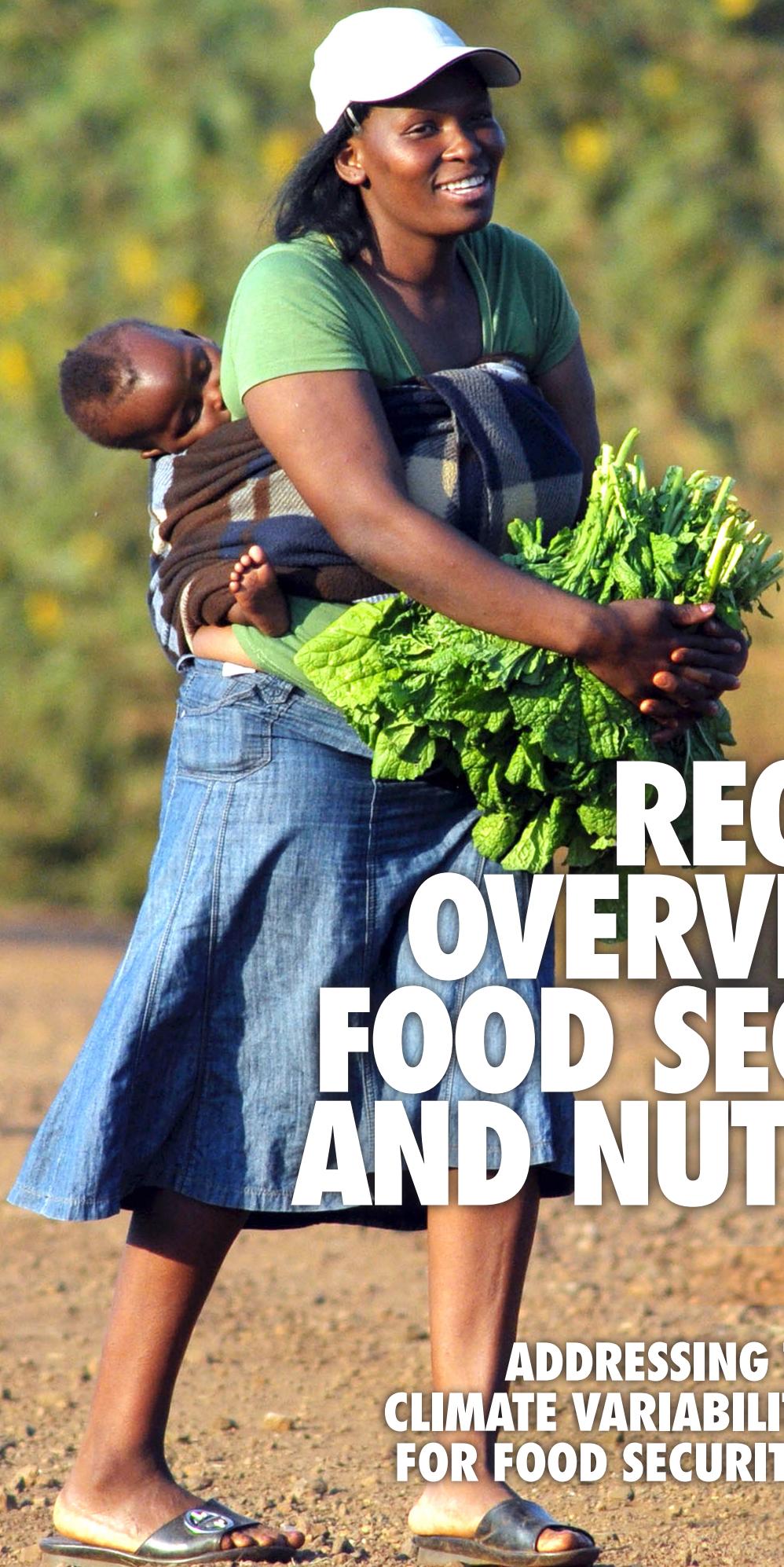




Food and Agriculture
Organization of the
United Nations



United Nations
Economic Commission for Africa



2018

AFRICA
**REGIONAL
OVERVIEW OF
FOOD SECURITY
AND NUTRITION**

**ADDRESSING THE THREAT FROM
CLIMATE VARIABILITY AND EXTREMES
FOR FOOD SECURITY AND NUTRITION**



2018

AFRICA

**REGIONAL
OVERVIEW OF
FOOD SECURITY
AND NUTRITION**

**ADDRESSING THE THREAT FROM
CLIMATE VARIABILITY AND EXTREMES
FOR FOOD SECURITY AND NUTRITION**

Recommended citation:

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. 116 pp.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) or Economic Commission for Africa (ECA) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO or ECA in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO or ECA.

ISBN 978-92-5-131157-8 (FAO)
© FAO, 2018

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holders is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via www.fao.org/contact-us/licence-request or addressed to copyright@fao.org.

FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org

ECA information products are available on the ECA website (www.uneca.org) and can be purchased through ECA printing and publishing unit at ecainfo@uneca.org

CONTENTS

FOREWORD	viii	Intraregional trade and food security and nutrition	45			
ACKNOWLEDGEMENTS	x	Introduction	45			
ACRONYMS	xi	Situation and trends in intraregional trade	46			
KEY MESSAGES	xii	Informal cross-border trade	49			
PART 1						
REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION	1	Trade and food security	49			
Food insecurity continues to worsen in Africa	2	Non-tariff barriers to trade	50			
Trends in food security in Africa	2	Climate change and food security and nutrition				
SDG Target 2.1	2	Introduction	51			
Trends in malnutrition						
SDG Target 2.2	8	The impact of climate change on agriculture, fisheries and forestry	52			
Progress towards the WHO global nutrition targets	8	Climate change is expected to worsen food security and nutrition	55			
	16	Working towards adaptation and mitigation of climate change	55			
		Action at international, regional and national level is required	56			
Food insecurity continues to deteriorate while Africa faces new challenges	19	PART 3				
ADDRESSING THE THREAT FROM CLIMATE VARIABILITY AND EXTREMES FOR FOOD SECURITY AND NUTRITION				61		
Introduction				62		
Situation and trends				64		
Observed trends				64		
Projected changes				72		
The impact of climate variability and extremes on food security and nutrition				74		
Availability of food				75		
Access to food				76		
Utilization of food				77		
Building resilience to extreme climate events				78		
Informal safety nets are not enough				79		
Shock-responsive social protection is needed				80		
Investing in resilience				81		
Stronger, coordinated efforts are needed				83		
Greater coherence and coordination between climate change adaptation and disaster risk reduction and management policies is needed				87		
Migration, remittances and food security and nutrition				89		
Remittances impact food security	38	ANNEX				
Enhancing the impact of remittances on food security, nutrition and rural development	41	REFERENCES				91
REFERENCES				91		

TABLES, FIGURES AND BOXES

FIGURES

- 1** Prevalence of undernourishment in the world, Africa and its subregions, 2005–2017
- 2** Change in the prevalence of undernourishment in African countries from 2004–06 to 2015–17
- 3** Change in the prevalence of stunting in African countries (difference between most recent observations)
- 4** Prevalence of stunting in children under five by gender in African countries (most recent year available)
- 5** Prevalence of wasting in children under five in African countries (most recent year available)
- 6** Prevalence of wasting in children under five by gender in African countries (most recent year available)
- 7** Prevalence of overweight in children under five in African countries (most recent year available)
- 8** Overweight in children under five by gender in African countries (most recent year available)
- 9** Area, production and yield of rice in Senegal, 1962–2016

- 10** Estimates of the current and future structure of employment in sub-Saharan Africa: 2005–2010 and 2010–2020
- 11** The number (stock) of international migrants in the world
- 12** Total stock of international migrants by subregion of origin, 1990–2017
- 13** Remittance inflows in Africa by subregion, 2000 to 2017
- 14** Intraregional exports of agricultural products (scale varies by subregion)
- 15** Number of extreme meteorological, hydrological and climatological disasters in Africa, 1980–2017
- 16** Number of people affected by extreme meteorological, hydrological and climatological disasters in Africa, 1980–2017
- 17** Damage due to extreme meteorological, hydrological and climatological disasters in Africa, 1980–2017
- 18** Number of climatological disasters (droughts and wildfires) in Africa, 1980–2017
- 19** Number of hydrological disasters (landslides and floods) in Africa, 1980–2017

- 20** Number of meteorological disaster (storms and extreme temperatures) in Africa, 1980–2017

- 21** Number of drought-related disasters in Africa and its subregions, 1980–2017

- 22** Number of flood-related disasters in Africa and its subregions, 1980–2017

TABLES

- 1** Undernourishment in the world, Africa and its subregions, 2005–2017
- 2** Prevalence of severe food insecurity (measured using FIES) in the world, Africa and its subregions, 2014 to 2017
- 3** Prevalence and number of stunted children under the age of five in the world, Africa and its subregions, 2017
- 4** Prevalence and number of wasted children under the age of five in the world, Africa and its subregions, 2017
- 5** Regional progress towards the Malabo commitments: results of the biennial review 2017

6 Selected statistics on international migrants (stock), refugees and remittances in Africa and its subregions by 2017

ANNEX TABLES

1 Prevalence of undernourishment

2 Number of undernourished

BOXES

1 Overweight in South Africa

2 Some progress / on course (in bold) for five global nutrition targets

3 The Ethiopian Productive Safety Net Programme

4 The drive to rice self-sufficiency in Senegal

5 Climate and weather: what is the difference?

6 Conflict and climate variability and extremes

7 Water management in Ethiopia: reducing the impact of shocks

8 Disaster early warning and preparedness in Mozambique

FOREWORD

The 2018 *Africa Regional Overview of Food Security and Nutrition* is co-published for the very first time with the United Nations Economic Commission for Africa. This new collaboration provides opportunities to broaden the technical scope, promote a wider dialogue and visibility of the findings and policy implications, and continue FAO's efforts to achieve closer collaboration on its flagship publications with the relevant UN agencies.

In 2017, FAO reported that the prevalence of hunger was on the rise in Africa, after many years of decline. The latest data, presented in this year's *Regional Overview*, confirms that this trend continues, with Central and Western Africa faring the worst. Today, a fifth of Africans are undernourished, representing a staggering 257 million individuals.

The worsening trend in Africa is due to difficult global economic and worsening environmental conditions and, in many countries, conflict and climate variability and extremes, sometimes combined. Economic growth slowed in 2016 due to weak commodity prices, in particular for oil and minerals. Food insecurity has worsened in countries affected by conflict, often exacerbated by drought or floods. For example, in Southern and Eastern Africa, many countries suffered from drought.

The deterioration of the food security situation and the lack of progress towards the WHO global nutrition targets makes it imperative for countries to step up their efforts, if they are to achieve a world without hunger and malnutrition by 2030. The call for greater action remains true even as the economic and climatic situation improves, offering hope of renewed progress in reducing food insecurity and malnutrition on the continent.

The need for greater efforts also emerges clearly from the findings of the inaugural biennial review of progress in implementing the goals of the Malabo Declaration. The evidence presented in the review indicates that countries committed to the values and principles of the Comprehensive Africa Agriculture Development Programme (CAADP), and that implement their National Agriculture Investment Plans, perform better. It is therefore imperative to strengthen commitments to the CAADP goals and to accelerate efforts toward formulating and implementing National and Regional Agricultural Investment Plans.

This year's *Regional Overview* also presents evidence from a number of countries that have successfully reduced food insecurity and malnutrition. Their experience shows that policies, when appropriately designed, and effectively coordinated and implemented, are important drivers of progress towards Sustainable Development Goal 2, i.e. end all forms of hunger and malnutrition by 2030. In addition to specific food security and nutrition policies, this year's report reviews four important cross-cutting topics, namely, youth employment, remittances, intraregional trade, and climate change. It highlights their interplay with the food system and their role in food security and nutrition.

Youth employment is a fundamental challenge across the continent and agriculture and the rural economy must play a key role in creating jobs to absorb the 10 to 12 million youth joining the labour market each year. However, the quality of jobs is equally important as most youth currently work in the informal economy and 67 percent of young workers live in poverty in sub-Saharan Africa. Rising incomes, urbanization and changing lifestyles pose challenges but also represent opportunities for the private

sector to generate the growth and employment needed to provide decent jobs for our youth. Governments must step up efforts to help youth acquire skills, resources and the opportunity to participate in decision-making and policy dialogue.

International and internal migration affects millions of Africans, many of whom are youth, each year. The remittances they send home play an important role in reducing poverty and hunger as well as stimulating productive investments. International remittances amount to nearly USD 70 billion, about 3 percent of Africa's GDP, and present an opportunity for national development that governments should endeavour to strengthen. At the same time governments must promote decent employment, inclusive growth and strengthened household resilience to avoid involuntary migration.

The signing of the African Continental Free Trade Area agreement is an opportunity to accelerate growth and sustainable development by increasing investment and trade, including trade in agricultural products. Although agricultural intra-African exports rose from USD 2 billion in 2000 to USD 13.7 billion in 2013, they remain relatively modest and often informal. Considerably higher trade flows are expected once the barriers to investment and trade are removed. Opening trade of food also carries risks to consumer and producer welfare, and governments should avoid using trade policy for multiple objectives but rather combine trade reform with additional instruments, such as safety nets and risk-mitigating programmes, to achieve food security and nutrition goals.

Climate variability and extremes, in part due to climate change, is a present and growing threat to food security and nutrition in Africa and is a particularly severe threat to countries relying heavily on agriculture. The effects of climate change, reduced precipitation and higher temperatures are already seen on the yields of staple food crops. Without climate change adaptation and mitigation, by 2050 an estimated additional 71 million people will be food insecure in the world, over half of whom will be in sub-Saharan Africa.

The 2017 edition of the *Africa Regional Overview of Food Security and Nutrition* reported that in many countries adverse climate conditions were among the reasons for rising levels of hunger. It is, therefore, timely that this year's edition's special focus is on presenting a broader evidence-based assessment of the threat posed by climate variability and extremes to food and nutrition security in the region. Many countries in Africa are at great risk to climate-related disasters and suffer from them frequently. Over the last ten years climate-related disasters affected on average 16 million people and caused USD 0.67 billion in damages across the continent each year. Greater efforts are needed to support rapidly growing insurance markets and establish strategic regional grain reserves to contain food price volatility and prevent food crises.

Greater urgency in building resilience of households, communities and countries to climate variability and extremes is needed. A myriad of challenges must be faced to building institutional capacity in designing, coordinating and scaling-up actions for risk monitoring and early warning systems, emergency preparedness and response, vulnerability reduction measures, shock-responsive social protection, and planning and implementing resilience building measures. Strategies towards climate change adaptation and disaster risk reduction must be aligned as well as coordinated with interventions in nutrition and food systems across sectors.

Bukar Tijani

Assistant Director-General and
Regional Representative for Africa

Vera Songwe

Executive Secretary
Economic Commission for Africa

ACKNOWLEDGEMENTS

The 2018 *Africa Regional Overview of Food Security and Nutrition* was, for the first time, jointly prepared by the Food and Agriculture Organization of the United Nations (FAO) and the Economic Commission for Africa (ECA).

This fourth edition of the *Africa Regional Overview of Food Security and Nutrition* has been co-authored by the FAO Regional Office for Africa (RAF) and the Economic Commission for Africa (ECA), in close cooperation with FAO's Agricultural Development Economics Division (ESA), Nutrition and Food Systems Division (ESN), Social Policies and Rural Institutions Division (ESP), Statistics Division (ESS), Trade and Markets Division (EST), and the Subregional Office of FAO for Eastern Africa (SFE).

Andre Croppenstedt (RAF) and Adama Ekberg Coulibaly (ECA) coordinated the preparation of the document and led its production under the overall supervision and guidance of Bukar Tijani, Assistant Director-General and Regional Representative for Africa, assisted by Serge Nakouzi, Deputy Regional Representative for Africa, and by Abebe Haile-Gabriel, Regional Programme Leader for Africa and FAO Representative for Ghana. The FAO-ECA collaboration was substantially supported and facilitated by Kafkas Caprazli (SFE), under the guidance of David Phiri, SFE coordinator.

For FAO, under the overall supervision of Kostas Stamoulis, FAO Assistant Director-General for the Economic and Social Development Department, the coordination and technical support provided by the Agricultural Development Economics Division (ESA) was led by Marco Sanchez Cantillo, ESA Deputy-Director, Cindy Holleman and Giovanni Carrasco Azzini. For ECA, under the overall supervision of Abdalla Hamdok, Chief Economist and Deputy Executive Secretary of the ECA and Collen Kelapile, Chief of Staff of the ECA, contributions were made by the Regional Integration and Trade Division (RITD) under the supervision of Stephen Karingi and including Adama Ekberg Coulibaly, Simon Mevel-Bidaux and Medhat El-Helepi; the African Climate Policy Centre (ACPC) under the supervision of Fatima Denton and including Jame Murombedzi, Yodit Balcha Hailemariam, Yosef Amha and Victor Konde; the Social Development Division (SDP) under the supervision of Thokozile Ruzvidzo and including Saurabh Sinha, Ngone Diop, William Muhwava and Adrian Gauci; the African Centre for Statistics (ACS) under the supervision of Oliver Chinganya and including Tinfissi-Joseph Illboudo, Haile Mulalem, Xiaoning Gong and Tissie Nadzanja; the African Trade Policy Centre (ATPC) under the supervision of David Luke and including Jamie Alexander Macleod and Lily Sommer; and the Macroeconomic Policy Division under the supervision of Adam B. Elhiraika and including Auma George Kararach.

Valuable contributions were received from: ESN, including Trudy Wijnhoven and Diana Carter; ESP, including Francesca Dalla Valle, Francesca Distefano, Ileana Grandelis, Lisa Van Dijck, Elisenda Estruch, Ion Bugac, and Thu Hien Dao; EST, including Ishrat Gadhok, and Georgios Memigkas; RAF, including Albert Nikiema, Koffi Amegbeto, Jean Senahoun, Melisa Aytekin, Pamela Pozarny, Mphumuzi Sukati, Adama Taoko, Peter Anaadumba, Sara Abdoulayi, Magnus Grylle and Karin Christianson; and SFE, including Kafkas Caprazli. Data for Part One were provided by ESS by José Alejandro Rosero Moncayo, Director, and the Food Security and Nutrition Statistics Team led by Carlo Cafiero and including Marinella Cirillo, Filippo Gheri, Klaus Grunberger, Sara Viviani and Anne Kepple.

Valuable contributions to Part Two were received from the FAO Subregional Office for Eastern Africa and from the FAO country offices in Burkina Faso, Chad and Mali.

The Office for Corporate Communication (OCC) assisted with publishing standards, layout and formatting. Copy-editing and proofreading services were provided by Joas Fiodehoume, and the Communication unit of the FAO Regional Office for Africa, supported by Kristin Kolshus and led by Daisy Leoncio and including Samuel Creppy and Samuel Nyarko, selected photos and worked on the final layout as well as prepared the public information events.

ACRONYMS

AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
AIR	African Institute for Remittances
ARNS	Africa Regional Nutrition Strategy
ASPYEE	African Skills Portal for Youth Employment and Entrepreneurship
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CADRI	Capacity for Disaster Reduction Initiative
CCA	Climate change adaptation
CESA	Continental Education Strategy for Africa
COMESA	Common Market for Eastern and Southern Africa
CREWS	Climate Risk and Early Warning Systems
DRR	Disaster Risk Reduction
EAC	East African Community
ECA	Economic Commission for Africa
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EM-DAT	The International Disasters Database
ENABLE	Empowering Novel Agribusiness-Led Employment for Youth
ENSO	El Niño–Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FIES	Food Insecurity Experience Scale
GAFSP	Global Agriculture and Food Security Program
GDP	Gross Domestic Product
ICN2	Second International Conference on Nutrition
IDMC	Internal Displacement Monitoring Centre
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
JFFLS	Junior Farmer Field and Life Schools
NEPAD	New Partnership for Africa's Development
OECD	Organisation for Economic Co-operation and Development
PoU	Prevalence of Undernourishment
PSNP	Productive Safety Net Programme
SADC	Southern African Development Community
SARCOF	Southern African Regional Climate Outlook Forum
SDG	Sustainable Development Goal
UEMOA	West African Economic and Monetary Union
UN	United Nations
UNDP	United Nations Development Programme
UNHCR	Office of the United Nations High Commissioner for Refugees
WHO	World Health Organization
WFP	World Food Programme
WMO	World Meteorological Organization

KEY MESSAGES

→ Africa is not on track to meet SDG 2. The prevalence of undernourishment continues to rise and now affects 20 percent of the population on the continent, more than in any other region. In Northern Africa, the rise is much less pronounced and the prevalence is 8.5 percent. In sub-Saharan Africa, the upward trend appears to be accelerating, and now 23 percent of the population is undernourished. The rise in the prevalence of undernourishment has been highest in Western Africa, followed by Central Africa.

→ There are today 821 million undernourished people in the world, 36.4 million more than in 2015. Of these 257 million are in Africa, of whom 237 million in sub-Saharan Africa and 20 million in Northern Africa. Compared to 2015 there are 34.5 million more undernourished in Africa, 32.6 million more in sub-Saharan Africa, and 1.9 million more in Northern Africa. Nearly half of the increase is due to the rise in undernourished people in Western Africa, while another third is from Eastern Africa.

→ At the regional level, the prevalence of stunting in children under five is falling, but only few countries are on track to meet the global nutrition target for stunting. Overweight in children under five continues to rise and is particularly high in Northern and Southern Africa. Progress towards meeting the WHO global nutrition targets is too slow at continental level to meet any of the targets.

→ The worsening food security situation was driven by difficult global economic conditions and weak commodity prices, in particular for oil and minerals. In many countries, notably in Eastern and Southern

Africa, adverse climatic conditions due to El Niño led to a decline in agricultural production and soaring staple food prices. The economic and climatic situation has improved in 2017, but some countries continue to be affected by drought or poor rainfall. In several countries, conflict, often in combination with adverse weather, has left millions of people in need of urgent assistance.

→ Youth employment is a fundamental challenge across the continent. Most youth work in the informal economy and 67 percent of young workers live in poverty. Agriculture and the rural economy will play a key role in creating jobs to absorb the millions of youth joining the labour market each year. Action to provide infrastructure, facilitating private enterprise development and youth specific skills training and access to land, financing, inputs, services and safety nets are essential.

→ Remittances from migrants play an important role in reducing poverty and hunger as well as stimulating productive investments. International remittances make up 3 percent of GDP in Africa and governments should strengthen their role in national development through reducing transfer costs and engaging the African Diaspora. At the same time governments must promote decent employment, inclusive growth and strengthened household resilience supported by strong, integrated social protection systems to avoid involuntary migration.

→ The signing of the African Continental Free Trade Area agreement is an opportunity to accelerate growth and sustainable development by increasing

trade, including trade in agricultural products. Although agricultural intra-African exports rose from USD 2 billion in 2000 to USD 13.7 billion in 2013, they remain relatively modest and often informal. Much remains to be done to facilitate trade and reduce non-tariff barriers. Opening trade of food also carries risks to consumer and producer welfare, and governments should avoid using trade policy for multiple objectives but rather combine trade reform with additional instruments, such as safety nets and risk-mitigating programmes, to achieve food security and nutrition goals.

→ Climate change is a present and growing threat to food security and nutrition in Africa and is a particularly severe threat to countries relying heavily on agriculture. In general, reduced precipitation and higher temperatures are already impacting negatively on the yields of staple food crops, although there is some spatial diversity. By 2050, climate change will cause another 71 million people to be food insecure in the world, over half of whom will be in sub-Saharan Africa.

