, Uganda, the United Republic of Tanzania and Rwanda.[61]

Currency depreciation: Falling demand for commodities and widening fiscal deficits as a result of the COVID-19 outbreak led to falling foreign exchange reserves and a depreciation of local currencies.[62] For example, between January and May 2020, the currencies of Angola, Seychelles, South Africa and Zambia depreciated by more than 20 percent.[63] While this is good news for exports, this should be compared to trade-offs of increasing external debt and difficulty for countries to borrow from lenders to revive economies. Moreover, the depreciation is systemic and is therefore unlikely to spur demand for exports or attract tourism.

The currency depreciations are likely to lead to inflation and further reduce the capability of countries to maintain imports for food products and necessary inputs to production and processing, which become more costly in local currency. The high dependency on food imports from outside the region for many countries means an increase in the cost of products such as wheat, sunflower oil, dairy products, rice, palm oil, maize, poultry and beef. Currency weakness will likely worsen the economic situation for many of these low-income and fragile states whose debt is issued in foreign currency, further depressing local demand and resulting in greater contraction of local economies. At the same time, currency depreciation in net food exporters, such as South Africa for maize, may benefit some of its neighbouring countries. In addition, oil and to a more limited extent global food prices, have fallen, to some extent countering the negative effects of the currency depreciation.

Food reserves: To fight food insecurity and malnutrition during the pandemic, several countries resorted to tapping into food reserves as part of their social protection mechanisms in support of vulnerable households, and/or using food for work schemes (for example,

Ghana, Ethiopia, Kenya, Mali, Namibia, Nigeria, South Africa, Rwanda, Senegal, Togo and Uganda). Other countries decided to replenish or increase their stockpile to ensure stability over time (for example, Botswana, Nigeria and Sao Tome and Principe), or to build afresh and maintain adequate food stock (Sierra Leone). Food reserves are used by some countries to stabilize prices and thus bolster food security. However, they are expensive to operate and, in Africa the experience with using food reserves to stabilize maize prices has been mixed.[64,65] In contrast, emergency food reserves, which tend to be smaller and less costly to operate, do not aim to stabilize prices but can be used to make food available to vulnerable population groups in times of crisis. To increase their effectiveness at supporting the vulnerable, they should be integrated with social and food security safety nets and other food assistance programmes. They must also be carefully designed, adequately funded and supported by effective early warning systems.[66]

Impact on economic and physical access to food

The COVID-19 pandemic is not only a health crisis but is also the cause of a devastating social and economic crisis, the effects of which are expected to last for some years to come. Real GDP in Africa fell by 2.1 percent in 2020, the continent's first recession in more than half a century.[67] The fall in real GDP was steepest in tourism-dependent countries (-11.5 percent), oil-exporting countries (-1.5 percent), and other-resource intensive countries -4.7 percent), while in non-resource intensive countries the decline in real GDP was 0.9 percent in 2020.[68] The World Bank estimates that the economic downturn may push an additional 26 to 40 million people in the region into extreme poverty (living on less than USD 1.90 PPP per day).[69,70] A large share of the new extreme poor are projected to be concentrated in countries already struggling with high poverty rates and numbers of poor. Existing inequalities between the rich and the poor and between rural and urban households are expected to further magnify the direct and indirect impacts of COVID-19. If inequalities, often driven by inadequate policy responses for poverty reduction, were to increase as a result of the pandemic, poverty rates would be considerably higher. For example, an increase of 1 percent in the Gini coefficient would result in an additional 19 million people to the extreme poor in the world.[71]

Incomes: Rising unemployment and under-employment during the pandemic will severely reduce the affected person's purchasing power. In low-income countries, food accounts for about 56 percent[72] of household expenditure, indicating that households will have to make difficult adjustments in their spending patterns when incomes fall. Those at highest risk of losing their livelihoods are urban populations, particularly daily wage earners in the informal economies and service sector employees, as well as seasonal, migrant and casual workers. The informal economy is not a marginal phenomenon, but rather the space where the majority of working men and women sustain themselves. Informal employment accounted for about 89 percent of all employment in sub-Saharan Africa and 67.3 percent in Northern Africa in 2018.[73] Africa and Latin America were projected to experience the highest decline (81 percent) in earnings of informal workers (compared to 60 percent globally) after the first month of the crisis.[74] In addition, 26.4 percent of Africans work in sectors considered at high risk of disruption.[75,76] Youth in Africa, mostly employed in the informal sector, are particularly vulnerable to COVID-19 impacts, experiencing loss of incomes and livelihoods such as in production, business and market-trade sectors due to movement restrictions and lockdowns. In sub-Saharan Africa, nearly 67 percent of all young workers live in poverty, and many youths are food insecure, even when they are in work.[77]

Affected households may resort to negative coping strategies such as reducing dietary diversity and even the amount of food consumed, as well as selling assets. Poorer consumers will try to maintain a stable calorie intake and, in view of their overall smaller food budget, shift from more expensive and more nutritious foods, such as fruits, vegetables, meats and dairy products, to cheaper staples such as grains, sugar, or roots and tubers. The worsening dietary diversity will contribute to worsening maternal and child nutrition outcomes. Children may also

have to work to help support their families on and off the farm. Negative coping strategies may be difficult to reverse and may contribute to food insecurity and poor nutrition for generations to come, thus perpetuating the cycle of poverty and hunger, particularly in rural areas. Such shocks not only worsen food security and nutrition, but they also undermine the socio-economic fabric of communities and households. Without public assistance, many of the poor and vulnerable will suffer unnecessary hardship and lasting deprivation, perpetuating poverty for future generations (see Box 2).

BOX 2
SOCIAL PROTECTION IS NEEDED TO MITIGATE THE NEGATIVE IMPACTS OF COVID-19 ON FOOD SECURITY AND NUTRITION

There is a growing body of evidence showing that social protection programmes are effective in helping reduce poverty and food insecurity, in improving human capital, building household resilience, and in reducing social, economic and political inequality.[78] The impact on nutrition appears weaker, but programmes did increase food consumption, dietary diversity, and participation in health and nutrition activities, all of which contribute to achieving better nutrition outcomes.[79] It is important to note that the benefits of transfer programmes spread beyond beneficiaries by boosting demand in the community. Many African countries have implemented or expanded social protection programmes in response to the economic downturn that resulted from the COVID-19 containment measures. By mid-2020, 26 African countries introduced some form of social protection programme, with many focused on utility fee waivers. For example, Ghana waived utility fees for water, electricity and gas for several months; Kenya provided USD 100 million to support the elderly, orphans and other vulnerable groups through a cash transfer programme; South Africa provided cash payments to the elderly and people with disabilities; and Uganda waived social security contributions for businesses affected by COVID-19.[80,81] Burkina Faso, Cabo Verde, Côte d'Ivoire, Kenya, Lesotho, Mauritius, Namibia, Rwanda, Sierra Leone and Togo have all created ad hoc programmes to target informal workers.[82]

Several countries, including Angola, Rwanda and the Gambia, are looking to using digital technology to register beneficiaries and make disbursements. Some governments, such as Ethiopia, Ghana, Nigeria and Sao Tome and Principe, have made advance payments of two to three months of cash benefits to help affected households and to avoid the gathering of participants that is associated with payments.[83]

Some countries, including Liberia, Nigeria and Cabo Verde, are ensuring that children have access to school meals while schools are closed, including options for delivery, pick up of cooked meals, or food baskets and take-home rations. Other countries are considering similar measures.[84]

In addition, many countries expanded the coverage of existing cash transfer programmes and some countries have increased the payments. For example, Nigeria expanded coverage from 885 089 to 9 330 714 beneficiaries, while Egypt raised coverage of its cash-transfer programme from 5 929 126 to 18 500 000 beneficiaries.[85] Many countries have also made access to social protection easier by, *inter alia*, waiving conditionality. In certain situations, for example, when markets do not function properly or dietary diversity is a particular concern, in-kind food aid may be appropriate, possibly as a complimentary tool to cash transfers. In general, however, social protection coverage remains very limited in Africa, with only about 10 percent of the population covered in pre-COVID-19 times.[86] In addition, many children benefiting from school-feeding programmes will have lost access to such school meals, putting further pressure on household resources. When these programmes are sourced through local produce, farmers also lose a source of demand for their products.

Remittances: Workers and households that are reliant on remittances to meet their basic necessities of life, such as food, housing, education and health needs, are losing significant amounts of income. Following the inflow of USD 86.2 billion in remittances in 2019,[87,88] the World Bank estimates that sub-Saharan Africa will experience a 23.1 percent fall in remittances mainly from migrant workers' loss of wages and employment due to the COVID-19 outbreak.[89] The forecast decline in remittances is expected to exacerbate poverty and worsen food security and nutrition. The crisis has also made sending remittances to African countries challenging since most payments are still cash based, and some money transfer operators have closed or reduced working hours during lockdowns. On the other hand, the use of digital technology to send remittances is currently on the rise, despite many migrants' and their families' limited financial inclusion or limited access to digital services. In addition, the cost of sending remittances, at about 9 percent of the amount sent, remains high, and policy action to lower this should be a priority, now and in the future.[90]

Export revenues: Lower commodity export revenues will undermine countries' ability to purchase enough food on international markets. This would be exacerbated if food prices were to rise on international markets. However, the FAO Food Price Index fell from January to May 2020 and, though it has since risen, the index remains below the March level.[91] Several industrial commodity exporters in Africa have had to cope with weaker external demand and lower prices for oil and metals. For example, from mid-January to end-March, base metal prices fell about 15 percent, natural gas prices declined by 38 percent, and crude oil prices dropped by about 65 percent.[92] Countries most affected in the region include Angola, Cameroon, Chad, Equatorial Guinea, Gabon, Ghana, Nigeria and the Republic of the Congo.

Some, but not all agricultural commodity exporters have suffered from a collapse in export demand as well as disruptions to supply chains. Although exports from Kenya fell by 1.8 percent, tea and fruit exports where higher than last year over the same period (March to May). Exports from the United Republic of Tanzania fell by 5.7 percent, while those from Burundi, Uganda and Rwanda fell by between 21.6 to 37.1 percent.[93] Small Island Developing States often specialize in the production of labour-intensive, highly perishable fruits and vegetables, which are vulnerable to disruptions in supply chains, caused for example by the temporary shortage in labour supply as a result of restrictions on labour mobility. The precipitous fall in global travel because of the pandemic has also had a particularly severe impact on countries which rely heavily on tourism (notably Cabo Verde, Egypt, Ethiopia, Mauritius, Morocco, Seychelles and Tunisia).[94]

Food prices: As already noted, the FAO Food Price Index did not indicate an across the board rise in food prices in the first half of the year. Moreover, the FAO Cereal Price Index has remained virtually unchanged since the beginning of the year. However, several African countries, notably South Sudan, Sudan and Zimbabwe, experienced price surges. These were mainly driven by adverse economic conditions exacerbated by restrictions related to COVID-19, which hampered marketing and trading activities.[95] Restrictive measures to contain COVID-19 also led to rising food prices in many other countries, but these restrictions were generally short-lived. In addition, larger harvests in some of these countries have countered, and in some cases more than offset, some of this upward pressure, leading to more stable or falling prices.

Impact on Utilization

The economic downturn associated with COVID-19 containment measures, which is expected to impact most countries, will lower incomes and reduce demand for and access to high-quality, nutritious food. Because demand for food staples is generally less elastic than demand for fruits and vegetables or meat and dairy products, the fall in income may not result in a lower intake of overall calories, but rather a deterioration in diet quality.[96]

Beyond food, evidence from several African countries shows that households often reduce spending on health and education in response to lower incomes or purchasing power.[97] Lower

household incomes also lead to poorer care for infants, children and mothers, worsening sanitary conditions and reduced use of health services.[98] This negatively affects utilization of food, undermines nutrition, and contributes to the next generation of disadvantaged children and adults.[99,100]

Women play a key role in food preparation and childcare in the household. However, the impact of an economic downturn is likely to be worse for women, who typically have lower wages and are often the first to lose their jobs.[101] Female-headed households are often poorer than male-headed households and are more exposed to informal employment, making them less resilient to shocks.[102] Economic downturns also put pressure on women to increase their participation in the labour force. While this helps protect household incomes, it may also undermine women's child caring abilities. An added pressure may come from schoolchildren having to stay at home.

The combined effect of falling household income, reduced access to sufficient and nutritious food, poorer childcare and child feeding practices and lower access to health, nutrition and social protection services is expected to have a dramatic impact on child nutrition. For example, a recent study estimated that at the global level, the economic downturn due to COVID-19 could lead to a 14.3 percent increase in the prevalence of moderate or severe wasting among children younger than five years. This would imply an additional 6.7 million children with wasting in 2020 compared with projections for 2020 without COVID-19, and an estimated 21.8 percent of these children (nearly 1.5 million) are in sub-Saharan Africa.[103] Poorer nutrition, sanitation, and inadequate child and healthcare due to a fall in per capita GDP is also expected to lead to greater child mortality in Africa, and in particular girls' mortality. In sub-Saharan Africa, a 1 percent decline in GDP increases the mortality of boys by 0.33 per 1 000 and that of girls by 0.62 per 1 000, while in Northern Africa the corresponding figures demonstrate a decline of 0.18 per 1000 for boys and an increase of 1.43 per 1 000 for girls.[104] ■

SUMMARY

Food security in all subregions of Africa has worsened in recent years, and the COVID-19 containment measures are likely to contribute to even greater food insecurity in 2020. Conflict, climate extremes, and economic slowdowns and downturns, often interlinked, continue to be the main drivers of this rise in food insecurity. These shocks not only weaken people's access to food and sap the resilience of households to withstand adversity; they also undermine government's ability to provide basic services and social protection. Underlying and exacerbating many of the challenges, is deep inequality in incomes and access to basic services. Achieving SDG 2 will require greater efforts by governments and the international community to provide conflict resolution, address climate change, strengthen resilience at all levels and strive towards inclusive growth.

Although many African countries are making progress towards reducing malnutrition, progress is too slow to meet the global nutrition targets for 2025 and 2030. In particular, progress is weakest for stunting, with sub-Saharan Africa being the only region where the number of stunted children has increased in recent years. Progress towards meeting the targets in exclusive breastfeeding and reducing overweight in children is slightly better.

NIGER
Women grind grains in a village in Zinder region.
©FAO/Luis Tato

PART 2
TRANSFORMING FOOD SYSTEMS FOR AFFORDABLE HEALTHY DIETS

PART 2

TRANSFORMING FOOD SYSTEMS FOR AFFORDABLE HEALTHY DIETS

INTRODUCTION

Food systems play an enormously important role in the lives of individuals everywhere and perhaps even more so in Africa. They are a large part of countries' economies and they play a key role in addressing some of the most pressing issues today, including food security, malnutrition, public health and the environment. However, as is shown in the section below on "Nutrition outcomes reflect dietary patterns" malnutrition is widespread in Africa, and while there are multiple underlying determinants of malnutrition, including illness, poor sanitation and lack of (nutrition) education, poor diets are a common factor for poor nutrition outcomes (see also Box 3).

This is not the result of African diets being of poor quality *per se*. A recent study comparing diets in 187 countries across the world found that in general, diets were more nutritious in West African/Sahelian countries than in many developed countries.[105] This is probably because these diets were diversified and included less energy-dense foods of minimal nutritional value, such as processed foods.[106] Unfortunately, many Africans do not enjoy diets that provide enough energy and diversity, and while healthier diets become more accessible as incomes rise, so do energy-dense foods of minimum nutritional value.

BOX 3
WHAT CONSTITUTES A HEALTHY DIET?

Broadly, the World Health Organization (WHO) defines a healthy diet as one that protects against malnutrition in all its forms, as well as non-communicable diseases (NCDs), such as diabetes, chronic heart disease, stroke and cancer.[107] Healthy diets should contain a balanced, diverse and appropriate selection of foods eaten over a period of time which meet a person's needs for macronutrients (proteins, fats and carbohydrates including dietary fibres) and essential micronutrients (vitamins and minerals), specific to their gender, age, physical activity level and physiological state. Healthy diets include less than 30 percent of total energy intake from fats, with a shift in fat consumption away from saturated fats to unsaturated fats and the elimination of industrial trans fats, less than 10 percent of total energy intake from free sugars (preferably less than 5 percent), consumption of at least 400 g of fruits and vegetables per day, and not more than 5 g per day of salt (to be iodized).[108,109] While the exact make up of a healthy diet varies depending on these individual characteristics as well as cultural context, locally available foods and dietary customs, the following list demonstrates common, basic and shared principles that constitute a healthy diet:[110]

BOX 3
(CONTINUED)

- starts early in life with early initiation of breastfeeding, exclusive breastfeeding until six months of age, and continued breastfeeding until two years and beyond, combined with appropriate complementary feeding;
- is based on a great variety of unprocessed or minimally processed foods, balanced across food groups, while restricting highly processed food and drink products;[111]
- includes whole grains, legumes, nuts and an abundance and variety of fruits and vegetables;[112]
- can include moderate amounts of eggs, dairy, poultry and fish; and small amounts of red meat;
- includes safe and clean drinking water as the fluid of choice;
- is adequate (i.e. reaching but not exceeding needs) in energy and nutrients for growth and development, and to meet the needs for an active and healthy life across the lifecycle;
- is consistent with WHO guidelines to reduce the risk of diet-related NCDs, and ensures health and wellbeing for the general population;
- contains minimal levels, or none if possible, of pathogens, toxins and other agents that can cause foodborne disease.

Poor diets are a reflection of the food produced as well as the variety available in markets, the cost and affordability of food, and consumer knowledge and preferences. Cost and affordability measure the degree to which food choices are constrained by food prices and household (per capita) income. Of all the barriers to food access, cost and affordability are among the most important, particularly in the case of nutritious food.[113] According to FAO and WHO, "Sociocultural aspects of food choice notwithstanding, people generally eat what they can afford."[114] At the same time, it is important to note that other factors, such as clean water and nutrition education, to name but two, are also important.

In Africa, many people cannot afford healthy diets because they are too poor. Nearly 430 million Africans live in extreme poverty, i.e. they live on less than USD 1.90 PPP per day (41.3 percent of the population in sub-Saharan Africa and 3.9 percent of the population in Northern Africa).[115] An additional 307 million people in Africa live on less than USD 3.20 PPP per day and just above that sits the floating middle-class, representing 21.7 percent of the population that earn between USD 3 PPP per day to USD 6 PPP per day.[116,117] Apart from low-incomes, Africans face some of the highest average food costs when compared to countries in other regions of a similar level of development (see Figure 2). Furthermore, nutritious foods, such as fruits and vegetables and animal-source foods are relatively expensive when compared to staples such as cereals and starchy roots.[118]

Making nutritious and sufficient food affordable for all people all year round is one of the biggest challenges to achieving SDG 2: ensuring access to safe, nutritious and sufficient food. Part two of this report focuses on a food-systems approach that supports healthy diets made up of the foods that promote all dimensions of individuals' health and well-being: accessible, affordable, safe and equitable, culturally acceptable, and that have low environmental pressure and impact. ■

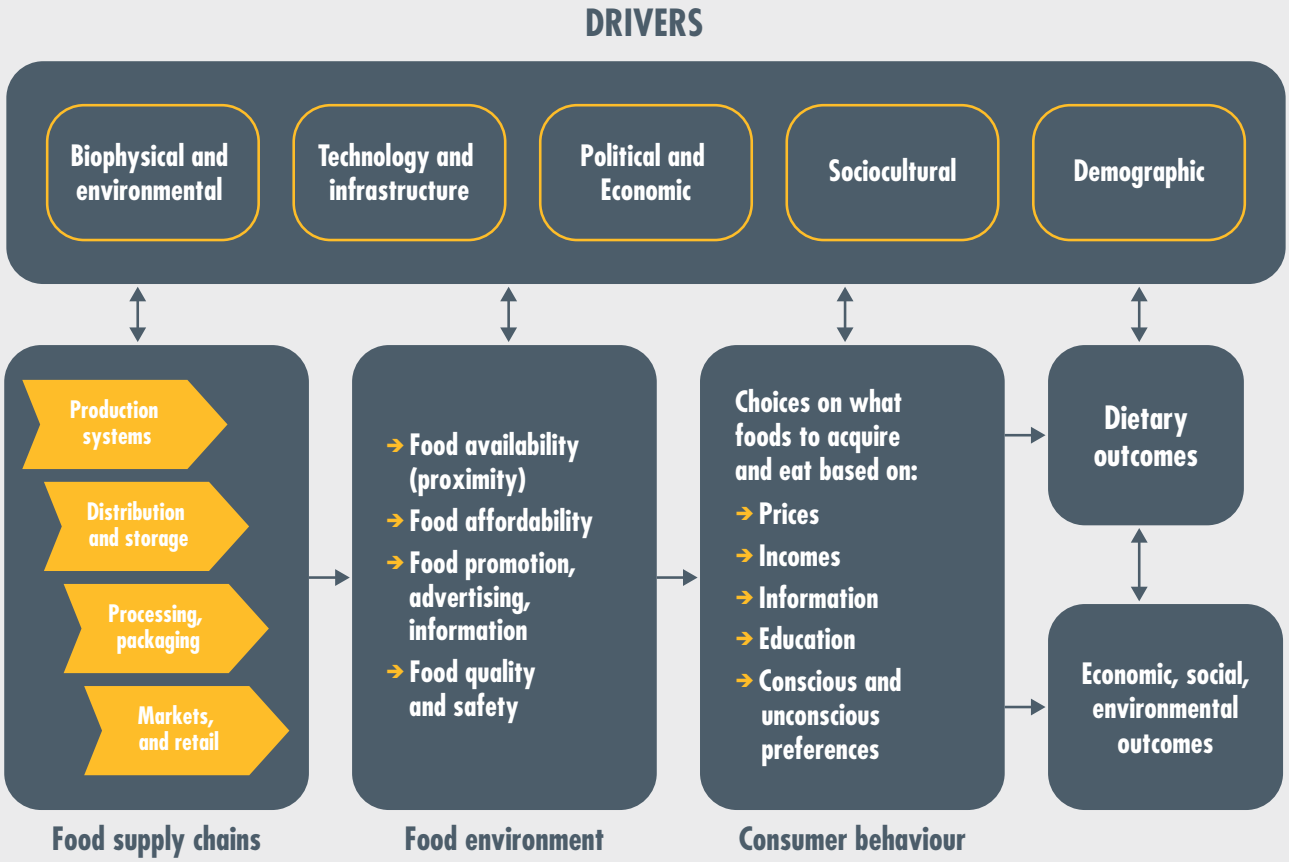
FOOD SYSTEMS

Food provides the energy and nutrients that we need to lead healthy and productive lives. Although an everyday necessity, the combination of resources, processes and activities required to get food onto our plates is astoundingly complex. In the broadest sense, a food system "gathers all the elements – environment, people, inputs, processes, infrastructures, institutions, etc. – and activities, that relate to the production, processing, distribution, preparation and

consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes."[119,120] Food systems determine the availability, accessibility, affordability, diversity and quality of the food supply and thus play a major role in shaping people's diets and health outcomes (Figure 6).

The actors, drivers and associated different systems (such as health, energy and transportation) interact in a dynamic manner that also changes as the underlying drivers change. The five main categories of drivers of food system changes include biophysical and environmental, innovation, technology and infrastructure, political and economic, socio-cultural and demographic drivers.[121] These drivers shape the three core elements of the food system: food supply chains, the food environment, and consumer behaviour.[122]

FIGURE 6
THE FOOD SYSTEM AND NUTRITION: CONCEPTUAL FRAMEWORK



SOURCE: Adapted from **HLPE**. 2017. *Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security.* High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

The food supply chains are the set activities and actors involved in the production, storage and distribution, processing and packaging, and retailing and marketing of food. Actions taken at any stage of this chain have implications for other stages and influence the types of food available and accessible, as well as the way they are produced and consumed. The key elements of the food environment that influence consumer food choices and diets are physical accessibility of the various types of foods; the prices of foods presented in these points of sales; marketing of foods, including the promotion, advertisement and sponsorships through different types of media, at point of sale and in the broader social environment; and food quality and safety. Finally, consumer behaviour refers to the choices and decisions made by consumers on what food to acquire, store, prepare, cook, eat, and dispose of, and on the allocation of food within the household. Consumer behaviour and decisions related to healthy eating are influenced by many factors and drivers, including personal food preferences; familiarity with certain foods; personal beliefs, attitudes and food skills; availability and affordability of foods; food marketing; consumer education; and wider sociocultural norms and political determinants.[123]

Each aspect of the food system, such as agricultural production, or processing is itself a complex subsystem with many different factors determining its nature. For example, production involves inputs, input markets and suppliers, the production processes as well as other dimensions such as researchers, extension workers, policies and output markets. Natural resources, including land, water and biodiversity are the basis for crop and livestock production. How these resources are managed within the context of the ecosystem determines to a large degree the availability, affordability, diversity, quality and safety of our food. In addition, how we manage such resources also impacts the incomes of farmers, the degree of inequality in land distribution, and the sustainability of the agricultural systems.

A food system approach is particularly helpful to understand the complex linkages between food supply chains, diets and health outcomes and in bringing out the different trade-offs inherent in any policy changes aimed at generating healthier diets in a sustainable manner. Below we provide a partial overview of African food systems. The first part of this overview, "Food supply chains in Africa: an overview," provides a broad overview of food supply chains with greater focus on agriculture, livestock and fisheries production systems. The second part, "Diet patterns in Africa," is a partial overview of the food environment, presenting food consumption patterns by income groups, age, location and education. Finally, the section "Towards healthy diets" focuses on costs and affordability, another dimension of the food environment, within the context of three diets that are representative of an "energy sufficient," diet, a "nutrient adequate," diet, and a "healthy" diet. The three sections are helpful in understanding some of the key constraints and shortcomings of the food system that are important in explaining nutrition outcomes and possible policies and interventions in order to shape food systems that deliver nutritious foods for everyone at all times. ■

FOOD SUPPLY CHAINS IN AFRICA: AN OVERVIEW

Food systems play a very important role in African economies, and much of the production, employment and value added happens in the food supply chain. For example, agriculture accounts on average, for about a fifth of GDP in African countries, and the food economy more broadly is of course even larger. For example, in Western Africa, agriculture accounts for 28 percent of GDP, but the food economy accounts for about 36 percent of the subregion's GDP.[124] Much of the economic activities are off-farm in marketing and processing which account for about 40 percent of value added in West Africa. Below some of the key features of the agriculture, livestock and production systems are presented.

Agriculture, livestock and fisheries production systems

Small sized family farms dominate crop and livestock production in Africa.[125] The average farm size is 1.6 hectare,[126] and nearly 93 percent of farms are less than 5 hectares, accounting

for about 57 percent of the agricultural area.[127,128] For the majority of countries for which data is available, the average size of landholdings has fallen across the continent, which is a reflection of the rapidly growing population in most countries.[129] In addition, new land for cultivation is becoming scarce. About 91 percent of the remaining unused but arable land is located in only six to nine countries, and in four of these, surplus land is under forest cover.[130] Overexploitation and a lack of investment, in part due to insecure land rights, has led to widespread soil degradation, undermining productivity. In Africa, about 95 percent of crop production remains rain fed, and about 494 million hectares suffer from soil degradation, in part because of the inadequate replacement of nutrients.[131]

An important dimension of African agriculture is the role played by women as farmers and farm labour. Regional level data shows that women make up about half the labour force, a figure that has remained largely unchanged over the last decades but is also poorly documented. There is much variation between countries and for different crops.[132] A recent study covering six countries[133] reported that women contribute just 40 percent of labour input to crop production. The study also highlights the considerable variation between countries: while women provide slightly more than 50 percent of the labour in Malawi, the United Republic of Tanzania and Uganda, this figure is only 37 percent for Nigeria, 29 percent for Ethiopia, and 24 percent for the Niger.[134] Available evidence shows that women have less access to land, fertilizer, mechanization, human capital, labour, credit and technology than men do.[135] Some of these differences are linked to women's weaker ties to the political hierarchy, and to the consequence that they are less able to ensure their rights, as for example over land.[136] The greater risk from expropriation weakens their incentives to invest and can lead to poor farming practices, such as shorter fallow periods.[137] These institutional constraints also contribute to women having lower yields on their plots than men do. The gender gap in access to productive resources is reflected in a substantial gender productivity gap of perhaps 20 to 30 percent.[138,139,140,141]

Staple foods account for most of the land cultivated. In 2018, about three quarters of agricultural land was cultivated to cereals (58 percent), and roots and tubers (17 percent), and this combined share has not changed in the past two decades for Central, Northern and Western Africa, but dropped slightly in Eastern and Southern Africa (Table 9).

The composition of the main cereals in the share of total cereal area harvested saw some change in the subregions between 2000 and 2018 (Table 10). The largest changes were an increasing share for maize (Eastern, Central and Western Africa) and rice (Central and Western Africa), while the share of millet fell overall (Central and Western Africa), but not in Northern and Southern Africa.

Cereal production, on a per capita level, has not improved significantly over the past thirty years in Africa as a whole (Figure 7). Across subregions, there has been a rise in per capita production since 1990, but from 2005, net per capita production has stagnated on the continent. Exceptions to this are Eastern and Central Africa, which have experienced significant improvements over the last decade, while Southern Africa, which suffered substantial production falls during the El-Niño related drought conditions in 2015 and 2016, has seen continuous declines in recent years.

Vegetable supply on the continent has remained much below the world average (142 kg per capita per year) except for Northern Africa (Table 11). Supply has been low and historically stagnant in Eastern and Southern Africa. In Central and Western Africa, supply increased in the 2000s, but the trend remains flat. Northern Africa has historically higher supply levels and has seen larger increases; however, the trend over the last eight years has been downward. In all subregions, the 2017 average is lower than the 2010 average.

The pattern for the annual per capita availability of fruit is similar, although the regional and subregional averages are closer to the world average of 75 kg (Table 12). Except for Northern Africa, which has seen steady growth in the availability of fruit, the trend has been one of decline or little change. »

TABLE 9
SHARE OF CULTIVATED LAND BY CROP, 2000 AND 2018 (PERCENTAGE)

	Cereals		Roots & Tubers		Fruit		Vegetables		Pulses		Treenuts	
Region/subregion	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018
Africa	62	58	15	17	7	7	4	4	12	12	1	2
Central Africa	47	52	31	26	8	8	4	4	9	10	0	0
Eastern Africa	56	55	16	13	10	11	3	3	15	16	1	1
Northern Africa	79	80	2	2	8	8	5	5	4	4	2	2
Southern Africa	89	82	2	4	5	8	2	3	2	3	0	0
Western Africa	59	53	17	22	5	4	4	5	14	13	1	3

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

TABLE 10
SHARE OF THE MAIN CEREAL CROPS IN TOTAL CEREAL AREA HARVESTED IN 2000 AND 2018 (PERCENTAGE)

	Barley		Maize		Millet		Rice, paddy		Sorghum		Wheat	
Region/subregion	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018
Africa	5	4	28	31	22	18	9	11	24	24	9	8
Eastern Africa	4	3	47	50	7	5	9	8	16	16	6	7
Central Africa	0	0	48	53	20	12	10	14	19	17	0	0
Northern Africa	18	16	7	5	12	16	4	2	25	30	33	31
Southern Africa	1	3	73	71	4	7	0	0	4	3	16	14

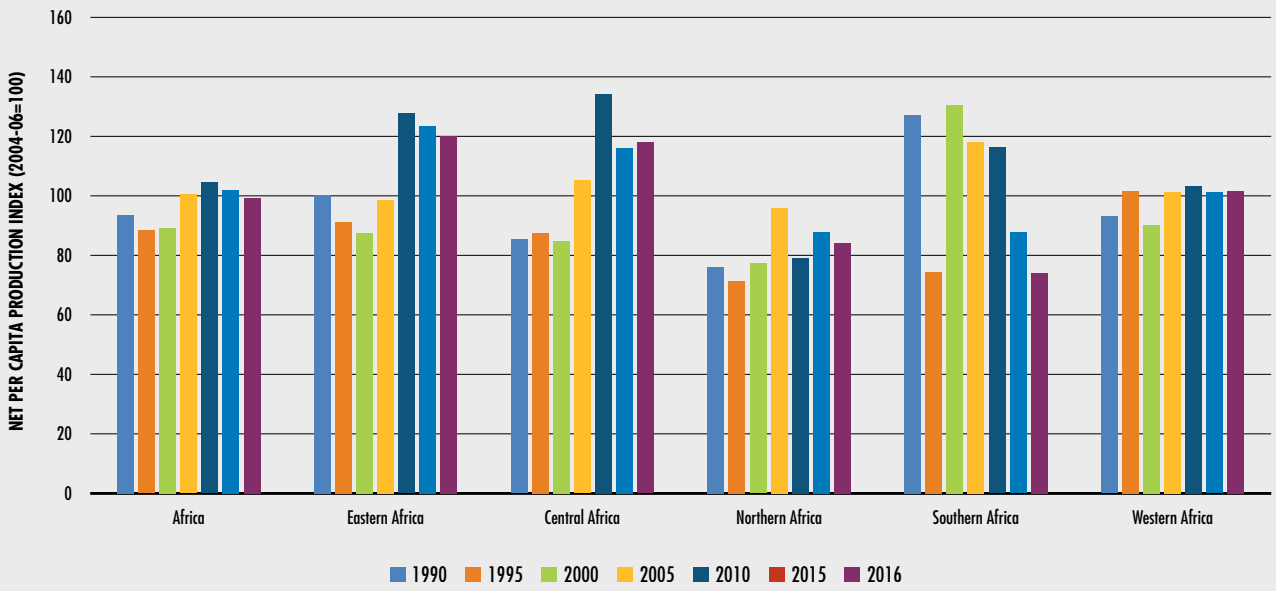
NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

TABLE 11
ANNUAL PER CAPITA SUPPLY OF VEGETABLES FOR AFRICA AND ITS SUBREGIONS, 1961–2017 (KG)

Year	Africa	Eastern Africa	Central Africa	Northern Africa	Southern Africa	Western Africa
1961	42.4	24.4	28.8	67.8	43.2	40.8
1970	45.0	23.9	29.4	77.5	43.5	41.9
1980	46.4	23.3	28.6	91.6	45.6	36.2
1990	49.5	21.1	29.3	103.4	43.5	41.2
2000	59.3	21.9	40.7	129.1	39.7	53.9
2010	68.2	29.4	60.7	157.3	43.3	54.8
2017	67.3	28.6	51.2	147.4	40.6	65.4

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

FIGURE 7
INDEX OF NET PER CAPITA CEREAL PRODUCTION, AFRICA AND SUBREGIONS, 1990–2017 (SELECTED YEARS)



SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

» A rough indication of whether vegetables and fruit have kept pace with cereal availability is to look at the ratio of cereal to vegetable and fruit availability over the 1961 to 2017 period (Figure 8). Simple ten-year averages show that the supply of cereals and roots relative to vegetables increased in Central, Eastern and Northern Africa, although in Eastern Africa the ratio has fallen in the last decade. In Southern Africa the ratio worsened, while in Western Africa it remained stable. The ratio of the supply of cereals and roots relative to fruit rose in Central and Western Africa, and in the last decade, also rose in Southern Africa. Northern Africa has seen a significant fall in the ratio, while for Eastern Africa the ratio remains stable. At the subregional level, the ratio of cereals and roots relative to vegetables and fruits (combined) is about three for Eastern, Southern and Western Africa in the 2010 to 2017 period. In Central Africa, this ratio has fallen over time to 2.3, while in Northern Africa, it has fallen to 1.1. It is also important to realize that the ratio varies by country.

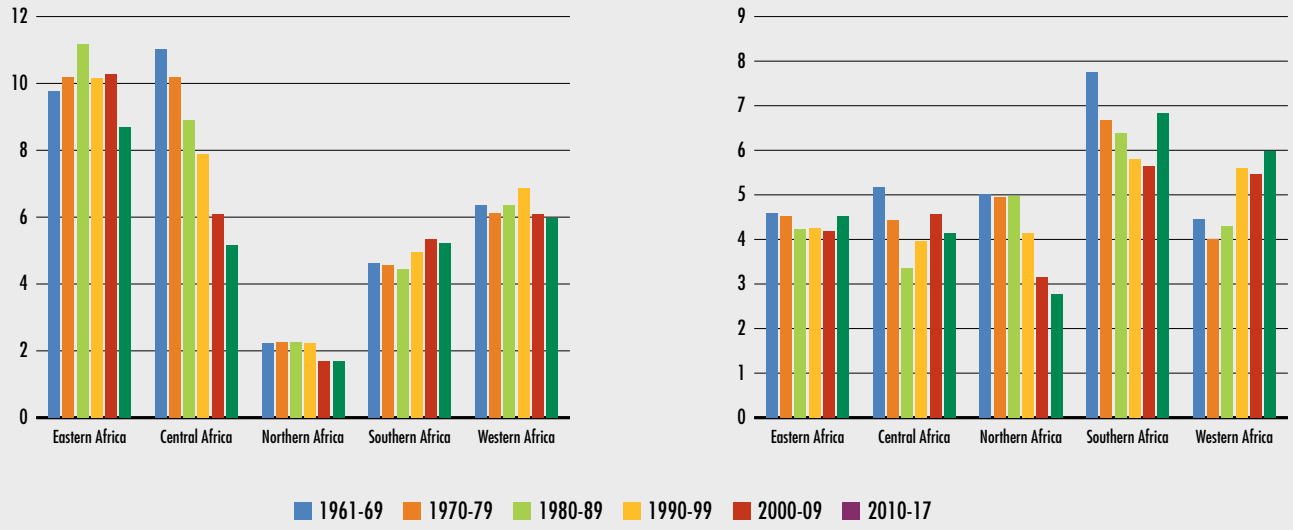
While cereals and roots and tubers dominate agricultural production, yields achieved are generally low, although there is considerable variation between regions.[142] For Africa as a whole, cereal yields are about 1.6 tonnes per hectare, and production increases have in the past been achieved predominantly with area expansion. Currently, yield gaps, i.e. the percentage difference between actual and potential yields, are 76 percent in sub-Saharan Africa, the highest of any region.[143] Also, average yields over all vegetables and fruit, at 9.1 and 7.2 tonnes per hectare, respectively, »

TABLE 12
ANNUAL PER CAPITA SUPPLY OF FRUIT FOR AFRICA AND ITS SUBREGIONS, 1961–2017 (KG)

Year	Africa	Eastern Africa	Central Africa	Northern Africa	Southern Africa	Western Africa
1961	45.3	48.4	53.5	30.9	25.2	57.2
1970	50.5	54.0	64.9	34.3	32.9	61.9
1980	51.9	58.7	76.8	39.4	28.2	56.4
1990	52.4	55.9	61.9	51.4	39.1	51.0
2000	58.0	54.7	50.1	66.9	43.4	59.6
2010	64.4	57.9	73.4	85.4	34.2	61.2
2017	62.6	52.9	65.5	96.7	23.3	57.9

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

FIGURE 8
RATIO OF THE SUM OF CEREAL AND STARCHY ROOT SUPPLY TO (LEFT HAND PANEL) VEGETABLE SUPPLY AND (RIGHT HAND PANEL) FRUIT SUPPLY (RIGHT HAND PANEL), 1961–2017, 10-YEAR AVERAGES



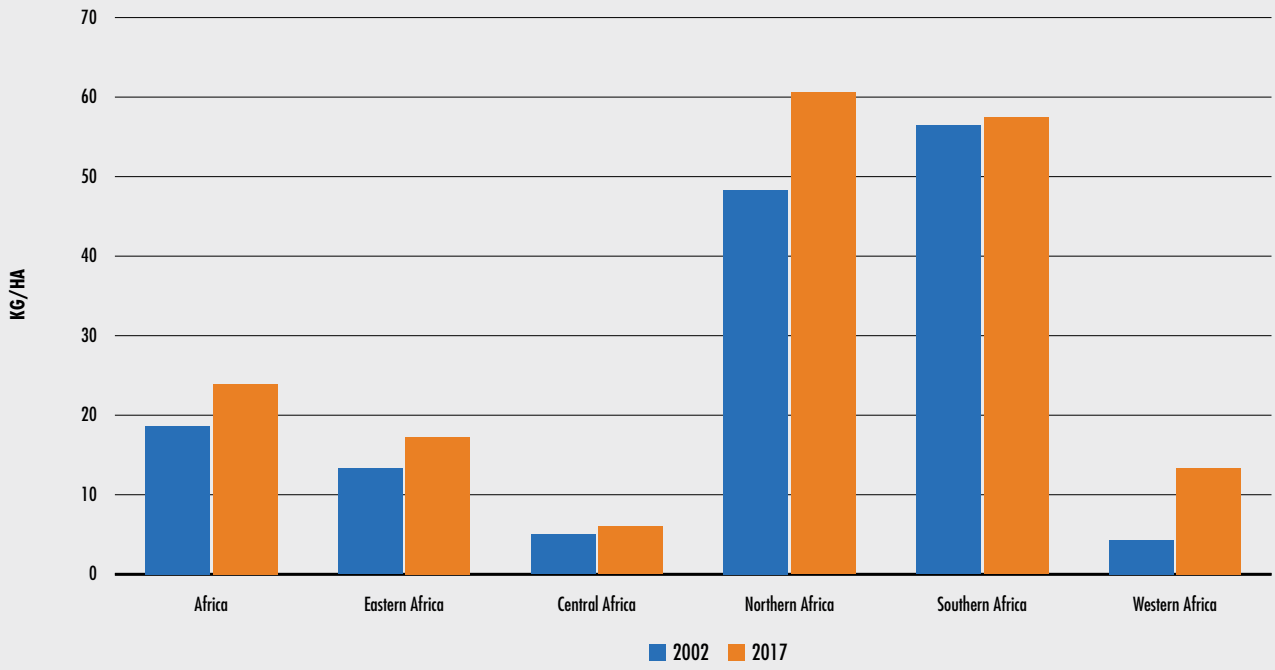
NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

» are low in comparison to Asia where the corresponding yields are 20.0 and 14.1 tonnes per hectare, respectively.