→ Climate variability and extremes are a key driver of the recent rise in food insecurity and one 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 nutrition outcomes, especially for children.

→ Climate resilience is key and must be built around climate risk assessments, science, proven technologies, and cross-sectoral collaboration. Greater action is required to strengthen or build institutional capacity for risk monitoring and early warning systems; emergency preparedness and response; vulnerability reduction measures; shock-responsive and long-term social protection; and planning and implementing resilience building measures.

→ The impacts of climate variability and extremes vary by gender and are often worse for women. Climate adaptation, mitigation, and resilience-building must, therefore, take a gender sensitive approach.

→ Africa lags in developing climate adaptation strategies and implementation. Greater efforts are needed in data collection, monitoring, and implementation of climate-smart agriculture practices. Continued efforts, through partnerships, blending climate change adaptation and disaster risk reduction, and long-term financing, are needed to bridge humanitarian and development approaches. In addition, actions across sectors must be scaled up to achieve greater resilience to climate variability and extremes.

**ETHIOPIA**

Consecutive climate shocks have resulted in back-to-back droughts, which have caused hunger to soar and malnutrition rates to rise to alarming levels
©FAO/Michael Tewelde



PART 1

REGIONAL

OVERVIEW OF

FOOD SECURITY

AND NUTRITION

REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

FOOD INSECURITY CONTINUES TO WORSEN IN AFRICA

Last year's edition of the *Africa Regional Overview of Food Security and Nutrition* reported that the food security situation on the continent appeared to be worsening (FAO, 2017a). The latest available data presented in the 2018 report confirms this trend. The worsening situation in Africa is due to difficult global economic conditions and, in many countries, conflict and adverse climate conditions, sometimes in combination. Economic growth slowed in 2016 due to weak commodity prices, in particular for oil and minerals (AfDB, 2018a). Food insecurity has worsened in countries affected by conflict, often exacerbated by drought or floods, and in Southern and Eastern Africa many countries have been adversely affected by prolonged drought (FAO, IFAD, UNICEF, WFP and WHO, 2017; FSIN, 2018). The expectations for 2018 are for an improved food security situation, although the effects of El Niño continue to be felt in some countries.¹ Notably, several countries have achieved sustained progress in reducing food insecurity in the face of challenging circumstances.

TRENDS IN FOOD SECURITY IN AFRICA

The 2017 *Africa Regional Overview of Food Security and Nutrition* marked the start of monitoring progress towards achieving a world without hunger and malnutrition, a goal set by the 2030 Agenda for Sustainable Development. In particular, the *Regional*

Overview reports annually on progress towards the Sustainable Development Goal (SDG) 2: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture". Progress is measured against two targets, the first, Target 2.1, captures progress towards ensuring access to food for all, while the second, Target 2.2, measures progress towards eliminating all forms of malnutrition.

In the following sections the indicators used to assess progress are presented. With regard to Target 2.1 these are the prevalence of undernourishment and the prevalence of severe food insecurity. Target 2.2 is assessed using the prevalence of stunting, wasting and overweight for children under five. Finally, progress towards the six global nutrition targets for 2025, set by the World Health Assembly, is also presented.²

SDG INDICATOR 2.1.1

Prevalence of undernourishment (PoU)³

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."

¹The El Niño–Southern Oscillation (ENSO) is an increase in surface temperatures in the tropical Pacific Ocean, which occurs roughly every 2 to 7 years and lasts from 6 to 24 months. Its effects can include huge increases in rainfall, tropical cyclones, droughts, forest fires, floods and other extreme weather events worldwide. For up-to-date and in-depth analysis the reader is referred to FAO, IFAD, UNICEF, WFP and WHO (2018).

²The 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.

³For more details on the PoU, see FAO (2017a) and the Methodological Notes in FAO, IFAD, UNICEF, WFP and WHO (2018).

REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION 2018

The FAO Prevalence of Undernourishment (PoU) indicator is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life. This indicator is published by FAO since 1974, and from 1999 onwards FAO has reported it in the annual *State of Food Insecurity in the World* (SOFI) report for almost all the countries in the world. Despite some limitations, the PoU indicator is an invaluable tool for monitoring progress towards reducing global hunger because it is consistently calculated and available across countries. Designed to capture a state of energy deprivation lasting over

a year, it does not reflect short-lived effects of temporary crises or inadequate intake of other essential nutrients; nor does it capture the effects of other sacrifices that individuals or households may make to maintain their consumption of dietary energy (FAO, IFAD and WFP, 2015a).

Globally, the prevalence of undernourishment has risen slightly each year, from 10.6 in 2015 to 10.9 percent in 2017.⁴ Today there are 821 million undernourished people in the world, up from 804 million in 2016 and 784 million in 2015 (Table 1). For Africa, the deterioration started a year earlier and was strongest in 2015–16 but again

**TABLE 1
UNDERNOURISHMENT IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2005–2017**

Region/Year	Prevalence (%)					Number (millions)				
	2005	2010	2015	2016	2017	2005	2010	2015	2016	2017
World	14.5	11.8	10.6	10.8	10.9	945	820.5	784.4	804.2	820.8
Africa	21.2	19.1	18.6	19.7	20.4	196	200.2	222	241.3	256.5
Northern Africa	6.2	5.0	8.0	8.5	8.5	9.7	8.5	18.1	19.5	20
Sub-Saharan Africa	24.3	21.7	21.1	22.3	23.2	176.7	181	203.9	221.9	236.5
Central Africa	32.4	27.8	24.1	25.7	26.1	36.2	36.5	37.1	40.8	42.7
Eastern Africa	34.3	31.3	30.5	31.6	31.4	113.5	119.1	121.4	129.6	132.2
Southern Africa	6.5	7.1	7.9	8.2	8.4	3.6	4.2	5	5.2	5.4
Western Africa	12.3	10.4	11.4	12.8	15.1	33.0	31.9	40.4	46.3	56.1

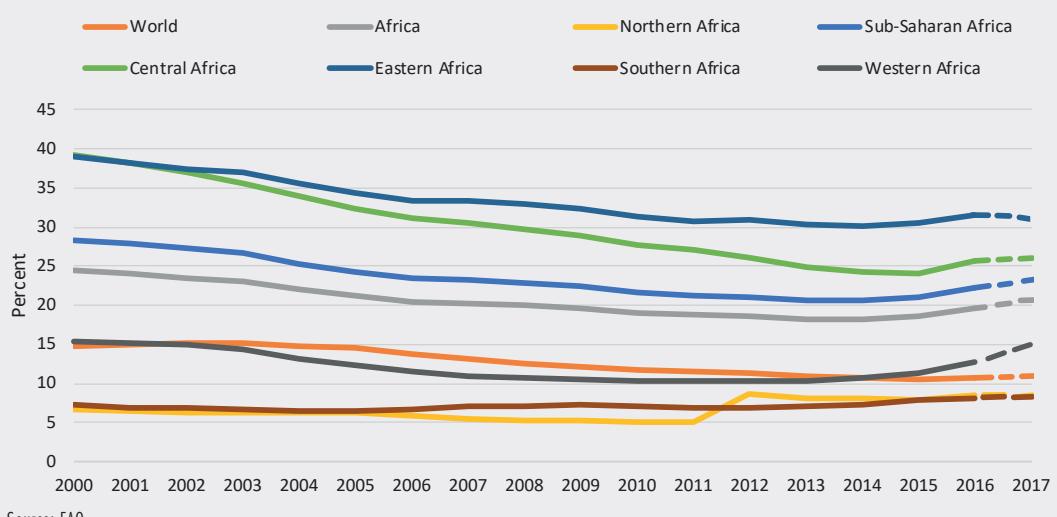
Source: FAO

⁴Prevalence at regional and subregional level are single-year estimates, while country estimates are based on three-year averages.

rose in 2016–17. (Table 1 and Figure 1).⁵ Today, 20.4 percent of the continent's population – 257 million people – are undernourished, up from 19.7 percent – 241 million people – in 2016. In sub-Saharan Africa, there are 237 million undernourished

in 2017, up from 222 million in 2016. The greatest deterioration between 2015 and 2017 occurred in Central and Western Africa, and in the latter region has accelerated in 2016–17.⁶

**FIGURE 1
PREVALENCE OF UNDERNOURISHMENT IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2005–2017**



The rise in the prevalence of undernourishment in Western Africa between 2014 and 2016 was strongest in Guinea, Mauritania, Niger and Nigeria. Nigeria, which accounts for half the population of Western Africa, was affected by deteriorating commodity prices while Niger faced population displacements and civil insecurity. In Mauritania, local food supplies are stretched by the influx of refugees while Guinea, recovering from the Ebola Virus Disease, suffered localized production shortfalls.

The food security in Nigeria was also adversely affected by a depreciating currency, leading to high inflation, also reflected in food prices, in particular rice, rising sharply in the second half of 2016 (FAO, 2018a). In addition, in northeastern Nigeria, civil conflict left millions in need of urgent assistance, and, based on the *Cadre Harmonisé*⁷ analysis of March 2018, although the situation has improved over 2017, 2.9 million people are expected to be severely food insecure during the 2018 lean season (June to August) (FAO, 2018b; FAO, 2018c).

⁵ 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.

⁶ The series for Northern Africa experienced a jump in 2012 due to the inclusion of the Sudan from that year onwards.

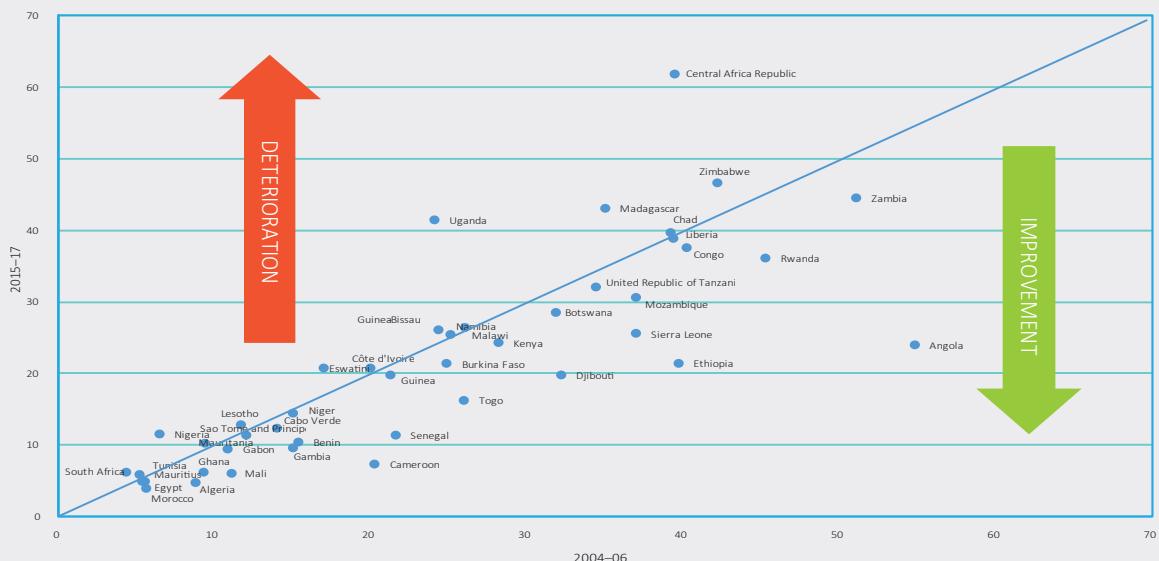
⁷ In 2008–2009 the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) developed the "Harmonized Framework for Identification and Analysis of Areas at Risk of and Populations Affected by Food and Nutrition Insecurity in the Sahel and West Africa". This tool, known as "Cadre Harmonisé", helps overcome problems of compatibility associated with using uncoordinated national food security monitoring. It provides a framework for countries to assess food and nutrition insecurity on an objective and consensual basis. The Cadre Harmonisé is now present in 17 countries in the region and provides regular and reliable data on food security, allowing government and humanitarian actors in the region to take informed decisions to prevent, mitigate, anticipate and respond to recurrent food crises.

Eastern and Southern Africa were severely affected by adverse climatic conditions due to the 2015–16 El Niño, one of the strongest recorded, which led to significant losses in crop and livestock production. In Eastern Africa, a 3.3 percent fall in undernourishment between 2014 and 2016 in Ethiopia, a country that accounts for 25 percent of the population of the subregion, was outweighed in particular by increases in Kenya, Madagascar, Malawi, and Uganda, which, combined, account for a third of the population of the subregion.⁸ In Southern Africa the increase in food insecurity over the same period was due to a deterioration in Botswana and South Africa, with the latter accounting for 87 percent of the population of the subregion. South Africa experienced a sharp fall in the commodity prices of some of its key exports, leading to weak economic growth. Although El Niño ended in 2016, it continues to affect weather patterns in some areas.

In 2017 global economic conditions improved and African real Gross Domestic Product (GDP) growth improved to 3.6 percent, up from 2.2 percent in 2016. The forecast for 2018 and 2019 are for real GDP growth of about 4 percent (AfDB, 2018a). However, climatic conditions remain difficult in many parts of the continent. In parts of the Horn of Africa, notably in Somalia, eastern Kenya and southeastern Ethiopia, recurrent drought continued to disrupt agricultural production in 2017 (FSIN, 2018). Drought and/or conflict led to soaring staple food prices in Ethiopia, Kenya, Niger, Nigeria, South Sudan, Sudan and Uganda. On the other hand, Southern Africa, so badly affected by drought in 2016, saw improved conditions and harvests in 2017.

Country-level estimates of the prevalence of undernourishment for 2004–06 and 2015–17 are shown in Table 1 of the Annex and in Figure 2 below.⁹ Two-thirds of the 43 countries for which

**FIGURE 2
CHANGE IN THE PREVALENCE OF UNDERNOURISHMENT IN AFRICAN COUNTRIES FROM 2004–06 TO 2015–17***



Source: WHO

*No data were available for Burundi, Comoros, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Libya, the Seychelles, Somalia, South Sudan and Sudan.

⁸No data is available for, *inter alia*, Burundi, Somalia and South Sudan.

⁹Country-level estimates of the number of undernourished people are given in Table 8 (ANNEX).

data are available were within 5 percent of the 2004–06 estimates, and 10 countries saw a change of 1 percent or less in either direction. Of the latter group, most have a prevalence of undernourishment that is already below that of the average of the sub-Saharan Africa, and progress may be more incremental. Between 2004–06 and 2015–17, the prevalence of undernourishment rose most in the Central African Republic, Uganda, Madagascar, Nigeria (discussed above) and Zimbabwe, and for each country the worsening of the food security situation occurred in the last 5 years or less.

In the Central African Republic, food insecurity has increased dramatically due to conflict which disrupted production and caused food price inflation, leaving 687 000 people internally displaced in early 2018, a rise of over 70 percent since January 2017. About 1.6 million people, 34 percent of the total population, were in need of urgent food assistance in early 2018 (FAO, 2018b).

In the case of Uganda, the number of undernourished has been inflated by the influx of over 1.4 million migrants and refugees, of which about 1 million alone came from South Sudan (FSIN, 2018). In addition, poor rainfall and crop and livestock pests and diseases reduced production and contributed to record high maize prices in 2016–17 (FAO, 2018c; FAO, 2018a). In 2017, production conditions improved and maize prices fell considerably in the second half of that year, but the effects of two consecutive seasons of reduced agricultural production linger (FAO, 2018b).

The food security situation in Madagascar has deteriorated following several years of extreme weather. By the end of 2016, parts of the country had endured 3 years of consecutive drought leaving about 1.5 million people in the southern and south-eastern part of the country in need of humanitarian assistance. The situation continues to be stressed in southwestern areas, but rice production is expected to improve in 2018 (FAO, 2018b).

Zimbabwe also suffered the effects of prolonged drought. Cereal production fell substantially in 2016 and higher prices reduced people's access to food. In 2017 production improved considerably, and prices fell, but an expected fall in cereal production in 2018 may put renewed stress on food security in 2018 (FAO, 2018b).

Although not always reflected in the three-year averages, climatic shocks in 2016 created exceptional food production shortfalls and/or widespread lack of access to food and left millions of people in Djibouti, Eswatini, Ethiopia, Lesotho, Kenya, Madagascar, Malawi, Mozambique, Somalia, Uganda and Zimbabwe in need of urgent assistance in early 2017 (FAO, 2017b). While 2017 saw an improvement, climatic shocks, sometimes localized, continued to leave millions in need of urgent food assistance in Djibouti, Eswatini, Ethiopia, Lesotho, Kenya, Madagascar, Malawi, Mozambique, Somalia and Zimbabwe (FAO, 2018b).

Additionally, millions of persons were in need of urgent food assistance due to conflict in early 2017 in the Democratic Republic of the Congo, the Lake Chad Basin (and in particular northeast Nigeria), South Sudan, and Sudan (FAO, 2017b). By early 2018, millions of individuals continued to be in need of urgent assistance in the same countries (FAO, 2018b). In addition, civil insecurity and localized conflict caused heightened food insecurity in Burundi, the Central African Republic, Chad, Libya, Mali and the Niger.

Notably, several countries also made significant progress in the fight against hunger, even under difficult circumstances. In particular, Angola, Cameroon, Djibouti, Ethiopia, Senegal and Sierra Leone reduced the prevalence of undernourishment by more than 10 percent between 2004–06 and 2015–17. All except Cameroon and Djibouti, which experienced a small deterioration, saw continued improvements in the 2015–17 period. The factors underlying the progress achieved in these countries are discussed in greater detail in Part Two.

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

The Food Insecurity Experience Scale (FIES) is a new tool, developed by FAO, which complements the information provided by the PoU. Based on 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 facing serious constraints on their ability to obtain sufficient food.

The recent trend in undernourishment is confirmed by the rise in the prevalence of severe food insecurity within the population, i.e. the number of people living in households where at least one adult has been found to be severely food insecure, as a percentage of the population.¹⁰ The rise in severe food insecurity as measured by the FIES also appears to be accelerating. This is true for Africa and is driven by developments in Western and Central Africa, while in Eastern and Southern Africa the rise in FIES has slowed, as it has in Northern Africa.

At the global, Africa and sub-Saharan Africa level, the PoU and FIES measures are broadly similar. However, at subregional level the PoU indicates a much lower level of food insecurity for Western and Southern Africa than that indicated by the FIES (Table 2). It is possible that access to food is not as high in these two subregions as the PoU, which gives greater weight to availability, would suggest.

**TABLE 2
PREVALENCE OF SEVERE FOOD INSECURITY (MEASURED USING FIES) IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2014 TO 2017**

Region	Prevalence of severe food insecurity			
	2014	2015	2016	2017
World	8.9	8.4	8.9	10.2
Africa	22.3	22.4	25.4	29.8
Northern Africa	11.2	10.0	11.7	12.4
Sub-Saharan Africa	25.0	25.2	28.6	33.8
Central Africa	33.9	34.3	35.6	48.5
Eastern Africa	25.9	25.4	29.7	32.4
Southern Africa	21.3	20.4	30.8	30.9
Western Africa	20.7	21.9	23.8	29.5

Source: FAO

¹⁰ For more details see FAO, IFAD, UNICEF, WFP and WHO (2018).

TRENDS IN MALNUTRITION

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.”

SDG INDICATOR 2.2.1

Prevalence of stunting in children under 5 years of age

Stunting in children under the age of five captures the effects of long-term deprivation and disease that often starts with maternal malnutrition. Stunted girls grow up to be stunted mothers, and maternal stunting is one of the strongest predictors for giving birth to a low-birth-weight infant. Maternal and child malnutrition thus perpetuate the cycle of poverty. Stunting causes permanent impairment to cognitive and physical development that can lower educational attainment and reduce adult income. The costs, both individual and for society are high: past stunting is estimated to have lowered today's GDP per capita in Africa by 9 to 10 percent (Galasso and Wagstaff, 2018).

Globally, 22.2 percent (151 million children) of children under five were stunted in 2017, while in Africa the prevalence was 30.3 percent (59 million children) and in sub-Saharan Africa the prevalence was 32.6 percent (54 million children) (Table 3).¹¹ While the prevalence continues to slowly decline, the number of stunted children slowly increases each year. The prevalence of stunting is 17.3 in Northern Africa but ranges from 29.1 in Southern Africa to 35.6 in Eastern Africa.

**TABLE 3
PREVALENCE AND NUMBER OF STUNTED CHILDREN UNDER THE AGE OF FIVE IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2017**

Region	Prevalence (%)	Number (million)
World	22.2	150.8
Africa	30.3	58.7
Northern Africa	17.3	5.0
Sub-Saharan Africa	32.6	53.8
Central Africa	32.1	9.3
Eastern Africa	35.6	23.9
Southern Africa	29.1	2.0
Western Africa	29.9	18.6

Source: UNICEF, WHO and World Bank, 2018a

¹¹ All global, regional and subregional data on stunting are from UNICEF, WHO and World Bank (2018a).

Figure 3 shows that progress in reducing stunting has been made by most countries, but also that there is considerable heterogeneity between countries and for many, the reductions are small. However, it should be noted that the start and end dates and the number of years between them vary between countries, reducing the comparability of the estimates.

The recent climatic shocks and conflicts that disrupted agriculture and rural livelihoods have

caused deaths and hardship and will leave many children stunted, at considerable cost to themselves and to society. Evidence from past conflicts, such as that in Rwanda during the 1990s, found a rise in stunting of children born in affected regions (Akresh, Verwimp and Bundervoet, 2007). And Hoddinott and Kinsey (2001) showed that children affected by the 1994–95 drought in Zimbabwe grew 1.5 to 2 cm less than those not affected and they remained shorter even four years later.