Low levels of productivity are a result of generally inadequate use of modern inputs, such as fertilizer (Figure 9), mechanization and irrigation, and the limited exploitation of the synergies embodied in their joint use.[144] For example, upland rice, which accounts for about 40 percent of the area under rice cultivation in sub-Saharan Africa, is typically cultivated on land with low soil fertility and with little use of external inputs. As a result, upland rice farmers achieve average rice yields of only 1 tonne per hectare and account for only 19 percent of rice production.[145] However, rice yields in Africa can be similar to those in Asia when grown in similar conditions, in particular using irrigation.[146]

However, a recent study finds that intensification is happening, especially for maize.[147] The same study shows that fertilizer use rates are low, but not always so and are indeed relatively high in some countries. However, modern agricultural inputs are rarely used together despite the well-known benefits derived from combining irrigation, improved seeds, and inorganic fertilizer use.[148]

FIGURE 9
TOTAL PER HECTARE FERTILIZER USE ON CROPLAND IN AFRICA AND ITS SUBREGIONS, IN 2002 AND 2017



NOTES: Fertilizer is equal to nitrogen, phosphate and potash use. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

The impact of technology remains low, with agriculture-related spending consistently underfunded (Table 13). The low levels of spending on infrastructure, such as irrigation, electricity and roads, as well as agricultural research and extension reflected in low levels of total factor productivity (TFP) growth over time.[149]

Growth in TFP has been lower than in other regions, especially since 2000, and it has generally been lower than population growth, except for Northern and Southern Africa in the 2011 to 2015 period (Figure 10). In Africa, output growth is largely driven by increased use of inputs, in particular land, and greater spending on research and extension is urgently needed to raise TFP growth in the face of rising land scarcity and degradation.[150,151] For example, about 91 percent of the remaining unused but arable land is located in only six to nine sub-Saharan African countries, and in four of these the surplus land is under forest cover.[152]

Livestock production is also of considerable importance in Africa, accounting for about one-third of agricultural value added, although the sector's importance varies by country.[153] In the Côte d'Ivoire, livestock production accounts for 5 percent of agricultural GDP, while in Chad, Namibia, Mali and Sudan, the share is 27, 28, 44 and 80 percent, respectively.[154] There are about 268 million pastoralists spread across Western, Eastern and Southern Africa, and pastoralism is a very important part of the livelihoods and economies in the drylands.[155] Productivity in the sector is low and per capita livestock production has not kept pace with population growth (Figure 11). In all subregions, except for Southern Africa, per capita livestock production is at or below the 2004 to 2006 period. Low levels of productivity and output growth are reflected in low levels of per capita availability of livestock products, in particular meat and milk, which are among the lowest in the world (with the exception of Southern Africa for meat and Northern Africa for milk).[156]

Soil quality is important for land productivity and in Africa, expansion of land under cultivation (which also drives deforestation), inadequate use of fertilizer to compensate for nutrient loss, overgrazing and reduced fallow periods as population pressure reduces available land, biomass use for fuel, and frequent droughts, all contribute to falling soil nutrient levels and organic matter.[157] In addition, grasslands suffer from 40 percent degradation (65 percent in Eastern Africa), which undermines long-term production of livestock as well as biodiversity in general, thereby threatening the livelihoods of pastoralist and agro-pastoralist communities.[158]

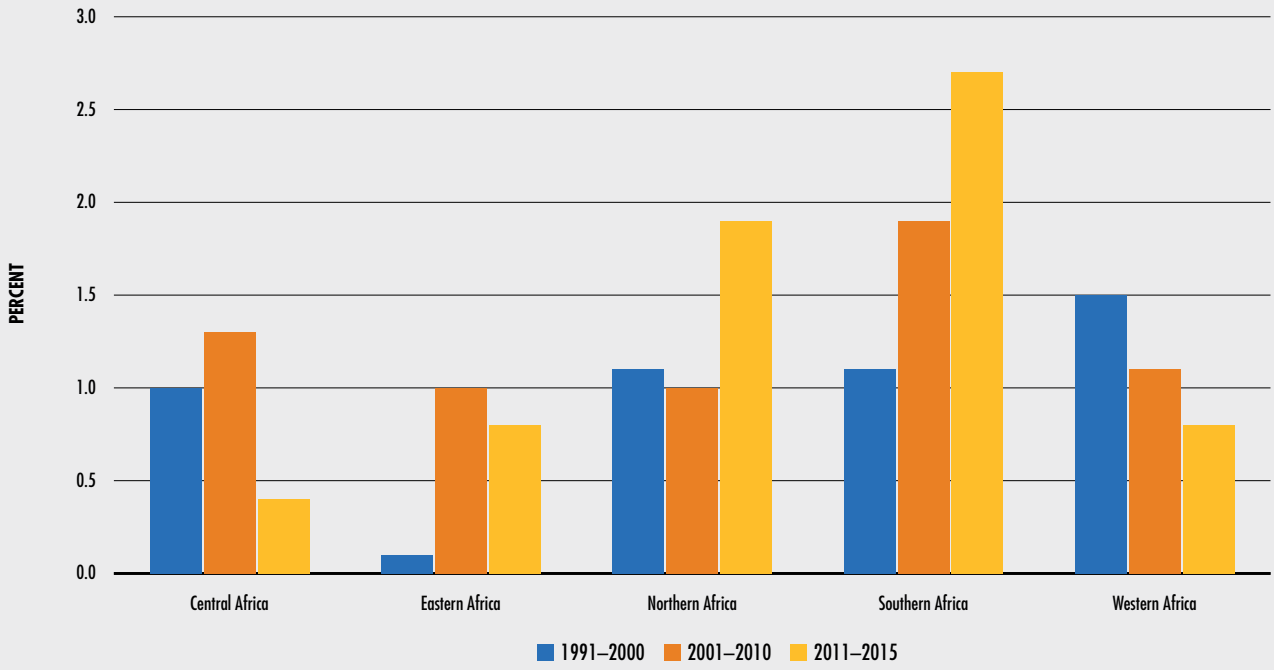
Total fish production reached 12 268 000 tonnes in Africa in 2018, and of this, 3 000 000 was from inland catches (25 percent of total global

TABLE 13
SPENDING ON AGRICULTURE AS A SHARE OF TOTAL GOVERNMENT SPENDING AND AGRICULTURAL RESEARCH SPENDING AS A SHARE OF AGRICULTURAL GDP (THE INTENSITY RATIO)

	Share of agriculture in total expenditure (%), 2014	Agricultural research spending as a share of agricultural GDP
Central Africa	**1.3**	**0.2**
Eastern Africa	**5.3**	**0.8**
Northern Africa	**3.9**	**0.4**
Southern Africa	**3.9**	**2.0**
Western Africa	**5.8**	**0.5**

SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.

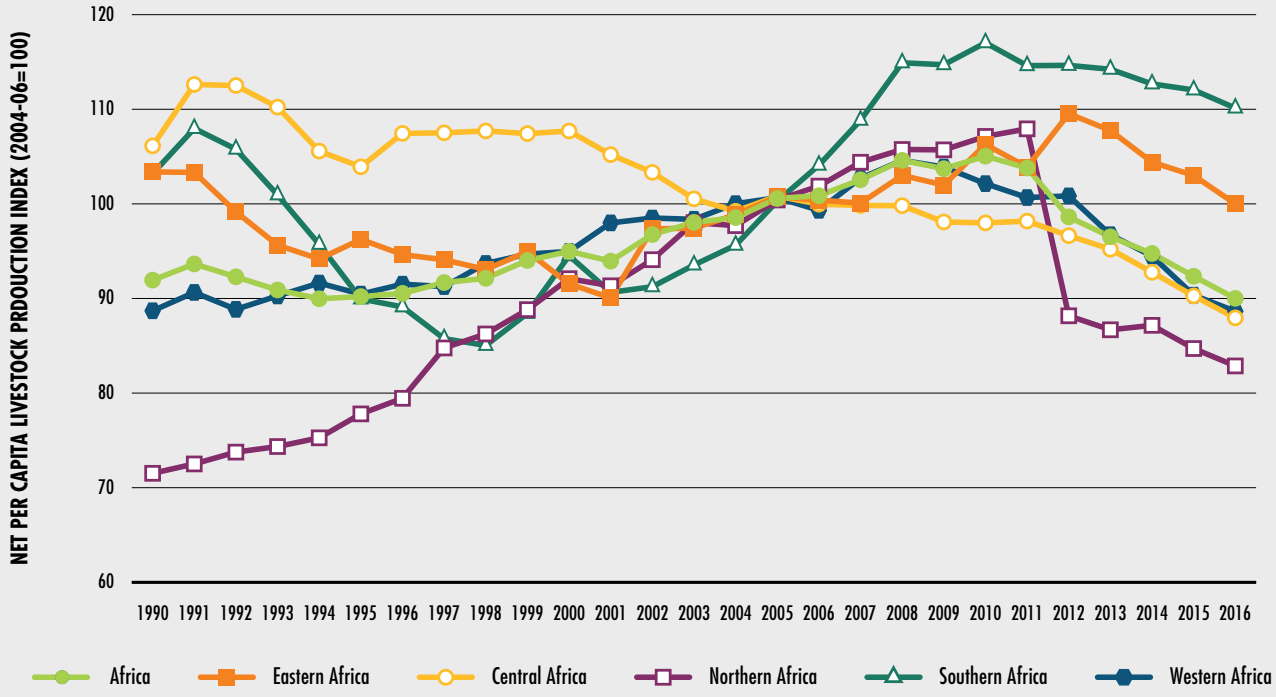
FIGURE 10
AVERAGE SUBREGIONAL GROWTH IN TOTAL FACTOR PRODUCTIVITY FOR 1991–2000, 2001–2010 AND 2011–2015



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **International Food Policy Research Institute (IFPRI)**. 2019. *Agricultural Total Factor Productivity (TFP), 1991–2015: 2019 Global Food Policy Report Annex Table 4.* Washington, DC, IFPRI [dataset]. https://doi.org/10.7910/DVN/9IOAKR

inland catches).[159,160] Production from capture fisheries has stagnated globally while in many areas fish stocks are declining.[161] However, globally aquaculture has expanded rapidly to meet rising demand, and this is also true for Africa. From 1995 to 2018, African aquaculture production increased from 110 200 tonnes in 1995 to 2 196 000 tonnes in 2018, and from 2001 to 2018 it was the region with the fastest growth in aquaculture production. In many African countries, the sector offers considerable opportunities for expansion with important positive implications for employment, food security and nutrition. Egypt, Nigeria, Uganda, Ghana, Zambia, Tunisia, Kenya, Malawi, Madagascar and South Africa account for about 96 percent of the total aquaculture production on the continent. Egypt's aquaculture sector produces 1 562 thousand tonnes of fish, followed by Nigeria with 291.3 thousand tonnes, compared to 343.1 thousand tonnes for the rest of Africa.[162] About 86 percent of aquaculture production is from inland production. The most popular fish is tilapia, although in Nigeria catfish production dominates. In Egypt, aquaculture accounts for 77 percent of the total national fish production

FIGURE 11
PER CAPITA LIVESTOCK PRODUCTION INDEX VALUE (2004–2006=100), BY SUBREGION, FOR 1990–2016



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

and employs about 580 000 workers. As is the case in other African countries, most of Egypt's production is for domestic consumption. In Nigeria, fish farming has expanded in particular in peri-urban areas, and a substantial proportion of investments in new agricultural programmes are in fish farming.[163]

The farm gate price value of aquaculture is estimated at about USD 1.6 billion in 2018, and the currently high levels of fish imports suggest considerable scope for expansion if competitiveness can be improved.[164,165] Common challenges constraining growth of aquaculture include the generally high cost of feed, the availability and quality of feed (a significant amount of feed is imported), poor transport and electricity infrastructure, weak technical and extension support, cheaper imports, food safety standards, and constraints to land and water. The sector, particularly in processing and marketing, is also an important source of employment for women.

Food production systems help determine availability and diversity of food, as well

as playing a central role in determining agricultural incomes and wages for unskilled labour. However, the key features of Africa's food production systems, described above, indicate significant shortcomings in their ability to provide affordable nutritious foods and this is reflected in evidence presented in the sections below on "Diet patterns in Africa" and "Nutrition outcomes reflect dietary patterns." Several key constraints emerge from the discussion. Low levels of productivity limit farm incomes, help keep wages for unskilled labour low and help maintain relatively high domestic prices. In addition, the relative neglect of nutritious foods, such as vegetables, fruits and animal-source foods, is reflected in their high prices, relative to staple foods. At the root of these constraints are the low levels of spending on agriculture and agricultural research and development, the poor storage, transport and electricity infrastructure, the limited availability of irrigation, the low levels of modern technology adoption and input use, the disadvantaged position of women farmers, insecure land rights, poor market access, a limited ability to exploit economies of scale, poor food safety, and poor quality soils. In addition, production systems in Africa are often adversely impacted by climate variability and extremes and a high degree of seasonality.[166] Relevant policies and interventions needed to address these constraints are presented in the section "Transforming food systems to deliver healthy diets for all."

Distribution and storage and processing and packaging

Post-production, some food is stored and processed for use by producing households. What is not consumed is stored for further distribution and processing. The mid-stream sector has grown in recent years, especially so in lower- and upper-middle income countries. In the Niger, a low-income country, the share of the midstream in domestic food supplies is estimated at about 19 percent, while in Egypt it is 57 percent.[167] As cities grow, so do food supply chains, and because food processing, distribution, and services tend to be more labour-intensive, they are promising sources of employment and income growth.

Poor handling of produce at harvest and post-harvest, including distribution and processing, account for most of the food losses incurred in the region. A recent study concluded that most losses occur post-harvest and during storage on-farm; however, there is no consensus on the magnitude of post harvest losses in sub-Saharan Africa.[168] Given that qualifier, available estimates suggest that food losses and waste are lower than in most other regions but still amount to about 167 kg per capita per year with about 96 percent of losses occurring before food reaches the consumer.[169,170] In Eastern and Southern Africa, average post-harvest dry-weight loss in 2019 for maize, rice, sorghum and millet is estimated to range from 15–18, 11–14, 5–13 and 4–13 percent, respectively.[171] The economic value of losses are considerable. For food grains these may reach USD 4 billion in sub Saharan Africa,[172] while for South Africa, the total losses across the food supply chain have been estimated to be about 2.1 percent of GDP.[173] Post-harvest losses in the fishery sector are considerable in various countries, particularly near water bodies where small pelagic fish are captured and sundried. Losses may reach 30 to 40 percent of the total landings. On the Congolese side of Lake Tanganyika a total estimated 20,000 tonnes of "ndagala" may be lost annually, representing a total amount of USD 20 million (for reference, the value at first point of sale is about USD 1 per kg fresh weight). Also, from other large lakes and coastal areas considerable losses have been reported in the artisanal processing of small pelagics (herring-like and sardine-like fish species).

In most sub-Saharan African countries, the use of cold chains for meat, fruits and vegetable conservation, encounter many challenges and are generally inaccessible to small farmers.[174] Storage and processing is also important for food safety, which is a major concern as Africa suffers the highest burden of foodborne disease of any region.[175] Diarrheal disease accounts for about 70 percent of the total foodborne disease burden in the region.[176] One study finds that 25 percent of stunting could be due to children experiencing more than four episodes of diarrhoea before two years of age.[177] Also important in Africa are aflatoxins,[178] a type of mycotoxin produced by fungal infestation of crops which can cause

liver cancer and have been linked to stunting in children.[179,180,181] Many governments are already taking action. For example, in 2014, the Kenyan government destroyed 14 000 tonnes of maize due to aflatoxin contamination.[182] Exposure to mycotoxins has been found to be strongly associated with poverty in rural areas.[183] Of lesser magnitude, but of particular concern in some countries, is cyanide in cassava, which requires appropriate processing to mitigate the risk. Related to safe food and in itself very important for the food security and nutrition as well as the health of the population is access to safe water (Box 4). »

BOX 4
WATER, FOOD SECURITY, NUTRITION AND FOOD SYSTEMS[184]

Water is key to food security and nutrition. Water of sufficient quantity and quality is critical for agricultural production and for the preparation and processing of food. Access to safe drinking water, as well as sanitation and good hygiene practices, are also crucial to the good nutrition of all.

Farming activities can lead to water contamination through badly managed agricultural inputs such as fertilizer. At the same time, farmers that irrigate rely on water of a certain quality to achieve potential crop yields. The use of contaminated water for irrigation also presents potentially serious risks to human health through contaminated crops, and to ecosystems through the spreading of pollutants into aquatic environments and soils.[185]

Water use in the industrial sector, including food processing, also requires uncontaminated water in increasing amounts as demand grows. Although it uses less water than agriculture, the food industry is a water-intensive activity in the manufacturing sector. Food processing can require water for a number of operations, such as washing, evaporation, extraction and filtration, and many if not most food-borne illnesses can be traced back to poor quality of water used in food production, processing and preparation.

While water of adequate quality is essential for the food-processing sector in order to deliver nutritious and safe food, the operations of the sector generate wastewater. The improper disposal of food processing effluents also harms the quality of water itself. Water waste, for example, carries contaminants such as nitrogen, oxygen-depleting substances, and pathogens, which make their way into lakes and rivers. This leads to reduced water quality, impacting biodiversity and lowering fish production and their quality. Without proper treatment, the disposal of processing-related contaminants into water bodies may result in direct exposure of humans to such contaminants and to limited access to safe, drinkable water, especially for the most vulnerable. People are also indirectly affected by eating contaminated food products, such as fish.

For the consumer, a supply of safe and reliable water for sanitation and hygiene (WASH) practices is a necessity for a healthy life. Lack of access to safe and clean water for WASH is a key underlying cause of malnutrition, particularly in children. Diarrhoeal disease, a major cause of child death in most developing countries, is directly linked to a poor WASH environment, particularly in low income countries where access to clean water is a major issue. Furthermore, in the presence of a poor WASH environment, food that is eaten risks passing through the body without being absorbed due to diarrhoea or other manifestations of environmental enteropathy. Water-related diseases undermine productivity and economic growth, reinforcing deep inequalities and trapping vulnerable households in cycles of poverty.

In 2017, less than 60 percent of the population in low-income African countries had access to basic drinking water, and about 17 percent had access to basic sanitation (Figure 12). Improvements come with rising levels of Gross domestic product (GDP), but while the gap from income-group to income-group shrinks in urban areas, it widens (or is virtually unchanged) in rural areas (Figure 12). Overall, only about 15 percent of the population on the continent has access to safely managed drinking water services.[186] Not having access

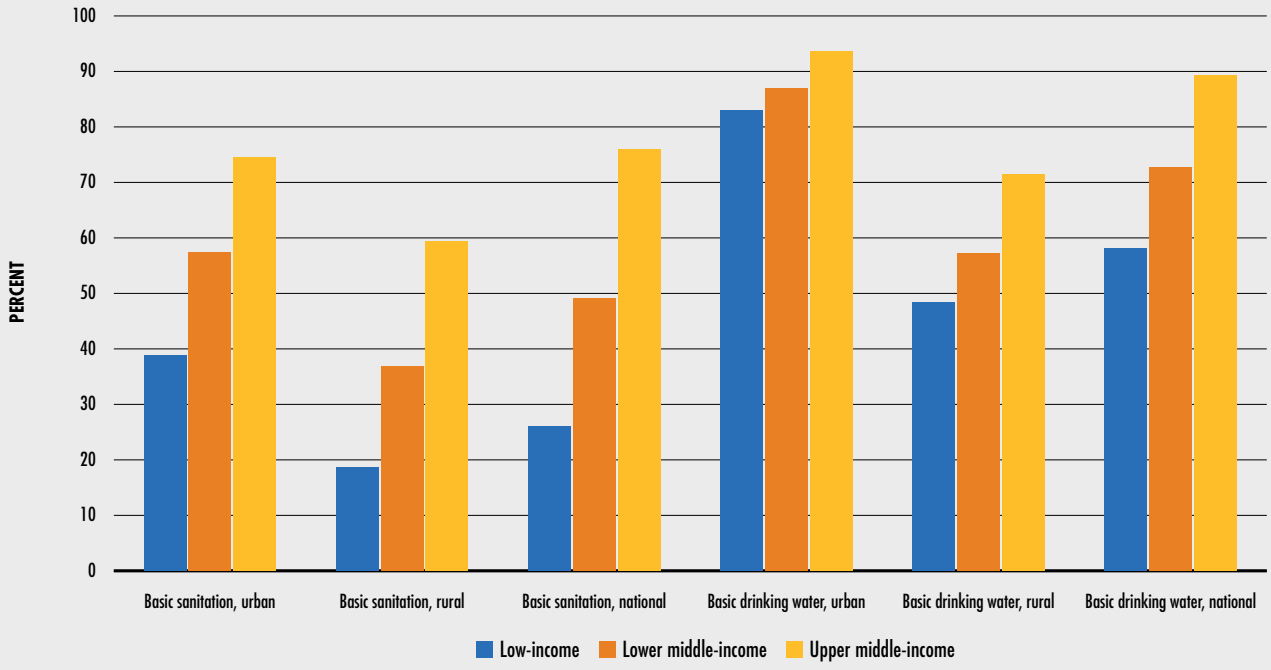
BOX 4
(CONTINUED)

to safe drinking water on the premises at home entails – especially in rural areas – considerable time to access it: and it is often women's time.

Water of poor quality can cause a number of waterborne diseases, which are transmitted by ingestion of contaminated water and can lead to malnutrition, morbidity and sometimes death. Important waterborne diseases include diarrhoeal diseases, cholera, shigella, typhoid, hepatitis A and E and poliomyelitis. In Africa, each year unsafe water sources, unsafe sanitation, and lack of hand washing facilities account for about 570 thousand deaths, including that of 152 thousand children under the age of five.[187]

One study reported that when a household in Cameroon, Senegal or Chad does not have access to drinking water, children residing there are considerably more likely to have diarrhoea than those residing in households with easy access to drinking water.[188] The link between prevalence of diarrhoea among children and malnutrition is well established, highlighting that water quality is important for food utilization and nutrition, even in situations where food may be available.

FIGURE 12 ACCESS TO BASIC DRINKING WATER AND SANITATION INCREASES WITH DEVELOPMENT, BUT LARGE RURAL-URBAN DIFFERENCES REMAIN, AFRICA, 2017



SOURCE: **World Bank**. 2020. World Development Indicators. In: *World Bank DataBank* [online]. Washington, D.C. [Cited June 2020] https://databank.worldbank.org/data/source/world-development-indicators

» Consumption of highly processed foods remains low by comparison to developed countries, but their local manufacture and consumption is rising in many countries. Evidence for Mali found that highly processed food accounts for about 15 percent of urban diets and 7 percent of rural diets.[189] However, there is evidence that the African food processing sector is growing strongly. For example, in the United Republic of Tanzania, 61 percent of 486 processed food products were locally manufactured, 10 percent were made in Kenya and Uganda, and 8 percent in South Africa.[190] Sales of highly-processed foods and drinks in Africa were about 14.4 kg per capita per year in 2016 (similar to South and Southeast Asia), compared to 113.3 per capita per year in North America.[191] Sales of highly processed drinks for Africa were about 37.4 kg per capita per year, compared to 157.6 kg per capita per year in North America. For the latter, carbonated drinks are the most important item. The same study finds that over the 2002 to 2016 period, sales in highly processed foods increased most in South and Southeast Asia, followed by Northern Africa and the Middle East, while for highly processed drinks the increase was highest in South and Southeast Asia and in Africa.[192]

Markets and modern retail

In most countries in the region, distribution of staple foods, fruit, vegetables, meats, eggs and fish is dominated by traditional open markets, which are also important outlets for packaged processed food and frozen products.[193,194] In Ghana, open markets account for 68 percent of the food retail trade and convenience stores and small grocery stores for another 30 percent.[195] In urban areas, many consumers also frequently purchase street food.[196] In Nigeria, street foods were found to provide nearly 60 percent of the daily energy intake of a sample of market women;[197] in Nairobi, 53 to 78 percent of households in a low-income area consumed street foods at least once a week;[198] in rural areas of Kenya, schoolchildren typically ate street food twice a day;[199] and in Mali, street food accounted for 19 to 27 percent of household food expenditure.[200] Daily energy intake from street foods in adults ranged from 13 to 50 percent of energy and in children from 13 to 40 percent of energy.[201] In some countries, notably South Africa, but also Kenya, modern retailing has expanded rapidly since the mid-1990s and 2000s. In South Africa, supermarkets accounted for 50 to 60 percent of the food retail market in 2002, and this share has remained steady.[202] In Kenya, the share of supermarkets in urban food retailing was 20 percent in 2003. However, traditional open air and informal markets remain dominant, accounting for about 60 percent of food sales in Nairobi.[203] A recent report on consumer habits in Africa suggests that in Kenya the share of supermarkets in retailing has increased only marginally in recent years.[204]

In South Africa, much of the food system is already modern, and South African companies are part of the transformation of the retail sector on the continent. In other African countries, modern food retailing – supermarkets, hypermarkets, gas marts and convenience stores – remains limited. For example, modern retail outlets account for between 1 and 2 percent of the retail trade in Ghana, Nigeria and Senegal.[205] However, changes are also taking place in those countries where food systems remain largely traditional, although a lack of data makes it difficult to paint an accurate picture. The recent Global Retail Development Index ranks Ghana fourth, after China, India and Malaysia, and Senegal sixth, showing the considerable growth and potential seen in these countries.[206]

The post farm-gate systems, including distribution, storage, processing and packaging, and modern and traditional retail also play a central role in determining availability and diversity of food. Important shortcomings in these segments include poor storage facilities and a lack of cold storage leading to reduced market access for some products, high levels of post-harvest losses and threats to food safety. In addition, the manufacture and marketing of processed foods that often include energy-dense foods of minimal nutritional value, has been increasing rapidly in many African countries. These constraints and developments add to the cost of food and reduce the availability of nutritious foods and thereby contribute to the dietary patterns and nutrition outcomes observed in Africa and described in the subsequent section. Relevant policies and

interventions needed to address these constraints are presented in the section "Transforming food systems to deliver healthy diets for all."

Structural transformation is driving the food system transformation

The food system transformation is part of the broader structural economic transformation, characterized by changes in the relative importance of agriculture and a reallocation of factors of production (Figure 13). The process has entailed a sectoral reallocation of labour, increases in sectoral productivities, and a reduction in productivity gaps between sectors.[207] Within this context, the food system sector is of substantial importance for employment growth and inclusive development (Box 5).

Structural transformation embodies several interlinked transformations of food and agriculture, which are also emerging in Africa: (1) urbanization, (2) dietary changes, (3) food system transformation, (4) rural factor market transformation, and (5) the intensification of farm technology. All five are linked in mutually causal ways.[208]

Urbanization is associated with changing patterns of food demand

Rural-urban migration leads to changing lifestyles, greater participation of women in the labour force, and higher incomes. Income growth leads to rising demand for food but also for greater dietary diversity, and changing lifestyles drive demand for greater convenience in purchasing and preparation.[209] Africa is the

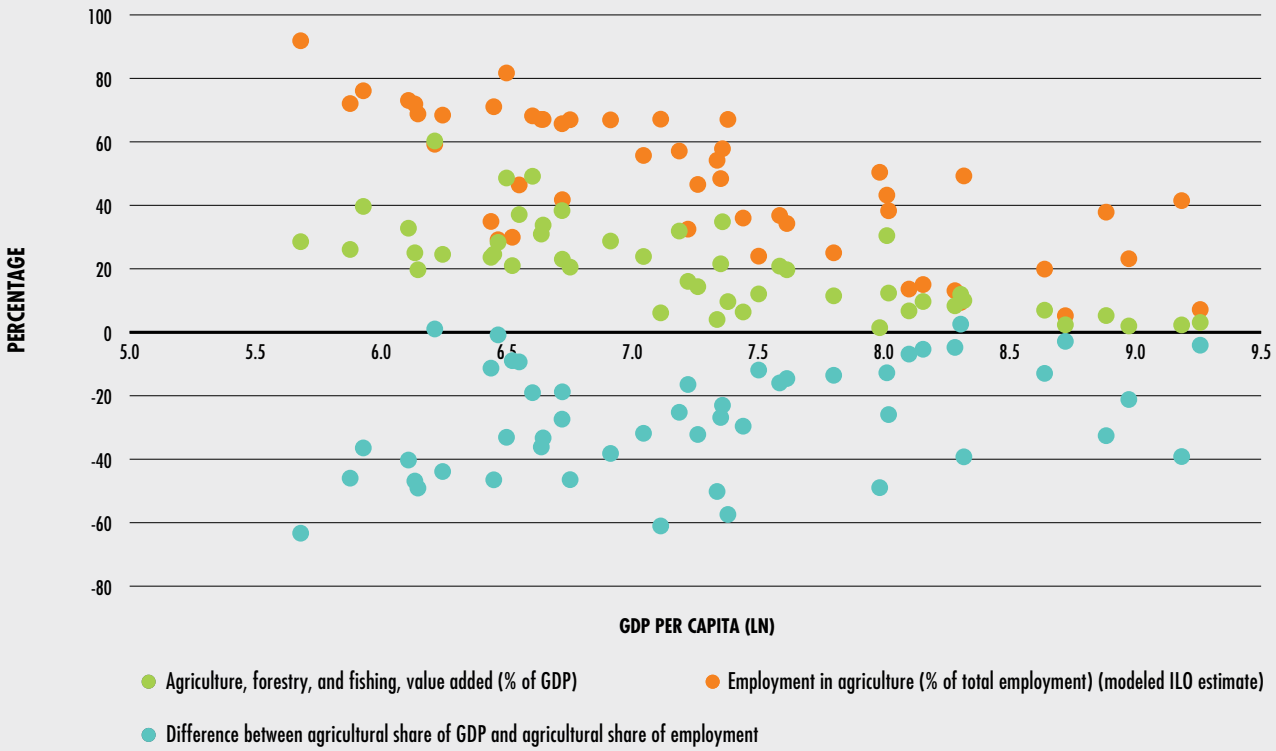
BOX 5
THE FOOD SYSTEM IS KEY FOR EMPLOYMENT AND INCOME GENERATION

Apart from costs, affordability depends on employment and incomes. Very many Africans find employment in the food system. Many in agriculture directly, but increasingly also in the non-farm sector of food systems. For example, in Western Africa, 66 percent of all employment is in the food system and of that, 22 percent is in off-farm food-related activities. Evidence for Nigeria, Rwanda and the United Republic of Tanzania shows that 23, 8 and 17 percent of the labour force is employed in the off-farm section of the food system.[210] In urban areas, 35 percent of jobs in the region are in the food economy of which about 60 percent are in food marketing and in food away from home.[211] Food processing is now a significant share of total manufacturing employment in Western Africa.[212]

The food system is particularly important for inclusive growth. In Western Africa, 68 percent of all employed women work in the food system. Their share in employment is particularly high in the food-away-from-home, food manufacturing and food marketing sectors. Overall, 37 percent of all female food economy workers are employed in off-farm segments compared to 11 percent of men. Agriculture is also important for youth employment with 64 percent of 20–24-year-olds in Western Africa working in the food economy.[213] Employment in agriculture falls with age, but the food system remains a key sector. For example, in Côte d'Ivoire, Ghana, Nigeria and Senegal, the employment share outside agriculture for the 15–19 and 30–34 age cohorts increases from 31 percent to 67 percent (within total employment).

Most new jobs in the food system will be created in the farm segment, but the off-farm system is estimated to account for 40, 16 and 11 percent of new jobs in Nigeria, Rwanda and the United Republic of Tanzania.[214] Promoting growth of the post-farm gate food system is likely to be pro-poor and beneficial in particular for youth and women. A recent study found poverty-growth elasticities which indicate that food-system related sectors such as agro-processing and trade and transport services can be as effective as agricultural growth at reducing poverty.[215]

FIGURE 13
SHARES OF AGRICULTURAL VALUE ADDED IN GDP AND EMPLOYMENT IN AGRICULTURE FOR AFRICAN COUNTRIES



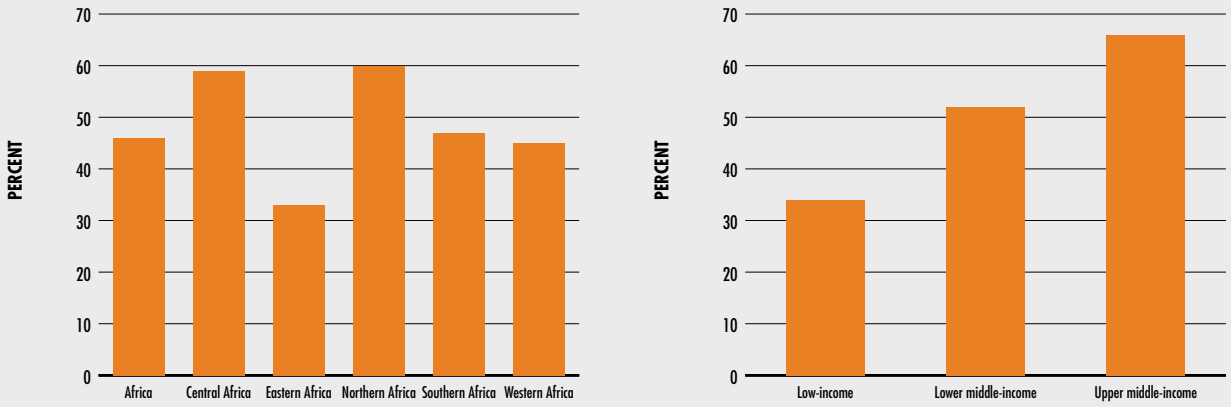
NOTES: Includes data for 49 African countries.
SOURCE: **World Bank**. 2020. World Development Indicators. In: *World Bank DataBank* [online]. Washington, D.C. [Cited June 2020] https://databank.worldbank.org/data/source/world-development-indicators

region with the fastest rate of urbanization, but the proportion of the population that lives in urban areas varies by subregion and rises with per capita GDP (Figure 14).

Urban centres are important for food systems because they drive changing patterns of dietary consumption, and their importance in consumption and trade is greater than the actual rate of urbanization implied. As urban households have more income than rural households, they also spend more on food. For example, in Malawi, Uganda, the United Republic of Tanzania, and Zambia, urban households consume, on average, 48 percent of all food produced and sold, although they make up only 25 percent of the total population.[216]

Rising urbanization will help drive up demand for food, and this is amplified by rapidly growing populations. From 2019 to 2050, the population is expected to grow from 1 066 million to 2 118 million,[217] and this rise and growth in GDP per capita will spur significant growth in

FIGURE 14
PROPORTION OF THE POPULATION IN AFRICA THAT LIVES IN URBAN AREAS, BY REGION, SUBREGION AND INCOME GROUP, 2017



NOTES: Income classifications taken from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519. Seychelles is classified as high-income but, as it was the only country in that group in Africa, it was included with the upper-middle income group for the purpose of this overview. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **World Bank**. 2020. World Development Indicators. In: *World Bank DataBank* [online]. Washington, D.C. [Cited June 2020] https://databank.worldbank.org/data/source/world-development-indicators

demand for agricultural products. In response, and assuming everything else remains the same, such as post harvest loss levels, the agricultural output would need to more than double by 2050 to meet increasing demand.[218] At the same time, and even though greater quantities of staples are bought, the share of staple food in total household food expenditures falls, and that of non-staple foods, such as fruits, vegetables, meat, fish and dairy products, rises.[219,220] The rise in demand for animal products also pushes up demand for animal feed. Overall, the agriculture and agribusiness markets are estimated to grow to about USD 1 trillion in 2030, from the USD 313 billion estimated in 2013, from USD 313 billion, as estimated in 2013.[221]

In addition, as incomes grow and with greater urbanization, not only will more food be bought but there will also be a change in consumption patterns. The change in lifestyle that comes with greater urbanization and more sedentary activities and the shift towards energy-dense foods and processed foods is termed the "nutrition transition." In addition, the nutrition transition is accompanied by a changing food system, which contributes to the excessive intake of energy. Changing technologies and scale mean that food is more available and more affordable, but in particular, the availability of relatively cheap, highly processed, energy-dense and micronutrient-poor foods increases.[222,223]

Growing urbanization leads to changing lifestyles, including a higher participation of women in the labour force.[224] There is more emphasis on convenience and time saving, and this explains why of the major staple foods, consumption of rice, which is easier to cook than most of the other staples, has grown fastest.[225]

Rice is also easy to store, handle, and has a long shelf life. In Kenya, bread gained in popularity as a timesaving and easy to store product.[226]

In addition, there is a rise in demand for processed products and food bought outside of the house. For example, evidence from Nairobi suggests that when mothers work outside the house, the consumption of street food increases.[227] In large cities, a rapid spread of fried and processed food, such as instant noodles, breakfast cereals, frozen chicken parts and milk powder, has been observed.[228] In Western Africa, processed foods account for about 50 percent of household food expenditure for higher income households. However, even for the poorest people in both urban and rural areas, the share is about 36 percent.[229] Some of those foods, such as soft drinks, snack foods, processed meats, bakery items, instant foods and deep-fried foods are unhealthy when constituting a regular part of a diet.[230]

A review of low- and middle-income countries found that irrespective of a country's income level, a high socio-economic status and urban location were associated with higher dietary quality and diversity.[231] However, a recent study for the United Republic of Tanzania, using a unique set of panel data tracking rural-urban migrants, found that urbanization, while a factor, might not in itself explain different consumption patterns observed in rural and urban locations. Rather, as people move to urban areas the shift in dietary patterns is mainly due to socio-economic differences, in particular income and education. The study also finds that the rise in unhealthy diets is due to rising incomes, rather than urbanization. It follows that policy makers should worry about unhealthy diets also in rural areas as incomes rise there as well.[232]

Income is a key determinant of food consumption patterns

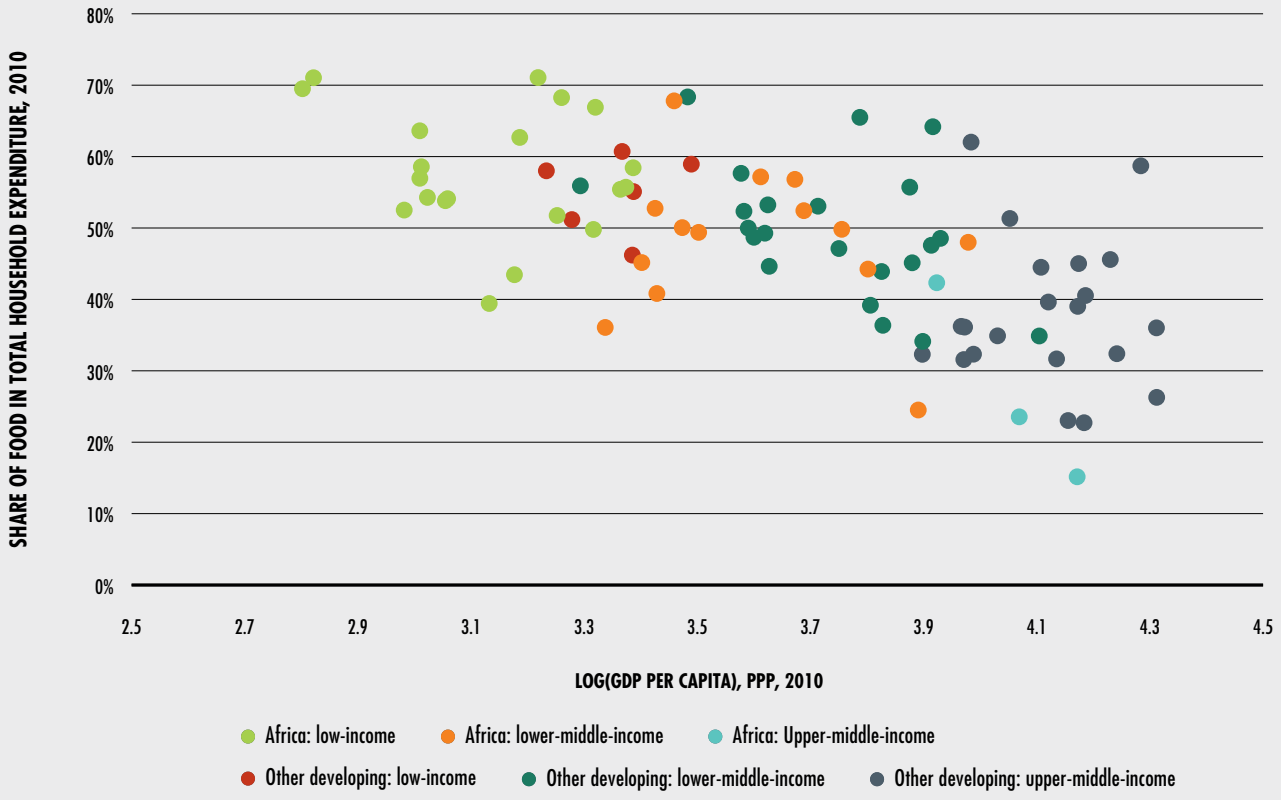
Per capita GDP is a good proxy for household expenditures (incomes), a key factor determining food consumption levels and patterns. A study, using data for 79 countries, finds a strong association between per capita household final consumption expenditure and per capita GDP.[233] The link between income and food consumption is weaker for households producing some of their own food, but the available evidence shows that even most rural households are net food buyers.[234,235]

Per capita GDP also reflects a country's level of development and its stage in the overall structural transformation process. With a gradual shift to higher productivity activities, not only does per capita GDP rise, but so do household incomes.[236] With rising household incomes, the share of income that households spend on food falls, even as total household food expenditures rise.[237] This inverse relationship between incomes and the share of food in total expenditures is known as Engel's law, named after the statistician and economist Ernst Engel. This relationship emerges in Figure 15. It follows that poorer household's food consumption will be affected more by food price rises, and that the strength of the inverse relationship will depend on the relative increases in incomes, prices and the speed at which households shift into higher quality, more expensive foods.

In addition, the more countries are further along with structural transformation with higher levels of per capita GDP, the lower the households' food expenditure shares (Figures 13 and 16), a result of higher incomes and an income elasticity of less than one. However, income elasticities vary by type of food, with necessities having a lower income elasticity while the income elasticity of more desirable foods, such as horticultural products, meat, fish and dairy products, is larger than one. How dietary patterns change also depends on price developments and the relative price elasticity of foods. Again, more nutritious foods typically have higher price elasticities than necessities, such as staple foods.[238]

The share of income allocated to food is highest for poor households, which often struggle even to meet basic energy requirements. However, as incomes rise, demand for staple foods, such as cereals or roots and tubers, rises more slowly than for fruit, vegetable and meat and dairy products. This relationship is known as Bennett's law: as incomes rise, household's food purchasing patterns exhibit a desire for diversity. This is borne out by recent work using data from the Global Dietary Database.[239] That study finds

FIGURE 15
SHARE OF FOOD EXPENDITURE IN TOTAL HOUSEHOLD EXPENDITURE VERSUS PER CAPITA GDP (PPP), AFRICA AND ALL OTHER DEVELOPING COUNTRIES, BY INCOME GROUP, 2010

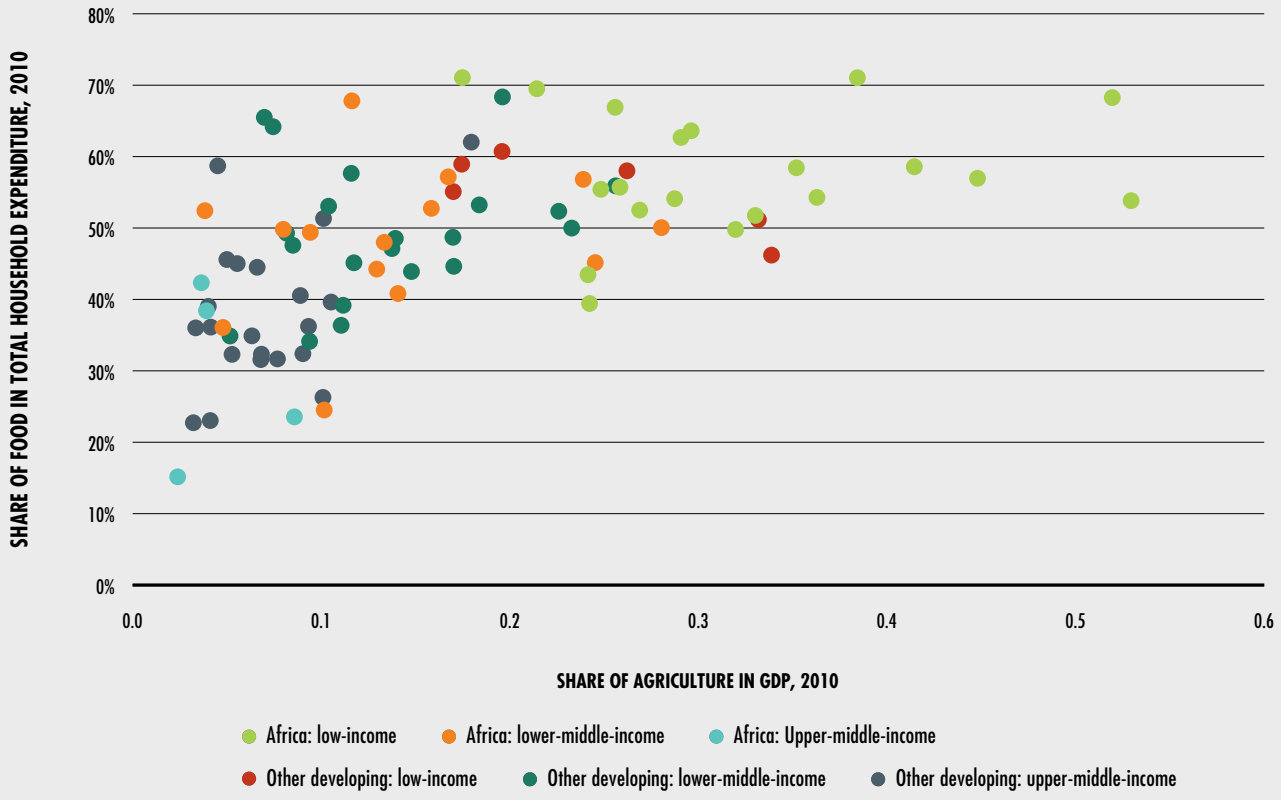


SOURCE: **World Bank**. 2020. World Development Indicators. In: *World Bank DataBank* [online]. Washington, D.C. [Cited June 2020] https://databank.worldbank.org/data/source/world-development-indicators

that for sub-Saharan Africa, income is strongly positively correlated with intake of red meat and milk, while the correlation is weaker for fruit and vegetables.[240] However, as noted earlier, the supply of many nutritious foods has stagnated or at any rate risen much slower than could be expected. In large part his is due to supply side constraints which, combined with strong demand in the face of higher incomes, has also led to greater price inflation for these foods, in turn dampening demand.

Figure 17 shows that the available aggregate data for Africa is in line with what Engel's and Bennett's laws predict. As average incomes rise, households are able to afford more food (proxied by total calorie availability) even as the share of food in total household expenditure falls. At the same time the share of cereals, roots, and tubers in total calorie availability falls, implying a relatively larger increase in demand for oils, meat, fish, fruits and vegetables, as

FIGURE 16
SHARE OF FOOD EXPENDITURE IN TOTAL HOUSEHOLD EXPENDITURE VERSUS SHARE OF AGRICULTURE IN GDP, AFRICA AND ALL OTHER DEVELOPING COUNTRIES, INCOME GROUP, 2010

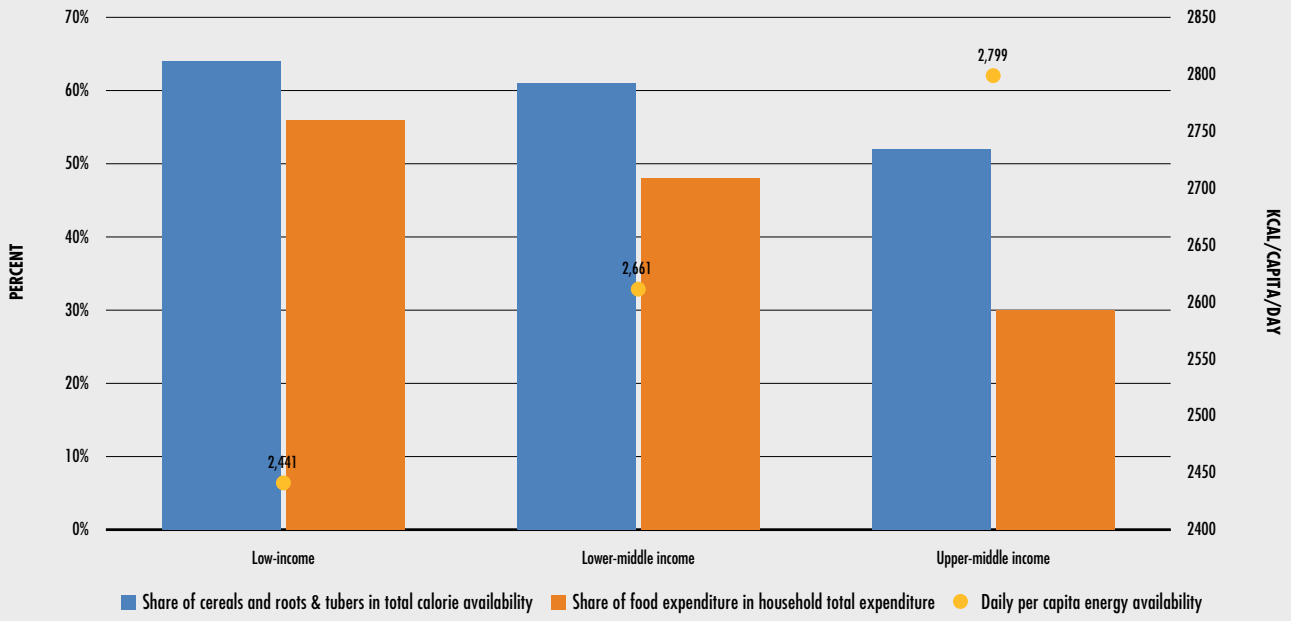


SOURCE: **World Bank**. 2020. World Development Indicators. In: *World Bank DataBank* [online]. Washington, D.C. [Cited June 2020] https://databank.worldbank.org/data/source/world-development-indicators

well as sweeteners. These trends are also borne out in the dietary patterns observed in Africa and described in the section "Diet Patterns in Africa." However, supply side constraints will have skewed the trends, with higher prices dampening effective demand. For some products, such as poultry, imports may help meet demand, but for others, such as vegetables, fruit and dairy, imports may only partially offset supply constraints.

It is important to realize that inequality mediates the situation and trends in dietary patterns and malnutrition. For example, Figure 18 shows that higher levels of inequality are also associated with lower levels of daily per capita energy availability, and this is true within each country income group. This relationship also maps into undernourishment, where on average, the prevalence of undernourishment is lower in higher country income groups, but within each

FIGURE 17
AVERAGE RATIO OF CEREALS & STARCHY ROOTS TO TOTAL ENERGY AVAILABILITY, SHARE OF FOOD EXPENDITURE IN TOTAL HOUSEHOLD EXPENDITURE, AND TOTAL DAILY PER CAPITA ENERGY AVAILABILITY, FOR AFRICA, BY COUNTRY INCOME GROUP, 2017



SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home and **World Bank**. 2020. *Global Consumption Data base* [online]. Washington, D.C. [Cite June 2020] (http://datatopics.worldbank.org/consumption/detail)

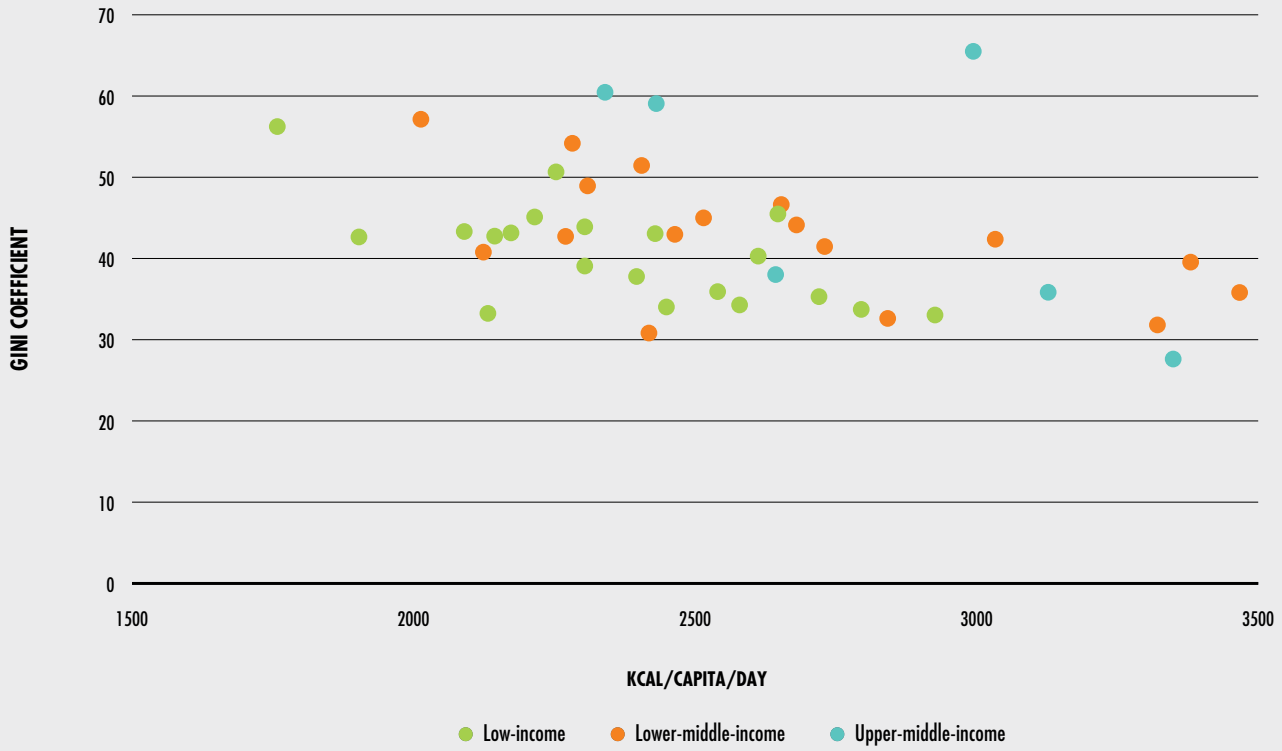
group, countries with higher levels of inequality exhibit a higher prevalence of undernourishment.

The situation and trends as shown using aggregate data in Figure 17 are confirmed by household survey data. For example, as household incomes have risen in Ethiopia, the share of food in total consumption expenditure declined from 60 percent in 1996 to 48 percent in 2011, while the quantity of food – in terms of adult equivalent – rose 55 percent. The share of cereals in total expenditure fell from 46 percent in 1996 to 36 percent in 2011, and households increased their consumption of animal products, fruits and vegetables, and processed foods.[241]

Are rising imports part of the transformation?

Overall, most of the increase and diversification in consumption, with the exception of some important items, will be met by local producers. Available evidence indicates that in Eastern and Southern Africa, the share of imports in total food consumption rose from about 11 percent in 2000 to 15 percent in 2010, while in Western Africa, the change was from 10 to 11 percent over this time period.[242,243] Continent wide, only about 10 percent of food consumed is imported,[244] although that figure is on the rise.[245] At the same time, the makeup of imports also appears to be changing. For example, wheat imports have grown at an annual rate of 13 percent in recent

FIGURE 18
GINI COEFFICIENT VS TOTAL DAILY PER CAPITA ENERGY AVAILABILITY (KCAL/CAPITA/DAY), FOR AFRICA, LATEST YEAR AVAILABLE



NOTES: Data from 43 countries.
SOURCE: **FAO and WIDER**. 2018. *World Income Inequality Database (WIID)*. Version 4. Helsinki, United Nations University – World Institute for Development Economics. Available at: https://www.wider.unu.edu/project/wiid-world-income-inequality-database.

years in Western Africa, but wheat flour imports have grown by only 1 percent a year, indicating a growing-local processing capacity.[246] With a rapidly growing population, rising imports of staple food products cannot be avoided unless production can keep pace. Closing the large yield gaps discussed above will help lower the reliance on imports, but not fully.[247]

Of course, imports are much higher for some countries. For Nigeria, imported processed food products contribute to about 5 percent of the food supply, while locally semi-processed and unprocessed foods contribute about 60 percent. On the other hand, a substantial amount of intermediate foods and ingredients are imported to serve the domestic food-processing sector, which accounts for about 65 percent of the manufacturing sector.[248] For Senegal, about 70 percent of food needs are imported.[249] In Ghana, the food retail market was estimated to be worth about USD 1 billion in 2006, with 34 percent of the market having imported high value products and 20 percent of the products

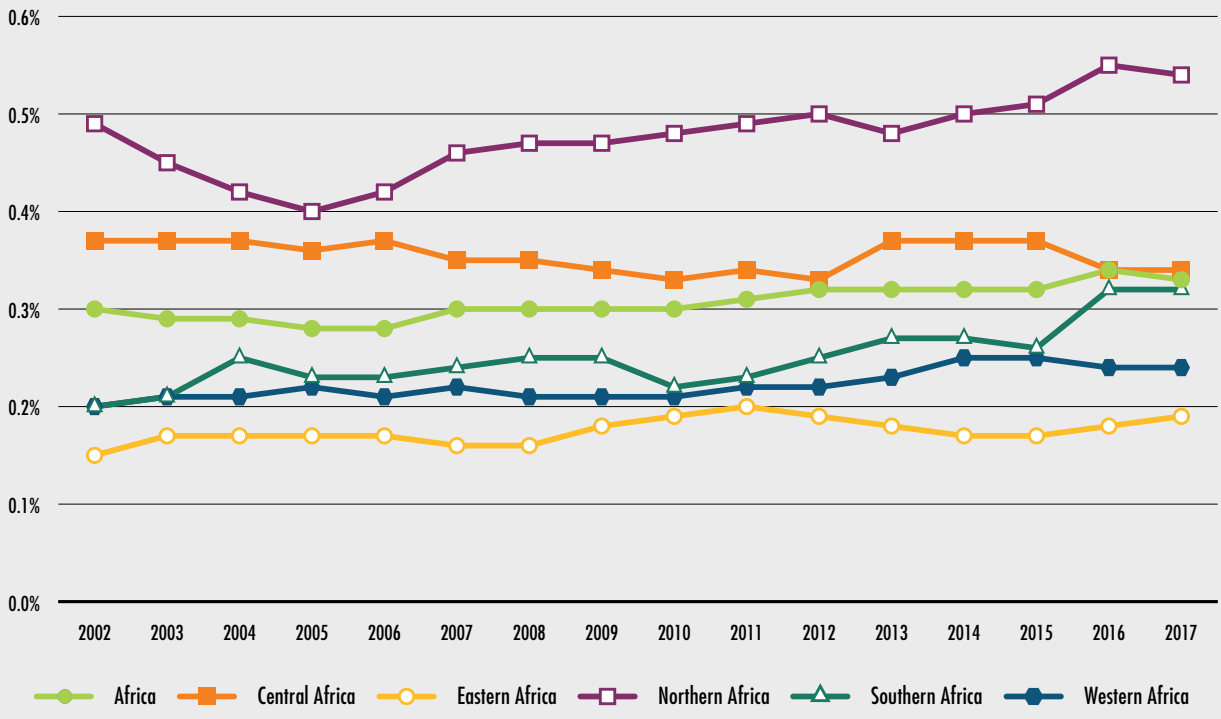
having been locally processed, either partially or completely. The remaining 46 percent are unprocessed foodstuffs and staples.[250]

The share of imports in total domestic supply will vary by product, and some products have seen imports surge, even if their share in domestic supply has not changed that much.[251] Figure 19 below broadly confirms this picture for total cereal imports to Africa, although the situation and trend varies by subregion.

This picture also holds for rice, where the rapid rise in consumption, especially in Western Africa, was met by local production and imports, with the ratio of imports to total domestic supply remaining steady and then falling after 2013 (until 2017 when there is an increase) (Figure 20). However, imports are very substantial, with Africa accounting for over a third of global imports in 2017.[252]

At the same time, import dependence has risen remarkably for some products. For poultry, sugar and vegetable oils in Africa, the ratio of imports to total domestic supply rose from 0.04, 0.40 and 0.41in 1990 to 0.23, 0.76 and 0.75 in 2017, respectively. There are large variations by subregion. For poultry meat, the rise was driven by Central Africa, Western Africa and

FIGURE 19
CEREAL IMPORTS TO AFRICA AND ITS SUBREGIONS AS A PROPORTION OF TOTAL DOMESTIC SUPPLY, 2000–2017 (3 YEAR MOVING AVERAGE)

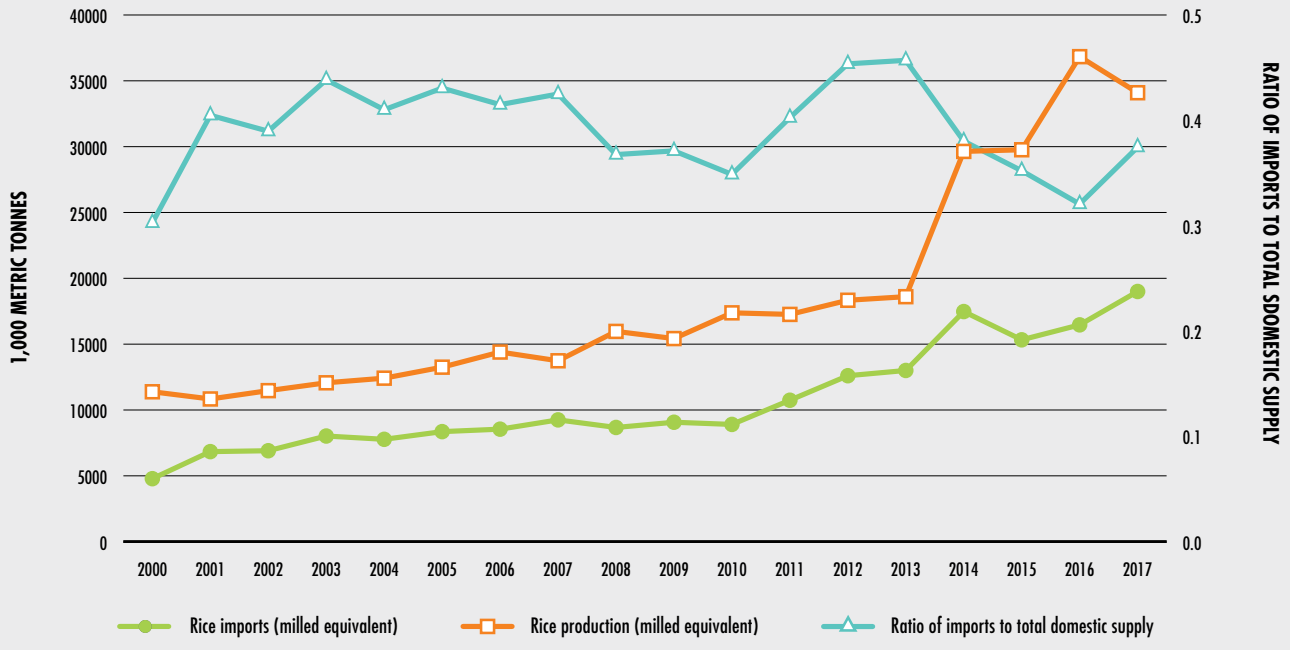


NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

Southern Africa, where the ratio of imports to total domestic supply reached 0.76, 0.43 and 0.26 in 2017, respectively. For Eastern Africa and Northern Africa, the ratio was 0.07 and 0.05 in 2017, respectively. The most dramatic rise over the last three decades has occurred in Western Africa, where the ratio of poultry imports to total domestic supply rose from 0.05 in 1990 to 0.43 in 2017. The import dependence for sugar is more uniform across subregions and is above 0.60 everywhere except for Southern Africa, where it was 0.45 in 2017. Eastern Africa has seen the largest rise in import dependence for sugar, with the ratio rising from 0.14 in 1995 to 0.64 in 2017. Similarly, the import dependence for vegetable oils is uniformly high, ranging from 0.46 in Central Africa to 0.87 in Eastern Africa, in 2017. The largest increase in the ratio occurred in Western Africa, where it rose from 0.07 in 1995 to 0.66 in 2017.

Structural transformation is reflected in massive changes in food systems, as already seen in developed and other emerging countries. Most noticeable are the changes in the growing modern retail sector, transformation in wholesale and logistics, and a processing sector that expands and evolves to meet the greater demand for packaged and processed goods, feeding not only into the modern retail sector but also the traditional open-air markets that remain dominant. The changes in demand that drive the transformation of the supply chain also drive changes in the farm sector, notably

FIGURE 20
RICE PRODUCTION AND IMPORTS (LHS) AND THE RATIO OF IMPORTS TO TOTAL DOMESTIC SUPPLY (RHS), AFRICA, 2000–2017



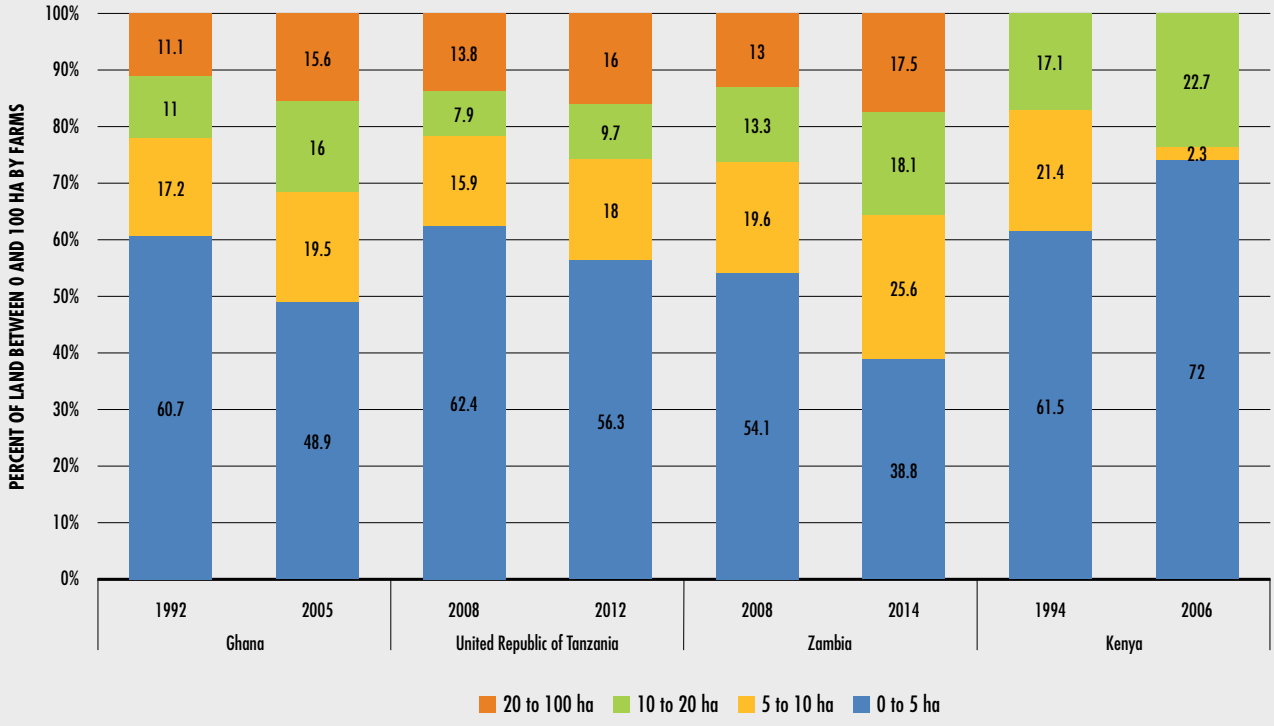
SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

greater commercialization and intensification, farm concentration and changes in the land rental, farm labour, farm services and farm input markets.

These changes are also happening in some African countries. For example, in Ghana high demand for agricultural products has led to greater commercialization of farming, reflected in an increase in the number of medium- and large-scale farmers and a rising land-to-labour ratio (Figure 21 for farm size distribution). Mechanization is also becoming more common as farmers adopt labour-saving technologies. Even small-scale farmers now use tractors for certain operations, and tractor ownership is common among medium- and large-scale farmers.[253] Other types of machinery, such as planters for precision planting, boom sprayers and pumps for crop maintenance, and combine harvesters for harvesting, are also becoming more common.

The rise in medium- and large-scale farms has also been documented in Kenya, Malawi, Rwanda, the United Republic of Tanzania

FIGURE 21
CHANGING SHARE OF TOTAL LAND OPERATED BY FARMS THAT ARE 0 TO 100 HECTARES IN SIZE FOR GHANA, THE UNITED REPUBLIC OF TANZANIA, ZAMBIA AND KENYA (VARIOUS YEARS)



NOTES: For Kenya the largest category is > 10 hectare.
SOURCE: **Jayne, T.S., Chamberlin, J., Traub, L., Sitko, N., Muyanga, M., Yeboah, F.K., Anseeuw, W., Chapoto, A., Wineman, A. & Nkonde, C.** 2016. Africa's Changing Farm Size Distribution Patterns: The Rise of Medium-Scale Farms. *Agricultural Economics, 47*(S1): 197–214.

and Zambia (see Figure 22).[254] This development is accompanied by the growth of land rental markets and a falling share of land under customary tenure. Many of the larger landholdings are owned by better off rural and urban households, not farmers scaling up their operations. For example, in Ghana, while the proportion of households owning land is falling in urban and rural areas, the proportion of land held by urban households increased from 26.8 percent in 2008 to 31.9 percent in 2014. Similar trends are observed in other countries.[255]

Summary

African food supply chains are dominated by small-scale family farms with generally low levels of modern input use and limited exploitation of the synergies that come from combining modern inputs. However, there is also evidence of increasing mid- and large-size farms and of input intensification, in particular for maize. The available evidence indicates that there are significant variations in input use between and within countries, and while aggregate yields are generally low relative to other regions, a few countries achieve comparatively high yields. Pastoralism is an important part of the livelihoods and economies of many dryland areas of Africa. Aquaculture is rapidly expanding but concentrated in relatively few countries. In general, research and extension as well as other public goods are underfunded and mostly focused on staple foods. Little research spending goes to vegetables, fruit and livestock. Low productivity and low growth in productivity coupled with high population growth is putting increasing strain on the natural resource base, as most production increases have come from expansion of cultivated area. Soil degradation is already a widespread problem in Africa, threatening livelihoods and productivity.

Distribution and processing is growing rapidly in some countries, but constraints, such as a lack of cold chains, remain. Food losses are not as high as in other regions but still amount to high economic losses. Food safety is gaining in prominence with urbanization and greater awareness of its importance. Modern retailing is also growing rapidly in a few countries, but most food is traded in traditional markets.

Structural transformation is happening in some countries. Urbanization and its associated changing lifestyles and rising incomes are leading to higher food consumption levels as well as greater diversification in diets and greater emphasis on convenience in shopping and preparing food. In part, the increase and diversification in food consumption will be met by local producers and food manufacturers; however, this will vary by product. Imports of some items, notably poultry, vegetable oils and sugar have risen very rapidly, representing both a challenge and an opportunity. Most of the required investment and innovation required for the food system transformation will come from the private sector. However, the public sector has a key role in establishing policies, coordinating across sectors, and providing public goods that allow the private sector to take advantage of opportunities and meet the many challenges. ■

DIET PATTERNS IN AFRICA

Food production and consumption patterns are determined within the food system and in turn play a key role in observed food security, nutrition and health outcomes. Energy and micronutrient intake help determine the health of individuals, even for the generations to come. The overview of food consumption patterns given below is structured on country-income groupings.[256] The analysis provides a picture of the situation and trends of diets based on the level and growth in national incomes, which proxy for both household incomes and the country's stage in the food system transformation.

Food consumption patterns by country-income groups, for adults and children under five in Africa

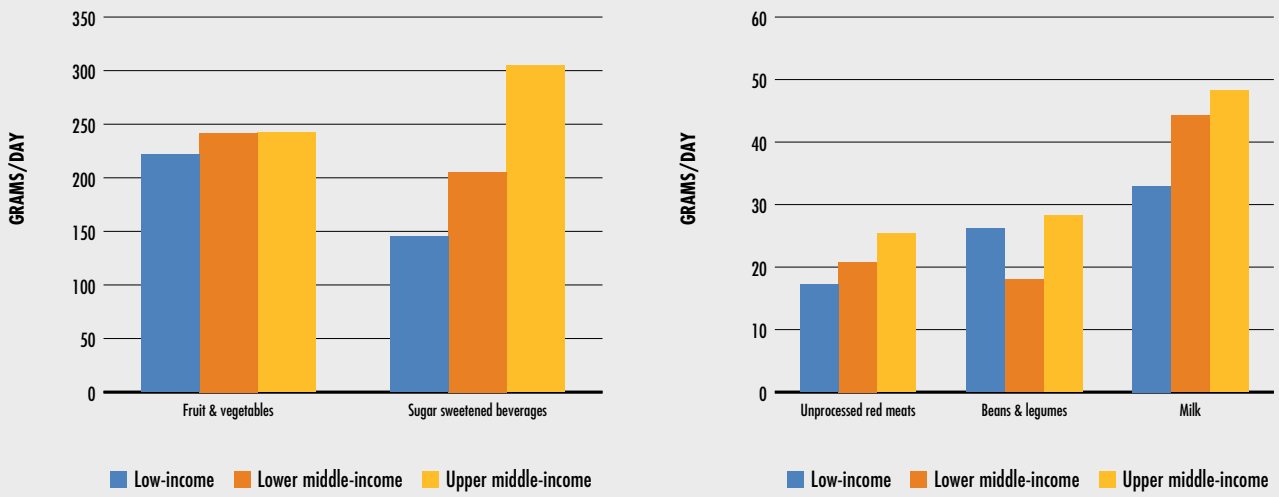
The latest available data from the Global Dietary Database (GDD) demonstrating the changing dietary patterns of adults by country income groups are shown in Figure 22.[257] The GDD categorizes the food groups as follows:[258]

- **Fruit**: This includes fresh, frozen, cooked, canned, or dried fruit, excluding fruit juices and salted or pickled fruits.

- **Vegetables**: This includes fresh, frozen, cooked, canned or dried vegetables. This definition excludes salted or pickled vegetables, vegetable juices, starchy vegetables and legumes.
- **Beans and legumes**: (beans, lentils) This includes fresh, frozen, cooked, canned or dried beans/legumes. This definition excludes peanuts and peanut butter.
- **Tree nuts and seeds**: Examples include walnuts, almonds, hazelnuts, pecans, cashews, pistachios, sesame seeds, sunflower seeds, pumpkin seeds and peanuts (including peanut butter).
- **Unprocessed red meat**: This includes beef, pork, lamb, mutton, or game that has not been cured, smoked, dried or chemically preserved and excludes eggs, fish and poultry.
- **Sugar-sweetened beverages**: This includes any beverage with added sugars having ≥ 50 kcal per 8 oz. (236.5 g) serving, including commercial or homemade beverages, soft drinks, energy drinks, fruit drinks, punch, and lemonade. This definition excludes 100 percent fruit juice, vegetable juice and non-caloric-artificially sweetened drinks.
- **Fruit juice**: This includes an intake of 100 percent fruit juice, excluding sugar-sweetened fruit juice.
- **Milk**: This includes dairy milk including non-fat-, low-fat, skim, and whole-fat milk. This definition excludes yogurt, fermented milk, and soy or other plant derived milk.

Interpreting the levels of food intake is not straightforward. However, Table 14 outlines the risk exposure levels used by the Global Burden

FIGURE 22
AVERAGE DAILY INTAKE OF SELECTED FOOD ITEMS FOR ADULTS: BY COUNTRY INCOME GROUP, 2015



NOTES: The items are presented in two separate graphs due to the differences in magnitudes involved.
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [March 2020]. https://www.globaldietarydatabase.org/

of Disease Collaborators to estimate the portion of deaths and DALYs that could be attributed to a given risk,[259] and this provides a benchmark against which intake levels may be compared and considered low or high.

The figure shows that as incomes rise, so does the demand for red meats and milk and, to a lesser extent, fruits and vegetables. One study found that income per person explains almost 80 percent of the variation in the consumption of animal products.[260] The graphs show that also demand for sugar sweetened beverages rise substantially with income. A similar pattern holds for dietary intakes of children under the age of five (Figure 23).