**FIGURE 3
CHANGE IN THE PREVALENCE OF STUNTING IN AFRICAN COUNTRIES (DIFFERENCE BETWEEN MOST RECENT OBSERVATIONS)**

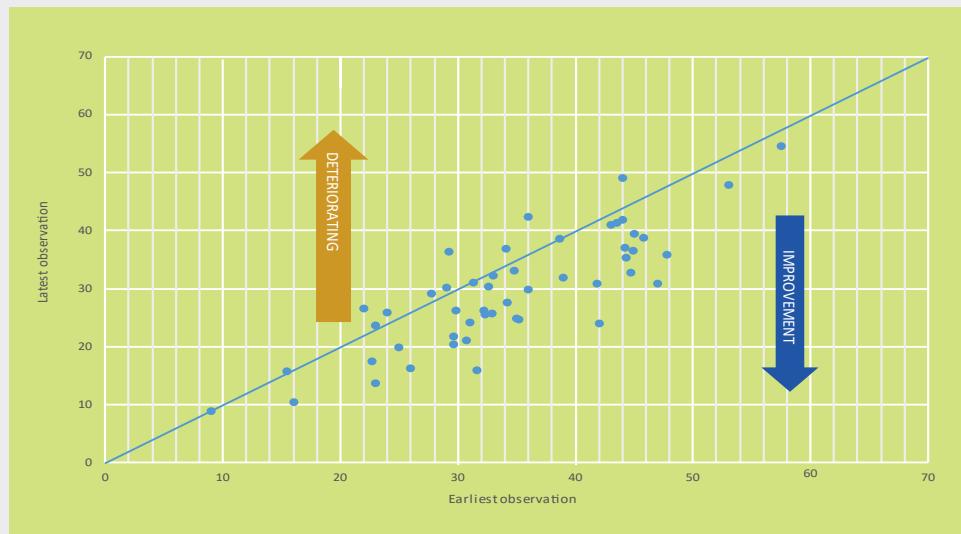


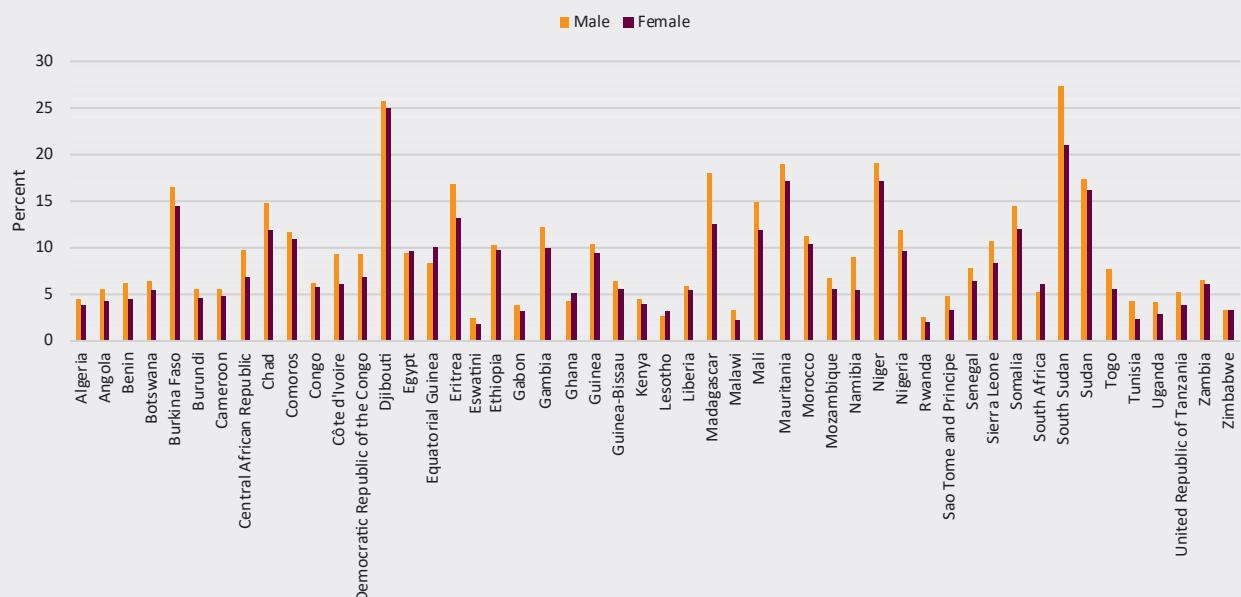
Figure 4 shows the prevalence of stunting for children under five by gender. For all countries for which data are available, the prevalence is higher for boys than for girls and in some cases, substantially so, especially for Lesotho (39.1 versus 28.1 percent) and Rwanda (43 versus 33.4 percent). This pattern is repeated also for wasting and overweight (discussed in the next section), indicating that gender disparities are not already reflected in these indicators of early childhood malnutrition.

The availability of adequate food supplies does not in itself guarantee good nutrition outcomes. In many cases, but not always, poor nutrition outcomes are the result of a lack of dietary diversity. Nutritionists consider dietary diversity a key indicator of a high-quality diet and evidence indicates that

dietary diversity is strongly and positively associated with child nutritional status and growth, even after socio-economic factors have been controlled for (FAO, 2013a).

In many countries, however, high levels of stunting are observed even though the average adequacy of dietary diversity is relatively high. In addition, stunting must be addressed through direct nutrition interventions integrated and implemented with nutrition-sensitive interventions and actions on social protection, health system strengthening, breastfeeding, prevention and treatment of diarrhoea and other infectious diseases, water, sanitation and hygiene, reproductive health and food safety (WHO, 2014a). Of particular importance is improved nutrition during the first 1 000 days.

**FIGURE 4
PREVALENCE OF STUNTING IN CHILDREN UNDER FIVE BY GENDER IN AFRICAN COUNTRIES (MOST RECENT YEAR AVAILABLE)**



Source: UNICEF, WHO and World Bank, 2018b

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

Wasting (or thinness) in children under the age of five typically indicates recent and severe weight loss, which is often associated with acute starvation and/or severe disease. While poor food security is one of the main underlying causes of wasting, there are other important causes, including poor access to health care; inadequate caring and feeding practices; poor dietary diversity and food safety; and no or poor access to safe water, sanitation and hygiene services. These factors are related to each other in that poor diets lead to increased risk of infection, and infection has a profound effect

on nutritional status (UNICEF and WFP, WHO, 2014).

In 2017 about 7.5 percent of children under five (50.5 million) suffered from wasting worldwide.¹² In Africa, the number was 13.8 million, or 7.1 percent, and most of these wasted children (9.1 million) were in Eastern and Western Africa (Table 4).

The true extent of this form of undernutrition is probably larger, with the effects on wasting in children of the prolonged drought in many parts of Eastern and Southern Africa and conflict in many countries not fully captured. For example, the Food Security Information Network (FSIN, 2018) reports that 3 million children were classified as affected by wasting in Ethiopia alone. In the Lake Chad Basin, the Democratic Republic of the Congo, South Sudan and Sudan, another 12 million children were so classified.

**TABLE 4
PREVALENCE AND NUMBER OF WASTED CHILDREN UNDER THE AGE OF FIVE IN THE WORLD, AFRICA AND ITS SUBREGIONS, 2017**

Region	Prevalence (%)	Number (million)
World	7.5	50.5
Africa	7.1	13.8
Northern Africa	8.1	2.3
Sub-Saharan Africa	6.9	11.5
Central Africa	7.1	2.1
Eastern Africa	6.0	4.0
Southern Africa	4.0	0.3
Western Africa	8.1	5.1

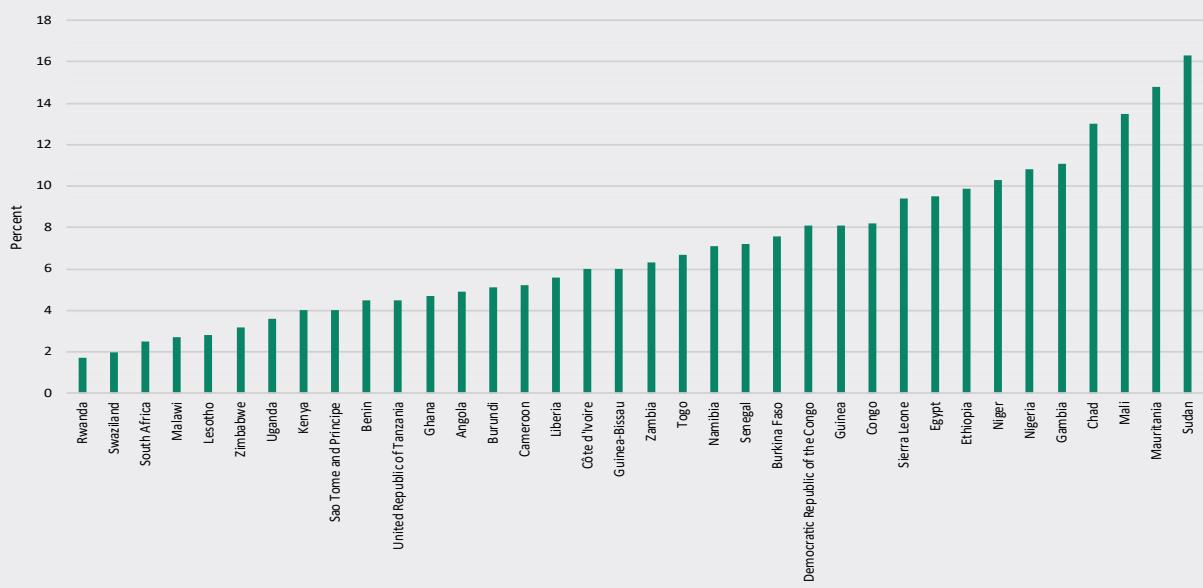
Source: UNICEF, WHO and World Bank, 2018a

¹² All global, regional and subregional data on wasting are from UNICEF, WHO and World Bank (2018a).

Figure 5 shows considerable variation between countries. It also indicates that a low PoU is not necessarily indicative of a low prevalence of wasting. For example, Egypt, Mali and Mauritania have a higher prevalence of wasting than might be expected,

given their relatively low PoU, while Malawi, Uganda and Zimbabwe have a low prevalence of wasting while they have a relatively high PoU. The result for Egypt is also unexpected given the high rate of child overweight (15.7 percent) in that country.

**FIGURE 5
PREVALENCE OF WASTING IN CHILDREN UNDER FIVE IN AFRICAN COUNTRIES (MOST RECENT YEAR AVAILABLE)**

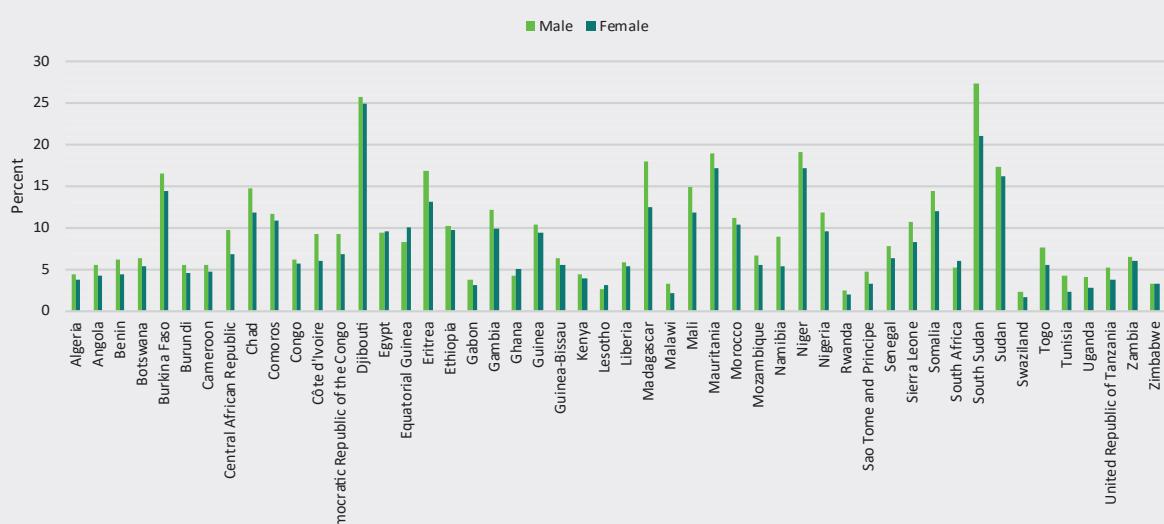


Source: WHO

Figure 6 shows that the prevalence for severe wasting is higher for male children. Although the differences are mostly small, they are quite large

for a few countries, notably Madagascar and South Sudan.

**FIGURE 6
PREVALENCE OF WASTING IN CHILDREN UNDER FIVE BY GENDER IN AFRICAN COUNTRIES
(MOST RECENT YEAR AVAILABLE)**



Source: Unicef, WHO and World Bank, 2018c

Wasting can be addressed through community-based management approaches, comprised of treatment as well as community awareness raising to facilitate early detection and treatments. Children from 6 months to 5 years of age with moderate wasting need to receive nutrient-dense foods to meet their extra needs for weight and height gain, either through improved home-based foods or supplementary foods in areas of food insecurity. Episodes of wasting may negatively impact child growth and development and actions to detect and prevent wasting may also reduce stunting (WHO, UNICEF and WFP, 2014). Furthermore, treatment of severe acute malnutrition within the health system must be improved. The United Nations (UN) Decade of Action on Nutrition is an umbrella for consolidating and aligning nutrition actions and

facilitates the policy process across the Second International Conference on Nutrition (ICN2) Framework for Action, including those aimed at reducing wasting.

Globally, **overweight** affected 38.3 million children under the age of five (5.6 percent) in 2017, and their number is steadily rising.¹³ Of these, 9.7 million children are in Africa, and the continental prevalence rate, at 5.0 percent, is quite similar to the global one. At the subregional level, the prevalence is below the continental average in Central Africa (4.7 percent), Eastern Africa (4.4 percent), and Western Africa (2.4 percent) while it is much above the average in Northern Africa (10.3 percent)¹⁴ and Southern Africa (13.7 percent). In the latter regions the trend is clearly upwards. Although the prevalence

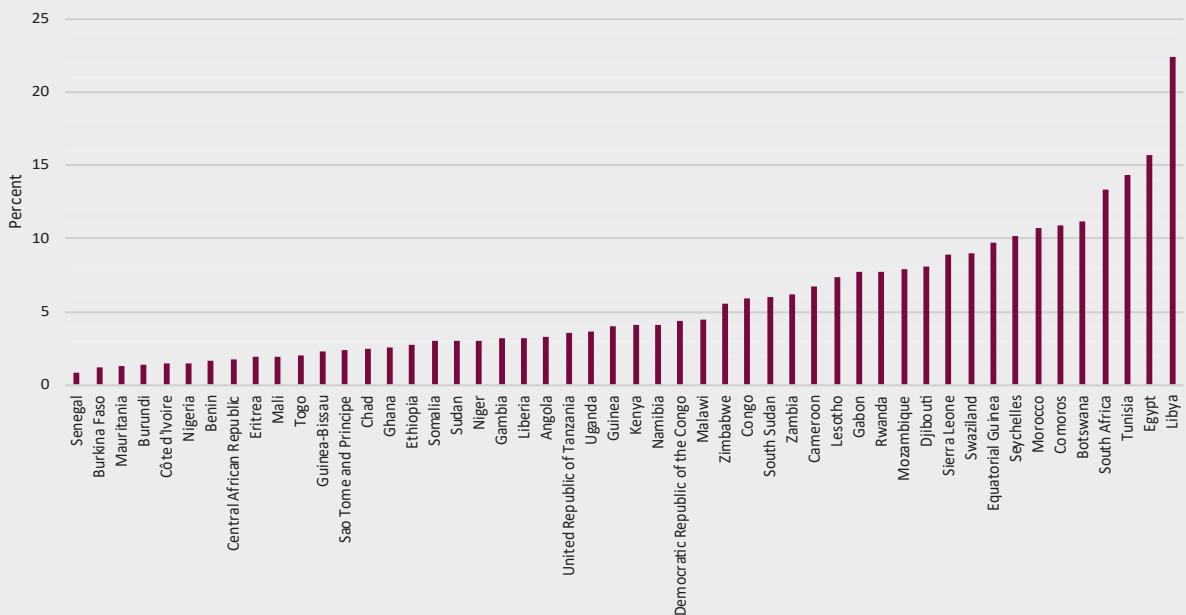
¹³ All global, regional and subregional data on child overweight are from UNICEF, WHO and World Bank (2018a).

¹⁴ Including the Sudan, where the prevalence of overweight is quite low (3 percent).

in Southern Africa is the highest in the world, the average reflects an especially high prevalence in South Africa (13.3 percent). The prevalence in Namibia and Lesotho is much lower (4.1 percent

and 7.4 percent respectively). The highest levels of child overweight are observed in Tunisia (14.3 percent), Egypt (15.7 percent) and Libya (22.4 percent) (Figure 7).

**FIGURE 7
PREVALENCE OF OVERWEIGHT IN CHILDREN UNDER FIVE IN AFRICAN COUNTRIES
(MOST RECENT YEAR AVAILABLE)**



Source: WHO

There are several factors driving the rise in overweight, complicating policy responses. One policy option that has received much attention is

WHO's recommended 20 percent sugar tax which has been adopted by a small number of African countries (see Box 1).

BOX 1 OVERWEIGHT IN SOUTH AFRICA

Overweight is a worsening problem in many countries and coexists with underweight and stunting in the population. In South Africa, about 27 percent of the adult population is classified as obese, with the prevalence at nearly 32 percent for women and 13.3 percent for men. This rise is linked to the increase in Type 2 diabetes, now one of the leading causes of death for South African women. The rise in overweight and obesity is driven by urbanization and the associated lifestyle and dietary changes. In addition, in South Africa, higher incomes are linked to rising overweight and obesity. Most adults living in urban areas do not engage in regular physical activity and this may account for 15 percent of obesity (Sartorius *et al.*, 2015). Higher income and a sedentary lifestyle of urban populations is often accompanied by changing diets towards increased intake of processed energy-dense

foods, often high in fat, sugar and/or salt. A factor that may complicate policy-making is the preference for a larger body size by many females (Sartorius *et al.*, 2015).

The South African Government has introduced a Sugary Beverages Levy, which taxes sugar content exceeding 4 grams per 100 ml at 0.021 Rand, translating into an effective tax rate of about 11 percent (fruit juices are exempt).¹⁵ The levy will in turn be used to raise public awareness. Additional interventions, in particular with regard to nutrition education, are needed and are likely to be more effective when they reach people at an early age. A review of 19 school-based interventions showed that nutrition training in schools helps to effectively address overweight and obesity, especially when combined with efforts to increase physical activity (Mozaffarian *et al.*, 2012).

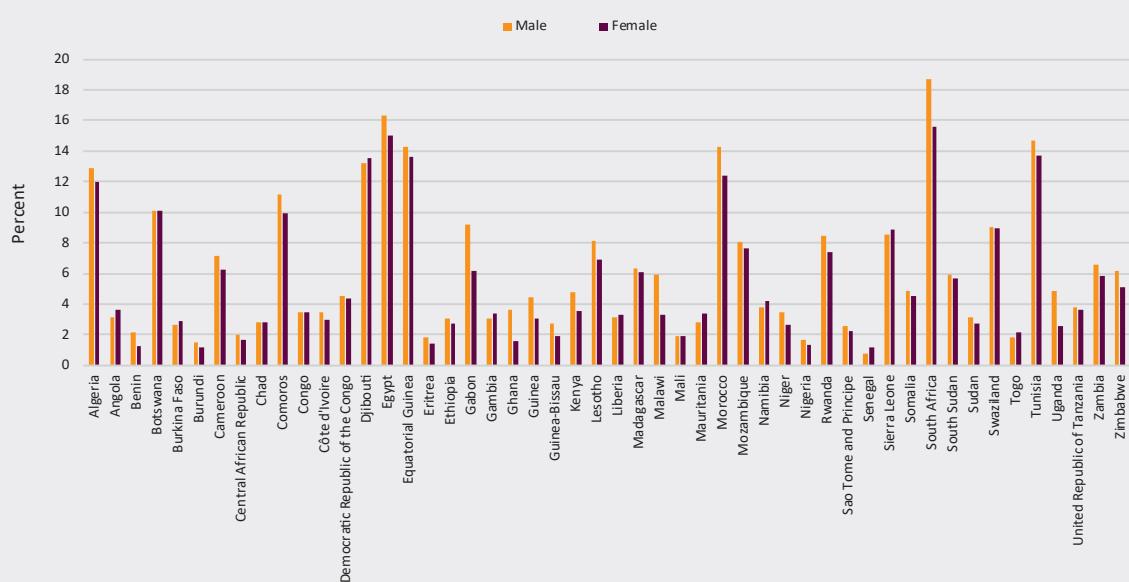
The rising trend in overweight in some countries and regions is a concern because overweight and obesity in childhood often carry over into adulthood at which time they are more likely to lead to non-communicable diseases like diabetes and cardiovascular diseases at a younger age (WHO, 2016).

Figure 8 shows the prevalence of overweight in children under five by gender. In most cases, this is higher for boys, and particularly so in South Africa, Gabon and Malawi. This contrasts with the fact that for adults, the prevalence of obesity in the region is higher, typically by a large margin, for women (IFPRI, 2018).

¹⁵ Healthy Living Alliance (HEALA) (<https://heala.org/donations/obesity-and-ncd/>). Initially planned to take effect in 2017, revisions to the levy delayed implementation to 1 April 2018. WHO had made a non-binding recommendation in October 2016 for a 20 percent tax.

FIGURE 8

OVERWEIGHT IN CHILDREN UNDER FIVE, BY GENDER IN AFRICAN COUNTRIES (MOST RECENT YEAR AVAILABLE)



Source: UNICEF, WHO and World Bank. 2018d.

It is perhaps not obvious why, even though the prevalence of undernourishment is rising, the prevalence of stunting continues to fall in most countries and the prevalence of overweight and obesity continues to rise. In part this is because the rise in food insecurity is not immediately reflected in nutrition outcomes, with the delay in response depending on the type of indicator. In addition, nutrition outcomes are determined by a number of factors, some of which may be improving while others are deteriorating and some factors, such as mothers' nutrition knowledge, may dampen the impact on child nutrition outcomes of a deteriorating food security situation. Apart from mothers' education and nutrition knowledge, dietary diversity, access to clean water and basic sanitation and health services also play a very important role in determining child nutrition outcomes. The interplay of factors show the importance of considering the entire food system in planning

interventions as well as the need for context-specific analysis to identify the underlying determinants of food security and nutrition.¹⁶

PROGRESS TOWARDS THE WHO GLOBAL NUTRITION TARGETS

Progress in achieving the SDGs, in particular SDG 2, is closely related to progress made in achieving the global nutrition targets, which were adopted by WHO Member States in 2012. The six interlinked targets for 2025 are:

- ➔ Achieve a 40 percent reduction in the number of children under five years who are stunted;
- ➔ Achieve a 50 percent reduction of anaemia in women of reproductive age;

¹⁶ See also FAO, IFAD, UNICEF, WFP and WHO (2018).

- ➔ Achieve a 30 percent reduction in low birth weight;
- ➔ Ensure that there is no increase in overweight;
- ➔ Increase the rate of exclusive breastfeeding in the first six months up to at least 50 percent; and
- ➔ Reduce and maintain childhood wasting to less than 5 percent.

Overall progress remains poor and is too slow at the continental level, as it is at the global level, to achieve any of the targets by 2025. While the prevalence of stunting has fallen in Africa, the number of stunted children has increased (UNICEF, WHO and World Bank, 2018a). Worldwide, no country is on track to meet the target for anaemia.

Today, a third of women of reproductive age worldwide – 613 million – suffer from anaemia. Of these, 110 million are in Africa, and the prevalence on the continent, 38 percent, is above the global average (IFPRI, 2018). Anaemia impairs women's health and their quality of life and impairs learning in children. Moreover, maternal anaemia is associated with mortality and morbidity in mother and baby (WHO, 2014b).

At the national level, data gaps for many countries and targets make it impossible to determine what, if any, progress has been made. However, no single country is on course to meet the five global nutrition targets that are being tracked (Box 2).¹⁷ Only Kenya, Lesotho and São Tomé and Príncipe are on course to meet four of the targets (stunting, exclusive breastfeeding, wasting and overweight). Overall, 6 countries (out of 54) are on track for under-five stunting, 11 for wasting, 17 for overweight, 0 for anaemia, and 16 for exclusive breastfeeding (IFPRI, 2018).