This observation is in line with other evidence. One study found that a tenfold increase in per capita GDP was associated with a 5.1 times increase in the amount of sugar-sweetened beverages consumed, per person. In turn, the study found that for low- and middle-income countries, each 1 percent rise in the consumption of sugar-sweetened beverages was significantly associated with an additional 3.4 cases per 100 adults being overweight, after correcting for potential confounders.[261]

While the GDD does not contain data on fats and seafood, a recent study found that in a global context, sub-Saharan Africa has extremely low levels of consumption of seafood omega-3 and nuts and seeds, while consumption of trans fats was high in Northern Africa.[262,263]

For given levels of income, diets vary by location and education levels

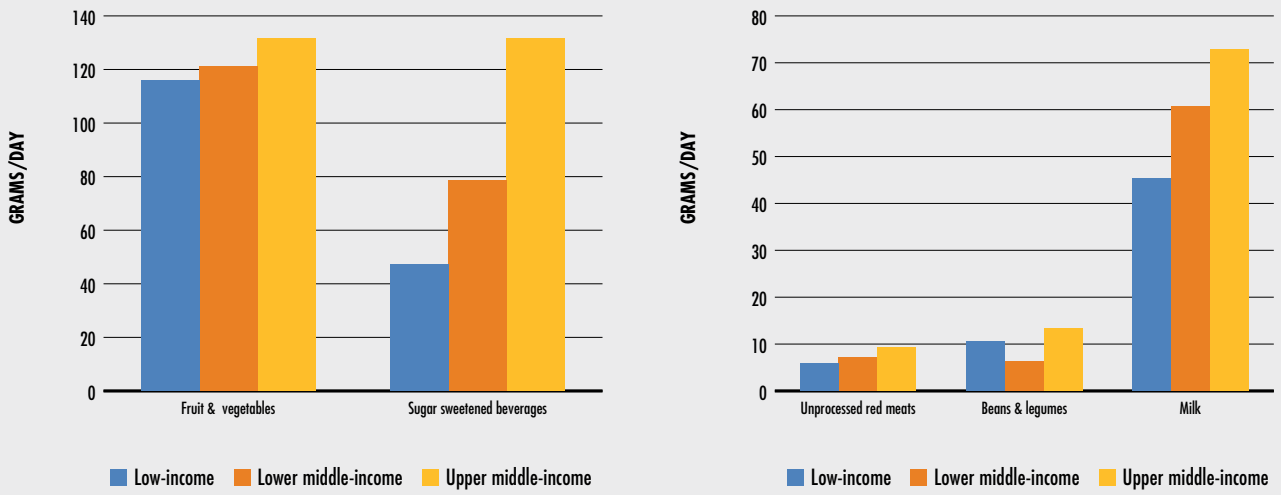
The Global Dietary Database also allows an analysis of intake of some foods by location, gender, age and by the level of education of the household. Table 15 shows a clear urban-rural divide that is very pronounced for nuts and seeds, unprocessed red meats, fruit juice (see also Box 6), sugar-sweetened beverages and milk. Rural diets consist of lower levels of nutritious foods, such as fruits and vegetables but especially nuts and seeds and milk. However, these diets also have a much lower intake of energy-dense foods of minimal nutritional value, such as sugar-sweetened beverages. Rural diets contain less red meat, which, considering the generally low levels of meat consumption, contribute to their diets being relatively poorer. The rural-urban gap is highest in low-income countries and falls as incomes grow. The results for adults versus children under five are very similar. For some of the food groups the gap narrows by country income group, but there is no change in the ratio for fruits and vegetables, and little change for milk. Table 16 indicates that there are virtually no differences in the intake of these foods by gender. »

TABLE 14
OPTIMAL LEVELS FOR DIETARY RISK FACTOR EXPOSURE

Risk factor	Optimal intake level (optimal range) per day
Diet low in fruits	250 g (200–300)
Diet low in vegetables	360 g (290–430)
Diet low in legumes	60 g (50–70)
Diet low in nuts and seeds	21 g (16–25)
Diet low in milk	435 g (350–520)
Diet high in red meat	23 g (18–27)
Diet high in processed meat	2 g (0–4)
Diet high in sugar-sweetened beverages	3 g (0–5)

SOURCE: **Afshin, A., Sur, P.J., Fay & K.A. *et al*.** 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184): 1958–1972.

FIGURE 23
AVERAGE DAILY INTAKE OF SELECTED FOOD ITEMS FOR CHILDREN UNDER FIVE YEARS OF AGE: BY COUNTRY INCOME GROUP, 2015



SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

TABLE 15
URBAN TO RURAL FOOD INTAKE RATIO FOR SELECTED FOOD GROUPS, ADULTS AND CHILDREN UNDER FIVE, FOR AFRICA, 2015

Food category	Adults	Children under the age of five			
	All countries	All countries	Low-income	Lower-middle-income	Upper-middle-income
Fruit & vegetables	1.09	1.11	1.11	1.11	1.09
Beans & legumes	1.07	1.07	1.07	1.07	1.07
Nuts & seeds	1.75	1.76	1.85	1.73	1.59
Unprocessed red meat	1.48	1.48	1.52	1.47	1.39
Sugar-sweetened beverages	2.19	2.19	2.36	2.13	1.87
Fruit-juices	1.84	1.83	1.91	1.82	1.68
Milk	1.49	1.49	1.52	1.48	1.41

SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

TABLE 16
MALE TO FEMALE (ADULT POPULATION) FOOD INTAKE RATION FOR SELECTED ITEMS, FOR AFRICA, 2015

Good category	Male to female intake ratio
Fruit & vegetables	0.98
Beans & legumes	0.99
Nuts & seeds	0.98
Unprocessed red meat	1.02
Sugar-sweetened beverages	0.93
Fruit-juices	1.02
Milk	0.99

SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

» For most food groups, food intake of children under the age of five varies consistently by the education level of the household (Figure 24). With higher levels of education, consumption increases even within the same country income group. In part, this result is likely driven by education being covariant with income. However, education is probably the key factor explaining the slight fall in the consumption of sugar-sweetened beverages for households at the highest level of education.

A comparison of food intake between children under the age of five in Africa compared to the rest of the world (RoW) (excluding high-income countries) shows that with the exception of nuts and seeds, consumption levels are lower in Africa, and the gap is wide for fruits and vegetables, beans and legumes and in particular for fruit juice, milk and unprocessed meat (Figure 25). Perhaps surprisingly, the level of consumption of sugar-sweetened beverages is more aligned between the two groups.

Figure 26 shows differences in food intake levels for adults between Africa and the rest of the world by country income group. Consumption of fruit and vegetables is broadly similar (in contrast to the gap observed for children under the age of five), while for unprocessed red meats and milk, consumption in Africa is lower than in the rest of the world. Consumption of sugar-sweetened drinks on the other hand is lower in Africa only in low-income countries and is then considerably higher in the higher income groups.

Figures 27 to 30 provide a picture of the inequality that exists between households with different levels of education (which will, however, be correlated with income). Intake of fruit and vegetables is substantially higher in households with higher education levels but relatively constant across country income groups, for each level of education. This pattern also holds for intakes of beans, nuts and seeds, fruit juice and milk. Intake of unprocessed red meats increases with income and, more substantially, with education levels. Finally, sugar intake »

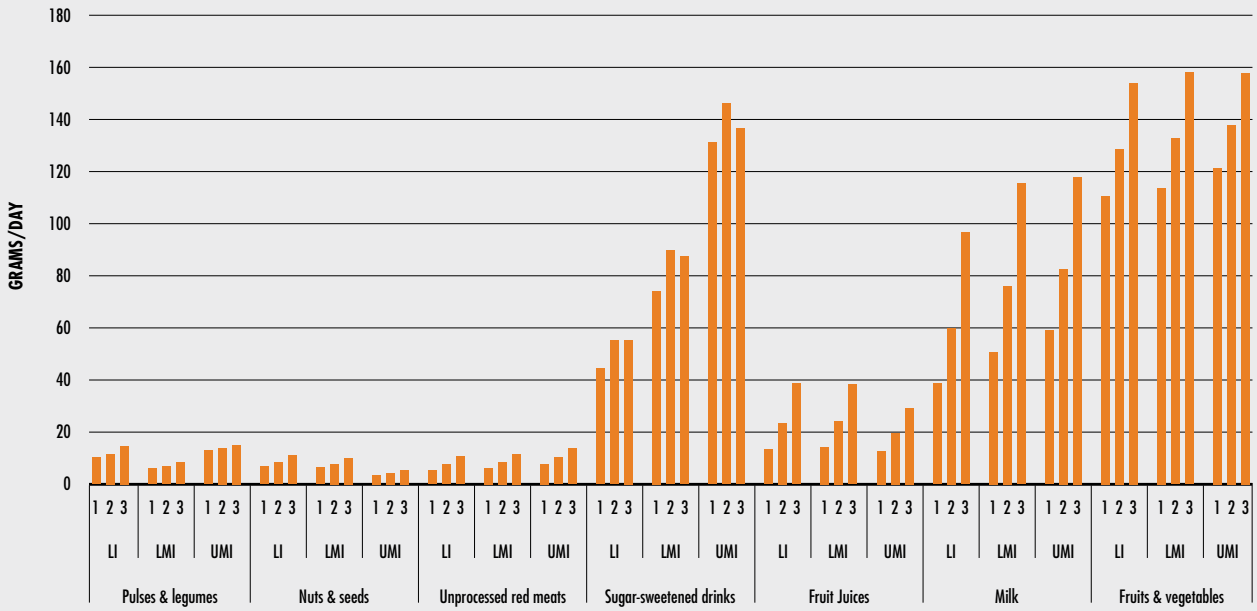
BOX 6
FRUIT JUICE – A NUTRITIOUS CHOICE?[264]

Fruit juices are relatively high-energy drinks that, at the same time, may be a marker of a healthier lifestyle. However, when consumed in large amounts, fruit juices may contribute to obesity and are associated with a greater risk of diabetes,[265] although the evidence on the effect of fruit juice on weight is mixed.[266]

Fruit juice contains a variable amount of sugar, and current dietary guidelines recommend that less than 10 percent of energy intake should be from free sugars (see Box 3 on World Health Organization (WHO) healthy diet guidelines). Different from sugar in fresh fruit, the sugar in fruit juice is not part of the cell structure as they are released by the juicing process, and therefore sugar contained in fruit juice adds to the consumption of free sugars.[267] However, fruit juice does offer the same micronutrient content of the corresponding whole fruits, although there is some reduction in the intake of fibre associated with fruit juice.[268]

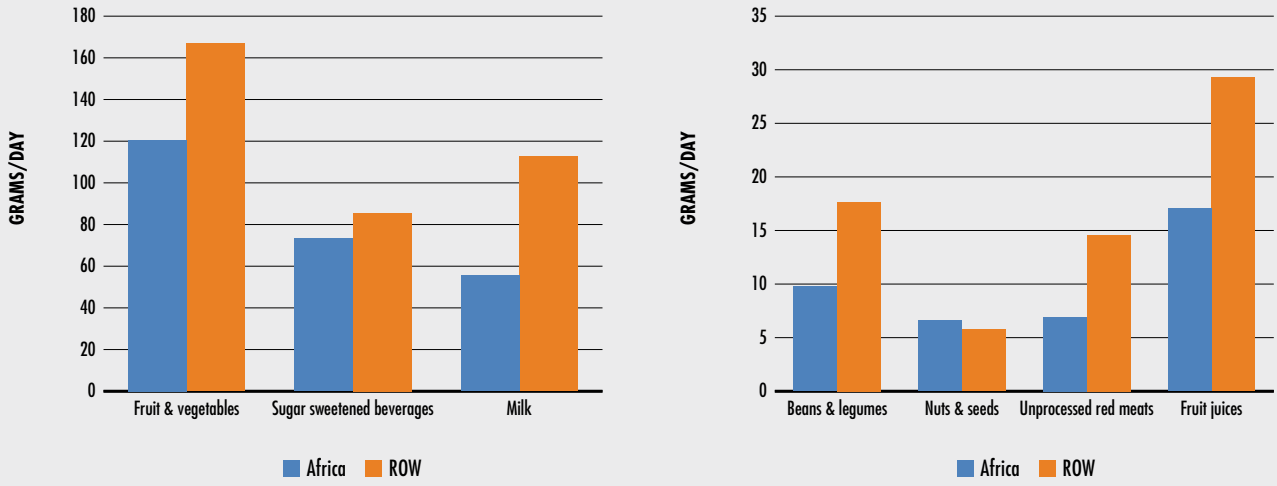
In common with sugar-sweetened beverages, fruit juice contains high amounts of sugar (although levels vary by juice) and excessive consumption is associated with a wide-range of negative health consequences, such as tooth decay, type 2 diabetes and cardiovascular disease. However, fruit juice, similarly to fruit, does have documented health benefits and, when taken in moderation, fruit juice can contribute to diet quality as a good source of micronutrients without contributing to excess body weight and with positive health benefits, such as a lower risk of cardiovascular disease and some forms of cancer.[269,270,271,272,273,274]

FIGURE 24
DIETARY INTAKE OF KEY FOOD GROUPS FOR CHILDREN UNDER THE AGE OF FIVE BY EDUCATION FOR EACH COUNTRY INCOME GROUP, AFRICA (LI=LOW-INCOME, LMI=LOWER-MIDDLE-INCOME, UMI=UPPER-MIDDLE-INCOME).



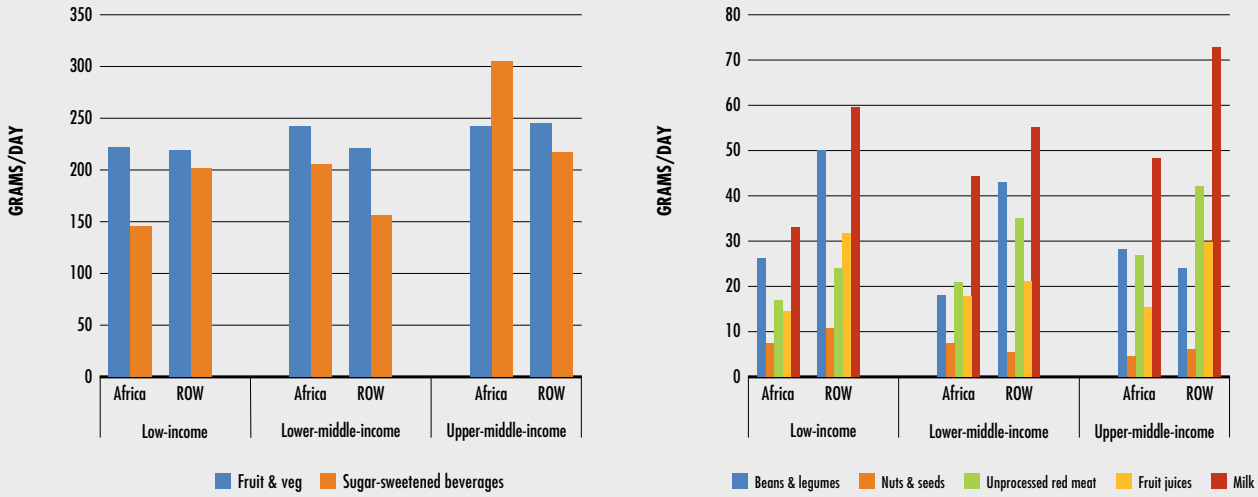
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

FIGURE 25
AVERAGE DAILY INTAKE OF SELECTED FOOD ITEMS BY CHILDREN UNDER FIVE, AFRICA VS REST OF THE WORLD (ROW)



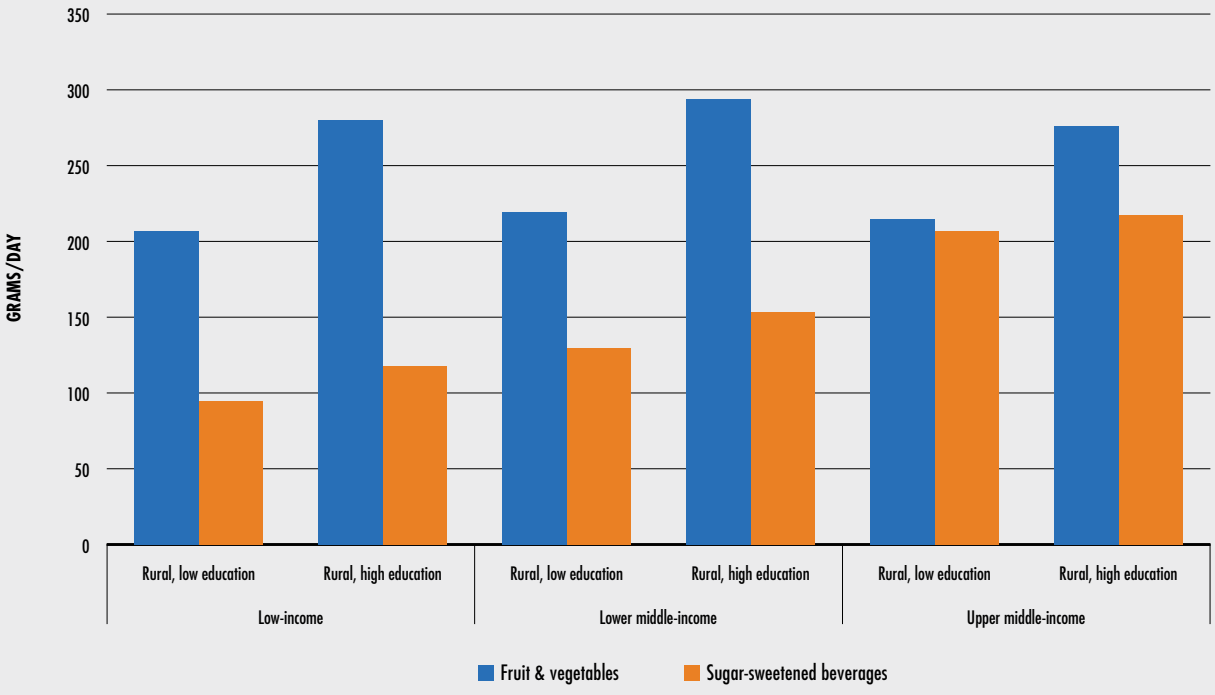
NOTES: RoW excludes high-income countries.
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

FIGURE 26
DIFFERENCES IN AVERAGE DAILY INTAKE OF SELECTED FOOD ITEMS BY ADULTS BETWEEN AFRICA AND REST OF THE WORLD (ROW), BY COUNTRY INCOME GROUP



NOTES: RoW excludes high-income countries.
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

FIGURE 27
RURAL (ADULT) POPULATION, AVERAGE INTAKE OF FRUITS & VEGETABLES AND SUGAR-SWEETENED BEVERAGES, AFRICA, 2015: LOW VS HIGH EDUCATION HOUSEHOLDS



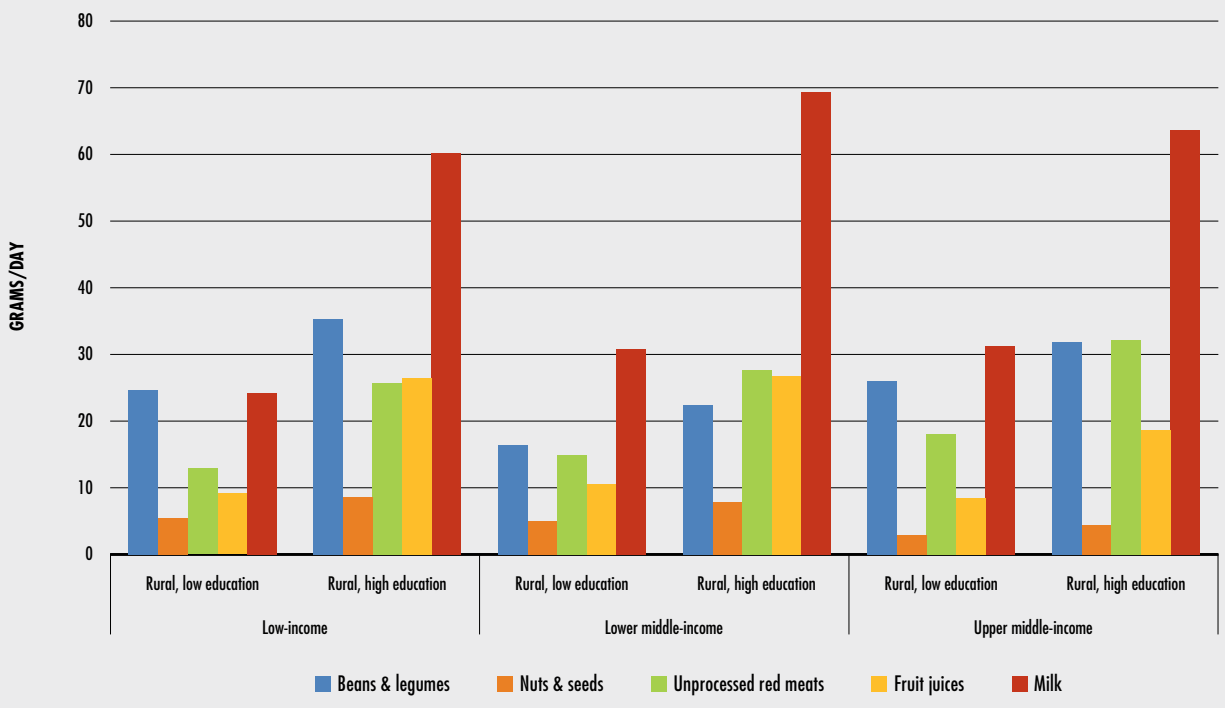
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

» changes relatively little by education group but quite strongly by income group. In summary, while intake levels are always higher in urban areas (although much less so for fruit and vegetables and beans – see Table 15), the change in intake by education level follows a similar pattern in both locations.

Maternal and infant and early childhood dietary patterns

The first 1 000 days are crucially important for physical growth and mental development, and deficiencies in nutrition, health and care received easily translate into poor growth and impaired cognitive development with long lasting consequences.[275] During pregnancy, the nutritional status and diet of the mother is key, while after birth it is important that breastfeeding commences within the first hour, is the exclusive source of nutrition for the first six months, and continues, together with complementary food, until the child is two.[276,277,278] There is increasing attention to the possibility that poor fetal growth and nutrition proxied by low birth weight is linked to NCDs, such as coronary artery disease, hypertension, obesity, and insulin resistance, later in life.[279,280]

FIGURE 28
RURAL (ADULT) POPULATION, AVERAGE INTAKE OF BEANS & LEGUMES, NUTS & SEEDS, UNPROCESSED RED MEATS, FRUIT JUICES, AND MILK, AFRICA, 2015: LOW VS HIGH EDUCATION HOUSEHOLDS



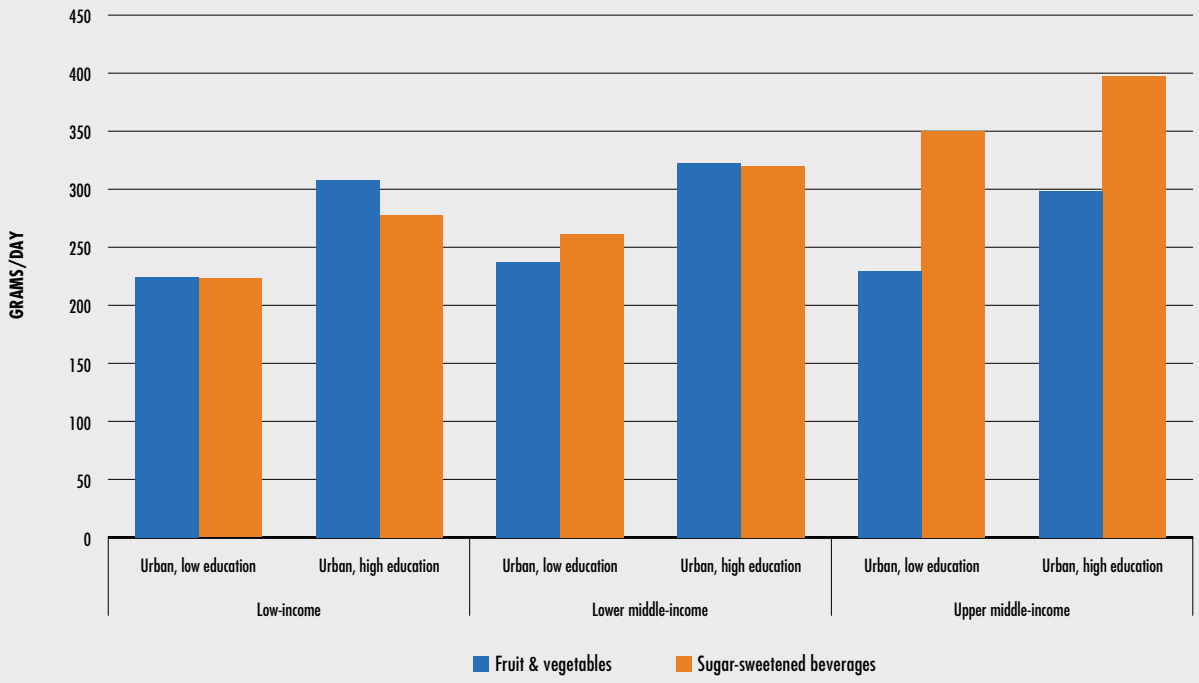
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

To assess the diets of young children, UNICEF and WHO recommend three indicators:[281]

- Minimum Dietary Diversity: percentage of children 6–23 months of age who received foods from at least five out of eight defined food groups during the previous day[282]
- Minimum meal frequency: a percentage of children 6–23 months of age who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more during the previous day
- Minimum acceptable diet: percentage of children 6–23 months of age who received a minimum acceptable diet during the previous day

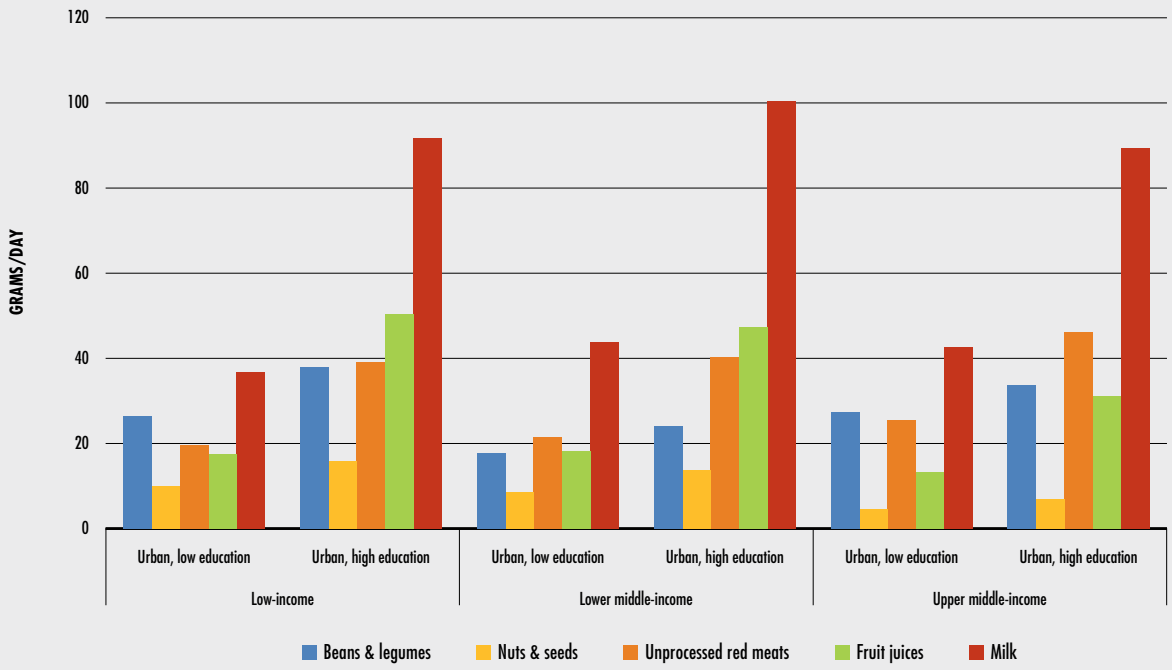
The Minimum Dietary Diversity (MDD) serves as a proxy for the nutrient content of foods consumed by infants and young children. It is an indicator in the Global Nutrition Monitoring Framework for tracking progress towards WHA global nutrition targets for 2025 and for the 2030 SDG targets.[283] UNICEF has been collecting data and maintaining a database on children's diets since the early 1990s when the initial set of global standard indicators were established.

FIGURE 29
URBAN (ADULT) POPULATION, AVERAGE INTAKE OF FRUITS & VEGETABLES AND SUGAR-SWEETENED BEVERAGES, AFRICA, 2015: LOW VS HIGH EDUCATION HOUSEHOLDS



SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

FIGURE 30
URBAN (ADULT) POPULATION, AVERAGE INTAKE OF BEANS & LEGUMES, NUTS & SEEDS, UNPROCESSED RED MEATS, FRUIT JUICES, AND MILK, ADULT RURAL POPULATION, AFRICA, 2015: LOW- VS HIGH- EDUCATION HOUSEHOLDS



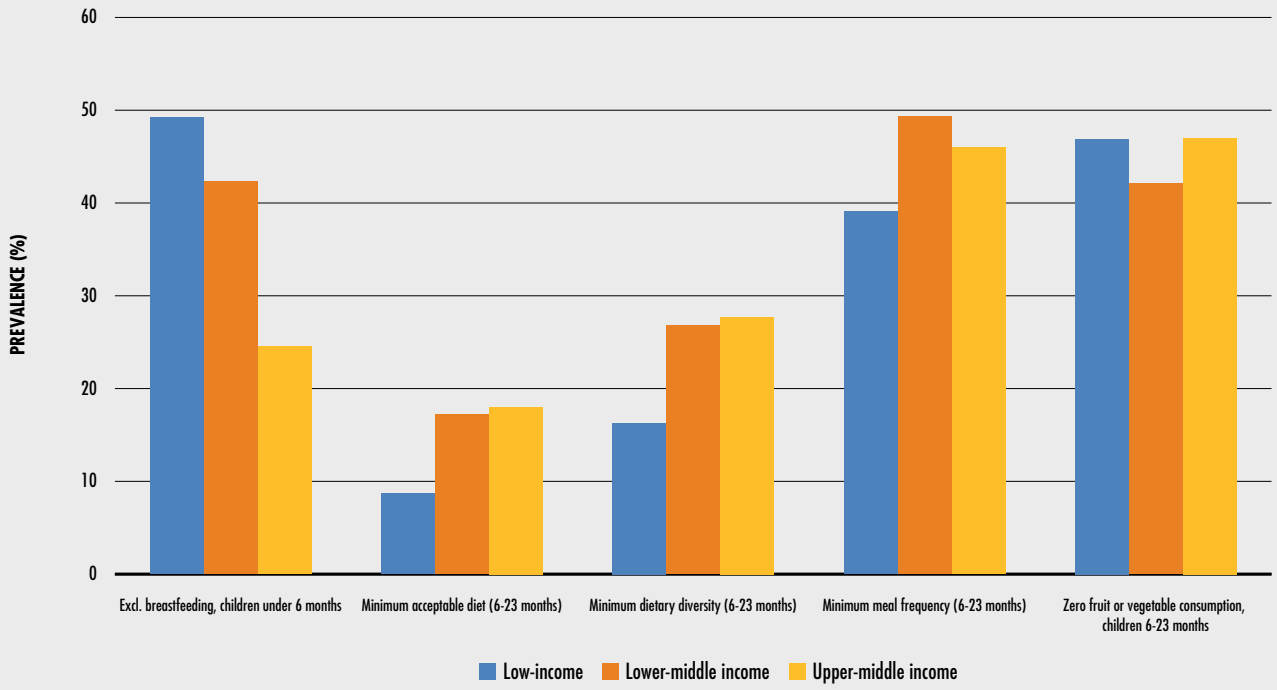
SOURCE: **Tufts University**. 2020. *Global Dietary Database* [online]. Medford, MA, USA. [Cited March 2020]. https://www.globaldietarydatabase.org/

Indicators assessing the quality of children's diets such as MDD were developed relatively recently (2008–2010) and have been included in global databases since 2014. Figure 31 shows that in general the quality of children's diets (6–23 months) is low with modest improvements seen as incomes rise.[284]

Summary

Diets, as reflected by the food intake data, are changing with rising income, urbanization and higher levels of education. They are improving in that calorie intake is rising and diversity is increasing, although poverty and inequality weakens the link. At the same time the intake of energy-dense foods of minimal nutritional value, as represented by sugar-sweetened beverages, is also rising, and indeed, it appears to be rising at a faster rate than that of other products. The changes are mediated by location and education. Large gaps exist between urban and rural intakes across most food groups, with urban consumers having substantially higher intakes. The urban-rural gap falls with rising county incomes. Education also mediates food intakes. This effect may also capture socio economic status, although the lower intake of sugar-sweetened beverages at high levels of education is most likely an education effect. The picture that emerges is one of low levels of consumption of most food groups compared to

FIGURE 31
DIETARY INFORMATION FOR INFANTS AND CHILDREN AGED 6–23 MONTHS



SOURCE: **UNICEF**. 2019. *The State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world.* UNICEF, New York.

other regions at the same level of development, except for fruit and vegetables and, for lower- and upper-middle income countries, sugar-sweetened beverages. Inequality in food intake levels when accounting for location and education appears to be very high. In general, dietary diversity is low, but particularly so for those on lower incomes. Africa lags especially with regard to the intake of animal-source foods. Improving diets will require interventions within and across sectors such as health and education as well as within different contexts, such as urban versus rural and different levels of poverty and inequality. Institutional collaboration is essential to achieve this. ■

NUTRITION OUTCOMES REFLECT DIETARY PATTERNS

Diets are a key driver of nutrition outcomes, and the broad food production, import and consumption patterns outlined in the previous section are reflected in the nutrition outcomes described in this section, again structured, by country-income groupings. This is not only consistent with the previous section, but also aligned with studies that show that the quality of diets and nutrition outcomes are strongly influenced by economic status.[285,286] Per capita GDP is a key driver of longer-term improvements

in nutrition outcomes, but the channels through which this happens are complex and difficult to disentangle.[287,288,289] This is because other factors, such as education, gender inequality and women's empowerment, feeding practices, tastes, infrastructure, location, demographic factors, access to government services, and environmental factors also play a role, and they are also correlated with per capita GDP.[290]

Maternal and infant nutrition outcomes

Evidence on maternal and infant malnutrition is scarce. The available evidence shows that in 2015, 13.7 percent of infants were born with low birth weight in Africa. Evidence for women of reproductive age is limited, but one study found that only 27 percent of women in that group, surveyed in the Kayes region of Mali, reached the MDD-W.[291] These women consumed animal source foods and/or vitamin A-rich vegetables and fruits more frequently than did other women.[292] Commonly used nutrition indicators are for underweight and anaemia in women. The prevalence of anaemia in women of reproductive is 27, 32, 33, 47 and 47 percent in Southern, Eastern, Northern, and Central and Western Africa, respectively. Figure 32 indicates that both indicators show improvements with income levels, but in particular, anaemia in women of reproductive age is very high at all levels.

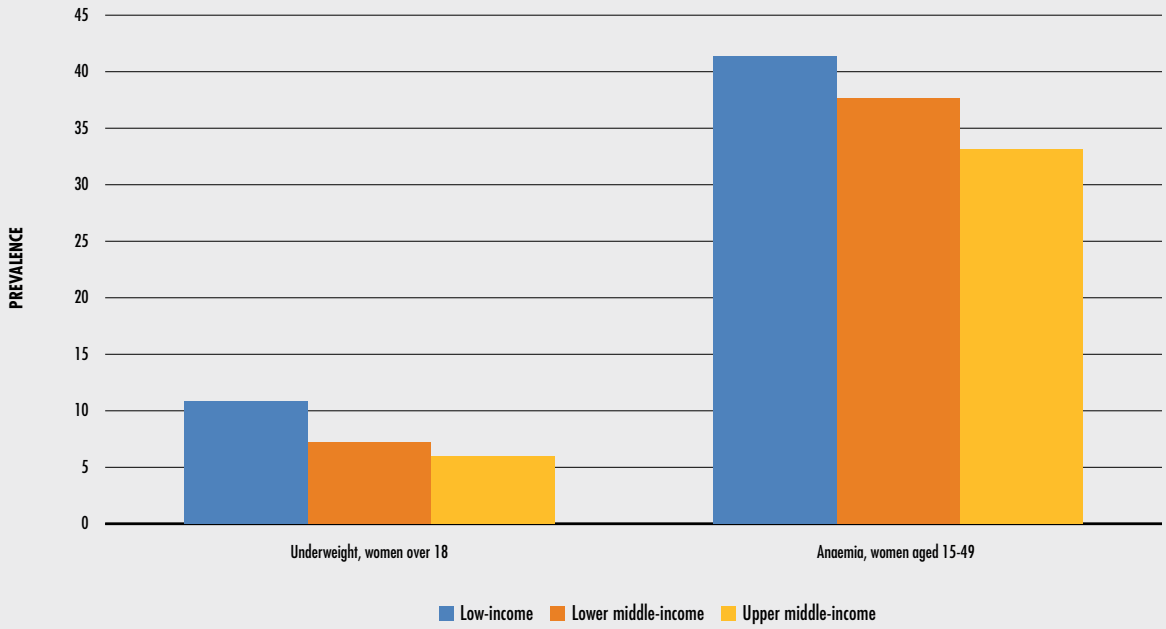
Nutrition outcomes for children under the age of five

Indicators for children under five are more readily available, and "child growth is internationally recognized as an important indicator of nutritional status and health in populations."[293] Figure 33 shows that many African children continue to suffer from underweight and stunting. The situation improves with economic development, but in particular for stunting, it is worrying that for all country income groups, the average level of stunting remains very high. High levels of stunting are in part a reflection of the poor diets that children are, on average, limited to. The previous section also showed that intakes by children under the age of five of some nutritious foods was much higher in urban areas than in rural areas. It is therefore likely that also stunting and micronutrient deficiencies (discussed below) will be more prevalent in rural areas. Stunting is a measure of long-term undernutrition in children and is caused by a lack of dietary quality and intake in the first thousand days of life, but other factors, such as disease, poor child caring practices, a lack of health care services and poor environmental hygiene (water and sanitation), also play role. The different factors work in the same direction and are themselves correlated with per capita GDP, but disentangling them is difficult.

The poor quality of diets is also reflected in micronutrient deficiencies, i.e. the deficiency in vitamins and/or minerals, another dimension of undernutrition also referred to as "hidden hunger," as it is not always easily observed.[294] Micronutrient deficiencies can lead to severe health problems and lead to impaired physical and mental development, imposing high economic and social costs to individuals and countries (at all income levels). At the global level, about 2 billion people suffer from one or more micronutrient deficiencies, with the highest estimated prevalence of inadequate intake being for calcium, iron, vitamin A, folate, zinc, riboflavin, and vitamin B-12.[295] Half the world's children suffer from "hidden hunger," and for the subregions of Africa, the prevalence rates are: 76 percent in Central Africa, 69 percent in Eastern Africa, 47 percent in Northern Africa, 64 percent in Southern Africa, and 67 percent in Western Africa.[296]

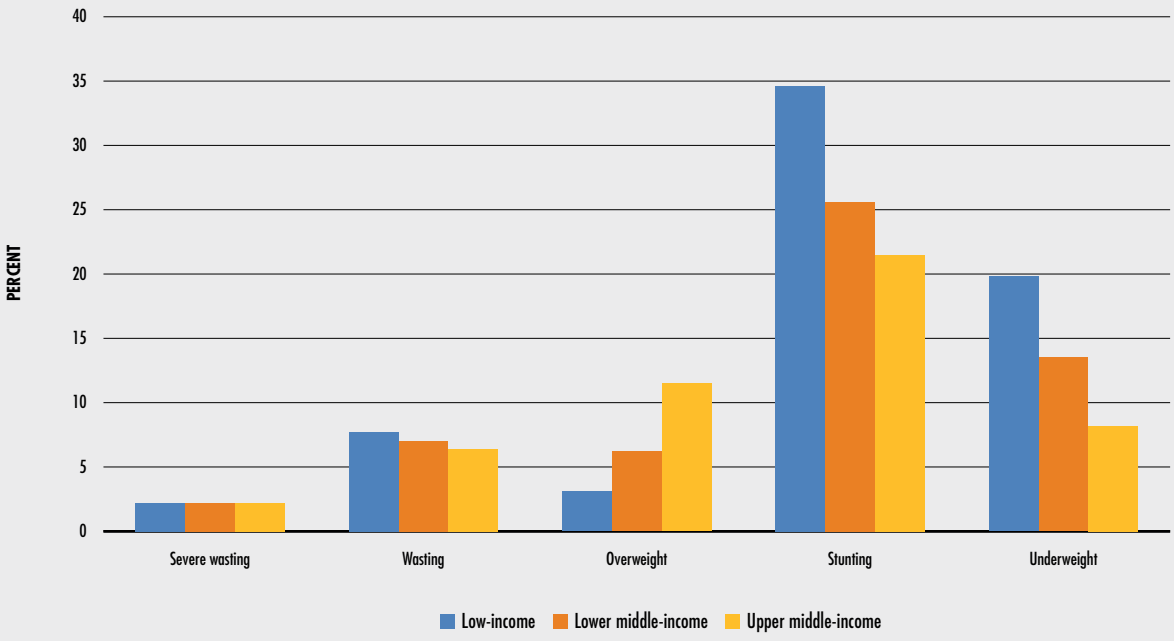
Iron deficiency, the most significant determinant of anaemia,[297] is the most common micronutrient deficiency, affecting more than 30 percent of the world's population. Iron deficiency is interlinked with maternal and child nutrition status and health. Maternal iron deficiency anaemia (IDA) is associated with low birth weight and disease later in life, and mothers with severe anaemia have double the risk of dying during or shortly after giving birth.[298,299] IDA in early life negatively impacts the cognitive and physical development of children, reduces work capacity in adults and results in substantial economic damage at country level.[300,301] The economic costs associated with anaemia have been estimated at 2.4, 2.7 and 4.2 percent of per capita GDP for Egypt, the United Republic of Tanzania and Mali, respectively.[302] »

FIGURE 32
UNDERWEIGHT IN WOMEN OVER THE AGE OF 18 AND ANAEMIA IN WOMEN OF REPRODUCTIVE AGE (15–49), AFRICA, 2016



SOURCE: **UNICEF**. 2019. *The State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world*. UNICEF, New York.

FIGURE 33
INDICATORS OF MALNUTRITION FOR CHILDREN UNDER THE AGE OF FIVE, BY COUNTRY INCOME GROUP (LATEST YEAR AVAILABLE)

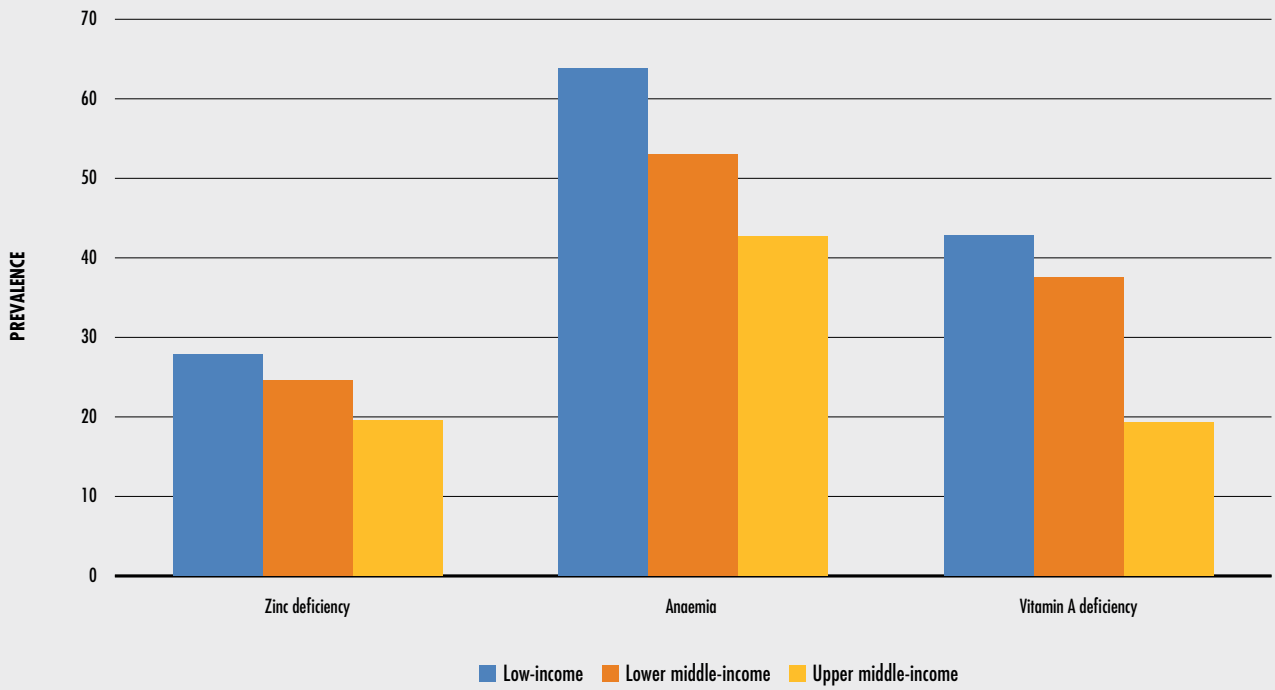


SOURCE: **UNICEF, WHO and International Bank for Reconstruction and Development/World Bank**. 2020. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (April 2020 edition) [online]. [Cited May 2020]. https://data.unicef.org/topic/nutrition/malnutrition/

» Figure 34 shows that, on average, levels of anaemia in children falls with national income, but remains high even in upper-middle-income countries (as was the case for women of reproductive age (Figure 33)). At the country level, for all countries for which there is data, the prevalence of anaemia in children under the age of five is higher than the 20 percent considered a moderate and severe public health threat by the WHO.[303]

Vitamin A deficiency (VAD) is a major nutritional concern affecting mainly children in developing countries, especially sub-Saharan Africa and South Asia. Low vitamin A intake during nutritionally demanding periods in life, such as infancy, childhood, pregnancy and lactation, greatly raises the risk of health consequences, or VAD disorders. VAD of sufficient duration or severity can lead to preventable childhood blindness, anaemia and weakened resistance to infection. Globally, about 30 percent of children under the age of five suffer from VAD, and about 2 percent of all deaths in this age group are attributed to VAD, mostly in sub-Saharan Africa.[304] The prevalence of deficiency was 48 percent in sub-Saharan Africa, while the average was much lower in Northern Africa.[305]

FIGURE 34
AVERAGE PREVALENCE OF DEFICIENCY OF SELECTED MICRONUTRIENTS IN THE POPULATION (IODINE AND ZINC) OR FOR CHILDREN UNDER THE AGE OF FIVE (ANAEMIA AND VITAMIN A), AFRICA (LATEST YEARS)



SOURCE: **WHO**. 2009. *Global prevalence of vitamin A deficiency in populations at risk 1995–2005*. WHO Global Database on Vitamin A Deficiency. Geneva, Switzerland; **Wessells, K.R. & Brown, K.H.** 2012. Estimating the Global Prevalence of Zinc Deficiency: Results Based on Zinc Availability in National Food Supplies and the Prevalence of Stunting. *PLOS One*, 7(11), and **WHO**. 2020. *Prevalence of anaemia in children under 5 years* (%) (March 2020 edition) [online]. [May 2020]. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/4801.

Only few countries (Cabo Verde, Kenya, Libya, Mauritius, Rwanda and the Seychelles) had a prevalence rate of under 10 percent, the WHO threshold for indicating a public health threat (moderate or severe).[306]

Folate,[307] a generic term for vitamin B-9, may be a public health problem that could affect many millions of people, although estimates of deficiency in populations are typically based on small, local surveys.[308] Folate deficiency in pregnancy has also been associated with low birth weight, preterm delivery, and fetal growth retardation.

Vitamin B-12 deficiency is increasingly recognized as a public health problem, although data is rare also for this micronutrient. Vitamin B-12 deficiency impairs child development, and there is some evidence that it can also have other negative health effects.[309] Available evidence shows that the prevalence of vitamin B-12 deficiency is relatively high in Africa. For example, in one school district in Kenya, 30.5 percent of children were found to be severely vitamin B-12 deficient, while another 37.7 percent were found to be moderately deficient.[310] A later study in the same school district reported between 57.5 and 81.8 percent of children as having severe or moderate deficiency in vitamin B 12.[311]

Iodine deficiency is a widespread public health problem for populations in Africa and throughout the world. Iodine deficiency is particularly serious during pregnancy, when iodine requirements rise considerably, and can lead to irreversible neurological complications and mental retardation in the child. Iodine deficiency is the greatest cause of preventable brain impairment in children, which leads to poor school performance, lower productivity in adults and in extreme cases, cretinism.[312,313] Even mild forms of iodine deficiency can harm children's ability to learn.[314] The prevalence of iodine deficiency, measured as low urinary iodine levels, is 33, 39, 43, 45 and 49 percent in Southern, Northern, Eastern, Central and Western Africa, respectively.[315,316]

Zinc is an essential mineral that is critical for immune system function and needed for normal growth and development from *in utero* until puberty. Zinc deficiency is associated with higher incidence of diarrhoea, respiratory illness and malaria infection.[317,318] A statistically significant correlation of zinc deficiency with stunting in children under the age of five was reported by one study.[319] About 17 percent of the world's population is estimated to be at risk of zinc deficiency, while in sub-Saharan Africa this figure is over 25 percent.[320] Only Egypt, Ethiopia, Gabon, Mauritania, Seychelles and Sudan have a low public health risk of zinc deficiency (prevalence < 15 percent), while the public health risk is high (prevalence > 25 percent) in 23 countries.[321]

While child undernutrition and micronutrient deficiencies are high and remain public health issues even in upper-middle-income countries, poor diets are also contributing to rising prevalence rates of child overweight, which is rapidly emerging as an additional health concern. In low-income countries child overweight is still a low public health concern, but it is already a borderline high public health concern in upper-middle income countries (Figure 33).[322] Childhood obesity is a health concern as it may cause breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance and psychological effects. In addition, childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood.[323] In adults, overweight and obesity are significant risk factors for NCDs, of which the major ones are cardiovascular diseases and diabetes mellitus, but there are others such as musculoskeletal disorders and some cancers.[324,325] The leading risk factors for cardiovascular disease in every region of the world are of dietary origin.[326]

A recent study found a significant, positive association between total volume sales of highly processed foods and drinks and mean population BMI for both men and women.[327] Another recent study, using data from the United Republic of Tanzania, South Africa, and peri-urban and rural Uganda, found that dietary patterns characterized by processed foods was associated with overweight and obesity in women and men.[328] On the other hand, a study using a

sample of urban Ghanaian consumers found that what is defined as a "purchase" dietary pattern (associated with sweets, rice, meat, fruits and vegetables) is negatively associated with type 2 diabetes, while the "traditional" dietary pattern (associated with fruits, plantain, green leafy vegetables, fish, fermented maize products and palm oil) was positively associated with type 2 diabetes.[329]

Highly processed foods contain high levels of refined sugars, salt and fats, and the excessive consumption of these nutrients leads to overweight, obesity, and certain diet-related NCDs, such as coronary heart disease (CHD), stroke, and diabetes mellitus. For example, one study found that the consumption of processed meats is associated with significantly higher incidence of both CHD and diabetes mellitus, with 42 percent and 19 percent higher risk, respectively, per 50-g serving per day. However, the same study did not find an association for unprocessed red meats and CHD, while the trend toward higher risk of diabetes mellitus was not significant, at 50-g per day.[330] Although it is important to make a distinction between processed and unprocessed meat products, it is nevertheless the case that excessive consumption of livestock products is associated with a variety of NCDs. While food-based dietary guidelines vary in their recommended meat intake, a recent expert report by the World Cancer Research Fund and the American Institute for Cancer Research recommends that red meat intake should not exceed 350 to 500 grams of cooked meat per week and that little or no unprocessed meat should be consumed.[331]

Recent evidence shows that the body mass index is rising at the same rate or faster in rural areas as in urban areas, particularly in low- and middle-income countries.[332] However, in sub-Saharan Africa the rural-urban differences are narrowing only for men but not women.[333] This apparent rural-urban convergence is attributed to the "urbanization of rural life," in that rising incomes and changing agricultural technologies have changed physical activity levels also in rural areas, and diets include a higher intake of calories in the form of processed foods, notably refined carbohydrates.

Processed foods, including highly processed foods, have become common in urban as well as rural markets. Even the rural poor are buying some processed foods.[334] The (limited) available evidence suggests that the penetration of processed food does not differ much over income terciles in Africa, in part because time constraints affect women across the income spectrum.[335]

Other factors also play a role, and a review of studies concluded that being female, aged, an urban resident, having a higher socio-economic status and spending more time watching TV were the key drivers of overweight and obesity.[336] In addition to the above-named factors, a preference for larger body sizes has been found to be a factor in explaining overweight in some countries, in particular in Southern and Western Africa.[337,338,339,340]

Per capita GDP reflects many of the underlying changes that are driving the nutrition transition and the rise in overweight and obesity (Table 17). The prevalence of obesity is higher for women at all income levels. However, with higher levels of per capita GDP, the socio-economic background of the obese tends to shift from higher- to lower-income households. This shift appears to happen earlier for women than for men,[341] although the cut-off point is sensitive to the definition of country income.[342,343] A recent study found that for Africa, countries in the upper-middle-income group and about half in the lower-middle-income group are above the national income point that defines the switch point.[344] However, research on this issue is limited and may vary by country. For example, evidence for South Africa finds that obesity is correlated with income/wealth but that this is more pronounced for men than women.[345,346]

Dietary diversity is an essential part of healthy diets

The preceding sections showed that, in broad terms, diets lack diversity and that the intake of fruit and vegetables and animal-source foods are low, while the intake of energy-dense foods of minimal nutritional value are relatively high in Africa. Diets that lack variety and do not include sufficient nutritious foods, together with the lack of knowledge of optimal dietary practices,

TABLE 17
PREVALENCE OF ADULT OBESITY BY COUNTRY INCOME GROUP, 2016

	Prevalence of obesity for:			
	All adults	Males	Females	Gap: female-male
Low-income	**7.6**	**3.5**	**11.4**	**7.9**
Lower-middle-income	**14.0**	**7.8**	**25.8**	**18.0**
Upper-middle-income	**19.1**	**11.4**	**26.4**	**15.0**

SOURCE: **WHO**. 2020. *Prevalence of obesity among adults, BMI ≥ 30, age-standardized Estimates by country* [online]. [June 2020]. https://apps.who.int/gho/data/view.main.CTRY2450A?lang=en

malabsorption, as well as a high incidence of infectious diseases, are the main causes of micronutrient deficiencies. Dietary diversity has been shown to be an important factor in determining the nutritional status and health of individuals. For example, dietary diversity, independently of the prevailing socioeconomic factors, is positively correlated with the nutritional status of children in Burkina Faso, Ghana, Kenya, Mali, urban Madagascar, Nigeria, Rwanda, the United Republic of Tanzania and Zimbabwe.[347,348,349,350,351,352,353]

Both meat and many plants contain high levels of important micronutrients. However, micronutrients in plants are often poorly absorbed while their bioavailability from animal-source food (ASF) is high. Compared to plant-based diets, ASF contain more preformed vitamin A (retinol), vitamins D and E, riboflavin, calcium, and iron and zinc in forms that are better absorbed from the diet.[354,355,356,357]

Seminal research conducted in the 1980s by the Nutrition Collaborative Research Support Programme found that vitamin A, vitamin B-12, riboflavin, calcium, iron and zinc were particularly low in the mostly vegetarian diets of schoolchildren in rural Egypt, Kenya and Mexico. Because animal source foods are a particularly rich source of all six of these nutrients, and because relatively small amounts of these foods, added to a vegetarian diet, can substantially increase nutrient adequacy, they can effectively improve infant growth, starting *in utero*.[358,359] Evidence from Sidamo province, Ethiopia, shows a lack of animal-source food in diets to be a significant contributing factor to zinc deficiency in pregnant women.[360] With regard to vitamin B-12, animal-source foods are the only natural food source, and deficiency in this vitamin is high in population groups with low intakes of ASF.[361]

Because ASFs are dense sources of energy and high-quality protein and also provide a variety of essential micronutrients, they are of particular importance for population groups with limited food intake capacity relative to their needs, such as young children, and pregnant and lactating women. Relatively small amounts of meat and/or milk can provide large amounts of the required protein and several micronutrients. For example, 100 grams of cooked beef provides an entire day's recommended intake of protein, vitamin B-12 and zinc, and contributes substantially to meeting the riboflavin and iron recommendations. Similarly, 100 grams of milk provides substantial amounts of calcium, vitamin B-12, vitamin A and riboflavin.[362] Meeting the requirements of young children must also include improving their mothers' diets.

For these reasons, small increases in animal-source foods can substantially improve the nutritional adequacy of poor and vulnerable people in most low-income countries, and of population groups with higher nutrient requirements, such as infants and women of reproductive age.[363] Several studies show that animal-source foods have a statistically significant association with better growth, cognitive function, activity, pregnancy outcome and morbidity, even when accounting for

socio-economic status and other factors, such as parental literacy.[364,365,366,367] Fish is also an important source of many nutrients, including protein of high quality, retinol, vitamins D and E, iodine and selenium. However, in general, fish consumption is low in Africa but accounts for more than half of animal protein in 14 countries and is nutritionally important, especially in low-income countries.[368] Evidence from Zambia documented that children whose main staple food is cassava and whose diets regularly include fish and other foods containing high quality protein had a significantly lower prevalence of stunting than those whose diets did not.[369] Significant amounts of micronutrients are found in parts of the fish that are discarded. In some countries these parts are ground into powder to use as condiment, and fish powder can be beneficial in school feeding programmes.[370]

However, excessive consumption of processed and unprocessed red meats comes with large health and environmental costs, which are already affecting many African countries in the lower- and upper-middle-income group, better-off households and especially women. These important costs involved with animal-source foods is further discussed in the section "Health and Environmental costs of current food consumption patterns" below.

Malnutrition is a major contributor to the burden of disease in Africa

The preceding analysis showed that, based on the available indicators, undernutrition and micronutrient deficiencies are widespread in Africa and are often a significant public health concern. In addition, overweight is already high in some countries and a rising concern in many others. The focus was on identifying broad patterns of association between diets and income and the corresponding association between malnutrition, income, diets, urbanization and education.

While this gives a better understanding of the situation and trends of malnutrition in Africa, it does not identify, in some objective way, which risk factors are relatively more burdensome. With regard to health costs, this can be done using Disability Adjusted Life Years (DALYs), which allow for an assessment of the severity of different types of malnutrition and dietary patterns using a common metric. DALYs can be thought of as a non-monetary measure of broader welfare losses. One DALY is one lost year of "healthy" life, and the sum of these DALYs across the population can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences.[371]

Estimating DALYs due to risk factors is done by comparing the disease burden in a group exposed to a risk factor with the disease burden in a group that had zero exposure to that risk factor.[372] When necessary, the level of minimum exposure required for the best health outcomes may be determined and used in place of the group with zero exposure. DALYs can therefore be thought of as the additional years of healthy life if the particular risk factor could have been avoided.

Figure 35 below shows the relative importance of the seven most highly ranked health risk factors in Africa in 1997 and 2017. At the continental level, child undernutrition and low birth weight were and remain the most common risk factors causing premature death and disability. However, it also emerges that dietary risks and high body mass index are increasingly highly ranked risk factors.

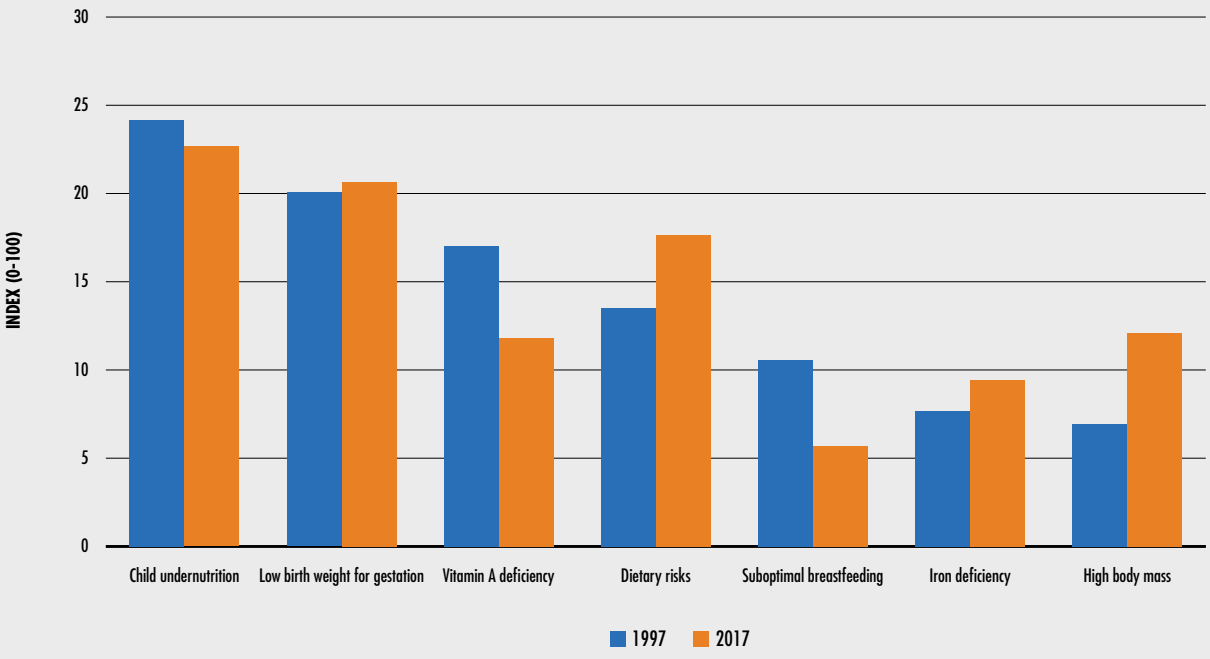
Figure 36 shows the percentage each risk factor contributed to the overall DALYs by country income group. For low-income countries, child undernutrition (the aggregate of wasting, underweight and stunting), low birth weight and micronutrient deficiencies contribute 29.4 percent of the DALYs lost compared to 6.9 percent for dietary risks and high body mass index combined. As national incomes rise, the relative weights change quickly. In lower-middle-income countries child undernutrition, low birth weight and micronutrient deficiencies account for 17.3 percent of DALYs, and in upper-middle-income countries, they account for

10.8 percent, while dietary risks plus high body mass index account for 15.0 and 19.4 percent in lower-middle-income and upper-middle-income countries, respectively.

Summary

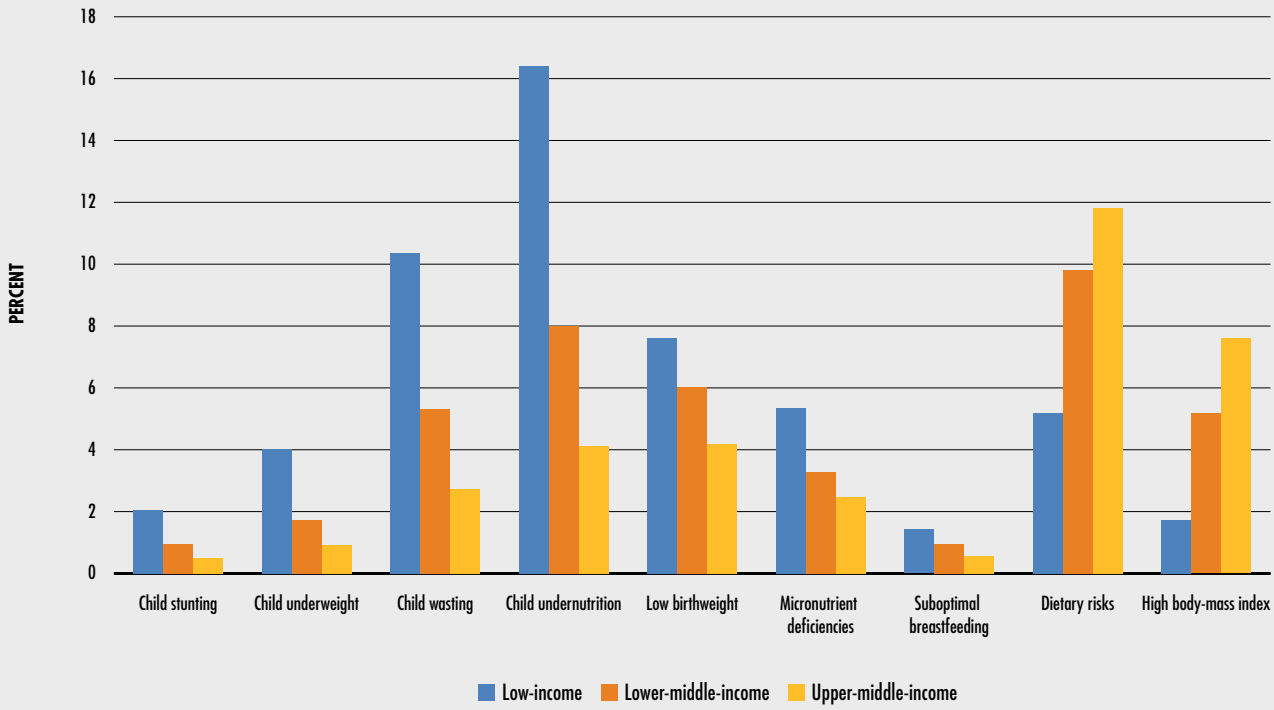
Maternal and child undernutrition as well as micronutrient deficiencies are high and widespread in Africa. The situation improves with income, but prevalences remain high even in upper-middle-income countries. At the same time, overweight is already a serious health concern in many countries and is rapidly increasing in others. These outcomes are in line with the food consumption patterns outlined in the previous section: dietary diversity is relatively low in Africa due to the low levels of consumption of nutritious foods, especially ASF. The food system does not generate healthy diets at the moment and the costs, in terms of disability adjusted life years, is very high. Child undernutrition and low birth weight weigh most heavily in the region's burden of disease, but as countries develop, the relative disease burden of child undernutrition falls while that of dietary risks and high body mass index rises steeply. Undernutrition, micronutrient deficiencies and overweight are linked to the food we eat, and improving diets will also require good nutrition governance, multisectoral collaboration, and incentivizing the private sector to produce and market nutritious foods. ■

FIGURE 35
RELATIVE IMPORTANCE OF THE SEVEN MOST HIGHLY RANKED HEALTH RISK FACTORS IN AFRICA FOR 1997 AND 2017



NOTES: The index is based on the weighted rankings (1–7) of each risk factors.
SOURCE: **Institute for Health Metrics and Evaluation (IHME)**. 2020. *GBDx Results Tool* [online]. [Cited June 2020] http://ghdx.healthdata.org/gbd-results-tool.

FIGURE 36
PROPORTION OF DALYS FOR ALL AGES, CONTRIBUTED BY KEY NUTRITION-RELATED RISK FACTORS PRESENTED INDIVIDUALLY BY COUNTRY INCOME GROUP, AFRICA, 2017



SOURCE: **Institute for Health Metrics and Evaluation (IHME)**. 2020. *GBDx Results Tool* [online]. [Cited June 2020]. http://ghdx.healthdata.org/gbd-results-tool.

TOWARD HEALTHY DIETS FROM SUSTAINABLE FOOD SYSTEMS

The previous sections showed that there is considerable malnutrition across countries in Africa. Most countries suffer multiple burdens of malnutrition, regardless of national income (Table 18). Indeed, in very many African countries a significant proportion of the population suffers not only from undernutrition, but also from micronutrient deficiencies and increasingly from overweight as well. Multiple burdens of malnutrition are observed even within the same household, where overweight mothers have stunted children. In Egypt, data for 2008 found that in 5.6 percent of households the mother was obese while a child was stunted.[373]

The poor nutrition outcomes align with the food consumption patterns outlined previously which showed that diets fall short of current WHO dietary guidelines (see Box 3) and that diets systematically varied by income and education and, for some items, by location (rural/urban). Poor diets are a major cause of malnutrition because they do not provide the necessary macro and/or micronutrients, and because they make

individuals, and in particular children, more vulnerable to disease and less able to overcome disease. Changes to African food systems are needed to provide healthy diets to all Africans at all times. One of the biggest challenges to achieving this is the cost and affordability of healthy diets which are important determinants of food choices; as such, they affect food security, nutrition and health. The cost refers to what people pay to secure a specific diet; affordability, on the other hand, is the cost of the diet relative to income.

Changes to food systems in Africa are necessary if they are to provide nutritious foods that are accessible to all. However, current production and consumption patterns in Africa are not only associated with poor nutrition outcomes: they also carry hidden[374] but substantial health and environmental costs. It is important to recognize this and understand that the food system is not only key in addressing the food security and nutrition targets of the SDGs, but also plays a role in achieving health and climate-related SDGs (SDG 3 and SDG 13, respectively). Transforming the food system for healthy diets for all must consider the relevant trade-offs and synergies with other SDGs and in particular include provisions for the environmental sustainability of food systems.

The hidden health and environmental costs associated with the food system are not incurred in the actual production and consumption of food and thus are not reflected in food prices. However, these costs do translate into real costs for individuals and society. If they were included in the price of food, production and consumption decisions would be made based on the full cost of food. In the next two sections the issues of the cost and affordability as well as the health and environmental costs associated with different types of diets are further elaborated.

The relative cost of nutritious food and healthy diets

Evidence shows that the cost and affordability of a diet is linked to the diet quality and to food security and nutrition outcomes, including both stunting and obesity. For example, there is evidence that lower prices of milk, eggs and fortified infant cereals help reduce stunting.[375,376] A recent study on children aged 6 to 23 months found that consumption of ASF was associated with reduced stunting but that consumption was low in large part because products such as fresh milk and eggs were very expensive.[377] Another study calculated the relative caloric prices as the ratio of the three cheapest products in each of 21 specific food groups, relative to the weighted cost a of basket of starchy staples.[378] Figure 37 presents a selection of these products by country income groups. Oil/fats and sugar are the cheapest source of calories, and are cheaper than starchy staples as they have a relative cost of calories ratio of under one. Red meat too is relatively cheap, while fruit, vegetables and other animal-source foods are relatively expensive, and

TABLE 18
AVERAGE NUMBER OF MALNUTRITION BURDENS OUT OF A POSSIBLE FOUR (STUNTING, WASTING, ANAEMIA AND OVERWEIGHT IN CHILDREN UNDER THE AGE OF 5)

	Average number of malnutrition burdens
Low-income	2.9 (2.8)
Lower-middle income	3.0 (2.8)
Upper-middle income	3.2 (2.9)

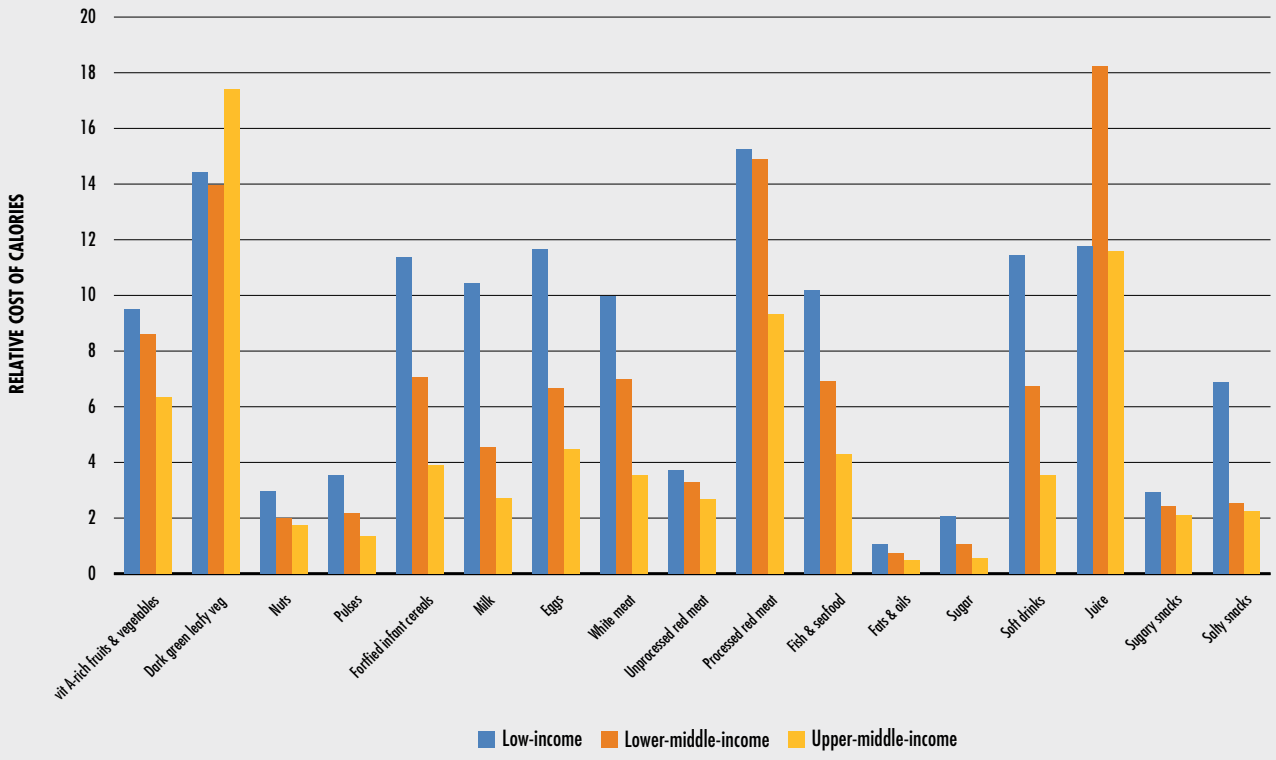
NOTES: The cut-off points used for defining nutrition burdens are: medium prevalence of stunting > 10 percent; medium prevalence of wasting > 5 percent; medium prevalence of anaemia > 20 percent, and medium prevalence of overweight > 5 percent. This follows the approach taken in **UNICEF**. 2019. *The State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world*. New York, USA. The figures in brackets are obtained when using a higher cut-off point of 20 percent for stunting.
SOURCE: For stunting, wasting and overweight in children under the age of five: **UNICEF, WHO and International Bank for Reconstruction and Development/World Bank**. 2019. *UNICEF-WHO-The World Bank: Joint child malnutrition estimates – Levels and trends* (March 2020 edition) [online]. https://data.unicef.org/topic/nutrition, www.who.int/nutgrowthdb/estimates, https://data.worldbank.org. For prevalence of anaemia in children under the age of five: **WHO**. 2020. Global Health Observatory. (March 2020 edition) [online]. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/4801.

dark green leafy vegetables are very expensive. The figure shows that for most food products the relative price of calories is strongly related to country income levels.

There is also evidence that overweight and obesity are influenced by prices, apart from other socio-economic factors. Sugar-sweetened beverages, but also other energy-dense and nutrient-low processed products, such as snacks, have become widely available in Africa and are linked to the rising levels of overweight and obesity. Often, these products are relatively cheap compared to healthier drinks or food products.

A study for Egypt found a significant and inverse relationship between the mother's body mass index and the price of *baladi* bread and fully and partially subsidized sugar. At the time, subsidies made calories from these energy-dense but nutrient-poor items very cheap, leading to their excess consumption and contributing to the high levels of overweight and obesity in the country.[379] Another recent study relates the increases in

FIGURE 37
THE AVERAGE COST OF THE THREE CHEAPEST FOOD PRODUCTS IN EACH FOOD CATEGORY RELATIVE TO THE COST OF A WEIGHTED BASKET OF STARCHY STAPLES, BY COUNTRY INCOME GROUPS (INCLUDES ALL DEVELOPING COUNTRIES).



NOTES: Based on data from 176 countries.
SOURCE: **Headey, D.D. & Alderman, H.H.** 2019. The Relative Caloric Prices of Healthy and Unhealthy Foods Differ Systematically across Income Levels and Continents. *The Journal Nutrition*, 1:149(11): 2020–2033 [online]. [Cited June 2020]. doi: 10.1093/jn/nxz158

overweight and obesity in lower-middle-income countries primarily to rapid changes in the food system, particularly the availability of cheap highly processed food and sugar-sweetened beverages.[380]

Several studies have shown that nutritionally desirable diets are more expensive than diets that are energy adequate only.[381] One study found that for South Africa, a healthier diet costs 69 percent more than a diet consisting of typically consumed food. For households below the median household income, the increased expenditure on nutritious food represents 57 percent of total household income.[382]

New analysis presented in *The State of Food Security and Nutrition in the World 2020* provides further evidence on the link between the cost and affordability of diets and nutrition outcomes. The analysis is based on three distinct diets:

- The **"Energy sufficient diet"** ensures adequate calories for energy balance for work each day. This is achieved using only the basic starchy staple for a given country, such as maize, porridge or rice only.

- The **"Nutrient adequate diet"** not only ensures adequate calories (as per the energy sufficient diet above), but also adequate nutrients through a balanced mix of carbohydrates, protein, fat, essential vitamins and minerals, within the upper and lower bounds needed to prevent deficiencies and avoid toxicity.

- The **"Healthy diet"**[383] not only ensures adequate calories and nutrients (as per the energy sufficient and nutrient adequate diets above), but also includes a more diverse intake of foods from several different food groups. This diet is intended to meet all requirements of nutrient adequacy and to help prevent malnutrition in all its forms, as well as NCDs.[384]

The healthy diet is guided by global guidelines[385] and is nationally adapted to a country's individual characteristics, cultural context, locally available foods and dietary customs through national food-based dietary guidelines (FBDG). At this time, though, there are relatively few countries that have quantified national FBDGs.[386] Therefore, the healthy diet adopted for the cost and affordability analysis in the *The State of Food Security and Nutrition in the World 2020* is guided by recommendations from ten national FBDGs, which represent a range of dietary recommendations articulated by countries and are locally adapted to each country through the assignment of the least costly food item available for a particular food group.[387]

Healthy diets are expected to be more expensive, as existing studies have shown that the cost of nutritious foods, such as fruits, vegetables, and animal-source foods, is typically higher than the cost of more energy-dense foods high in fat, sugar and/or salt, and micronutrient-poor foods, such as starchy staples, oil and sugar. However, these costs vary by national income levels.[388,389,390,391]

On a per calorie basis, most nutritious foods are more expensive in poorer countries, although there are some exceptions. Nutritious foods are often highly perishable and less tradable, and their prices are therefore to a large part determined by local productivity and supply chain efficiency, including transport and cold chains.[392,393]

Most evidence on the relative cost of nutritious foods is based on individual food items and/or food groups, and there is limited evidence comparing the costs and affordability of diets as a whole. Analyses of economic access to food have been limited to either income or food price indexes that are defined in ways that do not clearly relate to healthy diets.

The State of Food Security and Nutrition in the World 2020 focuses on bridging these gaps, and in this regional edition, the new insights into the cost and affordability of three diets of increasing diet quality are reviewed in the African context.[394] The three diets are theoretical and do not necessarily represent diets currently consumed. They do however give a measure of the cost and affordability of a very basic diet (the energy sufficient diet) to two diets that are progressively healthier, i.e. the nutrient adequate diet and the healthy diet.

Table 19 shows that for Africa, the average cost increase with the quality of the diet. Across all income groups, the nutrient adequate and healthy diet are three and over five times more expensive than the energy sufficient diet, respectively.[395] The ratios are relatively consistent across Africa and the subregions but fall as national incomes rise. For example, the ratio of the healthy to energy sufficient diet is 5.7 for low-income countries, 5.0 for lower-middle-income countries, and 4.3 for upper-middle-income countries.

The cost of a healthy diet is broken down by food group in Figure 38, which shows the cost of the different food-groups that are part of the healthy diet on a per person per day basis. Dairy products are the most expensive food group in all subregions of Africa, followed by protein (from animal and plant sources), fruit and vegetables. Relatively cheaper are starchy staples, while fats are cheapest.