BOX 2

SOME PROGRESS / ON COURSE (IN BOLD) FOR FIVE GLOBAL NUTRITION TARGETS

STUNTING: Burkina Faso, Cameroon, Congo, Democratic Republic of the Congo, Ethiopia, Guinea-Bissau, Lesotho, Malawi, Nigeria, Rwanda, Senegal, United Republic of Tanzania, Zimbabwe/**Egypt, Eswatini, Ghana, Kenya, Liberia, São Tome and Príncipe**

ANAEMIA: Benin, Burkina Faso, Burundi, Cameroon, Chad, Congo, Democratic Republic of the Congo, Egypt, Equatorial Guinea, Eswatini, Ghana, Kenya, Lesotho, Liberia, Madagascar, Mali, Mauritania, Namibia, Senegal, South Africa, Togo, Uganda, United Republic of Tanzania, Zimbabwe

OVERWEIGHT: Burkina Faso, Cameroon, Chad, Democratic Republic of the Congo, Egypt, Eswatini, Ghana, Guinea-Bissau, Kenya,

Lesotho, Malawi, Nigeria, São Tome and Príncipe, Senegal, Sierra Leone, United Republic of Tanzania, Zimbabwe

BREASTFEEDING: Mozambique, Nigeria, Togo, United Republic of Tanzania/**Burkina Faso, Cameroon, Congo, Democratic Republic of the Congo, Eswatini, Gambia, Guinea-Bissau, Kenya, Lesotho, Rwanda, São Tome and Príncipe, Sierra Leone, Sudan, Zambia, Zimbabwe**

WASTING: Burkina Faso, Cameroon, Chad, Nigeria, Senegal/**Angola, Eswatini, Benin, Ghana, Kenya, Lesotho, Malawi, Rwanda, São Tome and Príncipe, United Republic of Tanzania, Zimbabwe**

¹⁷ Low birth weight is a target but is not tracked because of ongoing methodological work being undertaken.



**DEMOCRATIC REPUBLIC
OF CONGO**

A man harvesting celery.
FAO has provided farmers with
improved-variety seeds and has
rehabilitated irrigation and
flood prevention infrastructures
©FAO/Olivier Asselin

To achieve the targets, countries must make greater efforts to implement the recommendations of the ICN2 Framework for Action. In particular, the UN Decade of Action on Nutrition calls for action across six cross-cutting and connected areas (UN, 2018):

- ➔ Sustainable, resilient food systems for healthy diets
- ➔ Aligned health systems providing universal coverage of essential nutrition actions
- ➔ Social protection and nutrition education
- ➔ Trade and investment for improved nutrition
- ➔ Safe and supportive environments for nutrition at all ages
- ➔ Strengthened governance and accountability for nutrition.

It is important to realize that for many targets and countries, data are missing. These targets have the overarching aim of improving maternal, infant and young child nutrition by 2025 and without data it is impossible to track outcomes and hold countries accountable when they fail to make progress (Development Initiatives, 2017).

FOOD INSECURITY CONTINUES TO DETERIORATE WHILE AFRICA FACES NEW CHALLENGES

In summary, food insecurity in Africa continues to deteriorate and today a fifth of the population, or 257 million people, are undernourished, 35 million more than in 2015. Central and Western

Africa have seen the largest deterioration in terms of the rise in the prevalence of undernourishment while in terms of the number of the undernourished, the rise has been greatest in Western Africa and Eastern Africa. At the same time, stunting in children under five continues to decline although their number is also rising. Overweight and obesity continue to rise and this is a serious concern for several countries in Southern and Northern Africa. Overall progress towards achieving the WHO global nutrition targets is too slow at the continental level to hope to achieve them by 2025.

Country-specific drivers are important determinants of food security and nutrition but there are several overarching factors that help explain the deterioration in food security for a number of countries. In particular, difficult global economic conditions and weak extractive and non-extractive commodity prices, adverse climatic conditions and conflict have contributed to rising food insecurity. However, while food security has worsened, the prevalence of stunting continues to decline. In part, this is because the rise in food insecurity is not immediately reflected in the prevalence of stunting, and it may also be so because stunting is determined by a number of factors, some of which may be improving while others may be dampening the impact on stunting of a deteriorating food security situation.

In Part Two of this report, regional policy developments are presented and national policies and programmes discussed with a focus on several countries that have successfully improved the situation of food security and nutrition. In addition, four cross-cutting issues are presented within the context of opportunities and challenges for food security and nutrition.



NAROK, KENYA

Maasai pastoralists feeding
their livestock.

©FAO/Luis Tato



PART 2

POLICIES AND PROGRAMMES TO SUPPORT FOOD SECURITY AND NUTRITION



POLICIES AND PROGRAMMES TO SUPPORT FOOD SECURITY AND NUTRITION

The evidence presented in Part One showed that in Africa the prevalence of undernourishment had fallen steadily until 2010 but had remained flat thereafter and started rising in 2014. Some of the factors that determine food security are beyond governments' control, but forward-looking policies for food security and nutrition are needed because, as is argued in Part Two, they can make a big difference.

REGIONAL POLICY DEVELOPMENTS

Africa's vision for development is driven by the African Union's (AU) Agenda 2063, a central part of which is on ending hunger and halving poverty by 2025, goals that are closely aligned with the SDGs 1 and 2. These goals were reaffirmed in the 2014 Malabo Declaration, itself based on the Agenda's first ten-year implementation plan (2015–25). The Malabo Declaration also reaffirmed the principles and values of the Comprehensive Africa Agriculture Development Programme (CAADP), the continental strategic framework for agricultural sector transformation,¹⁸ and recommitted to the two targets established by the Maputo Declaration.¹⁹ Furthermore, it committed to boosting intra-African trade, enhance the resilience of livelihoods and production systems to climate risk, as well as external shocks, and it expanded on the mutual accountability requirements (AU, 2015a).

After ten years of CAADP implementation, political leaders committed to strengthen mutual accountability, *inter alia*, through a biennial Agricultural Review Process that aims to track, monitor and report on progress in implementing the goals of the Malabo Declaration. The inaugural biennial review, presented at the African Union Assembly held in January 2018, assesses performance towards the seven Malabo commitments in comparison to a benchmark that defines the score needed to be on track to meet the commitments.²⁰ Aggregated findings are summarized in Table 5. Central Africa as a subregion is not on track to meeting the Malabo commitments, and neither is any of the countries of that subregion. Eastern Africa is one of two subregions that is, in aggregate, on track to meet the Malabo commitments, and of 14 countries that submitted a report, 9 are on track. Northern Africa is not on track, although only four countries were assessed. Southern Africa is the other subregion that is on track and all countries but Lesotho are on track. Finally, Western Africa is not on track and only five of the 15 assessed countries are on track to meeting the Malabo commitments.

The findings for Commitment 3, Ending Hunger by 2025, are in line with the trend shown by the SDG 2 indicators presented in Part One. However, results for Commitment 4, Halving Poverty through Agriculture by 2025, would appear to give rise to some hope.

¹⁸ CAADP was formulated by the New Partnership for Africa's Development (NEPAD), the African Union's economic programme that was established in 2001.

¹⁹ The targets are: (1) to achieve 6 percent annual growth in agricultural productivity by 2015, and (2) to increase the allocation of national budgets directed to the agricultural sector to at least 10 percent.

²⁰ For more details, see AU (2018).

**TABLE 5
REGIONAL PROGRESS TOWARDS THE MALABO COMMITMENTS: RESULTS OF THE BIENNIAL REVIEW
2017**

Malabo Commitment*	Central Africa	Eastern Africa	Northern Africa	Southern Africa	Western Africa	Africa
On track to meet the Malabo Commitments? Yes/No						
1: Re-committing on CAADP Process	Yes	Yes	Yes	Yes	Yes	Yes
2: Enhancing Investment Finance in Agriculture	No	No	No	No	No	No
3: Ending Hunger by 2025	No	No	No	No	No	No
4: Halving Poverty through Agriculture by 2025	No	Yes	Yes	Yes	Yes	Yes
5: Boosting Intra-African Trade in Agriculture Commodities	No	Yes	Yes	Yes	Yes	Yes
6: Enhancing Resilience to Climate Variability	No	No	No	No	No	No
7: Enhancing Mutual Accountability for Actions and Results	No	Yes	Yes	Yes	Yes	Yes
Overall	No	Yes	No	Yes	No	No

Source: WHO

*Forty-seven Member States reported on progress in implementing the Malabo Declaration. However, they did not necessarily report on each commitment.

The Biennial Review indicates some areas of good progress as well as areas of much concern. The most common country-level recommendations made in the review were: to increase public expenditures in agriculture and in particular on productivity-enhancing research and development; to strengthen social protection systems; to put in place policies that facilitate and promote intra-African trade in agricultural commodities; to increase access to financial and advisory services and to inputs, in particular to fertilizer; to improve nutrition interventions for children under five; to strengthen sustainable land management practices; and to build resilience to climate risks.

Following the Biennial Review, the 14th CAADP Partnership Platform, convened by the African

Union Commission and the New Partnership for Africa's Development, NEPAD Planning and Coordinating Agency, provided an opportunity to take stock and refocus on a number of policy issues, including the need to seek alignment and harmonization between CAADP/Malabo commitments and the SDGs.²¹ With regard to the Biennial Review countries concluded that, in general, countries that have adopted the CAADP values and principles and are implementing their National Investment Plans, performed better in the Biennial Review. The review underscored the importance of the Regional and National Investment Plans, and the need to refresh these and to, where they do not yet exist, formulate them using the results of the Biennial Review. Looking forward, the 14th CAADP PP urges:

²¹ See: 'Commuque of the 14th Comprehensive Africa Agriculture Development Programme Partnership Platform (CAADP PP) "Accelerating the Implementation of National Agricultural Plans to Achieve the Malabo Goals and Targets" 25-27 April 2018 Libreville, Republic of Gabon', available at <http://www.nepad.org/content/14th-caadp-partnership-platform>.

- ➔ the AUC, the NEPAD Agency, RECs and Technical Partners to play an even more proactive role to support development, implementation, mutual accountability and reporting of Malabo-compliant NAIP/RAIP processes.
- ➔ the AUC, the NEPAD Agency, RECs and Technical Partners and other relevant stakeholders to reenergize the operations of the CAADP Technical Networks, which were created after the Malabo Declaration, to start playing their catalytic roles, especially in strengthening coordination efforts of programmes concerned with the achievement of the different Malabo goals and targets, as well as SDGs.
- ➔ Member State Governments to mobilize their financing institutions and dedicated private sector to invest in agriculture by giving attractive loans and resource products to local producers, in order to turn them into businesses connected to export markets within Africa and overseas.
- ➔ the AUC/DREA, the NEPAD Agency and UN Partners to work together to harmonize the different data collection and reporting processes and cycles, with special reference to the SDGs and Malabo declaration commitments tracking through a harmonized Biennial Review Mechanism and reporting.

In line with the CAADP commitments, the Africa Regional Nutrition Strategy 2015–2025 (ARNS) responds to the malnutrition challenges that the continent is facing (AU, 2015b). The ARNS reflects the African Union's vision and mission statements for the next 50 years, the Agenda 2063, and several other important AU declarations. It also takes into consideration global initiatives, notably the SDGs.²² The ARNS has the six robust WHO global nutrition targets that are listed and discussed in Part One.

NATIONAL POLICY EXPERIENCES

The regional strategies and policies, i.e. the Malabo Declaration, the African Development Bank's "Feed Africa" Strategy and the Africa Regional Nutrition Strategy 2015–2025, as well as the Declaration on Women Empowerment and Development towards Africa's Agenda 2063, inform national policy frameworks and investment plans and it can be instructive to review country experiences in reducing food insecurity and malnutrition to highlight what drives success. As reported in Part One, Angola, Cameroon, Djibouti, Ethiopia, Senegal and Sierra Leone made substantial progress in reducing the prevalence of undernourishment by 10 percentage points or more over the 2004–06 to 2015–17 period. In addition, Kenya has made considerable progress towards meeting the WHO global nutrition targets. Some of the reasons for these countries' success are reviewed below.

In **Angola**, progress in reducing undernourishment has been driven by relatively high rates of economic growth, averaging 4.1 percent between 2005 and 2016. Per capita food production also rose strongly. Maize production increased by about 2.5 percent annually between 2004 and 2016 while rice production increased by nearly 21 percent each year. In addition, cereal imports grew at a rate of nearly 11 percent per year between 2004 and 2013, adding to availability. This food production growth is reflected in a rise of the index of average dietary energy supply adequacy from 100 to 120 between 2004–06 and 2014–16. In addition, Angola made considerable progress in increasing access to improved water sources. Despite such progress, serious concerns remain. High rates of inflation undermine access to food and other necessities. Economic growth has not been inclusive and extreme poverty has fallen little between 2000 and 2008, and remains high at about 30 percent. In addition, the prevalence of stunting has risen over time and, at 38 percent, remains one of the highest in sub-Saharan Africa.²³

²² The ARNS is itself closely aligned with the United Nations Decade of Action on Nutrition 2016–25, the framework to implement the commitments taken at the Second International Conference on Nutrition and achieve the World Health Assembly policies.

²³ The prevalence of stunting among children under five fell from 62 percent in 1996 to 29 percent in 2007 but is now at 38 percent (UNICEF, WHO and World Bank, 2018b).

In **Ethiopia**, the poverty rate has fallen from 67 percent in 1995 to just under 27 percent in 2015, while the prevalence of undernourishment fell from 39.7 percent in 2004–06 to 25.7 percent in 2015–17. Public investments and growth in services and agriculture led to high and consistent per capita GDP growth, averaging 7.4 percent over the 2005 to 2016 period. Importantly this growth was broad-based and in particular, growth in agriculture was inclusive, contributing significantly to poverty reduction (World Bank, 2015a). Per capita food

production grew strongly, with cereal production growing at a rate of 12.5 percent per year between 2004 and 2016. Interventions in other sectors were also important, leading to improved health, education and general living standards. In addition, the Government of Ethiopia managed to reduce poverty through the Productive Safety Net Programme (PSNP), a social protection programme established in 2005 (Box 3). While much remains to be done, the country is an example of the power of political will and coherent and effective policies and interventions.

BOX 3 THE ETHIOPIAN PRODUCTIVE SAFETY NET PROGRAMME

The Ethiopian Productive Safety Net Programme (PSNP) is a public works programme that also includes cash transfers to poor, labour-constrained households. The PSNP, which has now been in operation for 12 years and covers about 8 million individuals, is credited with having reduced the national poverty rate by two percentage points and improved food security, especially for longer-term beneficiaries (World Bank, 2015a). The programme's design and implementation also helps households cope better with seasonal hunger (Berhane *et al.*, 2014).

The PSNP's design is gender sensitive, recognizing the important role women play in food security and nutrition decisions in the household. Women are allowed to work fewer hours each day, arriving late and leaving early if they need to provide care for children at home. Furthermore, the programme calls for provision of day care centres at public works sites, and allows pregnant and nursing women to receive direct support with no work requirement. About 73 percent of recipients were female-headed households (Tirivayi, Knowles and Davis, 2013), but implementation of the gender-sensitive design has been patchy (Berhane *et al.*, 2013). For example, the PSNP

actively promotes women's participation at all levels and requires that women should represent half of all members in kebele (neighbourhood) appeal committees as well as other committees and task forces. However, women's representation in these structures remained relatively low (Seyoum, 2012).

A recent evaluation also showed the importance of setting adequate cash transfer levels, echoing the results of evaluations of social protection programmes in several other countries in sub-Saharan Africa. Specifically in Ethiopia, low payments relative to work requirements resulted in lower grade attainments for both boys and girls and increased child labour on family farms. With higher payments relative to work, girls' grade attainment rose and demand for boys' labour fell (Berhane *et al.*, 2017).

Importantly, the PSNP not only increased food security and reduced the poverty rate but also stimulated productive activities and investment in farming assets, especially for households that participated for longer periods, and in the Other Food Security Programme (OFSP) and later, the Household Asset Building Programme (HABP). The latter programme includes access to credit, assistance in obtaining livestock, bees, tools,

and seeds and assistance with irrigation or water-harvesting schemes, soil conservation and improvements in pastureland. The programme also supports community-level assets and strengthening resilience to climate change. For example, it facilitated the rehabilitation of over 167 000 hectares of land and 275 000 kilometres of stone and soil embankments, and planted more than 900 million seedlings (World Bank, 2012a).

The projected cost of cash transfer programmes that eliminate the poverty gap over the period 2016–30 is on average less than 0.1 percent of GDP each year in Northern Africa, and

approximately 5.3 percent of GDP in sub-Saharan Africa (FAO, IFAD and WFP, 2015b). In lower-income countries, social assistance may, initially, be targeted more narrowly at the poorest of the poor. One study estimates that bringing the poorest 20 percent of the population to a daily consumption level of \$1.00 (Purchasing Power Parity dollar) would cost less, between 0.1 and 2 percent of GDP for most countries in sub-Saharan Africa. For five countries, the cost would be higher, ranging from 2.3 to 4.5 percent of GDP (Plavgo, de Milliano and Handa, 2013). In Ethiopia, the cost of the PSNP was about 1 percent of GDP in 2010/11 (World Bank, 2015a).

Cameroon experienced a steady decline in undernourishment until about 2014, after which there was no further progress until 2016 when it saw a little increase. The improvement is mainly due to strong growth in per capita cereal production of about 5.1 percent per year from 2004 to 2016 (FAO, 2018d). However, extreme poverty remains high at 24 percent in 2014, down only 5 percentage points from 2007. Similarly, the prevalence of stunting remains high at 32 percent in 2014, down from 36 percent in 2006 (IFPRI, 2018). The country struggles with high levels of spatial and social inequalities and did not meet any of the Millennium Development Goals (MDGs), with the exception of the MDG on primary school enrolment.

Sierra Leone's civil war ended in 2002 and the country has experienced strong growth in per capita food production and relatively robust growth in per capita GDP. Progress has been made in reducing food insecurity but extreme poverty, although reduced, remains very high at 52 percent. Maternal,

infant and under-five mortality rates have fallen but remain amongst the highest in the world. Finally, food security remains precarious, with over half the population food insecure in 2015, i.e. without access to a sufficient amount of safe and nutritious food (Government of Sierra Leone, WFP and FAO, 2015).²⁴

Senegal has seen poverty rates fall from 68.4 percent in 1991 to 38 percent in 2011, while the prevalence of undernourishment fell from 21.6 percent in 2004–05 to 11.5 percent in 2015–17. Progress in Senegal appears to have been driven less by economic and agricultural growth than by good governance and effective policies and interventions. Per capita GDP growth averaged a modest 1.1 percent between 2005 and 2016 and per capita food production is no higher today than it was in 2004. However, although the country depends on rainfed agriculture and faces unfavourable climatic conditions, growth in cereal production was robust and rice production expanded dramatically (Box 4).

²⁴ The analysis is based on the Comprehensive Food Security and Vulnerability Analysis conducted at the end of the 2015 lean season.

BOX 4 THE DRIVE TO RICE SELF-SUFFICIENCY IN SENEGAL

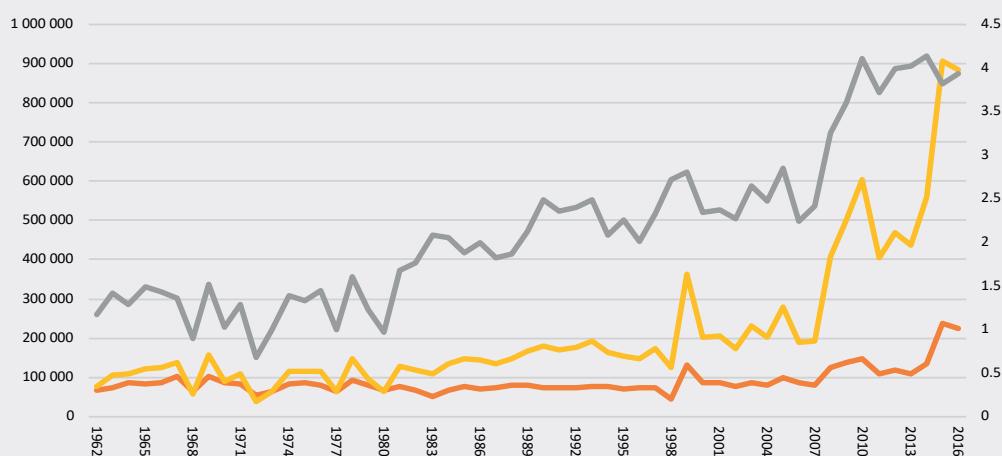
Rice is the most important cereal in Senegal and consumption has increased from about 50 kg per person/year in the 1960s to 72 kg per person/year in 2013. The high dependence on imports and the vulnerability to international markets was driven home when the retail price of imported rice in Dakar rose from 255 CFA franc per kilogram to 456 CFA franc per kilogram from December 2007 to July 2008, leading to rioting.

The government responded with the Great Agricultural Offensive for Food and Abundance (GOANA) which included massive investments in the rice sector, as well as in other crops. At the same time, the Rice Self-Sufficiency National Programme (PNAR) was developed within the framework of the National Rice Development Strategy (SNDR). Subsequently the government formulated the National Agricultural Investment Programme (PNIA) which led to the operationalization of the National Investment Plan in 2013.

Figure 9 shows that farmers responded positively to higher prices and investment programmes, with production rising from just under 200 000 tonnes in 2007, to 604 000 tonnes in 2010 and reaching 885 000 tonnes in 2016. Over the same period land under rice cultivation nearly tripled while yields rose from 2.4 tonnes per hectare to nearly 4 tonnes per hectare.

Despite this success, production (milled equivalent) accounted for only 26 percent of total domestic supply in 2013, compared to an average of 24 percent for the 1961 to 2013 period. Key challenges to achieving self-sufficiency remain the low levels of productivity, the non-availability of inputs such as fertilizer and seed, limited access to finance, a lack of storage and marketing facilities, and competition from cheap imports.

**FIGURE 9
AREA, PRODUCTION AND YIELD OF RICE (PADDY) IN SENEGAL, 1962–2016**



Source: FAO (2018d)

However, while the country has achieved success in reducing poverty and food insecurity, poverty remains relatively high and undernutrition is widespread. The Emerging Senegal Plan (PSE), the National Nutrition Development Policy (PNDN), the Multisectoral Nutrition Strategic Plan (PSMN) 2017–2021 and the new National Strategy for Food Security and Resilience set the right priorities and show continued strong political commitment. The country also invests in social protection. For example, the National Allowance for Family Security Programme (PNBSF) is a conditional cash transfer programme set up in 2013 and expected to reach 300 000 families by 2017. Other important programmes include efforts to increase health coverage and provide student grants.

Djibouti achieved a reduction in the prevalence of undernourishment from 32 percent in 2004–2005 to 19.7 percent in 2015–2017. This improvement was due to rising cereal imports, facilitated by robust growth driven by investments in infrastructure, especially ports. However, most other indicators of social welfare, such as poverty, health, education and malnutrition are poor and much work remains to be done. The country's economic prospects are buoyed by large inflows of foreign direct investments into ports, roads and hotels. At the same time unemployment, in particular that of youth and women, is high and the country is vulnerable to environmental shocks (AfDB, 2018a).

Kenya has had remarkable success in reducing undernutrition: the prevalence of undernourishment fell from 31.3 percent in 2000 to 22 percent in 2016; anaemia in women of reproductive age fell from 36 percent in 2005 to 27 percent in 2016; exclusive breastfeeding rose from 32 percent in 2009 to 61.4 percent in 2014; between 2005 and 2014, stunting and wasting in children under 5 years of age fell from 41 to 26 percent and 7 to 4 percent, respectively; child mortality (under 5 years of age) fell by 42 percent between 1989 and 2014 (10 percent between 2011 and 2015).

Today, Kenya is the only country that is on track, or made some progress, in five of the WHO global

nutrition targets. This achievement is largely due to government leadership, coordination and partnerships that have led to effective implementation of the National Nutrition Action Plan (NNAP) 2012–17 which focuses, *inter alia*, on maternal and child health and nutrition, recognizing and emphasizing the importance of interventions in the first 1 000 days of a child's life. The high level of political commitment is also reflected in the "Beyond Zero Campaign" that is championed by the First Lady and aims to strengthen HIV control and improve maternal, new born and child health.