Figure 39 shows that there are some variations across subregions in the share of the cost of specific food groups in the total average costs of a healthy diet, with vegetables accounting for a relatively (compared to other subregions) lower share in Eastern and Northern Africa, fruit having a relatively higher share in Northern and Southern Africa, and dairy products making up a relatively smaller share in Northern and Southern Africa. The right-hand panel of Figure 39 shows that as national incomes rise, fruit and vegetables take a progressively larger share in the total cost of a healthy diet, while the cost share of dairy products falls steadily.

Assessing the affordability of healthy diets

The affordability of the three diets is assessed in terms of income and household food expenditure levels. Table 20 gives the estimates of the prevalence and the total number of people

TABLE 19

THE COST OF A HEALTHY DIET IS ALMOST DOUBLE THE COST OF THE NUTRIENT ADEQUATE DIET AND FIVE TIMES THE COST OF THE ENERGY SUFFICIENT DIET BY REGION/SUBREGION AND INCOME GROUP, IN USD PER PERSON PER DAY, 2017

Regions/subregions	Energy sufficient diet	Nutrient adequate diet	Healthy diet
World	0.79	2.33	3.75
Africa	0.73	2.15	3.87
Northern Africa	0.75	2.90	4.12
Sub-Saharan Africa	0.73	2.06	3.84
Eastern Africa	0.61	1.98	3.67
Central Africa	0.73	2.09	3.73
Southern Africa	0.86	2.29	3.99
Western Africa	0.80	2.05	4.03
African Low-Income Countries	0.67	1.93	3.78
African Lower-Middle-Income Countries	0.76	2.37	3.89
African Upper-Middle-Income Countries	0.83	2.28	4.10

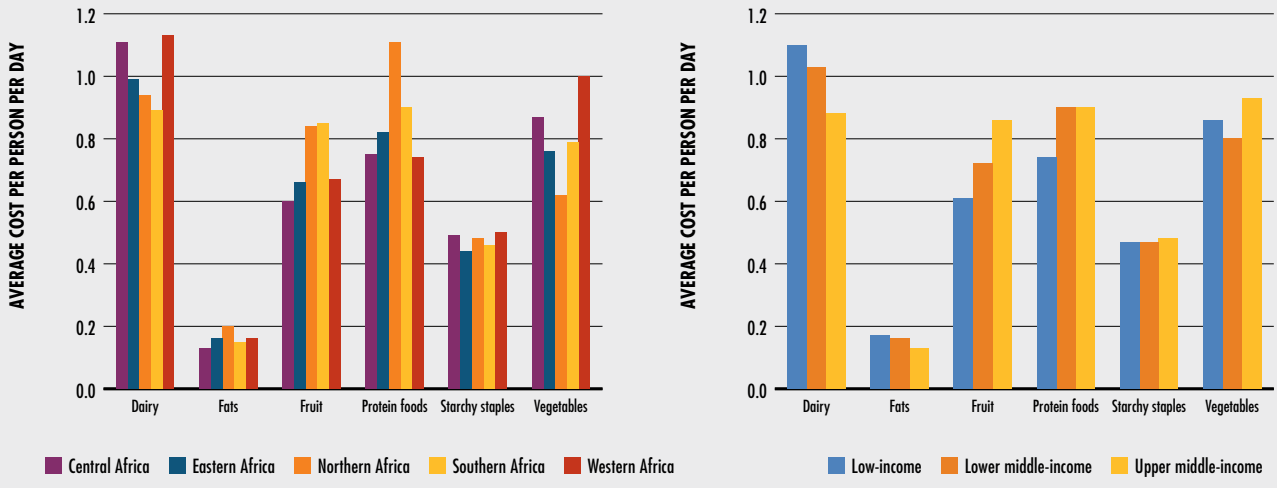
NOTES: The table presents the average USD cost per person per day of the three diets (energy sufficient, nutrient adequate and healthy) by region and development context in 2017. Country-level estimated costs of the diets are computed at the mean for the cost of energy sufficient and the cost of nutrient adequate diets, and at the median value for the cost of healthy diets. The cost of each diet represents a simple average of the cost incurred by countries belonging to a specific region or income group. See Annex 3 in **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en) for a full description of the cost methodology and data sources. FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

for whom each of the three levels of diet quality is not affordable if they spend 63 percent of their income on food (see notes to Table 20). The table shows that more than 3 billion people in the world could not afford a healthy diet in 2017. In Africa, nearly three-quarters of the population cannot afford the healthy diet. Moreover, more than half of all Africans cannot afford a nutrient adequate diet, whereas 11.3 percent cannot afford the energy sufficient diet. Of the globally 185.5 million people who cannot afford the energy sufficient diet, 80 percent live in Africa.

Another way of measuring access to healthy diets is to compare the cost of diets with a food poverty line. For the purpose of comparability, this food poverty line is based on the World Bank's extreme poverty line of USD 1.90 PPP per capita per day. However, the available evidence shows that the poorest people in low-income countries spend, on average, 63 percent of their incomes on food with the rest spent on other basic needs, such as housing, health, education and transport.[396] The resulting food poverty line of USD 1.20 PPP per capita per day is therefore the upper bound portion of the poverty line that can be credibly reserved for food.

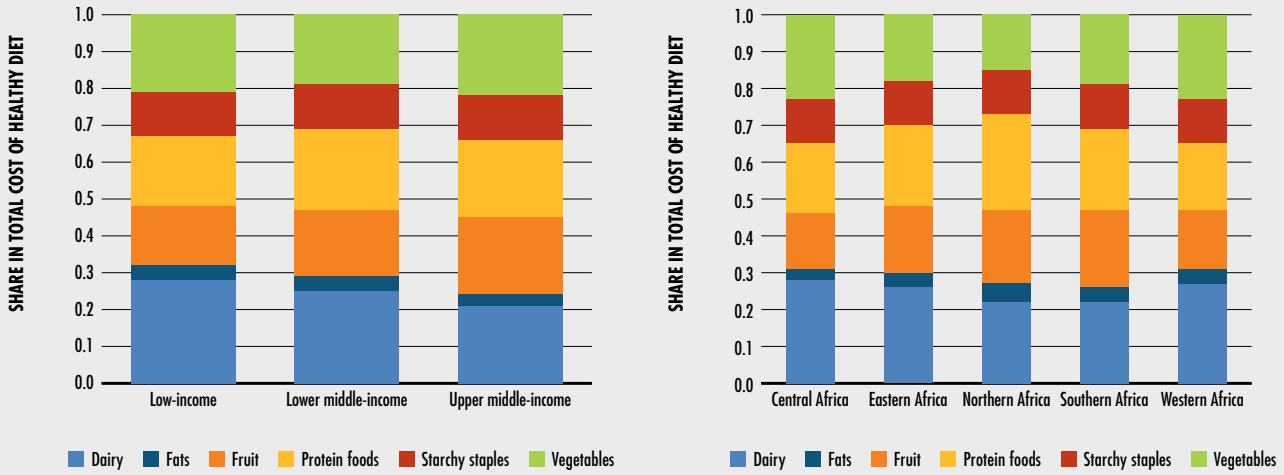
In low-income African countries, the energy sufficient diet costs about 56 percent of the USD 1.20 PPP per capita per day food poverty line, and in lower- and upper-middle-income African countries, the share is 64 percent and 70 percent, respectively (Figure 40). For low-income countries, the share shows little variation by subregion. Figure 40 also shows that the cost of nutrient adequate and healthy diets significantly exceeds the food poverty line. »

FIGURE 38
AVERAGE COST PER DAY OF A HEALTHY DIET FOR KEY FOOD GROUPS BY REGION AND BY COUNTRY INCOME GROUP, AFRICA (USD PER PERSON PER DAY, 2017)



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

FIGURE 39
SHARE OF FOOD GROUPS IN TOTAL AVERAGE COST OF A HEALTHY DIET, BY SUBREGION AND BY COUNTRY INCOME GROUP



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

TABLE 20
ALMOST THREE QUARTERS OF THE POPULATION IN AFRICA CANNOT AFFORD A HEALTHY DIET, 2017

	%	Total number (Million)	%	Total number (Million)	%	Total number (Million)
	Energy sufficient diet		Nutrient adequate diet		Healthy diet	
World	4.6	185.5	23.3	1513.0	38.3	3021.5
Africa	11.3	148.6	51.0	680.6	73.8	964.8
Northern Africa	1.4	2.9	29.2	84.3	46.0	136.1
Sub-Saharan Africa	12.5	145.8	53.4	596.3	76.9	828.8
Eastern Africa	9.4	28.9	53.9	224.2	75.3	325.1
Central Africa	18.5	27.9	59.8	112.5	78.5	142.4
Southern Africa	10.0	11.1	41.7	33.8	64.3	40.3
Western Africa	13.1	77.9	53.5	225.8	81.6	320.9
African Low-Income Countries	13.7	46.5	64.4	336.9	88.6	472.5
African Lower-Middle-Income Countries	10.9	91.3	45.5	310.3	68.4	441.9
African Upper-Middle-Income Countries	4.4	10.9	18.8	33.5	36.9	50.4

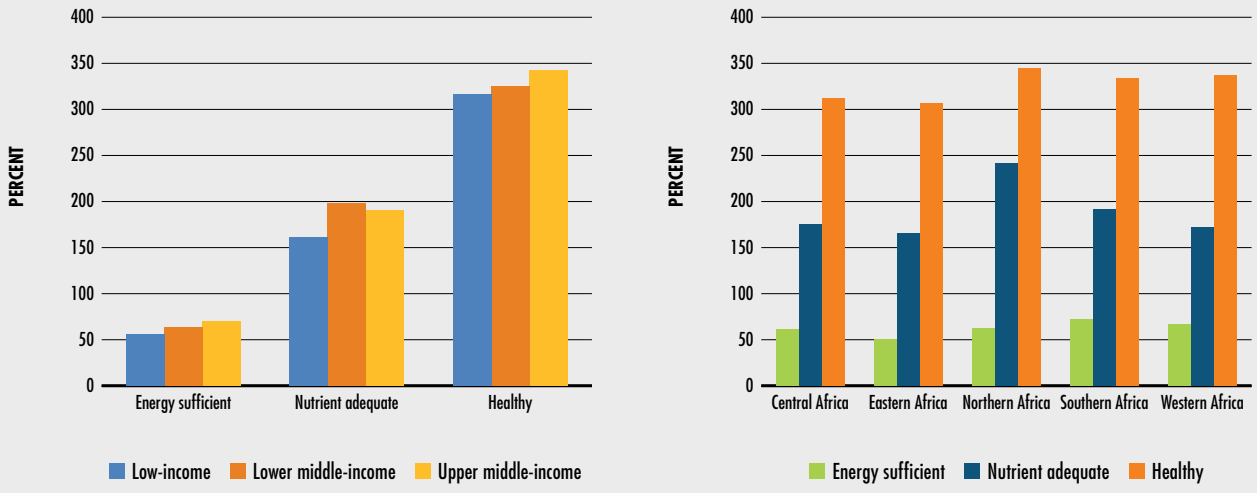
NOTES: The table presents the average percentage (%) and the total number (million) of population in each region and country income group who cannot afford the three reference diets (the energy sufficient diet, the nutrient adequate diet and the healthy diet) in the year 2017. This measure of affordability compares the cost of each diet with the average estimated income in a given country, under the assumption that 63 percent of the income available can be credibly reserved for food. A diet is considered unaffordable when its cost exceeds the 63 percent of the average income in a given country. This chosen percentage represents the food share expenditure of the poorest segment of the population in low-income countries, according to the World Bank. See FAO, IFAD, UNICEF, WFP & WHO. 2020. The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en)
FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

» National poverty lines, because they are designed to reflect basic needs, including food, are often the basis for programme targets and social safety net programmes, but the evidence provided in this report indicates that such poverty lines do not support a nutrient adequate or a healthy diet in any African country.

Finally, Figure 41 shows the cost of the three diets as a share of the country-level average daily household food expenditure, averaged over country income groups. The cost of the energy sufficient diet amounts to 41 percent of average household food expenditures in low-income countries. However, in two low-income countries (Liberia and Togo), the cost of the diet exceeds average household food expenditure. This share falls steadily with higher levels of development, but still accounts for a fifth of average household food expenditure in upper-middle-income countries. The cost of nutrient adequate diets exceeds average food expenditures by 17 percent in low-income countries and are 70 and 40 percent of average food expenditure in lower-middle-income and upper-middle-income countries, respectively. The cost of the healthy diet is over two times the average daily household food expenditure in low-income countries and is 71 percent of average food expenditure even in upper-middle-income countries. However, in only 15 countries[397] (only one of which is a low-income country) is the cost of the healthy diet lower than average household food expenditure.

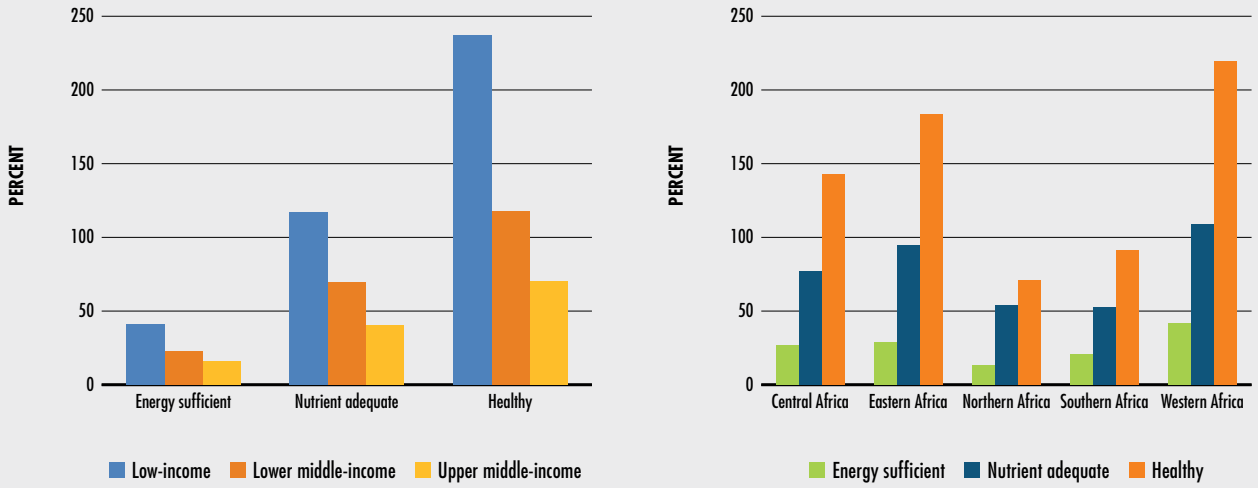
At the subregional level, all three diets are substantially more affordable in Northern and Southern Africa, regions that are mostly made up of lower-middle-income and upper-middle-income countries. Northern and

FIGURE 40
AVERAGE COST OF THE THREE DIETS AS A PROPORTION OF THE USD 1.20 PPP FOOD POVERTY LINE, BY COUNTRY INCOME GROUP FOR AFRICA (LEFT PANEL) AND SUBREGION (RIGHT PANEL), 2017



NOTES: FAO uses the M49 country and regional groupings, available at http://www.fao.org/documents/card/en/c/ca9692en). https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

FIGURE 41
AVERAGE COST OF DIETS AS A PERCENTAGE OF HOUSEHOLD FOOD EXPENDITURE, BY COUNTRY INCOME GROUP FOR AFRICA (LEFT PANEL) AND SUBREGION (RIGHT PANEL), 2017



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

Southern Africa are the only regions where the healthy diet is, on average, affordable, i.e. less than 100 percent of average daily household food expenditure. All three diets are least affordable in Western Africa.

The evidence presented here clearly shows that the cost of healthy diets must fall considerably to be affordable to the vast majority of Africans. In particular, nutritious foods that contribute to healthy diets, including vegetables, protein-rich foods, dairy and fruit must become cheaper. Providing food based dietary guidelines and influencing consumer behaviour are important but can ultimately only be effective when consumers can afford to buy the recommended diets.

The evidence presented earlier on shows that a majority of Africans cannot afford a healthy diet and many cannot even afford an energy sufficient diet. Raising incomes and eradicating poverty are of course essential to making healthy diets affordable, but that dimension is beyond the scope of this report. The focus is on policies and interventions targeting food systems that can remove or reduce supply side constraints which contribute to the relatively high cost of nutritious foods and which cause African countries to have relatively high food prices for a given income level (see Figure 2). The key supply side food system shortcomings were discussed above and are revisited at the beginning of the next section. In addition, demand side policies and interventions are needed to ensure access to nutritious food for the poorest and to influence consumer behaviour and the food environment in a manner compatible with healthy diets. The relevant policies and interventions needed to address these constraints are presented in the section "Transforming food systems to deliver healthy diets for all."

Health and environmental costs of current food consumption patterns

Poor diets are a key driver of malnutrition and very considerable health costs, as reflected in the DALYs attributed to, for example, child undernutrition, high body mass index and dietary risks. Poor quality diets do not only cause higher levels of disability and mortality, but also incur economic costs, such as lower lifetime earnings, loss of productivity and the costs of informal care. Poor maternal nutrition, infant feeding and care practices can result in stunting which has been recognized to affect a child's cognitive development later on as well as lower

productivity and wages in adulthood.[398,399,400,401,402] The loss in adult income from being stunted is estimated to be 22.2 percent annually in developing countries.[403] For Africa, productivity losses ascribed to adults who suffered from stunting in their childhood is estimated to lower today's per capita GDP by about 9 to 10 percent.[404] Another study estimates that undernutrition will reduce GDP by up to 11 percent by 2050 in Africa.[405]

In addition, overweight is associated with NCDs which have risen by 67 percent between 1990 and 2017 in Africa. Much of this increase is due to population growth and ageing, but also the incidence of NCDs in the population rose from 18.6 percent in 1990 to 29.8 percent in 2017. For example, overweight is associated with cardiovascular disease, which is a risk factor for diabetes, and the prevalence of diabetes has increased from 3.1 percent in 1980 to 7.1 percent in 2014.[406] Diabetes is estimated to cost USD 19.5 billion in sub-Saharan Africa (1.2 percent of cumulative GDP). Without intervention, this cost is estimated to absorb from 1.1 to 1.8 of GDP by 2030.[407] Southern Africa is the most affected subregion in sub-Saharan Africa, and it has the highest rates of diabetes and cardiovascular disease.[408]

Although they do not include all aspects of the health costs incurred, estimates presented in the *State of Food Security and Nutrition in the World 2020* project that the health costs associated with current food consumption will reach USD 1.3 trillion in 2030.[409] Of that figure, 57 percent is due to direct healthcare costs and 43 percent due to indirect costs, including losses in labour productivity (11 percent) and informal care (32 percent).

The food system also causes costly damage to our planet. For example, from 2007 to 2016 the food system was responsible for 21 percent to 37 percent of Green House Gas (GHG) emissions related to human activity. Of these GHG emissions, 10 percent to 12 percent originated in crop and livestock production at the farm gate (with the largest contribution coming from beef and lamb production); 8 percent to 10 percent from land use change (including deforestation and peatland degradation); 5 percent to 10 percent in supply chain activities (including from food loss and waste).[410] Population growth will require food production to increase by about 50 percent by 2050,[411] which will, everything else being equal, raise the level of emissions and put additional pressure on biodiversity (Box 7), soil and water quality. »

BOX 7
FOOD SYSTEMS AND BIODIVERSITY

Biological diversity (biodiversity), within and among species, is essential for ecosystems to function efficiently and sustainably.[412] In turn, ecosystem services are fundamental to the functioning of food systems, providing nutritious food and clean water, soil formation, regulating disease, climate, crop pollination and providing material for crop breeding.

Biodiversity, and more specifically agrobiodiversity,[413] helps maintain and improve soil fertility as well as mitigate the impact of pests and diseases on agricultural activity.[414] The availability of diverse genetic material is also important for improving productivity as well as the resilience of crops to threats, such as climate change. Agricultural systems that are species rich have been shown to generate higher and/or more stable yields over time.[415] For example, high levels of sorghum diversity allowed farmers in Mali to maintain production and productivity

BOX 7
(CONTINUED)

levels over several years of increasing drought (1978 and 1998).[416] However, over time the trend has been towards greater homogeneity in food supplies. Only four plant species, rice, wheat, maize and potatoes, account for 50 percent of the world's energy supply, and 30 percent of plant species account for 90 percent of the world's caloric intake.[417]

Dietary diversity is an important dimension of healthy diets, and higher levels of biodiversity might therefore translate into higher quality diets. One recent study found a positive correlation between species richness and micronutrient adequacy in diets.[418] Cropping diversity at farm level has also been linked to dietary diversity, but the findings are not conclusive with some studies finding that market access also plays an important role in dietary diversity.[419] Wild foods can also add to diversity and, although they are not included in national statistics, are considered an important part of food baskets in many areas. However, available evidence suggests that households located in areas of high biodiversity did not necessarily have higher dietary diversity.[420] A study conducted in a highly biodiverse area in the Democratic Republic of the Congo found that wild edible plants were not consumed in sufficient quantities to improve nutrition security or dietary adequacy.[421] Ultimately, it is not a contradiction to recognize that although dietary diversity can be met by a relatively small number of foods across food groups, the production of these foods depends on the "biophysical systems and processes to regulate and maintain a stable earth system."[422]

Biodiversity is fundamental to the sustainability of food systems, but perversely, crop and livestock production, and fishery and forestry are estimated to be responsible for around 70 percent of the loss of terrestrial biodiversity.[423,424] In particular, land- and water-use change, pollution, hunting, overharvesting, and greenhouse gas emissions that are associated with agriculture reduce species populations and have contributed to the higher rate of species extinctions in recent decades. Also of considerable concern for biodiversity loss are consumption of animal-source foods and bush-meat.[425] Consumption of bush-meat has caused a significant decline in mammals in sub Saharan Africa. For example, between 1970 and 1980, bush-meat consumption in Ghana is estimated to have reduced the biomass of 41 mammalian species by 76 percent.[426]

Loss of biodiversity, unsurprisingly, goes hand-in-hand with land degradation, deforestation, loss of soil fertility and chemical contamination of soil and water. For example, over 70 percent of inland and over 60 percent of coastal wetlands are estimated to have been lost since 1900, while mangrove areas shrank by 20 percent over the 1980 to 2005 period. About 34 percent of fish stocks are over fished and 60 percent fished to the maximum sustainable limit.[427] Over 40 percent of insect species[428] and seventeen percent of vertebrate pollinator species are threatened with extinction globally.[429]

Sustaining biodiversity can only be achieved through securing species habitats, which will require changes in dietary habits, reductions in food loss and waste, and changes in consumer behaviour.[430] Changes in dietary patterns are important, as livestock production is the predominant driver of natural habitat loss worldwide.[431] In addition, technological- and management-related changes are needed.[432] For example, Integrated Pest Management uses ecosystem resilience and diversity for pest, disease and weed control, and has been shown not only to increase yields but also to substantially reduce the use of pesticides, thus protecting biodiversity.[433] The additional pressures coming from rapid population growth and climate change in Africa will also require a shift towards greater agricultural intensification, which, over the long run, can help reduce the threat to biodiversity.[434] When intensification is pursued sustainably through, for example, the use of conservation agriculture, it not only improves yields but can also reduce the negative and enhance the positive environmental impacts of agriculture.[435]

» Climate change is already negatively affecting food availability through adverse impacts on crop yields, fish stock, and animal health, and the effects are anticipated to be more severe in sub Saharan Africa and South Asia.[436] Climate change will also adversely affect food accessibility through direct and indirect impacts on incomes, particularly to those involved in natural resources based activities. While some impacts of climate change on agriculture are positive, in the long term, negative impacts, in particular due to reduced water availability, will dominate, and by 2050, potential mean production losses for sub-Saharan Africa are predicted to be 22, 17, 17, 18, and 8 percent for maize, sorghum, millet, groundnut and cassava, respectively.[437,438] Globally, climate change is projected to reduce per-person food availability by 3.2 percent by 2050, and for Africa the reduction will be larger than the average.[439] Lower food supplies in turn means higher prices, which reduces the purchasing power of urban and non-farm rural households. Also, poor, smallholder family farmers are affected because many are net buyers of food.

With about two-thirds of the continent arid or semi-arid, climate change will impose, along with population and income growth, additional pressures on water availability and demand. Projections of climate change impacts in Africa indicate that between 75 and 250 million people will be at greater risk of water stress by the 2020s, and 350 to 600 million people by the 2050s, and, under a range of climate change scenarios, the arid land area in Africa may grow by between 5 percent and 8 percent by 2080.[440] Increasing scarcity of water and higher temperatures will also facilitate the development of pathogens and low water quality, affecting food utilization and nutrition status by increasing the incidence of diarrhoea and other illnesses.

Diets play an important role in relation to costs associated with climate change. Evidence reported in the *State of Food Insecurity and Nutrition in the World 2020* show that about 75 percent of the societal costs of GHG emissions come from meat and dairy production, in particular beef and milk. Such evidence indicates that changing diets, in particular reductions in meat and dairy products, are needed to help avoid climate change.[441]

The costs to society in terms of higher mortality, disease, natural resource degradation and greenhouse gas emissions attributed to current food consumption patterns are not reflected in the food costs faced by consumers.[442] An assessment of these health and environmental costs is presented in *The State of Food Security and Nutrition in the World 2020*, which compares a baseline diet that represents current consumption patterns to four alternative diets that include sustainability considerations.[443] The four alternative diets conform to diet patterns developed by the EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems. They allow for an examination of the hidden costs for different healthy diets that include aspects of environmental sustainability but are not meant as an endorsement of any particular diet pattern. The four alternative diets are listed below:[444]

- Flexitarian diet (FLX), which contains small to moderate amounts of all animal-source foods
- Pescatarian diet (PSC), which contains moderate amounts of fish, but no other meat
- Vegetarian diet (VEG), which contains moderate amounts of dairy and eggs, but no fish or other meat
- Vegan diet (VGN), which is completely plant-based, consisting of a variety of fruits and vegetables, whole grains and plant-based protein sources, such as legumes and nuts

The available evidence shows that rebalancing consumption towards any of the four alternative diets would result in a significant reduction in mortality and globally would lead to an average reduction of 95 percent of the diet-related health expenditures, compared to the benchmark scenario in 2030.[445] In addition, a shift to any of the four alternative diets would also significantly cut GHG emissions from the food system. This result is in line with those obtained by other studies that show that reductions in meat consumption and other dietary changes could reduce pressure on land use and reduce GHG emissions.[446,447,448,449] Large reductions in GHG emissions could be achieved with the FLX, PSC

and VEG diet patterns, while a move to a VGN dietary pattern would incur an additional, large reduction in GHG emissions.[450]

Globally, current diets would be 50 percent higher if the social costs associated with health and environmental sustainability were included in their total. In sub-Saharan countries, for every dollar spent on food, health and environmental costs add USD 0.35 PPP, or 26 percent of the total cost.[451]

In addition, the cost of healthier diets (FLX, PSC, VEG and VGN) would rise if the diet-related health and climate-change costs were included in the total cost. However, the increase of between 8 and 19 percent is lower than the corresponding rise calculated for the current food consumption patterns. Overall, considering the full costs (the wholesale cost and the diet-related health and climate-change costs), the rebalancing of diets towards a higher content of plant-based foods compared to the current average diets would lead to reductions in the full cost of diets of between 22 and 29 percent globally, and 11–21 percent in low-income countries.[452]

It is clear that significant gains in reducing the hidden health and climate change costs inherent in current food consumption patterns are achievable by switching to healthier diets, even the flexitarian diet, which, invariably, would imply a substantial reduction in the consumption of ASF. However, it is important to bear in mind that for many countries, in particular those low-income countries where child and maternal malnutrition levels are very high, a rise in ASF is needed to reduce undernutrition and micronutrient deficiencies.

Summary

Undernutrition and micronutrient deficiencies are widespread in Africa. In large part this is due to low intakes of nutritious foods such as vegetables and fruit, legumes, nuts and seeds, as well as animal-source foods. Other factors, such as disease and poor infant and young child feeding practices are also contributing factors. At the same time, consumption of energy-dense foods of minimal nutritional value rises rapidly with economic growth, and this is also reflected in the rising prevalence of overweight and the associated disease burden. African countries suffer from multiple burdens of malnutrition, regardless of income level.

New evidence shows that "healthy" and "nutrient adequate" diets are considerably more expensive than "energy sufficient" diets. Three-quarters of the African population cannot afford a "healthy" diet, and more than half cannot afford a "nutrient adequate" diet. Even the "energy sufficient" diet is out of reach for 11.3 percent of the continent's population. The population living in extreme poverty in low-income countries would need half of their food budget to secure the "energy sufficient" diet. For the majority of Africans to gain access to healthy diets, the cost of nutritious food must fall considerably.

Food prices do not include the hidden health and environmental costs incurred by current food production and consumption patterns. Including these costs would add USD 0.35 PPP to every dollar spent on food in sub-Saharan Africa, or 26 percent of the total cost. Rebalancing consumption towards a higher content of plant-based foods would not only reduce the cost of diets but also lower health and environmental externalities. Compared to current average diets, diets containing more plant-based foods would reduce the full (including health and environmental costs) cost of diets by 11–21 percent in low-income countries.

However, this does not imply that all countries should rebalance diets equally. In many low-income countries, the diets of young children may have a low environmental footprint, but the nutritional content may be inadequate. In such cases, the environmental impact may to have increase to achieve nutrition targets. ■

TRANSFORMING FOOD SYSTEMS TO DELIVER HEALTHY DIETS FOR ALL

Affordability of diets is determined by the cost of food relative to people's income. Reducing poverty and inequality are key to improving access to sufficient and nutritious food.[453] However, how people's incomes increase and how this affects people's capacity to access food is beyond the scope of this report. Rather, the focus is on policies and interventions throughout the food system that will be needed to raise yields, lower costs, and promote nutritious foods. In addition, complementary interventions that are nutrition-specific or sensitive are needed to ensure food safety, improve maternal and child nutrition and care as well as change consumer behaviour and create healthier food environments.

Guidance for policy interventions to lower the cost of food and in particular nutritious food can be drawn from the earlier analysis while keeping in mind that food systems and cost structures vary across regions and countries, and solutions must, therefore, be context specific. The overview of the food supply chains highlighted some features that are largely common to countries, and where interventions can reduce costs, and improve the availability, and access to nutritious food. In the African context, promising interventions are in research, extension to improve yields, in efforts to diffuse the adoption of commercial inputs and modern technologies and farming practices, and in promoting intra-African trade. However, a greater focus on nutritious food is also essential. Lower food prices in general are likely to have greater impact on food consumption in low-income countries and in lower income households. In addition, lower relative prices for nutritious food will improve consumption of such foods because income and price elasticities of staples such as cereals, fats and oils were lower than those of animal source foods across country and household income groups.[454,455] Furthermore, there must be a focus on reducing post-harvest losses, improving food safety, reducing transaction costs by investing in road networks, transport and market infrastructure, as well as promoting fortification and biofortification when feasible and advisable. Equally important are policy interventions in the food environment and to influence consumer behaviour. Many people need the immediate support that can be provided through nutrition sensitive social protection programmes. Women play a central role in the welfare of their children and this should also be reflected in the design of policies and interventions that affect women's working conditions and their ability to provide good care and feeding practices. Particular attention should be focused on maternal and child malnutrition and health in the first 1 000 days since conception. Finally, policies, such as promoting nutrition knowledge, taxes and subsidies, information campaigns, and regulating advertising to children play a role in promoting healthy diets.

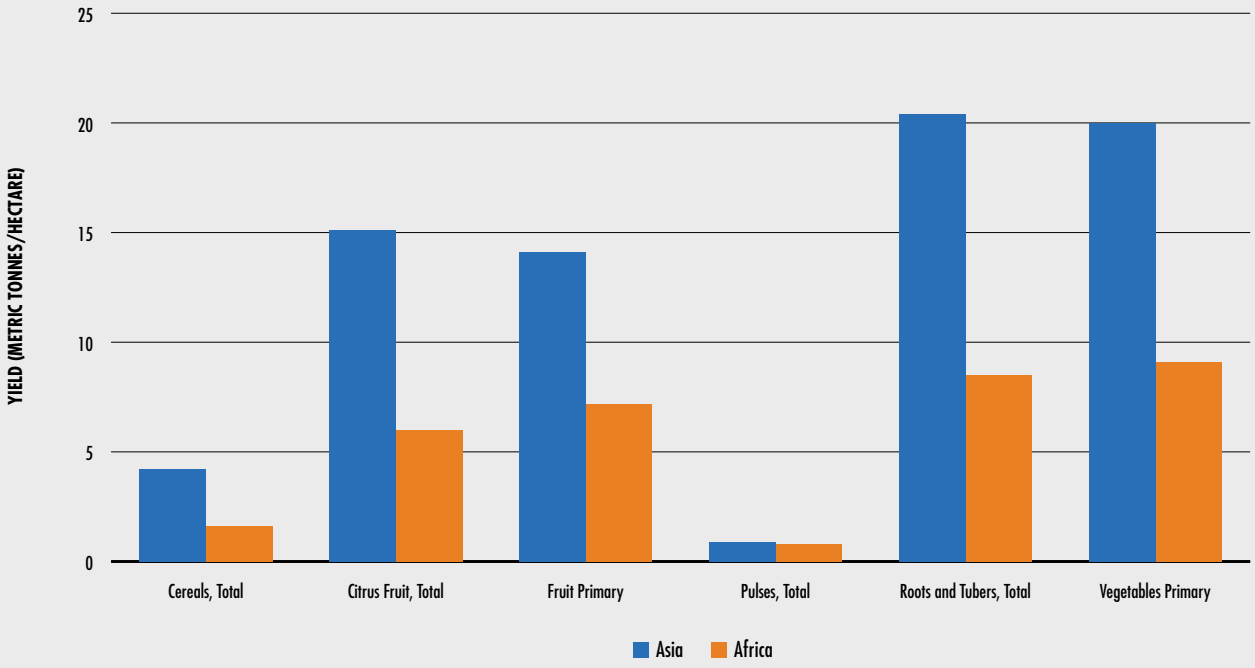
Public policy and expenditure to promote availability of and access to nutritious food

Effective public policy and expenditure will play a central role in overcoming the shortcomings just outlined, and to drive the development and transformation of the food system. One of the highest return investments is in research and development, essential to raise yields and promote sustainable farming techniques.

Yields are generally low in Africa, and raising them is a promising approach to reducing food prices and increasing farm incomes. Yield gaps, i.e. the percentage difference between actual and potential yields, are 76 percent in sub-Saharan Africa, the highest of any region.[456] Figure 42 shows that yield levels are invariably lower in Africa as compared to Asia. However, there are also significant subregional variations. For example, cereal yields in the subregion are on average half those in Asia, except for Southern Africa, where they are just as high. For roots and tubers, fruits and vegetables, yield levels in Northern and Southern Africa are similar to those in Asia but are much lower in the other subregions.

Yields are low because overall total factor productivity (TFP) is lagging in the region. Accelerated TFP growth is essential if Africa

FIGURE 42
YIELDS FOR AGGREGATED COMMODITIES IN AFRICA AND ASIA, 2018.



SOURCE: **FAO**. 2020. *FAOSTAT* [online]. Rome. http://www.fao.org/faostat/en/#home

is to transition to sustainable agricultural intensification, away from a strategy of output growth through area expansion. To achieve this, greater investment in research and extension, which is currently low (Table 13), is required.

Returns to investment in agricultural research are high. For example, a meta-review of 292 studies covering 1953 to 1997 found average rates of return on agricultural research to be 60 percent in developing countries, and 49.6 percent for Africa.[457] A more recent study found the rate of return on research in Africa to be 22 percent, on average, still a high return.[458] Agricultural research expenditures have a stronger impact on productivity than agricultural non-research expenditures.[459] When introduced together, agricultural technologies and new practices can significantly raise productivity and reduce food prices in low-income countries. Research shows that for staple foods, such combined efforts could reduce food prices by up to 49 percent for maize, up to 43 percent for rice, and 45 percent for wheat.[460] At the same time, public investments in roads, irrigation and electricity are needed and enhance the returns on investment in research and extension.

In Madagascar, communities with higher rates of adoption of improved agricultural technologies obtained higher yields and as a result enjoyed lower food prices, higher real wages for unskilled labour, and achieved better welfare indicators. The authors conclude that: "Improved

agricultural technology diffusion seems the most effective means of improving agricultural productivity and reducing poverty and food insecurity in rural Madagascar. But improved rural transport infrastructure, improved irrigation systems, maintenance of livestock herds, improved physical security, increased literacy rates, secure land tenure, and reasonable access to extension services all play a positive role in encouraging productivity growth and poverty reduction."[461]

National agricultural research and extension capability are essential to adapting new technologies to local conditions and to promoting locally relevant crops and livestock that otherwise receive little attention. Agricultural expenditure on research and extension grew by only 0.6 percent in 1980–1990 and -0.5 percent in 1990–2000, but then rose strongly between 2000 and 2014, from USD 1.7 billion to USD 2.5 billion (in 2011 Purchasing Power Parity prices).[462] However, three quarters of this growth occurred in Ethiopia, Ghana, Nigeria, South Africa and Uganda. Exploiting spillover from international research is more difficult in Africa due to the specificity of agro-ecological features.[463] In addition, the small size of many African countries makes it difficult to capture economies of scale in research and development.

Taking advantage of research and extension will also require farmers to be able to reach scale and access markets. Poor economies of scale limit the scope and ability of smallholders for mechanizing or adopting new farming technologies and linking to the urban supply chain. The rapid evolution of information and communication technologies can offer new forms of farmer extension, help improve market integration, reduce transportation costs, provide better price information and facilitate market exchange.[464] Evidence from 34 African countries indicates that ICT proliferation, especially mobile technology, boosted agricultural production.[465] ICT will also play an important role towards building greater resilience to climate change.

In addition, regional farmer federations such as the Pan African Farmers Organization (PAFO) and the associated subregional platforms play an important role in facilitating the transfer of production technology, helping farmers reach scale and advocating for supportive government policies. Farmer organizations can also ensure that smallholder farmers benefit from joining supply chains by helping negotiate fair contracts with processors and traders as well as helping farmers meet food safety and quality standards. Support to farmers, and in particular youth and women farmers, is essential to ensure inclusive growth and transformation of the food system. Trade, including intra-regional trade can also help farmers achieve greater scale, and the issue of intra-regional trade is further discussed below.

Secure private property rights and well-functioning land markets are recognized as potentially important factors in stimulating investment, productivity and higher farm incomes, as well as reducing the potential for conflict. In addition, it can help allocate land more optimally, especially when credit markets are not well developed. Land tenure security can promote farmer's investment in their own land as well as incentivise improved soil conservation and management.[466,467,468] Good land governance and management is indispensable to any efforts to alleviate poverty and spur inclusive economic growth and transformation. However, results for Africa have found weaker effects of land tenure reform on productivity, possibly because customary land rights already provide tenure security, a lack of savings prevent farmers from investing, and a lack of investment in public infrastructure, all of which may weaken the impact of land tenure reform.[469]

The importance of good management of land for agricultural transformation, development and peace and security is recognized by African Heads of State in the African Union's "Declaration on Land Issues and Challenges in Africa," which urges member states to "take note of the steps outlined in the Framework and Guidelines on Land Policy in Africa for their land policy development and implementation strategies."[470] The framework and guidelines reflect a consensus on land issues and serve as a basis for commitment of African governments in land policy formulation and implementation and a foundation for popular participation in improved land governance.[471]

In addition, empowering women, including through greater access to, and control over, land is an essential step towards closing the gender gap in agriculture, leading to considerable gains in productivity and production (see also discussion in the section "Agriculture, livestock and fisheries"). Enhancing household income and women's bargaining position in the household would improve the welfare of children in affected households, as well as lower food prices and improve food security and nutrition, in addition to attaining positive/enhanced health and education outcomes.

It is also imperative that the private sector is engaged in working towards healthy and affordable diets. Given limited government resources, public-private partnerships (PPPs) constitute an innovative approach to bring together businesses, government and civil society to help modernize agriculture, improve productivity and drive growth in agriculture and food supply chains, and contribute to inclusive and sustainable development. PPPs can combine the operational and economic efficiency of the private sector with the public sector's role in providing an enabling environment and as a regulator to ensuring that public health and environmental concerns are considered.

Promoting agricultural growth and private investment and engagement must include a business friendly environment. However, policy makers face making trade-offs between producers, consumers and intermediaries, when making policy decisions for agriculture versus other sectors and even different agricultural subsectors. Policymakers pursue different government objectives through a set of policies that either provide incentives to agriculture through, for example, subsidies or penalizes the sector in some form or another. In this way, government policy decisions affect the cost of nutritious foods either directly or indirectly. Domestic policies on trade, marketing and/or exchange rate measures, introduce distortions to the prices that farmers receive for their products. These distortions are measured as the deviation of farm gate prices from international reference prices, where the latter is the undistorted price that would prevail in the absence of policies and under perfect market conditions. The Nominal rate of protection (NRP) is a key indicator that measures these distortions.

For African countries for which data is available, the NRP is negative (Figure 43), and agriculture is penalized relatively more in low-income African countries. Policies that penalize agriculture lead to lower food prices, which benefits consumers but reduces the income of farmers. In the longer-term, when farmers face disincentives to invest, production suffers, which reduces demand for labour, reduces wages for unskilled labour in farm and non-farm jobs and reduces the availability of nutritious foods. In countries where agriculture accounts for the majority of employment, the downward pressure on wages will impact all households relying on wage income, and the net impact of agricultural taxation on the affordability of nutritious foods may be negative. On the other hand, policies that boost higher food prices would hurt consumers while benefitting farmers and actors further along the chain. However, unless higher food prices are achieved through higher productivity, the gains to farmers are dampened as they also purchase much of their food in markets.[472]

While agriculture is in general penalized in many African countries, some food crops receive support. Data for a select number of sub-Saharan African countries indicates that over the 2005 to 2017 period, more than one-fifth of all expenditures were in the form of producer subsidies (Table 21). While subsidies can help raise productivity, over the longer term returns to subsidies are lower than for expenditures on public goods (see also section below on "Input costs are high in Africa"). Transfers to farmers are often preferred by policy makers because they are immediately available resources that are easily targeted at a large electoral group. Reallocating public expenditures would potentially help to transform food systems to improve food security and nutrition outcomes by making healthy diets more affordable.

In addition, greater emphasis must be placed on promoting trade, in particular intra-African trade (the latter is discussed below). Some governments continue to put in place export bans and controls

with the aim of lowering food prices and stabilizing them. However, export restrictions often have the opposite effect by raising prices and increasing volatility, as well as undermining long-term investment in agriculture.[473] The most commonly applied policies are tariff and non-tariff barriers that restrict imports with the aim of protecting producers and food processing industries. Such measures can increase the cost of food imports and negatively impact on affordability. However, non-tariff measures, such as sanitary and phyto-sanitary measures, play an important role in raising food safety and quality, which help improve the nutritional content of food. Some staple food products, such as rice and maize, have been protected and supported in some African countries, which has stimulated their production. However, support to these staple foods has also made nutritious foods, such as fruit and vegetables, less attractive to farmers.

FIGURE 43
AGRICULTURAL PRODUCTION IN AFRICAN LOW-INCOME AND MIDDLE-INCOME COUNTRIES IS PENALIZED: AVERAGE WEIGHTED NOMINAL RATE OF PROTECTION 2005–2018

NOTES: The table shows average weighted nominal rate of protection for agricultural production by country income group, between 2005 and 2018. Nominal rate of protection expressed as the ratio of the price gap (difference between observed and reference prices at farm gate) and the reference price at farm gate.
SOURCE: **Ag-Incentives**. 2021. *Nominal rate of protection*. In: Ag-Incentives [online]. Washington, DC. [Cited January 2021]. http://ag-incentives.org/indicator/nominal-rate-protection

Raising productivity and improving sustainability

Climate-Smart Agriculture (CSA) is an integrated approach to managing cropland, livestock, forests and fisheries that addresses the interlinked challenges of food security and climate change and provides a guiding framework at the international, regional and country level for climate-smart adaptation and mitigation planning. CSA integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. It is composed of three main pillars: (1) sustainably increasing agricultural productivity and incomes, (2) adapting and building resilience to climate change, and (3) reducing and/or removing greenhouse gas emissions, where possible.[474]

There is no standard list of CSA practices that can be universally applied. Interventions are not determined a priori but based on a process of building evidence and dialogue. Good practice should be guided by the need for sustainable intensification of agricultural production to raise productivity while conserving natural resources. In addition, as sub-Saharan Africa is mostly rainfed, it is also important to improve water and soil moisture management.

Several technologies, with positive environmental qualities, have been shown to significantly increase rainfed maize yields in sub-Saharan Africa. No-till farming and integrated soil fertility management can improve yields by over 30 percent and over 20 percent, respectively. In addition, for low-rainfall Eastern Africa, drought tolerant crops have been shown to boost yields by about 17 percent. Adopting drought-tolerant seeds, as a climate-smart practice, not only helps to reduce price jumps, but can also raise farmer incomes.[475] A recent study for Eastern Zimbabwe found that households that grew drought-tolerant maize (DTM) harvested 610 kg per hectare and earned about USD 240 per hectare more than households that did not use DTM.[476] Among the combined technologies assessed for sub Saharan Africa, the highest benefit is obtained with no-till and heat-tolerant varieties, with yield increases of over 40 percent under rainfed conditions achievable.[477]

For Northern Africa, no-till farming under irrigated conditions can raise maize yields by over 70 percent and wheat yields by over 28 percent. Integrated soil fertility management can increase yields by 10 percent for irrigated maize and 10 percent for irrigated wheat. Precision agriculture is relatively important in this region with potential yield increases of 29–39 percent for irrigated wheat. Drought tolerant varieties can raise yields by between 12 and 30 percent for irrigated wheat. Finally, enhanced nitrogen-use efficiency can raise irrigated maize yields by between 49 and 57 percent.[478,479]

TABLE 21
SHARE OF TOTAL EXPENDITURES ON FOOD AND AGRICULTURE (SELECTED AFRICAN COUNTRIES, 2005-2017)

Producer subsidies	**22.5 %**
Extension and research and development	**18.8 %**
Agricultural infrastructure	**16.3 %**
Other (e.g. land, natural resources)	**15.0 %**
Consumer transfers	**9.2 %**
Administrative costs	**9.1 %**
Inspection, storage and marketing	**9.0 %**

NOTES: The figure shows average composite shares of expenditure over total expenditures in food and agriculture (2005–2017) in selected African countries (Benin, Burkina Faso, Burundi, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Rwanda, Senegal, Uganda and United Republic of Tanzania). Definitions of expenditure categories can be found at www.fao.org/in-action/mafap/database/glossary-public-expenditure
SOURCE: **FAO**. 2021. Database. In: *Monitoring and Analysing Food and Agricultural Policies (MAFAP)* [online]. Rome. [Cited January 2021]. www.fao.org/in-action/mafap/data

Rainfed systems account for 95 percent of farmland in sub-Saharan Africa, and the expansion of irrigation and better management of rainwater and soil moisture is also essential to raising productivity and reducing yield losses during dry spells and periods of variable rainfall. The continent has large untapped water resources and an irrigation potential of about 37 million hectare.[480]

In addition, it is essential to accelerate the restoration of degraded lands and to increase the level of organic carbon in soils. Higher organic carbon improves nutrient and water intake by plants, increasing yields, and leads to more efficient use of resources, such as land, water and nutrients. It also reduces soil erosion and increases water retention.[481]

Input costs are high in Africa

Low yields are also a reflection of high input costs, notably for fertilizer.[482] In Zambia, the cost of imported fertilizer was 30 to 40 percent more than in Thailand. A bag of fertilizer was about twice as expensive in Uganda as it was in Europe or the US. Very limited domestic production, high international and national transport costs (trucks are stopped frequently and bribes are common) help explain the higher cost.[483] A recent study for Nigeria found that the profitability of fertilizer is marginal for many maize farmers due to the relatively low marginal physical product and the cost of the input. The authors found that in particular, transportation costs accounted for about 70 percent of the purchase price of fertilizer in Nigeria.[484]

The high cost of fertilizer is also due to small markets and long distances to service a dispersed market through poor infrastructure.[485] Solutions can only be long-term investments into improved infrastructure and, considering the large scale needed, regional production and trade. The 2019 African Continental Free Trade Area (AfCFTA) Agreement, upon full implementation, would provide a unique opportunity to unlock the untapped potential for large-scale fertilizers industry in Africa.

Governments frequently use subsidies to reduce the cost of fertilizer, a policy that gained popularity after the first African Fertilizer summit (held in Abuja, Nigeria in 2006) which called upon African Union member states to improve farmers' access to fertilizer by granting targeted subsidies, with special attention to poor farmers.[486,487] In many countries input subsidies continue to represent the largest part of agriculture expenditure.[488] The massive food price increases seen during and after the food, fuel and financial crisis of 2007–08 gave further impetus to these policies. Because such subsidies are often targeted at poor farmers and aimed at improving food security more broadly, they are sometimes seen as part of social protection policy as well as agricultural policy.

Fertilizer subsidies can have significant impacts on production and food development security in a short period. Evidence from Asia shows that India, Bangladesh, Indonesia and Pakistan spent large amounts of public funds subsidizing fertilizer, and these subsidies are credited with contributing to the rapid growth in food production known as the Green Revolution, at least in the early stages.[489] Importantly, input subsidies were accompanied by large-scale expenditures on research and extension, irrigation, rural roads and development of fertilizer markets.[490]

However, public expenditures are more effective in generating economic growth and poverty reduction when spent on roads, agricultural research and extension, and education and irrigation, rather than on fertilizer subsidies.[491] In addition, fertilizer subsidy programmes absorb a large part of government agricultural budgets, with a recent review calculating that input subsidies (mostly fertilizer) accounted for between 9.1 and 44.5 percent of public expenditures in Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Senegal, the United Republic of Tanzania and Zambia (nearly 20 percent when averaged over the ten countries).[492] While effective in boosting production and food security in the short-term, fertilizer subsidies are not a substitute for spending on research, extension and infrastructure.

While fertilizer comes with its own negative impacts for the environment, current use rates in Africa are very low. Rather, fertilizer use in Africa is important as higher yields can abate nutrient mining and soil degradation that comes from deforestation and omitting fallow periods. Improvements in soil fertility needed to promote agricultural productivity will require much higher fertilizer use, as well as improved land management practices.

Government policy and expenditure is predominantly focused on staple foods, and more emphasis on fruit, vegetables and animal source foods is needed

Many countries have and continue to suffer from high levels of food insecurity and as a result, policies and investment focuses, on staple, and oil crops, neglecting non-cereal crops.[493,494,495] One study reported that in a sample of 70 low- and middle-income countries, on average there were four to five public sector researchers working on cereals per million inhabitants, but only 1 researcher each in the cultivation of fruits and vegetables.[496] Also, donor funding for research and development has prioritised major staples and neglected research into fruits, vegetables and livestock. This lack of investment into fruit and vegetable production is today reflected in relatively high prices of these commodities *vis-à-vis* staple foods. However, fruit, vegetables and ASFs are, as discussed in previous sections, vitally important sources of micronutrients and fibre and are essential for balanced and healthy diets.

Ethiopia is an example of a country that has successfully increased yields for staple foods, while there has been no such improvement in the yields of nutritious foods. Because staple foods weigh heavily in the average Ethiopian household's food expenditure, increased productivity and production in the cereal sector has led to stable prices in the face of rising demand, which has been very beneficial for poverty alleviation and calorie intakes.[497] However, the dietary quality has not improved significantly.

A study using data from 1996 to 2011 found that with rising household income, the share of food in total consumption declined from 60 percent in 1996 to 48 percent in 2011, while the quantity of food – in terms of adult equivalent – rose 55 percent. As expected, the share of cereals in total expenditure fell from 46 percent in 1996 to 36 percent in 2011, and households increased their expenditure for animal products, fruits and vegetables, and processed foods.[498] The amount spent on cereals, in terms of Ethiopian Birr per adult equivalent per year, remained steady between 1996 and 2011, but rose from 36 to 88 for pulses, from 56 to 100 for animal products, from 34 to 61 for oil and fats, from 28 to 59 for vegetables and fruit, and fell from 19 to 16 for root crops. Yet, in terms of kg per adult equivalent per year, consumption of cereals rose from 149 in 1996 to 192 in 2011, and for pulses fell from 23 to 22, for animal products rose from 17 to 21, for oil and fats rose from 2 to 5, for vegetables and fruit rose from 31 to 45, and for root crops rose from 15 to 30.[499]

Rising incomes meant greater food security in terms of access to cereals, and this is true across income quintiles, a reflection of the equitable growth experienced in Ethiopia.[500] However, even with rising incomes, dietary quality did not improve in the same way that calorie availability improved, and this is due to the disproportionate rise in the price of vegetables and fruits and of animal source foods when compared to cereals. The average real price per calorie (in Ethiopian Birr) across all cereals was 0.23 in 1996, and this fell to 0.18 in 2011. For vegetables and fruit, the real price per calorie was 0.46 in 1996, and this rose to 0.95 in 2011; for animal source foods, the price rose from 0.77 in 1996 to 1.71 in 2011. Clearly, parallel improvements in the productivity and prices of vegetables, fruits and animal-source foods are needed even with income growth if household diets are to improve in quality and if poorer households are to have access to good quality diets.

Home gardens are a potential route to increasing dietary diversity with vegetables and fruit, while also helping generate some income. When integrated with primary health care, nutrition education and women's empowerment,

and when focused on the production of yellow and dark-green leafy vegetables, home gardens have been found to improve the vitamin A status of two to five-year olds.[501] Home gardens can also help bridge seasonal gaps, which are particularly high for certain vegetables (see also below).

For example, Action Contre La Faim's (ACF) "Health & Nutrition Gardens," implemented widely in Western Africa, is based on home vegetable gardens for diversifying household diets. The approach focuses on facilitating access to inputs, training on crop production, and post-harvest conservation. In addition, ACF aims to empower women, evaluate food consumption patterns and ensure location appropriate selections of vegetables, and to provide cooking demonstrations and nutrition education, including for improved maternal and child-feeding practices.[502] The home gardens have been credited with increasing the supply of vegetables and improving the dietary diversity of households, in particular with vitamin A rich vegetables.

A broader intervention, implemented by Hellen Keller International in Burkina Faso, targeted at households with women and children in the first 1 000 days, is the Enhanced Homestead Food Production Programme which helped mothers establish homestead gardens and provided inputs and training in gardening, irrigation and small livestock rearing. In addition, the programme included a nutrition and health behavior change communication strategy with the goal of improving children's nutritional outcomes, as well as providing training on essential nutrition actions, including optimal infant and young child feeding practices. Evaluations of the programme showed significant improvements in maternal and child nutrition, improved women's empowerment, increased household access to and consumption of nutritious foods, and dietary diversity.[503,504,505]

However, making vegetables and fruit more widely available and affordable will require, similarly to traditional ALVs discussed below, increased spending on research and extension, developing seed markets, providing credit, and investing in infrastructure along the supply chain to help farmers bring these typically more perishable products to market. Farmers also need support in the appropriate handling and use of pesticides, while consumers need to be able to know that the products are safe, also with regard to food borne diseases. Perishable vegetables are often grown close to or inside towns, and access to unpolluted water is a growing constraint.[506] Because vegetables are susceptible to damage from insects and plant diseases, farmers often make excessive use of pesticides. It is important to establish suitable standards, and to monitor and to test.[507] Post-harvest losses are higher in this sector and apart from good on-farm practices, investment in logistics, cold storage and market information systems are needed.[508]

A promising area of research is that of traditional African leafy vegetables (ALV), which have to date been under-researched. ALV's have relatively high levels of protein and certain micronutrients, such as calcium, iron, phosphorous, vitamin A and vitamin C, compared to non-native crops (Table 22). They are sometimes also more resistant to droughts and pests.[509,510,511] However, the degree of bioavailability of some of these micronutrients has been found to be low.[512] Despite this, some argue that a focus on which individual foods are good vehicles of individual micronutrients is not the appropriate question but rather that overall food systems and diet patterns that generate healthy outcomes should be the focus. This argument is made also in view of the adverse effects that excessive ASF consumption on health has in more developed countries, and that avoiding such an outcome should already be a priority of policy makers in developing countries.[513]

Traditional varieties are important in some countries, especially for poorer households. In the United Republic of Tanzania, they account for 40 percent of all vegetables consumed by poor households, compared to 12 percent for the wealthiest group. Traditional varieties have been found to contribute significantly to meeting the micronutrient requirements, in particular vitamin A and iron, of poor households.[514,515]

There are a number of constraints to increasing production and consumption of traditional ALVs.

First, it is necessary to increase spending on research to produce higher yielding crops that have attractive traits. Second, availability to quality seeds is a major constraint. Markets for non-staples are typically poorly developed, and investment in transport systems, cold storage systems and information systems is needed to improve the functioning of markets for perishable products such as vegetables and fruit.[516] Consumer education is needed as lack of knowledge and the sometime negative perceptions regarding traditional varieties are one reason why consumption of ALVs declines as income grows.

However, there have also been some successful efforts at promoting African Leafy Vegetable production, such as the Bioversity International African Leafy Vegetables programme in Kenya. Through this programme, farmers received appropriate support and began growing leafy vegetables in the outskirts of Nairobi. As a result, the market has grown rapidly with an increase in the gross value of over 200 percent between 2001 and 2006. At the same time, promotional efforts focusing on the health benefits of ALVs helped increase consumer demand.[517,518]

Also, consumption of ASF, especially in low-income countries and by the poor must increase. ASF provide high quality proteins and micronutrients that are particularly important for children and often missing in the low-quality diets of the poor. In addition, livestock, by providing income and a store of cash, bolsters food security and household resilience. For the many farming households that practice mixed farming and the pastoralist communities that are prominent particularly in the Horn of Africa and the Sahel, livestock already helps diversify diets. In addition, livestock holdings, in particular pastoralist systems, use marginal lands and compete relatively little with crop production and rather offer an efficient use of resources.[519]

One approach is to support poor rural households engaged in small-scale livestock holdings. For example, the Heifer International Livestock

TABLE 22
MICRONUTRIENT CONTENT OF SELECTED AFRICAN TRADITIONAL LEAFY VEGETABLES (PER 100 GRAM)

Crop\Nutrient	Vitamin A (µg RAE)	Vitamin C (mg)	Iron (mg)	Calcium (mg)	Zinc (mg)	Folate (µg DFE)
ALVs						
Amaranth	477	64	8.9	410	0.4–0.8	85
Spider flower plant	558	13	6.0	288	0.2–0.5	--
Nightshade	306	20	1.0–4.2	442	0.2–0.4	--
Cowpea leaf	664	56	5.7	256	0.3–0.6	101
Sweet potato leaf	490	70	6.2	158	0.2–0.7	80
Exotic vegetables						
Kale	769	120	1.7	135	0.4	29
Cabbage	9	32	0.6	47	0.2	43
Daily recommended dietary allowance for children aged 1–8	300–400	15–23	7.0–10.0	500–800	3.0–5.0	150–200

NOTES: RAE = Retinol Activity Equivalent; DFE = Dietary Folate Equivalent. µq=microgram, mg =milligram.
SOURCE: **Herforth, A.** 2010. *Promotion of traditional African vegetables in Kenya and Tanzania: a case study of an intervention representing emerging imperatives in global nutrition.* Division of Nutritional Sciences, Cornell University. (PhD Dissertation)

Programme in Rwanda donated a dairy cow or a meat goat to selected households which increased their consumption of milk and meat relative to households that did not receive animals. This improved dietary diversity at the household level and significantly improved child nutrition outcomes, results that are in line with other studies.[520,521]

In Ethiopia, the FARM-Africa Dairy Goat Development Project aimed to increase income and milk consumption by raising the productivity of local goats managed by women through a combination of improved management techniques and genetic improvements. The intervention led to an increase in the per capita availability of milk and a considerable improvement in the nutritional status and family welfare of project participants.[522] Interventions that promote livestock ownership to increase ASF consumption at the household level are particularly relevant when these households are remote, but less effective when access to markets is good.[523]

In many countries, and in particular in the Horn of Africa, Southern Africa, and in the Sahel, livestock production is of considerable importance for food security and the economy more generally. However, pastoralists in these regions face challenges in the form of climate change, increasingly stringent sanitary standards, and competition from crop farmers or conservation activities.

A further challenge is achieving the necessary scale for livestock and poultry, related also to the need to control disease, the need to manage complex supply chains and ensure quality, as well as to ensure competitiveness through lower transaction costs. In addition, integrators generally prefer to deal with a few larger operators rather than many smaller ones. Demand for pork and poultry meat has grown strongly in recent decades (Table 23), and is expected, along with demand for dairy and for eggs, to have the highest growth rates to 2050 in sub-Saharan Africa. For example, Western Africa is projected to have a six to sevenfold increase in the consumption of monogastric products (mostly poultry) to 2050, while demand in Southern and Eastern Africa is projected to increase fourfold.[524]

Scale is particularly important for these products to compete with imports. Poultry is the most easily mechanized livestock sector and significant economies of scale are typically available in the post farm segment.[525]

Transaction costs can be reduced through effective horizontal and vertical integration. Cooperatives, an example of both horizontal and vertical integration, have played a key role in the dairy sector development of Kenya where they allow 2 million households to engage in small-scale dairy farming to participate in the milk sector and to be competitive, also through lowering transaction costs.[526] In Kenya, the dairy market developed mostly without a formal market structure and may have been more pro-poor as a result.[527]

Vertical integration is often achieved through the use of contracts. In theory, these can help include small scale producers as well as encourage gender equality by providing equal access to resources, including capacity building targeted equally at women and men. Contract arrangements vary and often involve the contractor supplying genetically superior breeds (particularly in poultry and pig production), feed, advice and support, and a guaranteed market for the end product.[528] However, a review of case studies on various types of contracts found that results for including small-scale producers in contracts have been mixed.[529] In general, contract farming increases the competitiveness of large farms relative to small farms, and there are cost and quality control incentives for the integrators in dealing with fewer, larger producers rather than with many smaller producers.

Food safety issues are of great importance for fruit and vegetables as well as animal products. Threats occur along the chain, and interventions that can reduce food borne disease are improving abattoirs, cold storage, upgrading traditional markets and water disinfection. In Egypt, oxygenated tanks for the transport of live fish have been successful at local scale.[530] Consumers are willing to pay a premium for safer food. For example, evidence from Kenya finds a negative correlation between price and aflatoxin

contamination, suggesting that consumers pay a premium for higher quality.[531] The same study also points out that purely voluntary arrangements may leave some consumers at risk.

Reducing food waste and loss can reduce the cost of food and improve sustainability of agriculture

Reducing food losses along the food chain can help raise incomes, reduce the pressure on land and energy use, and help increase availability and reduce food prices. In Africa, food loss in terms of physical quantity is estimated to be over 15 percent in total, and halving post-harvest losses by 2025 is a target expressed in the Malabo Declaration.[532] Recent estimates show that reducing food losses in primary production and food processing by a quarter, in terms of economic values, would boost GDP and improve availability and access to food, as well as utilization in sub-Saharan Africa (Table 24).[533]

One approach to reducing food loss during storage that is receiving much attention is the use of hermetic bags (and silos).[534] This method not only reduces losses but also contamination with fungal toxins and thus contributes to greater food safety. However, reducing food loss is possibly one of the least effective and most costly ways of boosting food availability and improving competitiveness in Africa, as elsewhere.[535,536]

Other techniques at reducing losses include improving fish smoking and dying practices. FAO has pioneered an innovative technique to smoke and dry fish, the FAO-Thiaroye Technique, which results in a near complete elimination of losses at the processing stage and enhances the quality and safety of the finished product.[537] In Côte d'Ivoire, the technique is estimated to reduce losses of smoked fish rejected on food safety or quality grounds to the tune of USD 1.7 million annually.[538]

Finally, it is important to note that some interventions that raise utilization or stability can also increase food losses. For example, maintaining buffer stocks will most probably lead to some of the food being lost.

In many African countries, high seasonal prices exacerbate hunger and undernutrition

Seasonal food insecurity, due to seasonal price shocks, is an important driver of undernutrition.[539] In the United Republic of Tanzania, there is a 27 percent difference in the price of maize between the high and the low season.[540] Seasonal price differences are particularly high for fruit and vegetables. For example, evidence from seven African countries[541] shows that the seasonal price gap was 60.8 percent for tomatoes, 49.1 percent for plantain/matoke, 33.1 percent for maize, 28.4 percent for bananas, 16.6 percent for rice and 14.1 percent for eggs.[542] Seasonal price spikes can worsen household food security and nutrition outcomes when households cannot smooth consumption adequately over the spikes.

TABLE 23
AVAILABILITY OF MEAT IN AFRICA, 1961–2017 (KG) PER CAPITA PER YEAR

Year	Bovine	Mutton & goat	Pigmeat	Poultry
1961	6.9	2.7	0.7	1.3
1970	6.7	2.7	0.7	1.7
1980	7.1	2.5	0.7	2.4
1990	6.2	2.5	1.0	3.3
2000	6.0	2.8	1.1	4.2
2010	6.3	2.9	1.3	6.1
2017	5.6	2.5	1.5	6.2

SOURCE: FAO.

TABLE 24
THE IMPACT OF A 25 PERCENT REDUCTION IN FOOD LOSSES ON GDP, FOOD SECURITY AND NUTRITION, FOR SUB-SAHARAN AFRICA, PERCENTAGE CHANGE

GDP	Availability (production)	Access (purchase)	Calories	Protein	Vitamin A	Calcium	Zinc
0.57	1.02	0.67	0.75	0.70	0.62	0.96	0.74

SOURCE: **FAO**. 2019. *The State of Food and Agriculture 2019. Moving forward on food loss and waste reduction.* Rome. (also available at www.fao.org/3/ca6030en/ca6030en.pdf).

For example, for urban households in Burkina Faso, caloric intake and micronutrient intake suffered during the lean season.[543]

Particularly in areas dependent on rainfed cultivation, the year-to-year availability of food is the key determinant of fluctuations in undernutrition and short-term deprivation.[544] In Malawi and the Niger, strong seasonal food price variations are a major determinant of child malnutrition, and these fluctuations occur even in periods of relatively abundant harvests because of limited investment in storage at the community and household levels, limited credit availability and inadequate strategic food reserves.[545]

Intra-regional trade can help increase availability, lower prices and improve stability of supply and prices

The large gaps between country specific food price indices and the subregional average shows that markets are not working well (Figure 44).[546] A recent study for 13 countries from Eastern and Central Africa found that on average distance increases price differences between countries by 42 percent and, after controlling for distance, price differences are more than 7 percent larger between than within countries.

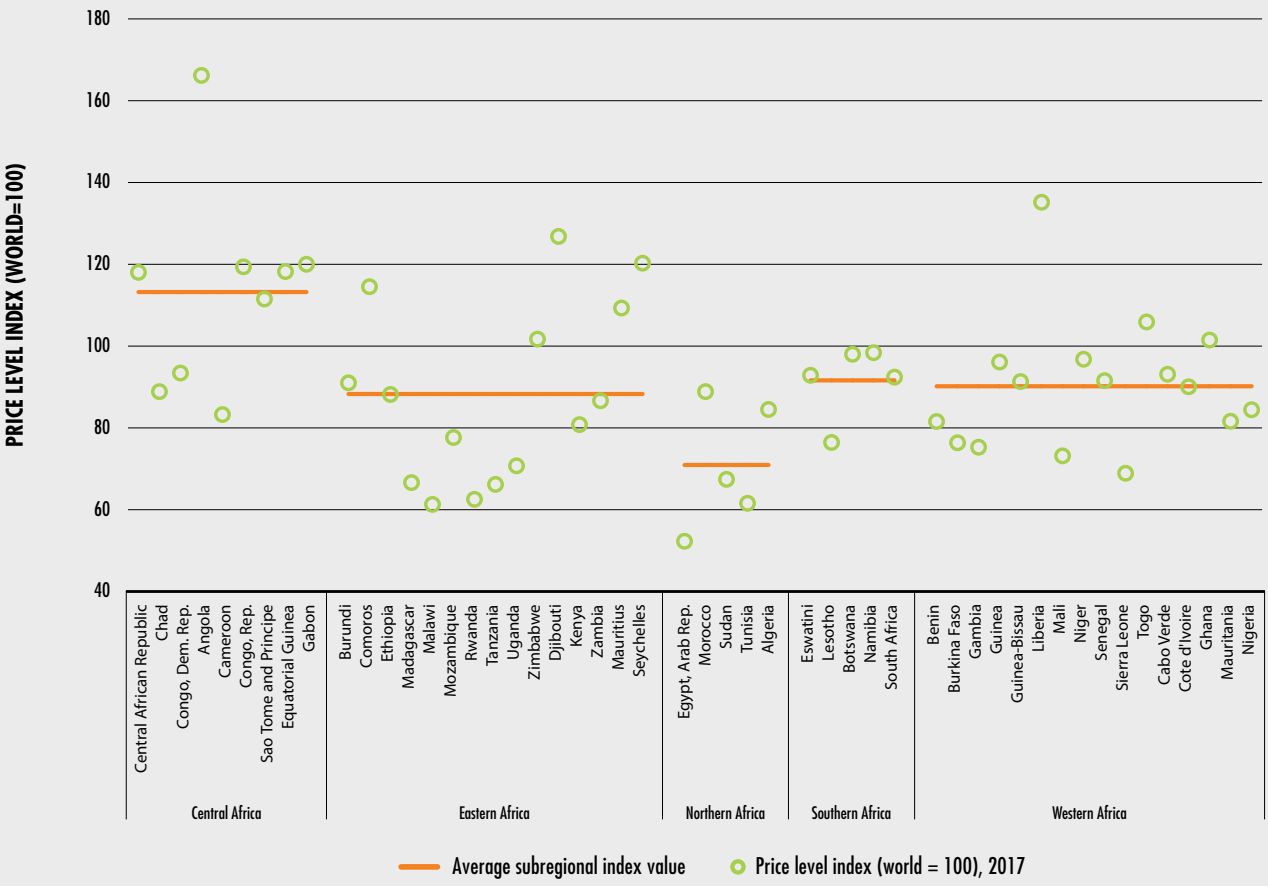
Indeed, most of Africa's trade is with countries outside the region. While it has grown over the last decade, intra-regional trade currently makes up only 27 percent of total agri-food exports and 17 percent of total agri-food imports.[547] At the subregional level, intraregional trade was 5 percent for COMESA, 10 percent for the Economic Community of West African States (ECOWAS) and SADC, and less than 2 percent for Central Africa.

The picture is skewed somewhat by the fact that a good part of trade between countries is informal. For example, in Southern Africa, informal cross-border trade (ICBT) accounts for 30–40 percent of total intra SADC trade, amounting to perhaps as much as USD 17.6 billion a year.[548] In Eastern Africa, the informal cattle trade made up 85 percent of the total in 2011.[549] Similarly, in Western Africa, for Mali and Burkina Faso, official statistics may account for only one-third of the actual value of intraregional livestock trade.[550] However, even if ICBT is included, the total level of intra-African trade is not likely to be more than 20 percent of the total.[551]

ICBT is widespread because of weaknesses in institutional capacities related to taxation, regulation and private property rights. Tax rates are often high, and procedures related to taxation, business registration, licensing and inspection are typically very complicated. Moreover, other barriers to trading through the formal sector, such as poor skills, education and training and weak infrastructure, force traders to engage in informal trade in an effort to meet demand.[552] To address these issues, governments need to simplify legislation and regulations governing businesses registration and operation, trade, educate traders on formal procedures, and tackle corruption.[553]

Removing barriers to intraregional trade in agricultural inputs can stimulate production and agro processing and lower prices. In general, greater regional integration would create larger markets for farmers and agro-processors. This could lead to greater regional sourcing, lower imports from outside of Africa, and capture scale economies, thus lowering costs and enhancing competitiveness.

FIGURE 44
SUBREGIONAL VARIATIONS IN PRICE LEVELS COULD BE LOWERED BY GREATER SUBREGIONAL TRADE IN AGRICULTURAL AND FOOD PRODUCTS



NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping.
SOURCE: **World Bank**. 2020. *World Bank Data Bank*. ICP 2017. In: *The World Bank* [online]. Washington DC. [Accessed June 2020]. https://databank.worldbank.org/source/icp-2017

Trade, by increasing supply and/or competition, can lower staple food prices or dampen price rises and facilitate access to food.[554] Lower prices are an important aspect of food security for the poor who typically spend a large share of their income on food. Trade also increases the variety of foods available and possibly improves food safety and quality.

Food price volatility is a profound threat to stability of access to food over time, and in some sub Saharan African countries, this food price volatility is higher at the national level than in international markets, and staple food imports can help protect consumers from price shocks.[555,556] In practice, governments, citing national food security concerns, often use

export restrictions to help alleviate price surges. However, many studies argue that they have the opposite effect by raising prices and increasing volatility, as well as undermining long-term investment in agriculture.[557]

Cross-border trade faces many hurdles in Africa. Average delays in customs clearance are 12.1 days, much higher than in other regions. Domestic transportation costs are also high, accounting for between 50–60 percent of marketing costs in the region.[558] Adding to the cost of transport are frequent roadblocks. For example, one study reported that trucks en route from Lomé to Ouagadougou are stopped an average of 17 to 23 times.[559]

Sanitary, and phytosanitary measures (SPS) are another cost, adding about 13 percent to domestic food prices in sub-Saharan Africa.[560] In addition, traders often face artificial obstacles, such as certificates of origin when these are not officially required.[561] Sanitary and phytosanitary measures have the legitimate and critical function of protecting countries from risks to public health, to animal and plant life, and health. However, weak capacities to enforce SPS measures can result in a country's exclusion from key markets, and poorly applied procedures can add unnecessary costs to the trading system. For example, evidence from the Burkina Faso, Ghana and Benin corridor indicate that the cost of obtaining SPS certificates for maize, or paying a bribe, adds about USD 40 per tonne, or 9 percent of the farm gate price.[562] Moreover, food safety and SPS regulations vary across countries even though agro-ecological conditions for pests and diseases are shared.[563] Promoting intraregional trade will mean reducing these barriers to trade, which today often push traders towards using informal channels, thus avoiding compliance with SPS measures entirely and defeating the intended purpose of the SPS measures.

Governments can facilitate cross-border trade by investing in physical infrastructure, simplifying procedures, harmonizing standards, streamlining licensing procedures and certificates of origin requirements, improving market information and finance, and improving professionalism of customs officers.[564,565] An area of urgent action is that of improved trade data, the absence of which may lead to inconsistent policy making.[566]

Fortification and biofortification

Vitamin and mineral fortification and supplemental feeding that benefit pregnant mothers as well as infants and young children play a role when these populations do not have access to sufficient micronutrients through food. WHO recommended actions to reduce anaemia include iron and folic acid supplementation, fortification of major staple foods with iron, folic acid and other micronutrients. Food fortification can successfully improve health outcomes and increase relevant micronutrient biomarker concentrations as well as being cost-effective when the vehicle used is widely consumed and cheap.[567,568,569,570] For example, programme costs for salt and iron iodization are quite low on a per-person per-year basis, but setup costs can be significant.[571] Although fortification can be effective, many programmes struggle to achieve wide coverage and compliance with national standards. In addition, few national programmes have measured the impact of fortification on biological and functional outcomes.[572]

Salt iodization is an example of food fortification that has had considerable impact in reducing iodine deficiency in a low-cost manner. Fortification of wheat flour or cooking oil with different vitamins and minerals is fairly common but may not always reach more remote populations, and the additional costs may prevent uptake by those most in need. A review of mandatory food fortification in South Africa found that the addition of micronutrients to staple foods made a significant difference to the intake of vitamin A, folic acid, iron, and other micronutrients. Especially children living in rural areas benefitted.[573] For effective implementation it is important to know the number and location of the population that the programme is meant to reach, as well as which food is likely to be most effective. Sustainable fortification programmes have to be accompanied by monitoring, quality control and objective measures.

Currently, 40 African countries have mandatory legislation for salt iodization in place (Table 25), and several African countries are legislating to increase the use of other types of fortification in food products.

For example, Kenya has legislated for the mandatory fortification of maize and wheat with iron and zinc, and vegetable oil and fats with vitamin A.[574] Sao Tome and Principe has introduced a programme of food fortification with multiple micronutrient powder that covers all children under the age of five.[575] Single use, 1-gram sachets of Multiple Micronutrient Powder are designed for point of use fortification of complementary foods for children and vulnerable populations to address anaemia and vitamin and mineral deficiencies. The Government of Cabo Verde promotes a strategy for household fortification with micronutrients, such as iron, vitamin D, calcium and magnesium, in powder form for children from 6 months to 59 months of age. These interventions are strengthened through education and nutritional guidance in schools, health services and communication addressed to the population in general.[576] In all, 25 African countries have made wheat flour fortification mandatory (Benin, Burkina Faso, Burundi, Cabo Verde, Cameroon, the Congo, Côte d'Ivoire, Djibouti, Ghana, Guinea, Kenya, Liberia, Malawi, Mali, Mauritania, Morocco, Mozambique, the Niger, Nigeria, Senegal, South Africa, the United Republic of Tanzania, Togo, Uganda and Zimbabwe), and in nine of these countries the legislation also covers maize flour (Burundi, Kenya, Malawi, Mozambique, Nigeria, South Africa, the United Republic of Tanzania, Uganda and Zimbabwe).[577] In several other countries (Democratic Republic of Congo, Eswatini, the Gambia, Lesotho, Namibia, and Sierra Leone), more than half of industrially milled wheat flour is fortified, even though it is not mandatory (and Lesotho and Namibia fortify more than half of their industrially milled maize flour). In addition, many countries also fortify cooking oil, sugar and salt as part of their comprehensive nutrition strategy.[578]

Fortification can also be pursued through agronomic practices and plant breeding and is referred to as biofortification. Unlike food fortification, which occurs during food processing, biofortification uses conventional plant-breeding methods to enrich staple crops with micronutrients. The focus is on essential micronutrients, such as iron, vitamin A and zinc, which are difficult to obtain from diets lacking in diversity. Biofortified crops are bred to increase the content of micronutrients as well as having higher yield, pest resistance and other attributes. Examples of biofortified foods are orange fleshed (vitamin A-enriched) sweet potatoes, iron-rich beans and zinc cowpea, to name only a few. Biofortification can be very cost effective when it achieves scale and reaches a large number of households that suffer from micronutrient deficiency.[579] Available evidence shows that biofortified crops can significantly improve the micronutrient status of individuals, but further research is needed to assess the potential health impacts.[580,581] It is considered particularly useful to address micronutrient deficiencies in populations that live in remote rural areas and when achieving dietary diversity is a long-term goal.[582] ■

TABLE 25
NUMBER OF AFRICAN COUNTRIES WITH MANDATORY LEGISLATION FOR SALT IODIZATION, BY SUBREGION

Central Africa	**7**
Eastern Africa	**10**
Northern Africa	**4**
Southern Africa	**4**
Western Africa	**15**

SOURCE: **Development Initiatives**. *2020. Global Nutrition Report 2020. Country Nutrition Profiles: Africa* (available at https://globalnutritionreport.org/resources/nutrition-profiles/)

POLICIES TARGETING THE FOOD ENVIRONMENT AND CONSUMER BEHAVIOUR

Ensuring good child and maternal health and nutrition status must be a priority

For a majority of countries, poor maternal and child nutrition carry the largest burden of disease. Maternal and child undernutrition is the primary pathway through which poverty is transmitted from one generation to the next. Policy makers should therefore put particular emphasis on maternal and child malnutrition and health in the first 1 000 days since conception, both as a moral imperative but also as an investment with high returns (see also Box 8).