The NNAP was developed to operationalize the strategies outlined in the Food Security and Nutrition Policy 2012 and aims to contribute to the realization of the Kenya Vision 2030. For example, expecting mothers are encouraged, through the free maternity services policy, to deliver their babies in health facilities, resulting in improved mother and childcare. Between 2008 and 2014 the number of babies born in a health facility has risen from 43 percent to 61 percent (Kimani-Murage, 2015).

The achievements have also been due to Kenya's well developed social protection systems. The Kenya National Safety Net Programme (NSNP) was established in 2013 and provides a common operating framework for the government's four cash transfer programmes²⁵, namely Persons With Severe Disabilities Cash Transfer, Older Persons Cash Transfer, Cash Transfer for Orphans and Vulnerable Children (CT-OVC), and the Hunger Safety Net Cash Transfer. Over 500 000 households are receiving cash transfers on a regular basis and over 370 000 households in Northern Kenya receive cash assistance in case of extreme weather events.²⁶

Legislation further strengthens the country's efforts to fight malnutrition in all its forms. The Mandatory Food Fortification Legislation requires fortification of maize and wheat with iron and zinc, and vegetable oil and fats with Vitamin A; and the Breast Milk Substitutes (Regulation and Control) Act 2012 is the implementation of the WHO International Code of Marketing of Breast Milk Substitutes, putting restrictions on promoting and selling of products

²⁵ These were established prior to the NSNP.

²⁶ See www.socialprotection.or.ke for more details.

that can be breast milk substitutes (RESULTS UK, Concern Worldwide and University of Westminster, 2015).

Policy-makers are guided by information generated through effective monitoring and research. In 2012 Kenya joined the global Scaling Up Nutrition (SUN) movement which has facilitated planning and implementing nutrition specific and nutrition sensitive interventions across sectors. Most of the interventions outlined in the NNAP are part of SUN actions (Republic of Kenya, 2012). Joining the SUN initiative has also strengthened nutrition alliances, provided a forum for the exchange of ideas and experiences, and strengthened civil society's ability to hold the government to account (RESULTS UK, Concern Worldwide and University of Westminster, 2015).

A key constraint to the country's fight against malnutrition is a lack of funding. Although the government is committed to raise 10 percent of the necessary budget to implement the NNAP, additional resources are needed. Considerable support is received from donor countries and agencies; however, such funding is not always aligned with health worker priorities (RESULTS UK, Concern Worldwide and University of Westminster, 2015).

Other challenges are gender and spatial inequalities in nutrition outcomes, and capacity-building of community health workers. In addition, although female secondary school enrolment has expanded steadily, greater efforts are needed to further raise educational attainments of women as well as effectively diffuse nutrition knowledge. The NNAP highlights in particular the integration of nutrition education in school curricula and the mainstreaming of basic nutrition training in all schools and other institutions (Republic of Kenya, 2012).

The country-level policy experience shows that effective food system and nutrition policies and their implementation can be an important driver of progress in achieving SDG 2. However, food security and nutrition are also affected by developments and policies in other sectors which are linked with the food system. In the subsequent sections of Part Two, four inter-related and cross-cutting issues of central importance to meeting the goals of the Malabo Declaration, as well as achieving the SDGs, are discussed in more detail: youth employment, migration, intra-African trade and climate change.²⁷ The discussion highlights the importance of considering food security and nutrition also in policy design in other sectors.

²⁷ There are of course other important issues and it is anticipated that these will be discussed in subsequent editions of the *Africa Regional Overview of Food Security and Nutrition*.



KENYA

Ms. Miriam Mbuvi and son
Joel Koigu, beneficiaries of
FAO's mechanization
programme for conservation
agriculture farmers
©FAO/Luis Tato

YOUTH EMPLOYMENT IN AGRICULTURE

Introduction

Addressing youth employment is one of the most pressing challenges facing African policy-makers, one that is also directly linked to the migration of rural youth (Deotti and Estruch, 2016). Between now and 2050 the population in the region will grow from 969 million in 2015 to 2.168 billion in 2050 (UN, 2017a). Sub-Saharan Africa is the continent in the world with the youngest population: about two-fifths of its population are in the 0–14 age bracket and nearly one fifth in the 15–24 age bracket (UNECA, 2016). There are about 420 million youth (15–35 age bracket) in Africa today, a number expected to double by 2050.²⁸ The share of youth in the working age population (15–64 age bracket) is about 20 percent, compared to a global average of 18 percent. By 2050, the share will be 14 percent at the global level but still 19 percent in sub-Saharan Africa (ACET, 2014).

The importance of youth employment is reflected in the 2017 African Union roadmap on “Harnessing the demographic dividend through investments in youth” which clearly recognizes that “harnessing the demographic dividend presents a great opportunity to building resilience of young people and addressing the root causes of many of the key challenges facing Africa including forced migration, radicalization and violent extremism.” (AU, 2017a, p. 6).²⁹ At the 29th Ordinary Summit of the African Union held in July 2017, the commitment was emphasized by declaring 2018–2027 “the African Decade for Technical, Professional and Entrepreneurial Training and Youth Employment”. The Summit also endorsed the African Youth Fund and institutionalized the Pan-African Youth Forum.

²⁸ There are different definitions of youth. The United Nations and the World Bank use 15–24 as the cut-off points while the African Youth Charter defines those aged 15–35 as youth. Some countries use still different cut-off points (AGRA, 2015).

²⁹ The strategies of regional bodies are informed by and reflected in: (1) the African Union’s Ouagadougou Declaration, an overall regional framework for employment promotion by all AU Member States, emphasizing youth and women; (2) the African Union’s Malabo Declaration, affirming commitments from African Union Member States to reduce unemployment among youth and women; (3) the African Union’s Agenda 2063, a strategic framework for inclusive growth and sustainable development, with priorities in job creation and creating opportunities for youth employment and self-realization; and (4) the United Nations’ African Youth Charter, a political and legal framework for action on youth development, accompanied by an action plan for 2009–2018.

Situation and trends in youth employment in Africa

In Northern Africa, youth unemployment is nearly 30 percent and is about 3.3 times the adult rate (ILO, 2017). In contrast, in sub-Saharan Africa, youth unemployment stands at about 11.1 percent and is a little lower than the world average (ILO, 2017), but the rate is twice that for adults in the region, and about 60 percent of the unemployed are youth. However, this statistic does not provide an accurate description of the employment picture in Africa. Over the 2000–08 period, about 16 million 15–24 year olds found employment (AfDB *et al.*, 2012). However, most non-student youth work is in the informal economy as contributing family workers, subsistence farmers, home-based micro-entrepreneurs or unskilled workers, and are classified by the International Labour Organization (ILO) as being in “vulnerable employment” due to the informal nature of these occupations (AfDB *et al.*, 2012; ILO, 2017).

These youth typically earn low wages in casual or seasonal employment, and often face unsafe, exploitative working conditions with very limited opportunities for skills development.³⁰ These precarious economic and working conditions, coupled with environmental vulnerabilities and social exclusion, increasingly drive rural youth to migrate to urban areas and abroad, depriving rural areas of a vital and, potentially, the most dynamic share of their workforce. Unemployment and underemployment pose a threat to the welfare of the affected youth and, more generally, to the stability and social economic development of the society they live in. About 40 percent of young people who join a rebel movement do so for lack of employment and other income-earning opportunities (World Bank, 2011a).

³⁰ Youth aged 15 to 17 are in many countries within the legal working age but nevertheless also classified as children and should not undertake jobs classified as hazardous.

Youth, even when they have found work, often struggle to meet basic needs, including food. Based on a sample of 22 countries, 42 percent of young people in work are food insecure, and for those in vulnerable employment, the figure is 50 percent (AfDB *et al.*, 2012). Many youth are working, but are poor. Working poverty is generally higher for youth than adults (ILO, 2018), and the highest rate of poverty is found among young women and men living in rural areas (AfDB *et al.*, 2012). In sub-Saharan Africa, the number of youth in working poverty rose dramatically from about 7 million a decade ago, to about 58 million today, meaning nearly 67 percent of all young workers are living in poverty (ILO, 2018).³¹

Further, unemployment levels among youth are generally higher for young women than young men and gender wage gaps are important. Research by the United Nations shows that African women hold two-thirds of all jobs in the non-agricultural informal sector, and on average only make 70 cents for each dollar a man would earn (UNDP, 2016). A lack of role models, social norms and discrimination all contribute to this pattern of inequalities (Beaman *et al.*, 2012; Marcus and Harper, 2015; Alibhai, Buehren and Papineni, 2015). Without information and support, young women often opt for the types of work they see other women doing, even if it is not as profitable as other available opportunities. Vocational training, livelihoods projects, and apprenticeships often reinforce these social norms by offering training in stereotypically female and low-return jobs (Filmer and Fox, 2014). The continued demand from young women for these types of training indicates that overcoming certain gender norms requires specialized interventions.

Creating employment for the millions of labour market entrants in the coming years will be a tremendous challenge. About 10 to 12 million youth join the labour market but only 3 million formal jobs are created each year (AfDB, 2018b). If youth employment rates remain unchanged, then nearly 50 percent of all non-student youth will be unemployed by 2025. An estimate by Fine *et al.*,

(2012) predicts that 54 to 72 million wage jobs can be created by 2020. This may be optimistic, as it is based on data from fast growing developing and emerging market economies on other continents. Using sub-Saharan Africa data, Fox *et al.*, (2013) estimate that 30 million jobs will be created by 2020, covering about 20 percent of new entrants.

Agriculture is key to creating employment for youth

Fox *et al.*, (2013) use survey data from 28 of 47 countries in sub-Saharan Africa – covering about 75 percent of the 2010 labour force – to show that most new entrants between 2005 and 2010 found work in household enterprises and in agriculture (Figure 10). For 2010–2020, they predict that most new entrants will continue to work in those sectors, showing the continued importance of agriculture for future employment.

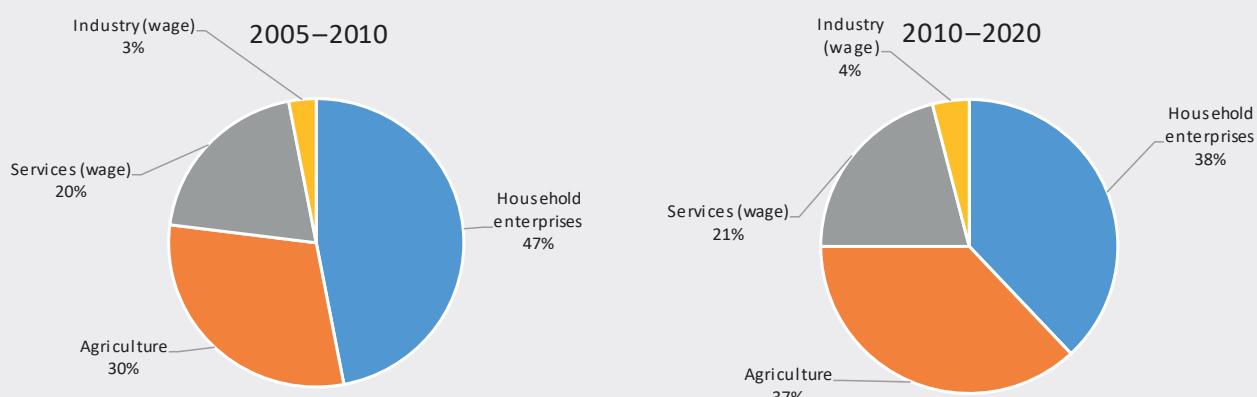
Although agriculture will remain the largest sector in many countries, it is shrinking, relative to other sectors, in particular services. A study by McMillan and Harttgen (2014) finds that for 19 African countries, the share of labour engaged in agriculture fell by 10 percent while that engaged in services and manufacturing rose by 8 and 2 percent, respectively.³² This process is normal for countries that are going through a period of structural transformation. However, several studies show that in many countries in sub-Saharan Africa, youth are leaving agriculture faster than adults (Maïga, Christiaensen and Palacios-Lopez, 2015; Ahaibwe, Mbowa, and Lwanga, 2013; Bezu and Holden, 2014).

At the same time, agriculture holds considerable promise in terms of growth and jobs. The rise in population and growth in GDP per capita will drive significant growth in demand for agricultural products. In response, agricultural output would need to more than double by 2050 to meet increasing demand (FAO, 2017c). Overall, agriculture and agribusiness markets are projected to grow from USD 313 billion today to about USD 1 trillion in 2030 (World Bank, 2013b).

³¹ The 2017 International Labour Organization (ILO) Youth Employment Trends report found that of the youth in working poverty, 35.3 percent were male and 30.6 percent female (ILO, 2017).

³² In terms of numbers, though, the labour force engaged in agriculture is increasing in the region.

**FIGURE 10
ESTIMATES OF THE CURRENT AND FUTURE STRUCTURE OF EMPLOYMENT IN SUB-SAHARAN AFRICA: 2005–2010 AND 2010–2020**



Source: Fox *et al.*, (2013)

Not only will demand for food expand significantly, but, with rising incomes, lifestyle changes and greater female participation in the workforce and the composition of diets will change substantially. A disproportionate rise is assumed in the consumption of non-grain products, such as fruits, vegetables, meat, fish, eggs, milk, and edible oils, compared with coarse grains, root crops and legumes, and more processed foods (FAO, 2017c).

This growth and change in demand can also be seen as an opportunity for the continent. Evidence shows that, although the balance of trade in agricultural products has worsened for sub-Saharan Africa, domestic production has met most of the increase in demand over the past 50–60 years (Vorley and Lançon, 2016). Domestic farmers and businesses already supply 80, 74 and 63 percent of the food market in Eastern, Western, and Southern Africa, respectively (Diao, *et al.*, 2006).

On average, only about 10 percent of food consumed on the continent is imported (Reardon and Timmer, 2007), although that figure has been on the rise and is much higher for some countries (Rakotoarisoa, Iafrate, and Paschali, 2011). The transformation of the food system provides opportunities to farmers and agribusiness to expand and diversify their activities. Taking advantage of the coming opportunities will be particularly important for the 330 million youth who will join the labour force in the next 15 years (Losch, Fréguin, Gresh, and White, 2011).

However, it is not a given that domestic supply can meet rising food demand and for several products, imports have been rising steadily. For sub-Saharan Africa as a whole, the value of rice, wheat, sugar (refined and raw), palm oil, chicken meat and maize imports amounted to about USD 21.3 billion in 2013 (FAO, 2018d). Furthermore, many processed products are still imported.

Taking advantage of the opportunities is essential to eradicate poverty and hunger. Although a challenge, with the right incentives and enabling environment, farmers and agribusiness do respond to opportunities. For example, in Kenya, horticultural exports rose from 21 billion Kenyan Shilling in 2000 to 97 billion in 2014. In Ethiopia, floriculture exports rose from USD 13 million in 2005 to USD 550 million in 2016 (AfDB, 2016). More generally, in 1985 only 14 percent of agriculture and food exports from Africa were high value agricultural products while by 2005 the share had risen to 30 percent (Maertens, Minten, and Swinnen, 2009).

Yet, youth see agriculture as unattractive because the work is hard and the returns low, which is reflected in the fact that while agriculture accounts for 57 percent of employment, it accounts for only 16 percent of GDP in sub-Saharan Africa (World Bank, 2018). The limited economic opportunities and the low returns to agriculture are also the main reason why nearly one-third of all international migrants from developing countries are youth between 20 and 34 years of age (UN, 2013). Raising returns in agriculture is essential to attract youth, but also to meet rising demand.

Furthermore, beyond on-farm jobs, there is also significant potential for job creation in rural non-farm economic activities around food value chains linked to sustainable agriculture, agribusiness development and related support services. Rural non-farm economic activities, especially processing and packaging along agrifood chains, agribusiness development and related support services, can make an important contribution to job creation for rural young people and are critical to the process of structural transformation and diversification. In general, rural non-farm activities are an important source of income for farm and other rural households, including the landless poor as well as rural town residents. In the face of credit constraints, rural non-farm activities may improve the performance of agriculture by providing farmers with cash to invest in productivity-enhancing inputs. Furthermore, development of rural non-farm activities in the food system increases the profitability of farming by increasing the availability of inputs, improving

access to market outlets and increasing demand for primary production. In turn, better performance of the food system increases rural incomes and lowers urban food prices. Such economic diversification will need to build on strengthened rural-urban linkages to create additional job opportunities in trade, transportation, and rural services.

CHALLENGES AND AREAS OF INTERVENTION

Youth lack skills, and access to information and education, in particular training, for relevant skills. Although new entrants are getting more education, with 59 percent of 20–24 year olds predicted to have a secondary education in 2030 compared to 42 percent today (AfDB *et al.*, 2012), quality of education and skill matching are still lacking. Only 2 percent of African university graduates specialize in agriculture, and only 4 percent of graduates study engineering, manufacturing and construction (AfDB *et al.*, 2012). Nearly 80 percent of youth aged 25–34 working in agriculture have primary schooling or less, including 40 percent with no education at all (World Bank, 2014). Another major challenge is accessing vocational education, especially for young women, which limits their productivity and the acquisition of skills. Overall, in sub-Saharan Africa, three out of five young workers do not have the level of education expected to make them productive on the job.³³

Access to land is a serious constraint, and in addition, youth have inadequate access to financial services, markets and involvement in producer groups and policy dialogue. Youth and farmer associations can play an important role in helping youth get access to agricultural extension and advisory services, financial services and agricultural inputs, as well as post-harvest storage and marketing. Junior Farmer Field and Life Schools (JFFLS), developed by FAO, is an innovative approach that trains vulnerable rural youth in the agricultural, business and life skills needed to earn a decent living, and to become more productive and active members of their communities. JFFLS participants learn about agricultural and business topics and techniques,

³³ The Songhai Centre, established in 1985 in Benin, provides training for young agricultural entrepreneurs. The Songhai model has a proven track record and has been replicated in Nigeria, Sierra Leone and Liberia.

and then link them to more general life lessons and skills. To date, over 25 000 young women and men in over 20 countries have benefitted from JFFLS.

Enhancing youth participation requires a role in decision-making and policy dialogue. However, active participation of youth, in particular rural youth, in policy processes is limited. Too often, youth participation remains token or passive. Seniority is frequently associated with authority, and youth, especially young women, are not expected or allowed to speak out or voice their concerns. Although legal documents and policies such as the United Nations African Youth Charter explicitly state youth's rights to participate in policy design, many remain unaware of their rights.

Recognizing agriculture as an attractive option is even more challenging when economic and social restrictions related to access to productive resources are taken into account. The difficulty of achieving economic and social progress while respecting traditional norms and village elders often represent major challenges to young people, and even more for young women. Their access to land is frequently limited by land scarcity, inheritance laws and customs. This often discourages youth from considering agriculture as a livelihood option.

Platforms and mechanisms for youth engagement on policies and employment opportunities along various value chains need to be enhanced, and adapted to suit the heterogeneity of youth. National agribusiness platforms that facilitate the interaction between youth, the private sector and government can be effective mechanisms for addressing the specific needs of youth, as exemplified by the Rwandan Youth Agribusiness Forum (RYAF). However, dialogue is often held in urban areas, thus favouring the involvement of urban, often better-educated youth. Efforts should be strengthened to improve consultative processes in rural areas in order to better reflect the interests and needs of uneducated, rural and poor youth. The use of

modern Information and Communications Technologies (ICTs), such as mobile phones and SMS, social media and online TV, videos and radios, can be especially powerful in this regard.

The private sector is key for inclusive growth and the creation of decent jobs creation in Africa. The large and dynamic private sector, often informal, accounts for 70 percent of production, more than 65 percent of investment, and 90 percent of African jobs, so it is unsurprising that the livelihoods of so many Africans depend on it. The private sector has also been a major driver of the continent's fast economic growth over the past 15 years. While the number of young Africans grows rapidly, progress towards job creation has not kept pace. Tackling youth unemployment and underemployment cannot be done by the private sector alone. Solving the problem requires input from multiple actors, including the youth themselves, governments, non-governmental organizations, donors and the research community (AfDB, 2013).

POLICY INITIATIVES

The recognition of agriculture as a sector of opportunity for young people has resulted in multiple promising initiatives. At the international level, the G20 launched the G20 Africa Partnership, which includes the G20 Initiative for Rural Youth Employment. A core element is the commitment to help create, by 2022, up to 1.1 million new jobs benefitting young people, including through strengthening support to the Global Agriculture and Food Security Programme (GAFSP).³⁴ The ILO-led Global Initiative on Decent Jobs for Youth, with a strong focus on Africa, is the first UN system-wide effort to scale up action in support of youth employment.³⁵

Investing in integrated approaches that promote job creation and entrepreneurship development, but also the quality of jobs in rural areas, is a

³⁴ GAFSP was established in 2010 as a multilateral financing mechanism, which supports national and regional strategic plans for agriculture and food security in poor countries.

³⁵ Decent jobs, whether in self-employment or wage labour, are productive, respecting core labour standards, providing a fair income and ensuring equal treatment for all.

priority to harness the demographic dividend in the region. It requires increased attention to the needs of young women and young men, aspirations and specific challenges in making effective school-to-work transitions and finding decent jobs. Particularly crucial will be supporting youth-centered agroterritorial approaches and the establishment of dedicated spaces for multistakeholder coordination and policy dialogue on youth unemployment. All main approaches to foster agroterritorial development, such as agrocorridors, agroclusters, agro-industrial parks, agro-based special economic zones and agribusiness incubators, can potentially contribute to the goals of creating rural employment and improving rural-urban connectivity (FAO, 2017d).

At continental level, there are various initiatives to support youth employment in different ways. For example, the African Union has developed the Continental Education Strategy for Africa (CESA 16–25) and the Technical and Vocational Education and Training (TVET) Strategy to foster youth employment, both of which provide policy advice that can be aligned to national needs and priorities. In addition, the African Union Commission, NEPAD,

KfW Development Bank and the Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) developed the Skill Initiative for Africa (SIFA) that aims to promote and replicate successful practices and African solutions to contribute to decent employment, skill development and youth participation in entrepreneurship. Part of SIFA is the African Skills Portal for Youth Employment and Entrepreneurship (ASPYEE) knowledge platform which serves as a knowledge repository and enables the sharing of national approaches. Also relevant is the African Development Bank (AfDB) flagship programme “Empowering Novel Agribusiness-Led Employment for Youth” (ENABLE Youth) which is a loan facility to support youth to: (i) develop their skills and capacities; (ii) plan, launch and manage successful agribusinesses; and (iii) network, organize and mentor one another. The programme, in collaboration with the Forum for Agricultural Research in Africa (FARA), the International Institute of Tropical Agriculture (IITA) and the Alliance for a Green Revolution in Africa (AGRA), targets youth with and without tertiary education and aims to help address the heterogeneity of young African job seekers.



**DEMOCRATIC REPUBLIC
OF THE CONGO**

Women and a child carrying
farm products to the market

©FAO/Olivier Asselin

Migration, remittances and food security and nutrition³⁶

Every year, millions of individuals and families leave their homes because of a complex and intertwined array of factors.³⁷ On the one hand, the movement of people in search of better employment opportunities within and across countries is an inevitable part of the process of development. However, in Africa a lack of formal employment opportunities and the predominance of a low-wage informal sector, as well as constrained access to land for many youth, are key factors driving internal and international migration especially for youth (Deotti and Estruch, 2016 and Mercandalli and Losch, 2017). Many also migrate to escape poverty and food insecurity, while climate change adds further complexities. In rural areas, migration is often a key component of livelihood strategies, which focus on minimizing risks and diversifying household incomes. For a growing number of people, conflict, natural disasters and human rights abuses leave them with little choice but to migrate.³⁸ The two groups are distinct in their motivations and in the policies and interventions that governments and the international community use to address their situation. In this section, the focus is on African internal and international migration and how remittances that migrants transfer back home affect household and national food security and nutrition.³⁹

In recent years, migration has become a key priority for policy-makers, including those from Africa.

The Agenda 2063 advocates for the free movement of people to further continental integration. In 2015, African Union Heads of State and Government further committed to strengthen efforts to combat human trafficking and the smuggling of migrants as well as measures to facilitate free movement of persons on the continent. In August 2017, the African Union met to validate the Report on the Evaluation of the Migration Policy Framework for Africa, the Revised Migration Policy Framework for Africa, and the Ten-Year Plan of Action for the Revised Migration Policy Framework for Africa.

There are several reasons why migration is, or should be, of high importance to policy-makers in developing countries. For one, migration is an integral part of the gradual transformation of economies from predominantly agricultural to manufacturing and service sector-oriented. Migration reflects the reallocation of labour into higher productivity sectors, a process that drives economic growth as well as higher levels of productivity and welfare. In practice, however, most of the rural-urban migration is currently absorbed in the low productivity service sector and, in the absence of remunerative employment, many migrants, especially the more educated ones, leave their country. Indeed, in 2000, one out of eight Africans with a university-level education was living in an Organization for Economic Co-operation and Development (OECD) country (Ratha *et al.*, 2011).

Albeit causing the loss of labour, migration in compensation brings financial resources (remittances in monetary terms) and non-pecuniary capitals (skills, ideas, values and knowledge) back to countries of origin. Migration thus represents both challenges and opportunities for the migrant sending countries.

³⁶ The section benefitted substantially from FAO, IFAD, IOM and WFP (2018).

³⁷ See for example Mercandalli and Losch (2017).

³⁸ Yonetani *et al.*, (2015) reports that even after adjusting for population growth, the likelihood of displacement by disaster is 60 percent higher today than it was 4 decades ago.

³⁹ The link between food security and nutrition and conflict was the topic of the 2017 *State of Food Security and Nutrition* (FAO, IFAD, WFP and WHO, 2017) and the 2017 *Africa Regional Overview of Food Security and Nutrition* (FAO, 2017a), while the link to extreme weather events is the topic of this year's edition. Forced migration and food security are also analysed in WFP (2017) and FAO (2017e) while UNHCR (2017) presents global trends in forced migration.

This calls for the need to understand the factors that are holding back the development potential of migration in order to design adequate policy responses. As highlighted by the African Union, issues of key concern for the continent are, *inter alia*, the exodus of skilled individuals, facilitating the free movement of people within the continent, improving border governance, reducing the costs of remittances, reducing irregular migration and people smuggling, improving the quality of data on remittances and migration, and engaging the African Diasporas to contribute to the sustainable development of the continent (AU, 2017b).

Globally, international migration accelerated in the 2000–2015 period and then slowed a little in 2015–2017, reaching 258 million people in 2017 (Figure 11).⁴⁰ Over this period the ratio of international migrants to the global population has risen from 2.8 in 2000 to 3.2 in 2010 and then 3.4 in 2015 and 2017, reflecting the rise in migration over this period (UN, 2017a). Although it receives less

attention, internal migration, i.e. migration within a country, is estimated at about 763 million people in 2005, nearly four times the number of international migrants (Bell and Charles-Edwards, 2013).⁴¹

The regions from where the largest number of international migrants originated over the past 30 years are Southern Asia, Eastern Europe, Western Asia and Central America (Figure 12). Over the 1990–2017 period, the strongest growth occurred in South-Eastern Asia, South America, Southern Africa and Central America. However, in the 2010–2017 period, Eastern Africa, Western Asia, Central Africa and Southern Africa were the subregions with the highest growth of international migrants.

Table 6 provides some summary statistics about international migrants hosted in and originating from Africa. The volume of emigrants from sub-Saharan Africa is more than twice higher than that from Northern Africa, i.e. 25.1 million versus 11.2 million. According to Mercandalli and Losch

**FIGURE 11
THE NUMBER (STOCK) OF INTERNATIONAL MIGRANTS IN THE WORLD**



UN (2017b)

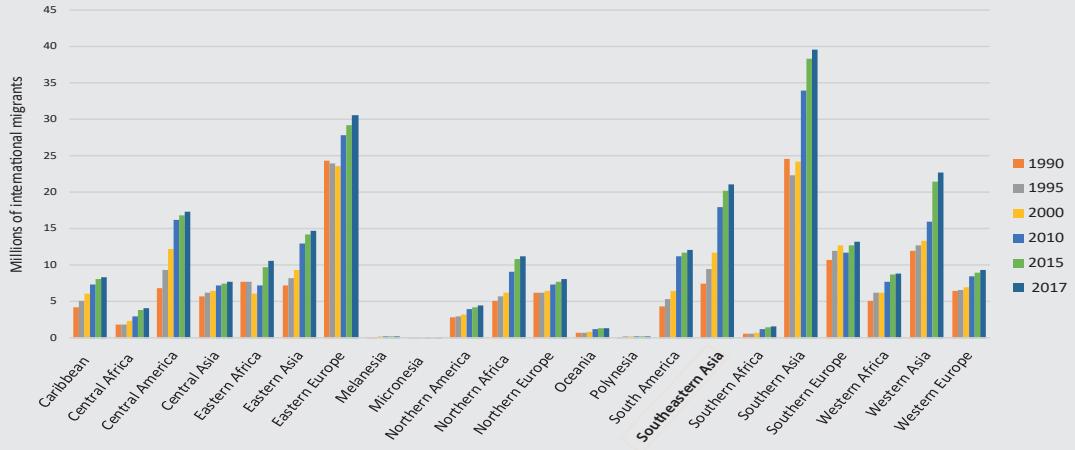
⁴⁰ International migration statistics include refugees.

⁴¹ In Africa, the number of internal migrants is estimated at 114 million.

(2017), while about 90 percent of migrants from Northern Africa migrate to other continents, sub-Saharan African migrants mostly move within the continent. Many migrants leave home because of conflict or persecution and when they cross a border are referred to as refugees.⁴² Today there are about 5.3 million refugees in sub-Saharan Africa, with most – 4.8 million – hosted in the region, mainly in Central and Eastern Africa. In addition, conflict or persecution has left 8.9 million persons internally displaced, i.e. they still reside in their country. Based on a small group of countries, Mercandalli and Losch (2017) find that youth (15–24 years old) made up about 34 percent of total international

migrants in Africa, the highest proportion of all regions. The authors report that the trend is similar for internal migration, with about 60 percent of rural migrants being between 15 and 34 years old. Rural migrants as well are mostly young people with little education or skills coming from agricultural households. Migration is an important phenomenon in rural areas and is driven by rural poverty and food insecurity, lack of employment and income-generating opportunities, inequality, limited access to social protection, climate change and depletion of natural resources due to environmental degradation.

**FIGURE 12
TOTAL STOCK OF INTERNATIONAL MIGRANTS BY SUBREGION OF ORIGIN, 1990–2017**



UN (2017b)

⁴² Refugees are people leaving their country because of conflict or persecution. They are defined and protected in international law, and must not be expelled or returned to situations where their life and freedom are at risk. (See <http://www.unhcr.org/refugees.html>).

REMITTANCES IMPACT FOOD SECURITY

Another more immediate reason why international and internal migrants are of importance to policy-makers, is that they remit substantial amounts of money and goods to their families. Remittance inflows to Africa were about USD 69.5 billion in 2017, of which USD 38 billion went to sub-Saharan Africa (Table 6 and Figure 13).⁴³ Inflows to the latter region have quadrupled since 1990, to about 2.5 percent of continental GDP and constitute the second largest source of net foreign inflows after foreign direct investment (Ratha *et al.*, 2011; World

Bank, 2018). The vast majority of remittances go to Western and Northern Africa (for Central Africa data is missing for most countries). It is estimated that the average annual remittance sent by an African emigrant, or emigrant household, is about USD 1 263 (Ratha *et al.*, 2011). For a number of countries, such as Cabo Verde, Comoros, Gambia, Lesotho, Liberia, Senegal and Zimbabwe, personal remittances exceeded 10 percent of GDP in 2016. It is clear that policy decisions related to migration and remittances can significantly impact on migrant household's and the nation's welfare.

**TABLE 6
SELECTED STATISTICS ON INTERNATIONAL MIGRANTS (STOCK), REFUGEES AND REMITTANCES IN
AFRICA AND SUBREGIONS BY 2017**

	Africa	Northern Africa	Sub-Saharan Africa	Central Africa	Eastern Africa	Southern Africa	Western Africa
Number of international migrants hosted in ¹	24 650 223	2 410 056	22 975 988	7 591 799	3 539 697	4 338 205	6 770 466
Number of international migrants hosted as proportion of the population ¹	2.0	1.0	2.3	2.2	1.8	6.7	1.8
Proportion of international female migrants hosted ¹	47.1	41.9	46.8	46.2	47.7	46	47.1
Number of international migrants originating from ¹	36 266 428	11 175 732	25 090 696	4 099 426	10 533 239	1 586 875	8 871 156
Number of refugees hosted in ²	5 530 987	743 836	4 787 151	1 293 406	3 023 522	95 541	374 682
Number of refugees originating from ²	5 997 367	686 700	5 310 667	1 074 578	3 672 683	2 216	561 190
Internally displaced persons (due to conflict) ³	12 603 700	3 704 500	8 899 200	2 960 000	3 484 000	0	2 455 200
Personal remittances as percentage of GDP in 2017 ⁴	3.1	4.4	2.5	0.1	1.7	0.4	5.5
Personal remittances in millions of USD in 2017 ⁴	69 470	31 623	37 847	318	5 688	1 490	30 351

Sources: (1) UN (2017b), (2) UNHCR (2017), (3) IDMC (2017), (4) World Bank (2018).

NB: Refugees include people in refugee-like situations.

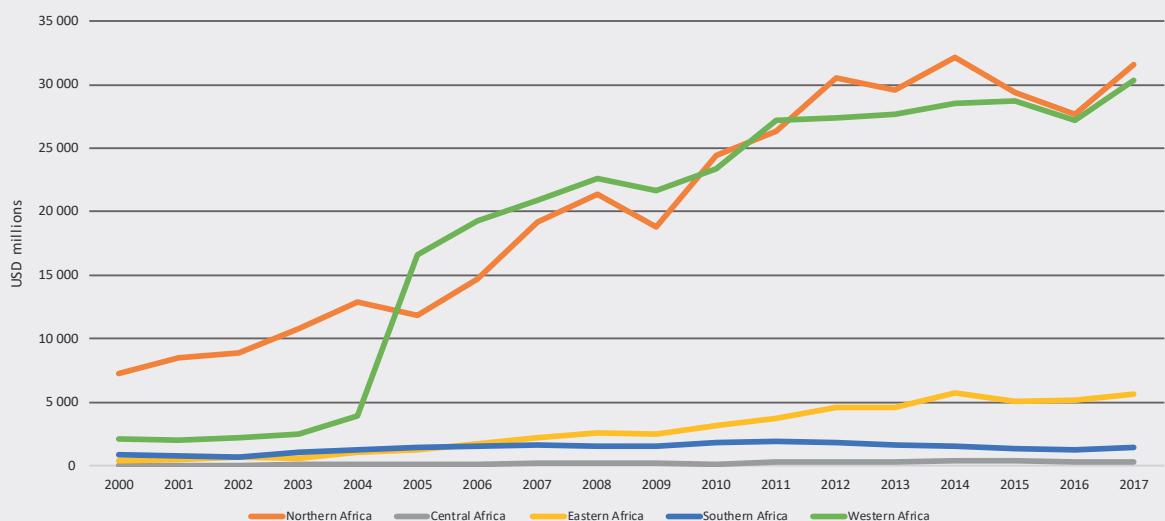
⁴³ Mercandalli and Losch (2017) report that in 2015, 17.5 percent of total remittances were intra-African.

The available evidence indicates that a significant part of remittances supports food consumption as well as education, health and better nutrition (Sander and Maimbo, 2005). For example, a survey for Botswana, Eswatini, Lesotho, Mozambique, and Zimbabwe revealed that on average, about 37 percent of remittances went into buying food, ranging from 67 percent in Mozambique to 28 percent in Lesotho (Crush and Caesar, 2016). By increasing access to more and more diverse food, remittances directly improve food security. A review by Thow, Fanzo and Negin (2016) found several studies reporting that remittances increased food expenditure, although other studies found no effect. In addition, several studies found that remittances can reduce underweight in children under 5 years of age, but there is only very limited evidence showing that they can reduce stunting and low birth weight. On the other hand, some studies showed a link between overweight and remittances.

Although the focus is typically on cash remittances, survey data from Southern Africa show that a substantial quantity of goods, much of it food, is also regularly sent back home, especially among internal migrants. Crush and Caesar (2016) report that 28 percent of migrant-sending households in Botswana, Eswatini, Lesotho, Mozambique, and Zimbabwe received remittances in the form of food. This figure ranged from about 60 percent in Mozambique to 7.6 percent in Lesotho.

Many studies focus on the impact of remittances on poverty. Adams and Page (2005), using a sample of 71 developing countries, estimate that a per capita increase of 10 percent in official, i.e. recorded, international remittances will reduce, on average, the share of people living in poverty by 3.5 percent. Similarly, a later study for 33 sub-Saharan African countries reported that a 10 percent increase in official international remittances as a share of GDP

FIGURE 13
REMITTANCE INFLOWS IN AFRICA BY SUBREGION, 2000 TO 2017*



*2017 estimates are preliminary.

Source: World Bank (available at: <http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data>)

led to a 2.9 percent fall in the share of people living in poverty (Anyanwu and Erhijakor, 2010).⁴⁴

Supporting such cross-country evidence are findings based on household survey data. For example, for Ghana, Adams, Cuecuecha and Page (2008) show that both international and internal remittances reduce poverty, but the former have a larger impact. On the other hand, Olowa *et al.*, (2013) find the opposite result for Nigeria. Also for Ghana, Castaldo, Deshingkar and McKay (2012) find that internal remittances are smaller than international remittances but reach more households and are more likely to reach the poor. Further evidence by McKay and Deshingkar (2014) indicates that internal remittances are more likely to reach poorer households. Looking at the issue from the migrant side, Beegle, De Weerdt and Dercon (2011) report that over a 13-year period, individuals who stayed in the community saw poverty fall by about 4 percentage points, while poverty declined by 12 and 23 percentage points, respectively, for those that moved within the region and those that moved outside the region.

While several studies show a poverty-reducing impact, others find no impact and there remains some debate on the issue (Amuedo-Dorantes, 2014). In part, this may be because a significant number of households receiving remittances from abroad are in the top income/consumption quintiles (Ratha *et al.*, 2011; McKay and Deshingkar, 2014). Typically, it is wealthier households that can afford to send someone abroad to find employment and they in turn benefit disproportionately from international remittances. Evidence from Nigeria shows that internal remittances are a much higher share of income for poor households than for richer households and vice versa for international remittances (Olowa *et al.*, 2013). This is also the reason why several studies that investigate the impact of remittances on inequality find that international remittances can worsen inequality, while internal remittances are more likely to reduce inequality. However, this effect is likely to weaken over time as network and information effects make it easier for poorer households to send migrants abroad (De Haas, 2007).

Whether migration improves the welfare of the migrant-sending households ultimately depends on whether remittances can compensate for the loss of the migrants' contribution to economic activities prior to their move. International migration is costlier but also generates higher returns. With regard to internal migration, Ackah and Medvedev (2010) find that in Ghana, remittances are beneficial when migrants move to urban areas but when they move to rural areas, the remittances are typically not sufficient to compensate for lost income. Even if remittances do not always result in a measurable impact on poverty, they improve access to food in the short-term and are of great significance for those households that receive them (Crush and Caesar, 2016; Castaldo, Deshingkar and McKay, 2012).

In the short run, when a member that contributes to the productive activities of a farming household emigrates, food production will probably decline. However, several authors note that the decision to migrate is itself motivated by economic difficulties due to limited employment opportunities, landlessness, little land or low returns to agriculture (see for example Tegegne and Penker, 2016).

In the longer term, remittances can have a positive impact on food availability by stimulating investment in productive resources. For example, De Haan, Kirsten and Rwe Lamira (2003) report that in South Africa and Botswana, cash remittances are essential to finance the purchase of agricultural inputs as rural financial markets are limited. Likewise, Ncube and Gomez (2011) report that for Zimbabwe, in part remittances help finance the purchase of equipment and investment, mostly in agricultural activities. However, investment in agriculture is less likely in areas with low agricultural potential.

Evidence, reviewed in Vargas-Lundius *et al.*, (2008), indicates that although the impact of migration is negative on crop production in the short term, over the long term, remittances may compensate for lost labour and stimulate farm and non-farm production. For example, emigration from neighbouring countries

⁴⁴ Both studies used \$1/person/day as the poverty line.

to South African mines reduced crop production in the sending countries, but over time earnings remitted by migrants enhanced crop productivity and cattle accumulation in all countries except Lesotho (Lucas, 1987). Evidence from the Volta Basin in Ghana shows that remittances fully cover the income lost by stimulating farm and non-farm production (Tsegai, 2004).

Even if remittances do not lead to investment directly, they may promote investment by providing liquidity and removing or relaxing binding credit and savings constraints. Evidence from Mali indicates that a substantial part of remittances is saved and serves as insurance (Ponsot and Obegi, 2010). Although rural households manage risks using mutual support and informal risk-sharing mechanisms as well as crop and income diversification, such strategies only offer partial insurance to the poor (Dercon, 2011). When remittances are regular and predictable, they partly substitute for insurance against economic downturns, natural disasters and serious health shocks, and allow households to make investments and take advantage of economic opportunities that they would otherwise consider too risky.

Finally, remittances can help households avoid coping strategies that may have a negative impact on food production. For example, Ethiopian households receiving remittances are less likely to sell productive assets to cope with food shortages (Mohapatra, Joseph and Ratha, 2009). Moreover, remittances are often counter-cyclical, rising in times of crisis, emphasizing their insurance quality (Ratha *et al.*, 2011).

It is important to realize that remittances may not only have an impact on receiving households, but on non-receiving households as well. When households spend cash on local products the benefits spreads to non-receiving households, leading to a multiplier effect (Taylor and Dyer, 2009). On the other hand, in countries where remittances are high relative to GDP they can also lead to inflation and currency depreciation, resulting in lower purchasing power for all households (Bracking, 2003; Narayan, Narayan and Mishra, 2011). At the same time,

international remittances are a relatively stable inflow of foreign exchange, facilitating the import of food, an important factor for countries that rely more heavily on imports.

ENHANCING THE IMPACT OF REMITTANCES ON FOOD SECURITY, NUTRITION AND RURAL DEVELOPMENT

In areas where remittances are an important source of income, policy-makers should consider leveraging these transfers, but few policy interventions currently exist to do so. Policies should be geared to create an enabling environment to invest remittances in a productive way in agricultural and non-agricultural businesses and initiatives. Governments and development partners, in collaboration with diaspora organizations, need to find ways to generate information and build capacities that facilitate the use of remittances, and the knowledge and skills that migrants have acquired, for investments in agriculture and natural resources management. Stimulating entrepreneurship in rural areas has the potential to create remunerative employment opportunities, contributing to addressing the adverse drivers of migration.

An important area of intervention is that of reducing the cost of transfers. Currently these costs are high in sub-Saharan Africa, at about 12 percent, compared to 8 percent in other developing regions (Ratha *et al.*, 2011). Apart from reducing the cost of transfers, financial institutions should create tailored financial products to leverage remittances and allow for productive investment. Efforts should also be made to enhance the financial literacy of migrants and their households. In this regard, it is relevant to note that the African Institute for Remittances (AIR), a specialised technical office of the African Union, became operational in 2015. The AIR is focused on reducing the cost of remitting money to and within Africa, and improving the regulatory and policy frameworks within which remittance transfers take place (AU, 2017b).

INTRAREGIONAL TRADE AND FOOD SECURITY AND NUTRITION

Introduction

Despite its vast agricultural potential, Africa has remained a net importer of agricultural products in the last three decades. In 1980, Africa had a balanced agricultural trade when both exports and imports were at about USD 14 billion, but by 2010 its agricultural imports exceeded exports by about USD 20 billion, according to FAOSTAT data. The increase in agricultural and food imports has been particularly striking for basic foodstuffs such as dairy products, edible oils and fats, meat and meat products, sugars, and cereals (especially wheat and rice), implying that food imports have been playing an increasingly important role in ensuring food security.

Regional integration, including through greater trade in goods and services, is one of the key aspirations of the African Union's Agenda 2063, as expressed in the Ten-Year Implementation Plan (2014–2023) adopted as the Malabo Declaration in 2014. Within this context, establishing the African Continental Free Trade Area (AfCFTA), a flagship programme of the Agenda, is expected to significantly accelerate growth and sustainable development through a doubling of overall intra-African trade by 2022, and a tripling of trade in agricultural goods by 2023 (AU, 2015a).

The AfCFTA would create a single market of up to 1.2 billion people and a GDP of nearly USD 2.2 trillion in 2016, which could generate substantial economic gains. By one estimate, based on the best-case scenario of the elimination of all tariffs on intra-African trade, the long-term gains would be approximately USD 16 billion annually (Saygili, Peters and Knebel, 2018).

Agricultural trade will also benefit significantly. The creation of a single market will generate economies of scale that are essential for a more efficient and commercial farming sector (Collier and Dercon, 2014). Moreover, according to the World Bank (2012b), removing barriers in accessing input and output markets, which are worse for farmers in Africa than for farmers in other regions of the world, offers African farmers the opportunity to benefit from the growing demand due to rapid population growth, urbanization and income growth.

The signing on 21 March 2018 of the AfCFTA by 44 African countries is an important milestone, with next steps being the ratification by countries.⁴⁵ In addition, the Agenda 2063 calls for progressively taking steps towards greater levels of integration, through the establishment of an African Customs Union, an African Common Market and the establishment of an African Trade Observatory. In support of these goals, the Assembly of the Heads of State and Government of the African Union also endorsed an Action Plan for Boosting Intra-African Trade (BIAT). In this regard, the experiences of the various regional economic communities (RECs) that make up the AfCFTA can provide valuable lessons. Having achieved varying degrees of economic integration, and with ongoing efforts towards developing regional policy frameworks in a number of policy areas, including through inter-REC efforts such as the Tripartite Free Trade Area (TFTA) between the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC) and the East African Community (EAC), these RECs are considered building blocks of a continent-wide free trade area (Sebahizi, 2017).

However, experiences from the formulation and implementation of the TFTA also provide examples of the challenges that must be overcome in continent-wide integration and the regional tools and frameworks that can facilitate this process. These challenges include different Rules of Origin (ROO) requirements, multiple overlapping REC memberships

⁴⁵ By August 2018, 49 countries had signed and 6 countries had ratified the agreement. For the agreement to be effective, it should be ratified by a minimum of 22 countries. It is to be noted that negotiation on rules of origin and accession rates is work in progress.

of many African countries, and the significant diversity of countries in the AfCFTA region (UNCTAD, 2016).

In light of these challenges, the Non-Tariff Barriers (NTBs) reporting mechanism developed in the context of the TFTA, is a useful common tool that can facilitate trade by benefiting the integration process and contributing to the timely achievement of the provisions of regional agreements (UNECA and Friedrich Ebert Stiftung, 2017). Going forward, it is important to assess the areas of convergence and divergence between the agriculture-related provisions of the RECs as relevant for agricultural trade, and identify concrete priorities to support the implementation of the AfCFTA.