The effectiveness of a variety of nutrition-specific and nutrition-sensitive interventions is well documented. With strong political commitment and investment in complementary health services, safe drinking water and good sanitation, maternal and child malnutrition can be reduced significantly.

Interventions should emphasize care and feeding practices, such as improved hygiene and de worming, exclusive breastfeeding for infants during the first six months, as well as vitamin and mineral supplements. A focus on maternal nutrition and caring and feeding knowledge is equally essential. Nutrition education and counselling play a central role in promoting good prenatal and postnatal care and diets for the mother and child.

BOX 8
ASSESSING THE FOOD ENVIRONMENT

In 2013, the Food Environment Policy Index (Food EPI) was developed by International Network for Food and Obesity / Non-communicable Diseases (NCDs) Research, Monitoring and Action Support (INFORMAS). The purpose of the index is to monitor and benchmark food environments and related policies and influence government policy to create healthier food environments. It focuses on the food environment rather than the wider food system, and on obesity, overweight and related non-communicable diseases (NCDs). Policies relating to food insecurity or sustainable food and farming systems are not included.

Nevertheless, in relation to the food environment, it is considered a useful tool to (1) identify and prioritize actions needed to address critical gaps in government policies, (2) compare the extent of implementation of government policies in one country with those in other countries, and (3) track progress in policy over time.[583]

Several African countries have policies for sodium (12 countries), NCDs (15), diabetes (29) and child focused advertising (6), and there are numerous countries with specific plans to address anaemia (31), exclusive breastfeeding (41) and addressing low birth weight (32),[584] but in general a thorough assessment of food environment policies and setting priorities is missing.

In Africa, a Food EPI has been completed in Ghana, Kenya, Senegal and South Africa and is planned for Benin, Burkina Faso, Côte d'Ivoire, Togo, Uganda and the United Republic of Tanzania. In Ghana, the Food EPI identified as priorities the regulation of advertising the sale of food and drinks containing added sugar to children as well as funding for addressing nutrition issues and nutrition relevant research.

BOX 8 (CONTINUED)

Other recommendations included the establishment of national food based dietary guidelines; monitoring and evaluation, particularly the development of a food composition database; monitoring of the food environment; and the establishment of guidelines on salt intake in line with World Health Organization (WHO) recommendations.[585]

Maternal health and nutrition are important for the mother's health and functioning as well as for their children, starting at conception. In Kenya, the implementation of the National Nutrition Action Plan (NNAP) 2012–2017 recognized the importance of interventions in the first 1 000 days of a child's life and expecting mothers were encouraged, through the free maternity services policy, to deliver their babies in health facilities, which resulted in improved care for mother and child. Between 2008 and 2014, the share of babies born in a health facility rose from 43 percent to 61 percent. In Ghana, interventions that target child health and nutrition outcomes include the scaling-up of Community Health Planning and Services and the adoption of the Baby-Friendly Hospital Initiative, which helped focus on care and counselling for pregnant mothers and on infant and young child feeding and care practices (IYCF).[586]

A recent study found that in at least four of seven countries which saw a significant fall in stunting, the fall is coincided with increased coverage of child immunization, deworming medication and maternal iron supplementation.[587] In general, combinations of activities are more effective than single interventions. A review of programmes considered effective in reducing stunting confirms earlier studies which ranked IYCF interventions amongst the most effective at reducing child malnutrition and mortality.[588] Key cost effective interventions are improved hygiene and deworming, exclusive breastfeeding for infants under the first six months, and vitamin and mineral supplements.

Breastfeeding provides essential and irreplaceable nutrition for a child's physical growth and cerebral development. Breastfeeding helps reduce child mortality, improve nutritional status, prevent both communicable diseases and NCDs, and improve child development and learning. It is estimated to be the preventive intervention with the single largest impact on child survival. Governments need to provide programmes that provide appropriate education to mothers, regulate the advertising and promotion of infant formula, and focus on women's working practices.

In Burkina Faso, the government aligned the country's Employment Code with the International Labour Organization convention on maternity protection, including maternity leave. The Government also legislated the prohibition of advertising infant formula, follow-up formula, bottles and teats, and banned samples and gifts to mothers and gifts to healthcare workers. In addition, all primary healthcare facilities now provide individual infant and young child feeding counselling. The country also successfully used targeted infant and young child feeding packages to improve nutrition indicators and outcomes for the first 1 000 days. As a result of these efforts, Burkina Faso has been able to raise exclusive breastfeeding rates from less than 10 percent in the 1990s and 2000s to about 50 percent today. In addition, the country has been able to reduce

stunting in children under the age of five from 43 percent in 2003 to 21 percent in 2017.

Gender roles are directly relevant for child and maternal malnutrition. Increasing women's control over resources and incomes has been shown to benefit their children's health, nutrition and education, as well as their own health and nutritional status.[589,590] Women in most countries also undertake most of the work related to childcare, food preparation and other household responsibilities such as collecting fuel and water. Women thus face multiple trade-offs in the allocation of their time that directly impinge on their own and their children's health and nutritional status, and these trade-offs are exacerbated during times of crises. Policies, interventions and investment in labour-saving farming technologies and rural infrastructure, targeted safety nets, and services such as on-site childcare can contribute significantly to health and nutritional outcomes for women, infants and young children.

After 6 months, children need energy-dense, micronutrient-rich complementary foods, and older children gradually share what should be nutritious family diets. Food systems play an important role in providing diverse and nutritious food obtained from own production or from local markets. Nutrition education and counselling play a central role in promoting good prenatal and postnatal care and diets for the mother and child. This especially concerns the most appropriate types of complementary foods, as well as preparation, storage and feeding practices that help preserve or even increase the nutritional quality of the food.[591]

Nutrition-sensitive social protection is important[592]

As noted in Box 2, social protection programmes are effective in helping to reduce poverty and food insecurity, as well as in improving human capital and building household resilience, and in reducing social, economic and political inequality.[593] When designed appropriately, social protection programmes can improve access to food as well as dietary diversity. For African programmes, impact evaluations found that cash transfer programmes increased food expenditure of participating households by between 10 and 30 percent in Kenya, Malawi, Zambia and Zimbabwe.[594] Evidence from sub-Saharan Africa indicates that well-designed cash transfers, providing adequate and reliable transfers, have resulted in significant improvements across a range of dietary diversity measures.[595] To be impactful on nutrition outcomes, households receiving cash transfers should have access to stores offering affordable food, and the programme should offer nutrition education.

Many programmes in sub-Saharan Africa are targeted at women, and research shows that giving women greater control over household spending leads to greater expenditures on food, health, education, children's clothing and nutrition.[596] Many social protection programmes offer in-kind transfers, and by providing food they also help to free up household income, some of which will also be spent on food, and together this can improve diets. Cash transfer programmes are considered appropriate in areas where households can easily purchase food, while in-kind transfers are more appropriate for remote areas with less access to markets.

Many African governments, in many cases with donor support, also support school feeding programmes which help boost school enrolment as well as providing healthy school meals.[597] When appropriately designed, these meals are an important contribution to the nutrient intake of many African children. In addition, when the food is provided by local producers, they can provide a boost to their incomes and the local economy. For example, Ghana's national school feeding programme, which supports about 2.8 million children, boosted agricultural sales by 33 percent, increasing farming household incomes.[598]

Taxes and subsidies to influence dietary behaviour

Some evidence shows that supermarkets contribute to the higher share of processed foods in household diets and the rise in body-mass index of adults.[599] One study showed that in Kenya, buying in a supermarket is associated with a 13-percentage point higher probability of overweight or obesity among

adults. However, the same study finds that buying in a supermarket tends to decrease child undernutrition. Outcomes differ by age cohort and initial nutritional status, and it is therefore not appropriate to classify supermarkets as simply good or bad for nutrition and public health.[600] A different study found that farm households supplying supermarkets in Kenya benefitted from income gains and price stability, and this translated into higher consumption of calories and higher intakes of vitamin A, iron and zinc.[601]

Government policies have an impact. A review of taxes and subsidies on food found that taxes on sugar-sweetened beverages ranged from 5 to 30 percent, and their imposition reduced consumption of these beverages by 5 to 48 percent.[602] The review also found that subsidies could stimulate consumption of healthy foods, although in some cases this came with an increase in calorie consumption. This and other studies conclude that taxes on sugar-sweetened beverages and subsidies on healthy foods can influence dietary behaviour.[603,604] However, it has also been noted that subsidies are more distorting than cash transfers, as well as being expensive, often not well targeted, and difficult to end.

Taxes on the sugar content of beverages of 10 to 20 percent are often suggested as necessary to have an appreciable impact on sugar consumption.[605] Governments should also consider restricting the sugar content beverages are allowed to have. Additional actions should include public education programmes discouraging the consumption of sugar-sweetened beverages, preventing media targeted at children from advertising these drinks, and ensuring their ban in those environments children spent much time in, such as schools and sports associations.[606] Currently, 23 African countries have a sugar-sweetened beverage tax (Table 26).

Food standards can also be used to reduce the availability of food with undesirable qualities. For example, Ghana implemented limits on the fat content of imported and domestic meat, which led to a significant reduction in imports of turkey tails and chicken feet.[607]

Nutrition training and education, regulating advertising and food based dietary guidelines are also needed

Efforts to make nutritious foods affordable must be complemented by nutrition education and training and public information campaigns as well as regulating advertising, food labelling and improving the local food environment. Education, including both general education and nutrition specific education, have been found to be effective means of improving nutrition.[608] Nutrition education should not only provide information about the importance of dietary diversity, but should also suggest specific ways to achieve it within the household budget.

TABLE 26
NUMBER OF AFRICAN COUNTRIES WITH A SUGAR-SWEETENED BEVERAGE TAX

Central Africa	**2**
Eastern Africa	**8**
Northern Africa	**2**
Southern Africa	**1**
Western Africa	**10**

SOURCE: **Development Initiatives**. 2020. *Global Nutrition Report 2012. Country Nutrition Profiles: Africa* (available at https://globalnutritionreport.org/resources/nutrition-profiles/)

Evidence shows that nutrition education can have a positive impact on dietary choices even when households face economic hardship.[609]

Nutrition training provided to mothers can have a positive effect on child growth and micronutrient deficiencies, primarily through improving breastfeeding practices and complementary feeding during the weaning of young children.[610] A recent global review conducted in low- and middle-income countries confirmed that provision of nutritional counselling to mothers along with nutritious complementary foods could lead to significant gains in the weight and height of children aged 6–24 months.[611] Nutrition training can also guide households in how to consume adequate amounts of energy and micronutrients through dietary diversification. A review of evaluations of school-based interventions found that nutrition training in schools was effective in addressing overweight and obesity, particularly when combined with efforts to increase physical activity.[612] Complementary interventions, such as improvements in sanitation, women's empowerment, and improved access to health facilities help provide a supportive environment and improve nutritional outcomes.

Public information campaigns also play an important role in addressing malnutrition by improving households' understanding of what constitutes a nutritious diet. These campaigns have been implemented by governments, the private sector and through public–private partnerships. Such campaigns are also known as "social marketing" as they use commercial marketing methods to achieve the social good.

National food-based dietary guidelines (FBDGs) can be useful as part of broad public information campaigns, but only a few African countries have developed FBDGs. They communicate in simple terms what constitutes an adequate and nutritious diet, thereby simplifying technical information developed by nutritionists in a way that is intelligible to the general public. FAO and WHO have been promoting the use of such guidelines since the International Conference on Nutrition in 1992. They have evolved to include not only nutrition but also food safety concerns and recommendations concerning physical activity.[613]

The effectiveness of advertising restrictions in influencing healthy food choices and improving nutritional outcomes is debated. However, given the high levels of advertising, it is very likely that commercial advertising almost certainly influences consumers' food choices and diets. WHO Member States have already endorsed a set of recommendations on the marketing of foods and non-alcoholic beverages to children.[614] These provide guidance to governments on the design of policies to reduce the impact on children of the marketing of foods high in saturated fats, trans-fatty acids, free sugars and salt.[615] In many countries there is a great deal of food advertising aimed at children, and typically advertisements are for highly-processed, energy dense foods with minimal nutritional value.[616] Currently, six African countries have a policy in place aimed at reducing the impact on children of marketing of foods and non-alcoholic beverages high in saturated fats, trans fatty acids, free sugars or salt.

Food labelling is another area that may usefully complement other interventions, as label information is more useful when consumers already have enough knowledge to understand the information. Food labelling may also be helpful in encouraging reformulation of products. However, research on the effectiveness of food labelling in influencing consumer choice in developing countries is very limited. There are reasons to expect that labels are relatively ineffective in influencing the dietary choices of the poor. For one, it would seem reasonable to assume that poor consumers are more concerned about price than about labelling. Labels are also more common for processed and packaged food, rather than for many of the products sold in wet markets.

The way forward

The experience in several countries that have implemented nutrition programmes shows that it is imperative to build a common vision of

eradicating hunger and eliminating malnutrition in all its forms using food systems approach. At the international level, the Scaling Up Nutrition (SUN) movement, the Right to Food principles and other initiatives, such as the UN REACH (Renewed Efforts Against Child Hunger and Undernutrition) partnership, work towards providing guidance, coordination and support.

Experience in countries with successful nutrition strategies, such and Senegal and Kenya, shows that strong and committed political leadership is essential for success.[617] Strong political leadership is essential for building coalitions and strong policy commitment. Transforming food systems for healthy diets cuts across sectors and ministries and means that it is inevitable that policymakers and other actors will have different, sometimes conflicting, views about nutrition problems. A key step towards creating a common vision is to bring the various sectors and stakeholders together, often times going beyond the food systems themselves.

The following steps provide a roadmap towards rapid and effective transformation of food systems at municipal, national, regional and global levels, including several key, high-level policy consultations, analyses and actions:[618]

- STEP 1: **Comprehensive situation analysis**. Governments must have a thorough understanding of the food security and nutrition situation in addition to the capacity of food systems to deliver nutritious foods and an understanding of at what level of affordability, to all segments of the population.

- STEP 2: **Cost drivers of healthy diets**. Governments must identify cost drivers of nutritious foods along the food supply chains, and to what extent the food environments facilitate or hinder people's physical, economic and social access to healthy diets. They must ensure cross-sectoral consultation, including representatives from public and private sectors, and civil society, while ensuring robust safeguards to manage conflicts of interest.

- STEP 3: **Address urgent needs of the most vulnerable**. While preparing for food systems transformation, they must ensure that adequate social protection mechanisms and emergency support are in place to help reduce the still unacceptably high levels of hunger and malnutrition in all its forms.

- STEP 4: **Identify policies and investments to leverage food systems transformation**. They must agree upon a set of well-designed policies and investment opportunities across social and economic sectors towards more nutrition-sensitive food systems that provide greater access to affordable, healthy diets for the entire population.

- STEP 5: **Implement policy recommendations and monitor adherence and impact**. They must ensure policy measures and investments are implemented in accordance with agreed priorities, backed by appropriate legislation, regulation and investment plans from all actors in the public and private sectors; establish an evidence-based monitoring system to monitor progress towards SDG targets.

A number of important principles should guide the implementation of these steps. First, food systems vary by country as does the food security and nutrition situation and the cost drivers of nutritious foods. Therefore, the design of policy instruments and investment strategies must reflect the specific country context. It is also important to understand and foster rural-urban linkages.

Second, policy alignment through improved planning and coordination must be strengthened. Food systems are complex and diverse and involve many different institutions and actors. High-level political will and considerable coordination are required to ensure concerted efforts across the many different sectors of the economy that are involved. Coordination efforts are often hampered by a lack of funding and qualified professionals as well as the inability to convene high-level consultations.[619] Coordination can be enhanced through multisectoral policy reviews and impact assessments as well as ensuring that cooperation is built on common incentives.[620]

Most of the necessary investment and, ultimately the food system transformation, will come from the private sector. However, the public sector holds primary responsibility for steering the process, providing public goods and ensuring that no one is left behind. Some interventions are long-term in nature, while others, such as those that ensure that the needs of the poor and vulnerable, are short term. In the short term, nutrition objectives may override sustainability considerations, but in the longer term, the two objectives must converge.

ANNEXES

ANNEX TABLE 1
PREVALENCE OF UNDERNOURISHMENT (PERCENT)

Region/subregion/country	2004-06	2009-11	2014-16	2015-17	2016-18	2017-19	2019
Africa	**24.5**	**18.9**	**18.3**	**18.5**	**18.6**	**18.6**	**19.1**
Northern Africa	**10.1**	**8.8**	**6.2**	**6.3**	**6.6**	**6.3**	**6.5**
Algeria	6.7	4.5	3.2	3.2	3.1	2.8	n.a.
Egypt	6.5	5.4	4.6	4.7	4.7	4.7	n.a.
Libya	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Morocco	5.5	5.6	3.8	3.8	4	4.3	n.a.
Sudan	21.3	21.8	11.4	11.9	12.2	12.4	n.a.
Tunisia	4.3	3.5	<2.5	<2.5	<2.5	<2.5	n.a.
Sub-Saharan Africa	**28.4**	**21.3**	**21.2**	**21.4**	**21.4**	**21.4**	**22.0**
Central Africa	41.7	30.4	28.2	28.8	28.7	29.0	29.8
Angola	52.2	37.9	19	19.5	19.4	18.6	n.a.
Cameroon	16.1	9.2	6.7	6.5	6.4	6.3	n.a.
Central African Republic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Chad	37.9	40.3	35.4	36.4	37.9	39.6	n.a.
Congo	34.1	33.7	25.3	25.9	27.4	28	n.a.
Democratic Republic of the Congo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Equatorial Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gabon	14.5	17.3	14.1	15.1	15.9	16.6	n.a.
Sao Tome and Principe	9.2	14.3	14.5	13.4	12.1	12	n.a.
Eastern Africa	**39.2**	**28.9**	**26.9**	**27.1**	**26.8**	**26.7**	**27.2**
Burundi	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Comoros	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Djibouti	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eritrea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia	37.2	30.7	21.5	20.6	19.9	19.7	n.a.
Kenya	28.7	24.6	22.3	23.4	23.7	23	n.a.
Madagascar	33.5	30	40.2	41.4	41.2	41.7	n.a.
Malawi	22.5	17.3	17.4	17	18.6	18.8	n.a.
Mauritius	5.1	4.7	5.8	5.4	5.5	5.3	n.a.
Mozambique	33.4	24.2	31	32.9	32.9	32.6	n.a.
Rwanda	34.9	23.9	33.9	34.8	34.9	35.6	n.a.
Seychelles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Somalia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
South Sudan	--	--	n.a.	n.a.	n.a.	n.a.	n.a.
Uganda	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Republic of Tanzania	31.7	31.6	24.8	24.4	24.5	25	n.a.

ANNEX TABLE 1 (CONTINUED)

Region/subregion/country	2004-06	2009-11	2014-16	2015-17	2016-18	2017-19	2019
Zambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zimbabwe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Southern Africa	**5.9**	**5.4**	**7.0**	**8.0**	**7.0**	**7.9**	**8.4**
Botswana	22.5	26.3	18.6	20.5	22.4	24.1	n.a.
Eswatini	9.4	9.9	17	16.8	16.5	16.9	n.a.
Lesotho	13.8	11.7	36.8	37.4	37.9	32.6	n.a.
Namibia	15.7	28.3	14.8	12.8	13.3	14.7	n.a.
South Africa	3.5	3.5	5	5.3	5.5	5.7	n.a.
Western Africa	**16.0**	**12.1**	**14.3**	**14.2**	**14.6**	**14.3**	**15.2**
Benin	12.2	8.7	7.6	7.5	7.4	7.4	n.a.
Burkina Faso	23	19.3	17.6	18.1	18.7	19.2	n.a.
Cabo Verde	11.1	15.9	17.6	17.5	17.9	18.5	n.a.
Côte d'Ivoire	20.3	22.9	19.9	19.2	19.9	19.9	n.a.
Gambia	21.9	13.2	11.6	12	12	11.9	n.a.
Ghana	11.4	6.7	7.7	7.5	7	6.5	n.a.
Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guinea-Bissau	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Liberia	35.9	32.2	38.8	38.8	38.4	37.5	n.a.
Mali	13.5	8.7	5.4	5.3	5.2	5.1	n.a.
Mauritania	9.6	7.4	9.6	10.8	11.7	11.9	n.a.
Niger	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria	7.4	7.4	11.1	12	11.9	12.6	n.a.
Senegal	17.4	9.8	11.4	10.3	9.6	9.4	n.a.
Sierra Leone	46.7	37.5	27.8	27.3	26.8	26	n.a.
Togo	27.8	24	21.3	21.3	21.1	20.7	n.a.

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping. For subregions or higher aggregates the estimates are based on annual data while for countries the estimates are based on three-year averages.
SOURCE: FAO

ANNEX TABLE 2
NUMBER OF UNDERNOURISHED (MILLION)

Region/subregion/country	2004-06	2009-11	2014-16	2015-17	2016-18	2017-19	2019
Africa	**192.6**	**196.1**	**216.9**	**224.9**	**231.7**	**236.8**	**250.3**
Northern Africa	**18.3**	**17.8**	**13.8**	**14.4**	**15.5**	**15.0**	**15.6**
Algeria	2.2	1.6	1.3	1.3	1.3	1.2	n.a.
Egypt	4.9	4.5	4.2	4.5	4.6	4.6	n.a.
Libya	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Morocco	1.7	1.8	1.3	1.3	1.4	1.6	n.a.
Sudan	6.6	7.5	4.4	4.8	5	5.2	n.a.
Tunisia	0.4	0.4	n.r.	n.r.	n.r.	n.r.	n.a.
Sub-Saharan Africa	**174.3**	**178.3**	**203.0**	**210.5**	**216.3**	**221.8**	**234.7**
Central Africa	39.7	40.0	43.5	45.8	47.2	49.1	51.9
Angola	10.2	8.9	5.3	5.6	5.8	5.7	n.a.
Cameroon	2.9	1.9	1.6	1.6	1.6	1.6	n.a.
Central African Republic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Chad	3.8	4.8	5	5.3	5.7	6.1	n.a.
Congo	1.2	1.4	1.2	1.3	1.4	1.5	n.a.
Democratic Republic of the Congo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Equatorial Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gabon	0.2	0.3	0.3	0.3	0.3	0.4	n.a.
Sao Tome and Principe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
Eastern Africa	**95.0**	**98.1**	**104.9**	**108.4**	**110.4**	**112.9**	**117.9**
Burundi	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Comoros	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Djibouti	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eritrea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia	28.4	26.9	21.7	21.3	21.1	21.5	n.a.
Kenya	10.5	10.3	10.7	11.5	11.9	11.8	n.a.
Madagascar	6.1	6.3	9.7	10.3	10.5	11	n.a.
Malawi	2.8	2.5	2.9	2.9	3.3	3.4	n.a.
Mauritius	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
Mozambique	6.8	5.7	8.4	9.2	9.4	9.6	n.a.
Rwanda	3.1	2.4	3.9	4.1	4.2	4.4	n.a.
Seychelles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Somalia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
South Sudan	--	--	n.a.	n.a.	n.a.	n.a.	n.a.
Uganda	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Republic of Tanzania	12.2	14	12.8	13	13.4	14.1	n.a.
Zambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zimbabwe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

ANNEX TABLE 2 (CONTINUED)

Region/subregion/country	2004-06	2009-11	2014-16	2015-17	2016-18	2017-19	2019
Southern Africa	**2.7**	**3.2**	**4.4**	**5.1**	**4.5**	**5.2**	**5.6**
Botswana	0.4	0.5	0.4	0.4	0.5	0.5	n.a.
Lesotho	0.3	0.2	0.8	0.8	0.8	0.7	n.a.
Namibia	0.3	0.6	0.3	0.3	0.3	0.4	n.a.
South Africa	1.7	1.8	2.8	3	3.1	3.3	n.a.
Eswatini	<0.1	0.1	0.2	0.2	0.2	0.2	n.a.
Western Africa	**36.9**	**37.0**	**50.3**	**51.2**	**54.2**	**54.7**	**59.4**
Benin	1	0.8	0.8	0.8	0.8	0.8	n.a.
Burkina Faso	3.1	3	3.2	3.4	3.6	3.8	n.a.
Cabo Verde	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	n.a.
Côte d'Ivoire	3.7	4.7	4.6	4.6	4.9	5	n.a.
Gambia	0.3	0.2	0.2	0.3	0.3	0.3	n.a.
Ghana	2.5	1.7	2.1	2.1	2	1.9	n.a.
Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guinea-Bissau	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Liberia	1.2	1.3	1.7	1.8	1.8	1.8	n.a.
Mali	1.7	1.3	0.9	0.9	1	1	n.a.
Mauritania	0.3	0.3	0.4	0.5	0.5	0.5	n.a.
Niger	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria	10.3	11.7	20.2	22.2	22.8	24.6	n.a.
Senegal	1.9	1.2	1.7	1.5	1.5	1.5	n.a.
Sierra Leone	2.6	2.4	2	2	2	2	n.a.
Togo	1.6	1.5	1.6	1.6	1.6	1.6	n.a.

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping. For subregions or higher aggregates the estimates are based on annual data while for countries the estimates are based on three-year averages.
SOURCE: FAO

ANNEX TABLE 3
PREVALENCE OF SEVERE OR MODERATE FOOD INSECURITY (FIES) (PERCENT)*

Region/subregion/country	Prevalence of severe food insecurity in the total population				Prevalence of moderate or severe food insecurity in the total population			
	2014-16	2015-17	2016-18	2017-19	2014-16	2015-17	2016-18	2017-19
Africa	**16.8**	**18.2**	**18.5**	**18.3**	**46.5**	**49.4**	**51.4**	**50.6**
Northern Africa	**9**	**10.4**	**11**	**9.3**	**26.4**	**30**	**36.8**	**31.1**
Algeria	13	12.7	11.4	9.3	22.9	21.5	19.7	17.6
Egypt	8.4	9	8.9	7.8	27.8	33	36	34.2
Libya	11.2	12.4	14.3	16.8	29.1	30.9	33.2	35.9
Morocco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	25.9
Tunisia	9.1	9.3	9.1	9.1	18.2	19.4	20	20
Sudan	13.4	14.4	15.4	16.4	41.4	43.9	46.4	48.9
Sub-Saharan Africa	**18.6**	**20**	**20.2**	**20.3**	**51.2**	**53.9**	**54.8**	**55.1**
Central Africa	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Angola	21	n.a.	n.a.	n.a.	66.5	n.a.	n.a.	n.a.
Cameroon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Central African Republic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Chad	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Congo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Democratic Republic of the Congo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Equatorial Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gabon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sao Tome and Principe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eastern Africa	**23.8**	**25.2**	**24.5**	**23.9**	**57.9**	**61.7**	**61.1**	**60.2**
Burundi	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Comoros	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Djibouti	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eritrea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia	14.5	15	14.8	14.1	56.2	58.3	59.4	57.9
Kenya	19.1	19.1	19.1	n.a.	56.5	56.5	56.5	n.a.
Madagascar	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malawi	51.7	51.7	51.8	51.8	81.7	81.9	82	82.2
Mauritius	5.2	5.9	6.3	6.7	13	16.6	18.5	20.5
Mozambique	40.7	40.7	40.7	40.7	68.4	68.4	68.4	68.4
Rwanda	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Seychelles	3.2	3.2	3.2	n.a.	14.3	14.3	14.3	n.a.
Somalia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
South Sudan	65.4	65.4	65.4	63.7	85.1	85.1	85.1	84.9
United Republic of Tanzania	n.a.	n.a.	23.8	23.8	n.a.	n.a.	55	55
Uganda	17.5	18.5	19.5	20.6	58	60.7	63.4	66.3
Zambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zimbabwe	35.5	36.7	35.9	34.2	64.7	66.7	67	66.7

ANNEX TABLE 3 (CONTINUED)

Region/subregion/country	Prevalence of severe food insecurity in the total population				Prevalence of moderate or severe food insecurity in the total population			
	2014-16	2015-17	2016-18	2017-19	2014-16	2015-17	2016-18	2017-19
Southern Africa	**19.5**	**19.7**	**19.9**	**19.7**	**44.4**	**44.6**	**44.8**	**44.8**
Botswana	34.9	39.9	41.4	41.2	59.3	65	67.2	66.7
Eswatini	29.4	29.4	29.4	30	62.6	62.6	62.6	63.3
Lesotho	n.a.	n.a.	n.a.	27	n.a.	n.a.	n.a.	49.7
Namibia	30.6	30.8	31	31.3	53.3	54.3	55.4	56.4
South Africa	18	18	n.a.	n.a.	42.9	42.9	n.a.	n.a.
Western Africa	**12.5**	**13.8**	**14.9**	**15.8**	**44.3**	**46.4**	**48.6**	**50.5**
Benin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Burkina Faso	10.1	11.3	12.5	13.9	42.4	44.1	45.8	47.7
Cabo Verde	n.a.	n.a.	9.6	9.6	n.a.	n.a.	37.7	37.7
Côte d'Ivoire	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gambia	23.6	23.6	23.6	24.6	52.7	52.7	52.7	54.3
Ghana	7.6	7.9	8.1	8.4	48.8	49.6	50.3	51.1
Guinea	44.3	47.1	49.7	49.7	72.5	73.4	74.1	74.1
Guinea-Bissau	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Liberia	63.1	62.5	62.1	60.4	87.6	88.6	89	88.5
Mali	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mauritania	14.2	18.7	22.1	22.4	31.6	37.6	42.5	44.8
Niger	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria	6.5	7.3	8.2	9.1	36.5	38.9	41.4	44.1
Senegal	14.5	15.7	15.3	16.7	39.3	40.8	39.1	40.7
Sierra Leone	30.4	30.9	31.3	31.8	78.4	79.4	80.4	81.4
Togo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

NOTES: FAO uses the M49 country and regional groupings, available at https://unstats.un.org/unsd/methodology/m49. In this report, "Central Africa" refers to the M49 "Middle Africa" grouping. For subregions or higher aggregates, the estimates are based on annual data, while for countries, the estimates are based on three-year averages.
Country-level results are presented only for those countries for which estimates are based on official national data or as provisional estimates, based on FAO data collected through the Gallup World Poll, for countries whose national relevant authorities expressed no objection to their publication. Note that consent to publication does not necessarily imply validation of the estimate by the national authorities involved and that the estimate is subject to revision as soon as suitable data from official national sources are available. Global, regional and subregional aggregates are based on data collected in approximately 150 countries.
SOURCE: FAO

NOTES

NOTES TO PART 1

1 Comparison of the estimates between different editions of the report is not possible as each year the series are revised with updated information for the food balance sheets, the population and for the coefficient of variation (see Box 1).

2 Undernourishment is defined as the condition of an individual whose habitual food consumption is insufficient to provide, on average, the amount of dietary energy required to maintain a normal, active and healthy life. The prevalence of undernourishment (PoU) is an estimate of the percentage of individuals in the total population that are in a condition of undernourishment.

3 An in-depth discussion of the role these factors play in food security can be found in the past three editions of the *State of Food Insecurity and Nutrition in the World* and the *Africa Regional Overview of Food Security and Nutrition*: **FAO, IFAD, UNICEF, WFP & WHO**. 2017. *The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security*. Rome, FAO; **FAO, IFAD, UNICEF, WFP & WHO**. 2018. *The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition*. Rome, FAO; **FAO, IFAD, UNICEF, WFP & WHO**. 2019. *The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns*. Rome, FAO; **FAO**. 2017. *Regional Overview of Food Security and Nutrition in Africa 2017. The food security and nutrition–conflict nexus: building resilience for food security, nutrition and peace*. Accra, FAO; **FAO and ECA**. 2018. *Regional Overview of Food Security and Nutrition. Addressing the threat from climate variability and extremes for food security and nutrition*. Accra, FAO; **FAO, ECA and AUC**. 2020. *Africa Regional Overview of Food Security and Nutrition 2019. Containing the damage of economic slowdowns and downturns to food insecurity in Africa*. Accra, FAO. 104 pp. (also available at https://doi.org/10.4060/CA7343EN).

4 Income classifications taken from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519.

5 Proxied by sugar-sweetened beverages in the analysis presented in part two.

6 The estimates on the cost and affordability of diets are based on the work reported in *The State of Food Security and Nutrition in the World 2020*. **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en). The concepts of a "healthy" and a "nutrient adequate" diet refer to specific diets that are further defined below.

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9 In addition, the prevalence of severe food insecurity (based on FIES) is presented, although it is not an SDG indicator.

10 The World Health Assembly is the forum that governs the World Health Organization (WHO). It is the world's highest health policy setting body and is composed of health Ministers from WHO Member States.

11 **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

12 Country level estimates of the prevalence of undernourishment, the number of undernourished and the FIES indicators are given in the Annex.

13 For a definition and descriptions of the food system, see part two.

14 Acute food security refers to food deprivation that threatens lives or livelihoods, regardless of the causes, context or duration, while chronic food insecurity refers to the persistent or seasonal inability to consume adequate diets for a healthy and active life, mainly due to structural causes. See **IPC Global Partners**. 2019. *Integrated Food Security Phase Classification Technical Manual Version 3.0. Evidence and Standards for Better Food Security and Nutrition Decisions*. Rome.

15 Country level estimates are presented in Annex table 3.

16 Similar to the PoU, people experiencing severe food insecurity, as measured by the FIES, are unlikely to be able to acquire enough food to continuously fulfil their dietary energy requirements.

17 **Viviani, S., Mane, E. & Cirillo, M**. forthcoming. *Why are women more food insecure than men? Global gender differentials in access to food*. Rome, FAO.

18 Micronutrient deficiency is technically a form of undernutrition but is often referred to separately because it can coexist with adequate or excessive consumption of macronutrients and carries health consequences that are distinct from those associated with stunting. See **UNSCN**. 2010. *Sixth report on the world nutrition situation: progress in nutrition*. United Nations System Standing Committee on Nutrition. Geneva, Switzerland.

19 Children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median.

20 **Development Initiatives**. 2018. *2018 Global Nutrition Report: Shining a light to spur action on nutrition*. Bristol, UK, Development Initiatives.

21 **Walker, S.P., Chang, S.M., Powell, C.A., Simonoff, E. & Grantham-McGregor, S.M**. 2007. Early Childhood Stunting Is Associated with Poor Psychological Functioning in Late Adolescence and Effects Are Reduced by Psychosocial Stimulation. *The Journal of Nutrition*, 137(11): 2464–2469 [online]. [Cited June 2020] https://doi.org/10.1093/jn/137.11.2464

22 **Galasso, E., & Wagstaff, A.** 2018. *The Aggregate Income Losses from Childhood Stunting and the Returns to a Nutrition Intervention Aimed at Reducing Stunting*. Policy Research Working Papers. The World Bank. (also available at http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-8536).

23 A more detailed discussion on the cost of stunting, its relationship to economic growth, and the relative success some countries – in particular Burkina Faso, Ghana, Kenya, Sao Tome and Principe and Senegal – have had in reducing the prevalence of stunting can be found in **FAO, ECA & AUC**. 2020. *Africa Regional Overview of Food Security and Nutrition 2019*. Accra, FAO. 104 pp. (also available at https://doi.org/10.4060/CA7343EN).

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25 Average (unweighted) prevalence are 19.2 and 26.8 percent for urban and rural areas, respectively. See **Development Initiatives**. 2018. *2018 Global Nutrition Report: Shining a light to spur action on nutrition*. Bristol, UK, Development Initiatives, p. 35.

26 See Table 6, p. 30 in **FAO, IFAD, UNICEF, WFP & WHO**. 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. (also available at http://www.fao.org/documents/card/en/c/ca9692en).

27 Wasting is defined as weight-for-height below minus two standard deviations, and severe wasting is defined as weight-for-height below minus three standard deviations, from the median weight-for-height in the reference population.

28 **WHO**. 2014. *WHA Global Nutrition Targets 2025: Wasting Policy Brief*. Geneva, Switzerland.

29 In 2019, the prevalence of wasting in children under five was below 5 percent (but above 3 percent) in Algeria, Angola, Cameroon, Equatorial Guinea, Gabon, Kenya, Liberia, Mozambique, Sao Tome and Principe, Seychelles, Uganda, United Republic of Tanzania and Zambia, while it was below 3 percent in Eswatini, Lesotho, Malawi, Morocco, Rwanda, South Africa, Tunisia and Zimbabwe.

30 For children under the age of five, overweight is defined as weight-for-length or height z-score more than two standard deviations above the median of the WHO Child Growth Standards, and obesity is defined as weight-for-height greater than three standard deviations above the WHO Child Growth Standards median.

31 **Black, R.E., Victora, C.G., Walker, S.P., Bhutta, Z.A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R. & Uauy, R**. 2013. Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, 382(9890): 427–451 [online]. [Cited June 2020] https://doi.org/10.1016/S0140-6736(13)60937-X

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32 **WHO**. 2020. Obesity and Overweight In: *WHO* [online]. Geneva. [Cited June 2020]. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

33 Several factors contribute to anaemia, but iron deficiency is estimated to be the cause in half of all cases. Iron deficiency is caused by insufficient dietary iron intake or absorption, greater need for iron during pregnancy or growth periods, and increased iron loss due to menstruation and helminth infestation. There are other causes, often coexisting with iron deficiency, such as malaria and other nutritional deficiencies. Anaemia is a particularly important complication of malaria in pregnant women. Pregnant adolescents are especially vulnerable to anaemia because they have dual iron requirements, for their own growth and the growth of the fetus and are less likely to access antenatal care. **WHO**. 2014. *Global Nutrition Targets 2025: Anaemia Policy Brief* WHO/NMH/NHD/14.4. Geneva, Switzerland.

34 **UNICEF and WHO**. 2020. *Low birthweight estimates, 2019* [online]. [Accessed June 2020]. https://data.unicef.org/topic/nutrition/low-birthweight; https://www.who.int/nutgrowthdb

35 This report uses the M49 country and regional groupings, throughout. See Notes to Table 1 for details of the country groupings.

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37 The IPC/CH categories for acute food insecurity are: 1 = minimal/none, 2 = stressed, 3 = crisis, 4 = emergency, 5 = catastrophe/famine. People experiencing IPC/CH Phase 3 or above are considered as needing urgent food, nutrition and livelihoods assistance. **IPC Global Partners**. 2019. *Integrated Food Security Phase Classification Technical Manual Version 3.0. Evidence and Standards for Better Food Security and Nutrition Decisions*. Rome. (also available at http://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/manual/IPC_Technical_Manual_3_Final.pdf).

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THE STATE OF THE WORLD

2020

AFRICA

REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

TRANSFORMING FOOD SYSTEMS FOR AFFORDABLE HEALTHY DIETS

The 2017, 2018 and 2019 editions of this report explain that the gradual deterioration of food security in Africa is due to conflict, weather extremes, and economic slowdowns and downturns, often overlapping. These shocks often affect populations already facing chronic poverty and limited social protection coverage and are exacerbated by policies that do not support equitable growth or poverty reduction.

2020 saw a continued worsening of food security, as the COVID-19 pandemic and associated containment measures caused a devastating social and economic crisis in many countries, with the consequences expected to last many years.

In addition to hunger, across all countries in Africa millions of people suffer from widespread micronutrient deficiencies, and overweight and obesity are emerging as significant health concerns in many countries. Overall progress in reducing malnutrition remains unacceptably slow in Africa.

Meeting global nutrition targets will only be possible if we ensure that people are nourished with quality diets that address all forms of malnutrition. However, of all the challenges to achieving this, cost and affordability of food are among the most important, particularly in the case of nutritious food. Evidence presented in this report shows that nearly three-quarters of the African population cannot afford a healthy diet, and more than half cannot afford a nutrient adequate diet. For the majority of Africans to gain access to healthy diets, nutritious food must become considerably more affordable.

ISBN 978-92-5-134449-1

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CB4831EN/1/06.21