SITUATION AND TRENDS IN INTRAREGIONAL TRADE

Most of Africa's trade is with countries outside the region. Overall intra-African trade is about 10 to 20 percent of the total (AU, 2012; UNECA, 2010) and this share has grown only slowly over time. For example, UNCTAD (2009) estimates that interregional exports accounted for 11.4 percent of the total in 2002–06, up from 4.1 percent in 1960–62. At 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. This compares to 20 percent for the Association of Southeast Asian Nations (ASEAN), 35 percent for the North American Free Trade Agreement (NAFTA), 60 percent for the European Union, 15 percent for MERCOSUR (the South American trade bloc) and less than 8 percent for Central American Common Market (CACM) (Brenton and Isik, 2012; Mitaritonna and Traore, 2017). Of the total intra-African exports, about 19 percent are agricultural products (UNCTAD, 2009). Intraregional trade in agricultural products has grown strongly in some areas, expanding, for example, from USD 305 million in 2005 to USD 635 million in 2007 in ECOWAS countries (Diallo, Soulé, and Staatz, 2017).

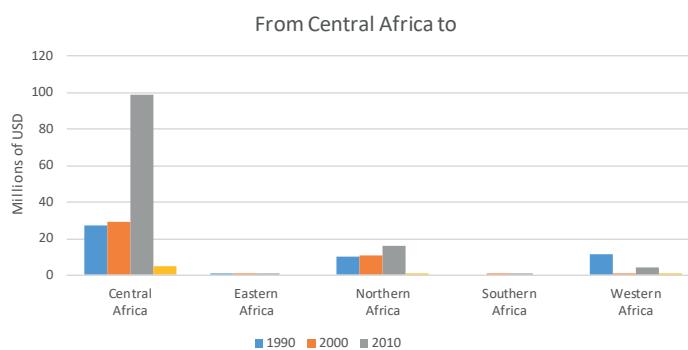
At the continental level, South Africa, Nigeria and Côte d'Ivoire account for 20, 10 and 7 percent, respectively, of total intraregional trade. These countries play a particularly important role in intra-RECs trade. For example in the Community

of Sahel-Saharan States (CEN-SAD), 28 percent of imports come from Nigeria and another 22 percent from Côte d'Ivoire. For SADC, about 64 percent of exports are from South Africa; for ECOWAS, 44 percent of exports are from Nigeria and 34 percent from Côte d'Ivoire and, for COMESA, Kenya accounts for 29 percent of intra-community exports (UNECA, 2010).

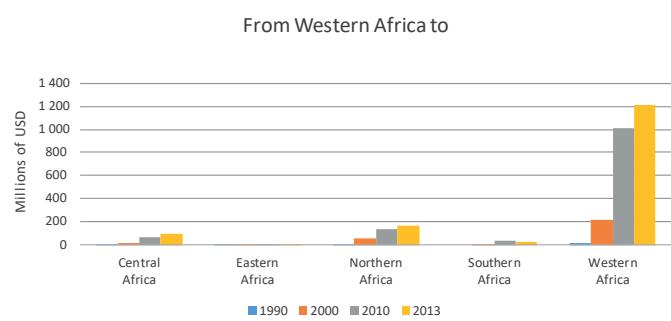
Although intraregional trade is low, and has grown only slowly, there has been some progress with RECs fostering trade through various programmes and initiatives. For example, there has been much success in removing or reducing tariffs on intraregional trade, especially, but not only, in Eastern and Southern Africa. The East African Community (EAC) has implemented a customs union, and 85 percent of intraregional trade in SADC is duty free. Data for the EAC show that internal trade has gone from USD 1.6 billion in 2004 to USD 3.5 billion in 2010 (AU, 2012). However, many African countries continue to impose high tariffs, quantitative restrictions and non-tariff barriers on imports from neighbouring countries (UNECA, 2010). To date, there remains a comprehensive gap between legislation and implementation (Engel and Jouanjean, 2015).

Officially recorded agricultural intra-African exports were USD 13.7 billion in 2013 (the latest year for which data is available), a considerable increase from the USD 2 billion and USD 6.9 billion exported in 2000 and 2010, respectively (FAO, 2018d). Figure 14 shows subregion-to-subregion exports of agricultural products. It is clear that for the greatest part, trade in agricultural products takes place between countries of the same subregion, although the magnitude varies considerably by subregion. For Southern Africa, several important trading partners, such as Zimbabwe, Zambia and Mozambique, are grouped with Eastern Africa, which is reflected in the relatively high Southern-to-Eastern Africa and Eastern-to-Southern Africa exports. Trade within the Eastern Africa region accounts for about 49 percent of total intra-African trade in agricultural products in 2013, with Southern Africa accounting for another 37 percent. The graphs also show that intra-subregional trade has grown considerably over the shown time period.

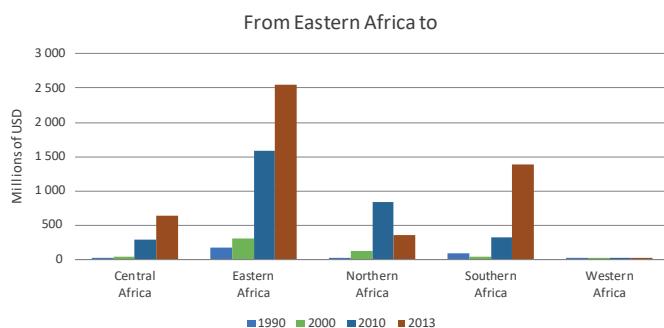
**FIGURE 14
INTRAREGIONAL EXPORTS OF AGRICULTURAL PRODUCTS (SCALE VARIES BY SUBREGION)**



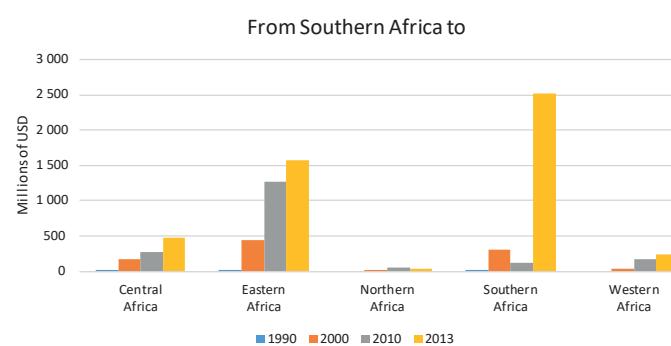
Source: FAO (2018d).



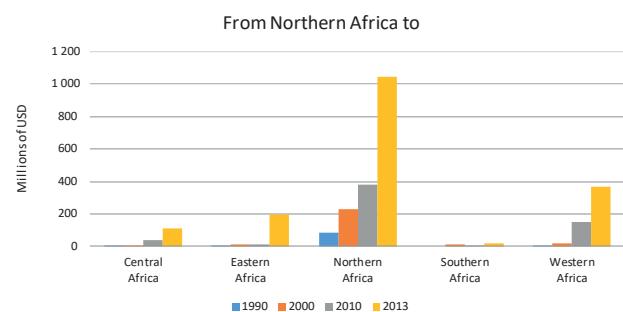
Source: FAO (2018d).



Source: FAO (2018d).



Source: FAO (2018d).



Source: FAO (2018d).



TANZANIA

Women selling vegetables
and cash crops in a local
food market
©FAO/Simon Maina

INFORMAL CROSS-BORDER TRADE

The picture of intraregional trade in Africa would not be complete without including informal cross-border trade (ICBT) which available evidence indicates is of considerable significance for many countries and individuals. For example, in Southern Africa, ICBT accounts for 30–40 percent of total intra SADC trade, amounting to perhaps as much as USD 17.6 billion a year (Afrika and Ajumbo, 2012). For Uganda, data indicates that informal exports to neighbours are about 86 percent of official exports and 19 percent of official imports, and informally traded agricultural products are about 75 percent of official agricultural exports (Lesser and Moisé-Leeman, 2009). In Eastern Africa, the informal cattle trade made up 85 percent of the total in 2011 (Afrika and Ajumbo, 2012). Similarly, in Western Africa, for Mali and Burkina Faso, official statistics may account for only one-third of actual value of intraregional livestock (Josserand, 2013).

Informally traded maize accounts for about 40–45 percent of all officially traded maize – and 31 percent of all traded maize – between the Democratic Republic of the Congo, Malawi, Mozambique, the United Republic of Tanzania, Zambia and Zimbabwe (Lesser and Moisé-Leeman, 2009). Finally, in Nigeria, ICBT accounts for between 20 percent of GDP in Nigeria to 75 percent in Benin (UNECA, 2010). Indeed, 15 percent of Nigeria's imports are informal and arrive through the Benin–Nigeria border. 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 (AU, 2012).

Informal cross-border trade is, in most cases, especially important for women. Trade between the Democratic Republic of the Congo and its Great Lakes neighbours is dominated by women, and two-thirds of respondents indicated that cross-border trade was their main source of income (Brenton and Isik, 2012). The available evidence indicates that women make up between 60 to 70 percent of informal cross-border traders (Quisumbing *et al.*, 2014; Afrika and Ajumbo, 2012).

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, forces traders to engage in informal trade in an effort to meet demand (Koroma *et al.*, 2017). To address these issues, governments need simplify legislation and regulations governing trade, educate traders on formal procedures and tackle corruption (Koroma *et al.*, 2017).

On the other hand, informality leaves traders exposed to officials who often solicit bribes, harass and sexually abuse traders and confiscate goods, holding back the contribution that the informal sector makes to economic development. In addition, ICBT is very often seen as unfair competition to domestically produced goods and the source of significant revenue losses for the government.

TRADE AND FOOD SECURITY

Trade affects each of the four dimensions of food security through its impact on incomes, prices and inequality, stability of supply, linking food-deficit areas with food-surplus areas, as well as food safety, variety and quality of food products, all of which help determine the food security and nutrition of individuals (FAO, 2015a; Brooks and Matthews, 2015). Because the nature of the impacts depends on the specific context, and because trade reforms are often introduced alongside other reforms, it has been difficult to establish a consistent link between trade liberalization and food security (FAO, 2015a; McCorriston *et al.*, 2013).

Economic growth has been essential for driving down poverty rates, and although it is difficult to establish a clear link between trade and income growth, many agree that economies that are more open tend to grow faster (FAO, 2015a). Strong economic growth helped reduce the global poverty rate from 46 to 27 percent between 1990 and 2005

⁴⁶ Exceptions to these results have occurred in developing countries with large inequalities in landholdings (FAO, 2015a).

(UN, 2011). The income and poverty effects of agricultural productivity growth are strongest in countries where agriculture is a large part of the economy and employs a large share of the labour force.⁴⁶ Growth in agriculture has been estimated to reduce poverty more than three times faster than growth in non-agricultural sectors (Christiaensen, Demery and Kuhl, 2011).

Opening food trade can increase availability, although it also carries potential risks (FAO, 2015a). However, while, agriculture and food trade might displace domestic production or lead to a move to greater cash crop production, it has generally been found to result in higher domestic production. The available evidence shows that the relationship between trade, export crops and food security is, with some exceptions, a positive one (Díaz-Bonilla, 2015)

Trade, by increasing supply and/or competition, can lower staple food prices or dampen price rises and facilitate access to food (Dorosh, Dradri and Haggblade, 2009). Lower prices are an important aspect of food security for the poor who typically spend a large share of their income on food. Evidence from the Horn of Africa indicates that informal cross-border trade in livestock subsidized grain consumption and was also used to finance cross-border trade in grain and other food products (Little, 2007).

Removing barriers to intraregional trade in agricultural inputs can stimulate production and lower prices. For example, Engel and Jouanjean (2013) note that in Western Africa farmers face long delays in accessing seed varieties and high barriers to trade in fertilizer. The World Bank (2012b) notes that trade barriers mean that it can take two to three years for new seed varieties to be released, even if they are used elsewhere on the continent. In general, greater regional integration would create larger markets for farmers and agroprocessors. This would lead to greater regional sourcing, lower imports from outside of Africa, and capture scale economies, thus lowering costs.

Trade affects utilization through making greater variety of foods available and possibly improving food safety and quality. At the same time, a higher reliance on imported food may raise consumption of often cheaper, energy-dense foods that are nutrient-poor or high in fat, sugar and/or salt. This

effect may however, also be the result of urbanization and higher incomes, which affect trade, rather than the other way around (FAO, 2015a).

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 (FAO, 2015a) and staple food imports can help protect consumers from price shocks (Haggblade, Me-Nsope and Staatz, 2017). 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 (FAO, 2015a). Moreover, using regional stocks is more efficient than the sum of national stocks when used without cooperation (Brooks and Matthews, 2015).

Governments often use trade policy inappropriately to achieve multiple objectives (Morrison, 2016). While the longer-term benefits of trade are well recognized, the political realities are such that governments try to protect consumers from price volatility (FAO, 2015a). A more effective solution would be to combine trade reform with safety nets and risk-mitigating programmes (Staatz, Diallo and Me-Nsope, 2017).

NON-TARIFF BARRIERS TO TRADE

Although there is political will at the highest level, implementation of agreements often lags their adoption and many hurdles to free trade continue to exist, adding costs to crossing borders in Africa. Average delays in customs clearance are 12.1 days, much higher than in other regions. One study estimates that the effect of crossing from Burundi to Rwanda adds an additional 174 km, or 4.6 hours, to the trip, while for trade between the Democratic Republic of the Congo and Rwanda, the border adds an extra 1 549 km, or 35 hours (World Bank, 2011b). The border between Uganda and South Sudan adds about USD 218 per tonne through duty and official charges to the price of beans in the Juba market (Yoshino, Ngungi, and Asebe, 2012). On the other hand, although Aker *et al.*, (2010) find a border effect for trade in agricultural products

between Nigeria and the Niger, it is much smaller than for developed countries.

Domestic transportation costs are also high, accounting for between 50–60 percent of marketing costs in the region (Pannhausen and Untied, 2010). Adding to the cost of transport are frequent roadblocks. A USAID (2012) study reported that trucks on route from Lomé to Ouagadougou are stopped an average of 17 to 23 times. In Western Africa, police checks add about 2 percent of the value of the cargo for international trucks (Engel and Jouanjean, 2013). Moreover, most studies indicate that bribing is an essential part of cross-border trading (Brenton and Isik, 2012).

Specific to agriculture, NTBs, such as sanitary and phytosanitary measures (SPS), have become relatively more important compared to tariffs (Imani Development, 2007), although non-compliance with existing tariff liberalization commitments is also common (Engel and Jouanjean, 2013). SPS measures raise domestic prices of foodstuffs by about 13 percent in sub-Saharan Africa (Cadot and Gourdon, 2012). In addition, traders often face artificial obstacles, such as certificates of origin when these are not officially required (Ness-Edelstein and Adoum, 2017).

Sanitary and phytosanitary measures have the legitimate and critical function of protecting countries from risks to public health and 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 (USAID, 2011). Moreover, food safety and SPS regulations vary across countries even though agro-ecological conditions for pests and diseases are shared (World Bank, 2012b). Therefore,

it is important to address procedural issues in the application of SPS measures, such as through efforts to simplify the paperwork, and to replace systematic inspections with risk profiling (Cadot and Gourdon, 2012). 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 (Brenton and Isik, 2012; Pannhausen and Untied, 2010). An area of urgent action is that of improved trade data, the absence of which may lead to inconsistent policy-making (Maur and Shepherd, 2015).

CLIMATE CHANGE AND FOOD SECURITY AND NUTRITION

Introduction

Predictions are that Africa is to warm during the twenty-first century, most likely above the global average in all seasons (Niang *et al.*, 2014). African ecosystems are already being affected by climate change and future impacts are expected to be substantial (Niang *et al.*, 2014). Populations are facing increased exposure to climate variability and extremes including extreme temperature, heat waves, droughts, tropical storms, heavy rains and floods, which are further contributing to forest degradation, loss of biodiversity and desertification (FAO, IFAD, UNICEF, WFP and WHO, 2018).⁴⁷

⁴⁷ Global warming leads to an increase in the energy in the atmosphere and it is likely that the intensity of tropical storms will increase (IPCC, 2012). However, it is important to note that shorter-term climate variations and extremes are not all attributable to climate change. Climate variability and extremes are the focus of Part Three and, therefore, not treated in detail in this section.

⁴⁸ IPPC reports provide the scientific basis for negotiations under the United Nations Framework Convention on Climate Change (UNFCCC).

In addition, negative impacts on crop yields have been more common than positive impacts (IPCC, 2014).⁴⁸ As a result, climate change jeopardizes human development by putting stress on food systems and rural livelihoods all around the globe, especially in developing countries.

In this section, the focus is on predictions of climate change in the future for Africa, the implications of these predictions for food security and nutrition, and the policies needed to address them. In Part Three of this report, we examine actual observed trends in climate variability and extremes, their impact on food security and nutrition, as well as policies and interventions needed to build resilience to climate-related disasters.

The African continent is particularly vulnerable to the effects of climate change, in part because of the heavy reliance on climate-sensitive activities and in part because of the high levels of poverty and food security that exist. The vast majority of farmed land is rainfed and unsustainable agriculture practices undermine the natural resource base and increase vulnerability to future risks. There will be higher stress on water availability and Northern Africa and southwestern parts of South Africa are likely to see a reduction in precipitation. In Western and Eastern Africa the projected sea-level rise could increase flooding and salinization problems and will have implications on human and animal health (Boko *et al.*, 2007). Climate change will also exacerbate land degradation, water stress, and desertification due to demographic pressure and unsustainable land management practices (UNCCD, 2015). In this way, climate change amplifies the adverse impacts of non-climate stressors on food security and nutrition, while some of these stressors, such as land use change and land degradation, will amplify climate change.

Climate change is a fundamental challenge that African policy-makers must address. Policies and actions to mitigate and adapt to climate change are needed to achieve SDG 13, “Take urgent action to combat climate change and its impacts,” but also because climate change impacts on SDG 1, SDG 2 and other SDGs, either directly or indirectly.

THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE, FISHERIES AND FORESTRY

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 (FAO, 2016a). Lower food supplies in turn means higher prices, which lowers 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, for the full range of SRES⁴⁹ scenarios, 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 (Boko *et al.*, 2007; IPCC, 2007). Increasing scarcity of water and higher temperatures will also facilitate the development of pathogens and water quality, affecting food utilization and nutrition status by increasing the incidence of diarrhoea and other illnesses. Specific impacts for the continent are reviewed in FAO (2016a):

For Northern Africa:

- Rising temperatures threaten in particular wheat production.
- A decline in water availability is anticipated, except for the Sudan and southern Egypt.
- In mid-latitudes, higher temperatures will make for richer pastures and bolster livestock production.
- Warmer winters will benefit livestock production while summer heat has the opposite effect.

⁴⁹ The Special Report on Emissions Scenarios (Nakicenovic *et al.*, 2000) was prepared by the Intergovernmental Panel on Climate Change (IPCC). The scenarios cover a wide range of emissions scenarios that are used in making projections of possible future climate change impacts.

- ➔ In many basins, usable water resources will decline further.
- ➔ While warming raises productivity in the Arabian Sea, the potential catch in some parts of the Mediterranean and Red Sea may fall by as much as 50 percent.
- ➔ Soil moisture depletion reduces productivity of major forest species, increases fire risk, and changes pest and disease patterns.
- ➔ Finally, forest growth is adversely affected by declining summer rains.

In sub-Saharan Africa:

- ➔ Climate change will, overall, reduce yields of cereals, especially maize.
- ➔ The frequency of extremely dry and wet years increases.
- ➔ Much of Southern Africa is drier, but rainfall increases in Eastern and Western Africa.
- ➔ Rangeland degradation and drought in the Sahel reduce forage productivity.
- ➔ Rising sea levels threaten coastlands, especially in Western Africa.
- ➔ By 2050, declining fish production in Western Africa will dramatically reduce employment in the sector.
- ➔ In Eastern Africa, fisheries and aquaculture are adversely impacted by warming, oxygen deficit, acidification and pathogens.
- ➔ Deforestation, degradation and forest fires affect forests in general.

- ➔ Forest losses reduce wildlife, bush meat and other non-wood forest products.
- ➔ Water scarcity affects forest growth more than higher temperatures.⁵⁰

Crops need specific conditions to thrive, including optimal temperatures and sufficient water. Higher temperatures may initially benefit plant growth in some cases; however, in the tropics, local warming (already with 1° C to 2° C) will affect the viability of the pollen for some crops and lead to a fall in yields of most crops, including maize and wheat (Porter *et al.*, 2014; Hatfield and Prueger, 2015). Counteracting this effect is rising atmospheric CO₂, which through a process of ‘carbon fertilization’, can increase yields although this also facilitates weed growth. In addition, some positive effects on yields are predicted in some areas due to higher precipitation, and in some elevated areas that could be cultivated due to warmer temperatures (FAO, 2016b).

In the longer-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 (Schlenker and Lobell, 2010). A more recent study for maize projects that between 2010 and 2090 the median percent change in the total production across the lowest and highest emission scenarios will be -8.1 to -2.9 percent in sub-Saharan Africa and for the subregions -14 to -7.2 percent in Southern Africa, -6 to -1.9 percent in Eastern Africa, -4.1 to -1.9 percent in Western Africa, -2.5 to -0.87 percent in Central Africa (Dale *et al.*, 2017). At the same time, the authors project that increased rainfall will increase yields in the Horn of Africa and increased temperatures will increase yields in the Ethiopian highlands and at the southern tip of the continent. However, predictions, although they

⁵⁰ For more details on the mechanisms involved, see FAO (2016a and 2016b).

remain uncertain, are generally negative, large and spatially varied.

More frequent and more intense dry spells and droughts will reduce water availability and, in turn forage and crop production for animals. The process of desertification will reduce the carrying capacity of rangelands and the buffering ability of agropastoral and pastoral systems. Heat waves and a hotter environment will damage animal health, reproduction and biodiversity, and reduce meat, milk and egg production. Already minor stresses can cause animals to produce less milk and meat (Fanzo, *et al.*, 2017). In South Africa, Niang *et al.*, (2014) reported that dairy yields could decrease by 10 to 25 percent under certain climate change scenarios.

In addition, changes in the seasonal rainfall patterns such as the late/early start of the rainy seasons affect the growth of crops and the availability of pasture for livestock, with potentially significant implications for food security and nutrition. Evidence presented in FAO, IFAD, UNICEF, WFP and WHO, (2018) shows that between 2004 and 2017 the growing season length has significantly reduced in Western and Southern Africa. A study by Codjoe and Owusu (2011) found that farmers in the Afram Plains region of Ghana have noticed delays in the start of the rainy season, mid-season heat waves, and flooding due to heavy rainfall, resulting in crop loss and low yields, and reducing the availability of household food (Codjoe and Owusu, 2011). Within-season changes have also been observed in other parts of Ghana, northern Tanzania and the Nigerian savannah (Mapfumo *et al.*, 2010; Traerup and Mertz, 2011; and Tambo and Abdoulaye, 2013).⁵¹

Temperature increases may affect riverine and lake fisheries, with variation however across Africa. Ocean ecosystems, in particular coral reefs, will be affected by ocean acidification and warming as well as changes in ocean upwelling, negatively affecting economic sectors such as fisheries. Climate change will exacerbate the already existing stresses, such as overfishing, habitat loss and pollution faced by fisheries and aquaculture. In addition, warmer temperatures will cause the extinction of some

species, shift the habitat of others, and increase the risks of disease throughout the production chain (FAO, 2016a).

Climate change will also affect the distribution and occurrences of animal and plant pests and diseases. Diseases that are transmitted by arthropod vectors, such as trypanosomosis, Rift Valley fever, malaria, bluetongue or zika, are sensitive to changes in climate. The bioecology of locusts and cereal rusts, which are long-standing pests, can also be affected by climate change and associated exceptional weather events, although much uncertainty remains around predictions.

Climate change may also adversely impact utilization through its impact on food quality and health and hygiene conditions. Higher temperatures facilitate the spread of pathogens, and water scarcity may reduce access to safe water and worsen sanitary conditions, leading to an increase in the burden of diarrhoea. Some tropical vector borne diseases such as malaria and schistosomiasis may expand into new areas, affecting in particular children and the poor.

Many forests will benefit from higher concentrations of atmospheric carbon dioxide, higher temperatures and changes in precipitation. However, most will experience the loss of important species, a decline in yields, and greater damage from an increased frequency and intensity of storms, wildfires, and other disturbances.

The adverse impact of climate change on agriculture, fisheries and forestry will negatively impact the livelihoods of smallholder family farmers and fisherfolk, reducing food availability and incomes as well as leading to higher prices. Access is also threatened by more frequent and widespread droughts which affect stability of supply and prices, especially if the areas affected are globally important producers. Even with functioning markets and trade, the price effects of such supply fluctuations could be amplified by other events, such as speculation, oil price shocks and a range of other factors that played a role in the 2007–08 food price spikes and volatility (Tadesse *et al.*, 2014).⁵²

⁵¹ See FAO, IFAD, UNICEF, WFP and WHO (2018) for more details.

⁵² We note that the interplay of the different factors is complex and there is still debate on the importance of the different factors.

CLIMATE CHANGE IS EXPECTED TO WORSEN FOOD SECURITY AND NUTRITION

The impacts described in the above section will amplify the challenge to eradicate hunger in the world. Globally, with no climate change, about 406 million people would be at risk of hunger in 2050 and with climate change another 71 million people would be at risk (Wiebe *et al.*, 2017). Among the developing regions, Southern Asia and Africa would be the most exposed to an increased risk of hunger. For the latter region, Wiebe *et al.*, (2017) predict that 157 million people will be at risk of hunger by 2050 without climate change and 196 million with climate change. Indeed, about 54 percent of the predicted increase in the number of undernourished will be in Africa, and in particular in sub-Saharan Africa.

Although much uncertainty remains regarding the modelled processes and the resulting estimates, it is clear that the impact is likely to be considerable. It is important to bear in mind that other factors also impact on food security and nutrition. Rapid population growth in Africa will exacerbate climate change-induced stresses while economic growth can, at least for some time, effectively counterbalance the effects of climate change (Nelson *et al.*, 2010).

Climate change will also undermine progress towards nutrition targets. Some evidence indicates that the concentration of grain protein responds to changes in the mean and variability of temperature and precipitation events (Porter and Semenov, 2005). Higher CO₂ concentrations will lead to lower levels of protein and some minerals and trace elements in some crops, including staple food crops like potato, rice and wheat (FAO, 2017f). And, as discussed in the previous section, the impact of climate change will also be felt through a reduction in the availability of some animal products, an increase in animal and plant pests and diseases, and a worsening in sanitary conditions.

WORKING TOWARDS ADAPTATION AND MITIGATION OF CLIMATE CHANGE

The threat of increasing poverty and hunger make climate change adaptation (CCA) and mitigation in the food and agriculture sectors a priority for African policy-makers. However, addressing climate change is important also because agriculture, land use change and land degradation are responsible for about 21 percent of total global greenhouse gas emissions (FAO, 2016a).

Climate-Smart Agriculture (CSA) is a recent concept, initially proposed by FAO in 2010 at The Hague Conference on Agriculture, Food Security and Climate Change, to address the need for a strategy to manage agriculture and food systems against climate change. 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 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 (FAO, 2013b).

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.

Individual interventions, such as legume intercropping, the timely and appropriate application of inorganic fertilizer and improved seed use, can bring important benefits for farmers. Rosegrant *et al.*, (2014) analyse the potential of a wide range of agricultural technologies to raise productivity while reducing adverse environmental impacts. For sub-Saharan Africa their results show that no-till farming and nitrogen-efficient crop varieties have the greatest impact under warmer and wetter climate in 2050, compared to a scenario without adopting these technologies. In particular they find that for rice, varieties that are more nitrogen-efficient have the highest yield gains, while no-tillage is the most effective for maize and wheat (Wiebe *et al.*, 2017). However, combinations of actions are likely to improve food security much more than individual interventions.

Research will play a fundamental role in helping farmers adapt to climate change. Currently, research is underfunded and typically focused on a narrow range of staples.⁵³ Greater attention should be paid to species, such as cassava, which do well under hot and dry growing conditions, or millet and teff, which are more drought-resistant. Crops that are more drought-resistant have the added benefit of experiencing lower price volatility (Minot, 2014).

In addition, restoration of degraded lands and increasing the level of organic carbon in soils is essential. 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 (FAO, 2013).

⁵³ This is also a reflection of the importance of these staples in current diets. For more details on drought-tolerant maize in Africa, see Part Three.

ACTION AT INTERNATIONAL, REGIONAL AND NATIONAL LEVEL IS REQUIRED⁵⁴

At global level, the 2015 Paris Agreement on Climate Change, the United Nations Framework Convention on Climate Change (UNFCCC) and the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030 in Africa, adopted in January 2017, are key policy frameworks/agreements that guide policy formulation and design of interventions. In particular the UNFCCC, through which the 2015 Paris Agreement was negotiated, offers the policy architecture to support CCA. At a continental level, the Malabo Declaration and the CAADP implementation guide are expected to provide renewed impetus and to stimulate decisions and actions. These should yield tangible and measurable results against ambitious targets compatible with the aspirations of the African Union (AU) Agenda 2063.

The international community is supporting efforts on CCA in a number of ways. The Global Action Programme on Food Security and Nutrition in Small Island Developing States (GAP), building on the outcomes of the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway, is intended as a tangible contribution to the integrated implementation of the 2030 Agenda, including SDG 13.

The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD)⁵⁵ supports 25 countries in sub-Saharan Africa to achieve their “REDD+ readiness” requirements, including the development of national REDD+ strategies or action plans, the design of National

⁵⁴ This section benefitted in particular from FAO (2018e).

⁵⁵ The UN REDD Programme is a collaborative partnership between FAO, UNDP and UNEP

Forest Monitoring Systems (NFMS) for Monitoring Reporting and Verification (MRV), the elaboration of Forest Reference Levels (FRL), and the development of safeguards information systems (SIS).

A key element of the Paris Agreement, the Enhanced Transparency Framework (ETF), requires countries to provide national inventory reports of their greenhouse gas (GHG) emissions and information on the progress made in implementing their Nationally Determined Contributions (NDCs).⁵⁶ Developing countries are also required to set up measurement, reporting and verification activities for the Nationally Appropriate Mitigation Actions (NAMAs).

Africa's flagship programme to combat the effects of climate change and desertification, the Great Green Wall for the Sahara and the Sahel Initiative (GGSSI), was launched by the African Union in 2007. The Action Against Desertification (AAD)⁵⁷ project builds on GGSSI and supports local communities, governments and civil society organizations in Burkina Faso, Ethiopia, Gambia, Niger, Nigeria and Senegal (as well as Fiji and Haiti) in the sustainable management and restoration of their dryland forests and rangelands. It also promotes income-generation activities and the creation of employment opportunities in rural areas, especially for youth and women, based on the sustainable production, processing and marketing of agricultural products and forest goods and services.

Other major Africa-based climate initiatives with focus on agriculture are:

- ➔ The Africa Climate-Smart Agriculture Alliance (ACSA). Launched in 2014, it will foster a coherent African CSA Agenda and facilitate assessment of performance at regional and country level against continental and even global benchmarks. ACSA covers Ethiopia,

Kenya, Madagascar, Malawi, Uganda, the United Republic of Tanzania and Zambia. The initiative is a partnership involving AU-NEPAD, five international NGOs (CARE International, Catholic Relief Services, Concern Worldwide, Oxfam and World Vision) and four technical partners (CGIAR Research Programme on Climate Change Agriculture and Food Security (CCAFS), Forum for Agriculture Research in Africa (FARA), FAO and the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN)).

- ➔ The Agricultural and Food-system Resilience: Increasing Capacity and Advising Policy programme (GCRF-AFRICAP), launched in 2017 and funded through the UK's Global Challenges Research Fund, will conduct capacity-building and research activities across Africa (Malawi, South Africa, Tanzania and Zambia) and the UK. Led by the University of Leeds in partnership with FANRPAN, a pan-African multistakeholder policy network, the programme aims to generate evidence-based policy to transform agriculture and food systems in Africa. In addition, AFRICAP aims to improve the productivity of farming systems and their resilience to shocks emanating from climate change impacts.
- ➔ The R4 Rural Resilience Initiative: Launched in 2011, it aims to enable vulnerable rural families to increase their food and income security by managing climate-related risks. Implemented by WFP and Oxfam America, the initiative is currently active in Ethiopia, Malawi, Senegal and Zambia, and is also being piloted in Kenya and Zimbabwe. R4 focuses on improved resource management through asset creation, insurance, livelihoods diversification and microcredit and savings.

⁵⁶ NDCs are at the heart of the Paris Agreement and embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. FAO, IFAD, UNICEF, WFP and WHO (2018) reports that almost 90 percent of developing countries specified agricultural sector prioritization as adaptation actions in their NDC.

⁵⁷ AAD is funded by the EU and the Group of ACP countries and implemented by FAO in partnership with the African Union Commission, the governments of the

concerned countries, the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD), the Royal Botanic Gardens of Kew and the Walloon Region of Belgium, as well as other partners.

- ➔ The Agricultural Climate Resilience Enhancement Initiative (ACREI): Endorsed in 2017, it aims at developing and implementing adaptation strategies and measures towards strengthening the resilience of vulnerable smallholder farmers, agropastoralists and pastoralists in the Horn of Africa to climate variability and change. The initiative, which targets Ethiopia, Kenya and Uganda, contributes directly to the implementation of the IGAD Drought Disaster and Sustainability Initiative (IDDRSI) programme and is aligned to the National Adaptation Plans of Action (NAPAs) and development strategies and visions of participating countries.
- ➔ The Promotion of Smart Agriculture towards Climate Change and Agro-ecology transition in West Africa: This is a regional initiative, supported by the European Union, the World Bank and NEPAD to support the transition towards agro-ecology in 15 Western African countries to reinforce the resilience of vulnerable populations. The initiative aims at the adoption of best practices, through public policies and farmers' training by 25 million households by 2025.

Building on FAO and United Nations Development Programme (UNDP) expertise, the Integrating Agriculture into National Adaptation Plans (NAP-Ag) programme aims to address climate change adaptation concerns in national planning and budgeting processes in 11 developing countries, including Gambia, Kenya, Uganda and Zambia.⁵⁸ In Kenya, the NAP-Ag programme has provided support to the development of a new Climate-Smart Agriculture Framework, and studies are being conducted on the institutional needs and challenges for adaptation planning in the country. The AfDB supports Mozambique, Niger and Zambia through the Pilot Program for Climate Resilience (PPCR), funded by the Strategic Climate Fund, to develop investment strategies aligned to their National Adaptation Programmes of Action.

Several countries have already developed their NAP roadmaps, to which the NAP-Ag programme contributes with relevant activities aimed at improving the generation of evidence-based results to inform policy on adaptation planning and monitoring and reporting. In Kenya, NAP-Ag supported the finalization and adoption of a NAP in which agriculture is one of the sectors. In Uganda, the NAP-Ag programme has supported the development of a national performance Monitoring and Evaluation (M&E) Framework for the Agriculture NAP and has built capacity for parliamentarians, central government officers, local government officers and non-state actors in gender-responsive planning, budgeting and policy development and implementation. Where a NAP roadmap is not envisaged, the programme provides support tailored to national circumstances, such as in Zambia where support has been provided to the National Policy on Climate Change and National Agricultural Policy.

A number of countries are also designing activities to leverage allocations from the Green Climate Fund (GCF) Readiness and Preparatory Support Programme to advance agriculture and adaptation planning activities. In 2017, FAO supported Benin, Burkina Faso, Congo, the Democratic Republic of the Congo, Ethiopia, Gambia, Ghana, Kenya, Mauritania, Mozambique, Sudan, and the United Republic of Tanzania, to engage in the process of preparing their GCF concept notes and proposals.

Emerging from the 2015 Paris Agreement, the Nationally Determined Contributions (NDCs) Partnership is a global coalition working to shift focus from commitment to implementation. With a footprint across 62 member countries, including 19 from Africa, and 9 institutional partners (as of October 2017), the NDC Partnership holds significant combined experience, resources, and expertise to effectively ensure that countries achieve NDC objectives (NDC Partnership, 2017). Similarly, the Africa NDC Hub serves as a resource pool for African countries together with local and international support institutions – public and private – to deliver on the Paris Agreement commitments in an effective and efficient manner.

⁵⁸ See also <http://www.fao.org/in-action/naps/en/> for further information.

Despite some of the progress described above, Africa lags in developing climate adaptation strategies and implementation, and policies need considerable strengthening (Mburia, 2015). Weaknesses also exist in collecting relevant data and in monitoring regional adaptation policies. Finally, funding remains a considerable constraint. The African Climate Policy Centre (ACPC) is an effort to address the need for greatly improved climate information and to strengthen the use of such information for decision-making, by improving analytical capacity, knowledge management and dissemination activities.⁵⁹ For example, the ACPC assists NEPAD in mainstreaming climate change in the investment programmes. In addition, the Climate Research for Development (CR4D) initiative is supported by partnership between the ACPC, the African Ministerial Conference on Meteorology (AMCOMET), the World Meteorological Organization (WMO) and the Global Framework for Climate Services (GFCS), and is aimed at strengthening links between climate science research and climate information needs in Africa and to improve access, quality, and usability and mainstreaming of climate information into development planning in Africa. For example, the CR4D, with support from the “Weather and Climate Information Service” (WISER) initiative, conducted a regional pilot project on subseasonal to seasonal (S2S) forecasting in Central and Western Africa.⁶⁰

An important area of action is the provision of climate information services. In Africa significant gaps exist in location-specific, reliable, and user-friendly weather forecast information. There are less than 300 weather stations, corresponding to only one-eighth of the required density to meet the WMO observation standards, and funding and commitment are needed to modernize hydrology and meteorology services. The AfDB, the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR), the WMO, the French

Development Agency (AFD), WFP and the UNDP are collaborating to implement a programme that modernizes hydrology and meteorological services at national, subregional and regional levels. These efforts are backed by the European Union, the multilateral Climate Risk Early Warning System (CREWS) initiative, and the Government of Japan. Moreover, the Green Climate Fund (GCF) has offered guidance to the development of the programme, and has started funding implementation on the ground (World Bank, 2017a). Efforts are also being made to improve the availability, access and use of climate information. For example, the “Enhancing National Climate Services” (ENACTS) initiative is implemented by National Meteorological and Hydrological Services and Regional Climate Centres in Africa with the support of the International Research Institute for Climate and Society (IRI) and other partners. It is designed to transform local, national and regional climate-sensitive development decisions through the widespread uptake of timely, relevant, locally enhanced and quality-assured climate information at relevant spatial and temporal scales. Funding from WISER allows IRI to help implement ENACTS in Uganda and Kenya, and to strengthen ongoing implementation in Ethiopia, Rwanda and Tanzania. The ACPC, through its pan-African component of the WISER project, also provides capacity training to various constituencies, such as parliamentarians, civil society organizations, the private sector, gender groups, and more. However, much work remains to be done to improve user awareness of specific climate information, improve data access, and strengthen user input to improve the relevance of data for users.

Finally, climate change adaptation and disaster risk reduction (DRR) are separate but overlapping concepts and policy frameworks that must be aligned as well as coordinated with interventions in nutrition and the food system (see Part Three for more on this).

⁵⁹ The ACPC, part of the Climate for Development in Africa (ClimDev-Africa) programme, is a continental body responsible for overseeing climate policy-related issues and tasked with ensuring that policy-makers receive evidenced based information (UNECA, 2011). For more information see <https://www.uneca.org/acpc> for more information.

⁶⁰ WISER is a UK-funded programme to improve the quality, accessibility and use of weather and climate information services at all levels of decision-making for sustainable development in Africa (<https://www.metoffice.gov.uk/about-us/what/international/projects/wiser>). For more information see also <https://www.uneca.org/wiser/pages/about-wiser>.



NAROK, KENYA

Maasai pastoralists having
their herd vaccinated
©FAO/Luis Tato



PART 3

ADDRESSING THE THREAT FROM CLIMATE VARIABILITY AND EXTREMES FOR FOOD SECURITY AND NUTRITION

ADDRESSING THE THREAT FROM CLIMATE VARIABILITY AND EXTREMES FOR FOOD SECURITY AND NUTRITION⁶¹

Introduction

Last year's edition of the *Africa Regional Overview of Food Security and Nutrition* reported that in many countries, adverse climate conditions were among the reasons for rising levels of hunger. In sub-Saharan Africa, the extremely strong 2015–16 El Niño caused record-breaking warming and widespread drought that left millions food insecure. It is, therefore, timely that this year's edition's special focus is on presenting a broader evidence-based assessment of the threat posed by climate variability and extremes to food and nutrition security in the region (see also Box 5).⁶²

The evidence presented shows that more numerous and more frequent occurrences of climate extremes and a rise in climate variability are threatening to erode gains made towards ending hunger and malnutrition.⁶³ Although, not all of these shorter-term climate variations may be attributable to climate change, what is clear from the evidence is that impacts on food security and nutrition are significant in the Africa region.

While climate change, which is discussed separately in detail in Part Two, takes place over a period of decades or centuries, some of the shorter-term

climate variations and extremes could be associated with periodic or intermittent changes related to different natural phenomena (such as El Niño, La Niña, volcanic eruptions or other changes in earth systems) (FAO, IFAD, UNICEF, WFP and WHO, 2018). Nonetheless, the attribution of climate variations and extremes to climate change or not is beyond the scope of this report. What is important is that the recently observed climate variability and extremes is a cause of concern as it is negatively impacting on the all dimensions of food security and nutrition, and contributing to a rise in hunger.⁶⁴

The report will show the urgent need to address this threat in a coordinated and regionally cohesive and coherent manner to achieve and maintain SDG 1 and SDG 2 by 2030 and beyond. This theme also shows that SDG 13, "Taking urgent action to combat climate change and its impacts", links directly towards improving food security and nutrition and that underestimating the importance of climate variability and extremes means that the impact of climate change is likely underestimated.⁶⁵

⁶¹ Extreme weather events and extreme climate events are collectively referred to as climate extremes.

⁶² An in-depth and original analysis of this topic at the global level is presented in FAO, IFAD, UNICEF, WFP and WHO. 2018. *The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition*. Rome, FAO.

⁶³ This is true at the global level (FAO, IFAD, UNICEF, WFP and WHO, 2018).

⁶⁴ Ibid.

⁶⁵ This section does not discuss the causes of more frequent climate extreme events and greater climate variability. The interested reader should consult IPCC (2012) and Niang *et al.*, (2014).

BOX 5 CLIMATE AND WEATHER: WHAT IS THE DIFFERENCE?

"The World Meteorological Organization defines climate as the statistical description of weather averaged over a period of time – the period taken being long enough to be able to identify statistical characteristics. While 'weather' describes the physical state of the atmosphere at a particular place at a particular time, 'climate' can be defined as the probability of deviations from average values, including the probability of extreme values. A period of 30 years is usually used to assess the climate"

(Max-Planck-Institut für Meteorologie, 2018). In addition, "climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. The term is often used to denote deviations of climatic statistics over a given period of time (e.g. a month, season or year) from the long-term statistics relating to the corresponding calendar period" (WMO, 2018).

Climate extremes cause deaths, displace people and leave many destitute and hungry. Over the last 10 years, climate extremes affected an average of 16 million people and caused USD 0.67 billion in damage in Africa, each year.⁶⁶ Evidence presented in the 2018 global report on *The State of Food Security and Nutrition in the World* (FAO, IFAD, UNICEF, WFP and WHO, 2018) shows that in countries with

a high exposure to climate shocks, the number of undernourished is more than double that of countries without high exposure. Already the risk of such extreme events affect food security by diminishing the incentive for farmers to invest in agriculture and to look for higher return activities. The negative impacts on individual and household welfare and private and public assets can last many years into the future.

⁶⁶ Calculation based on data from the International Disasters Database (EM-DAT) (see also Figures 16 and 17). EM-DAT is a global database on natural and technological disasters, containing essential core data on the occurrence and effects of more than 21 000 disasters in the world, from 1900 to present. EM-DAT is maintained by the Centre for Research on the Epidemiology of Disasters (CRED) at the School of Public Health of the Université catholique de Louvain located in Brussels, Belgium. A disaster is included in the database if: (a) ten or more people are killed; one hundred or more people are reported affected; a state of emergency was declared; a call for international assistance was made (for more details see www.emdat.be).

Climate variability and extremes add another destructive dimension to climate change. For example, focusing only on mean changes and ignoring climate variability would underestimate the impact of climate change on maize, sorghum and rice yields to 2050 in the United Republic of Tanzania by 3.6, 8.9, and 28.6 percent, respectively (Rowhani *et al.*, 2011). It is also likely that climate variability and extremes will worsen any prediction of the impact of climate change on food security and nutrition, which is already by itself predicted to raise the prevalence of undernourishment as well as severe stunting rates in sub-Saharan Africa (Lloyd, Kovats, and Chalabi, 2011).

A focus on sub-Saharan Africa is relevant because the continent is, in some regards, more vulnerable from climate change and from extreme climate events. This greater vulnerability is explained by a lower level of development as compared to other regions; a high share of rainfed agricultural production; a relatively high proportion of land that is arid and semi-arid; and a high degree of households that are self-sufficient (Benson and Clay, 1994). In addition, undernourishment and malnutrition on the continent is high and has worsened in recent years, also because climatic shocks often occur in conjunction with civil strife.

Although there is considerable uncertainty regarding predictions, especially ones that are spatially narrower, it is certain that the climate system is warming. In addition, the available evidence indicates a worsening of extreme temperature and precipitation events in some regions, including Africa. Greater climate variability and a higher frequency and intensity of extreme events will affect the availability, access, stability and utilization of food through changes in seasonality, wider fluctuations in ecosystem productivity, increased supply risks and reduced supply predictability. This will be a major problem especially for landlocked countries and Small Island Developing States, which are more vulnerable to both food supply disruptions and damage caused by extreme and climate events.

SITUATION AND TRENDS

Observed trends⁶⁷

Globally, there is strong evidence of an increasing trend in recent decades of some types of extreme weather events, including their frequency, intensity and duration (IPCC, 2012; Resilience Taskforce Sub Report, 2015). Many of the countries most at risk from such events are in Africa, where the main drivers of inter-annual and decadal rainfall variability are: Atlantic Ocean and other sea surface temperature patterns for Western Africa and the Sahel; El Niño–Southern Oscillation⁶⁸ behaviour for Western, Southern and Eastern Africa; and Indian Ocean dynamics for Eastern and Southern Africa (Conway *et al.*, 2009). These factors have caused natural variability throughout the world and there is evidence, reviewed below, that climate variability is increasing. The 2015–16 El Niño was one of the strongest of the past 100 years and resulted in record-breaking conditions in many tropical and subtropical countries.⁶⁹

Globally, IPCC (2012) concludes that, for areas with enough data, it is very likely that there has been a decrease in the number of cold days and nights and an increase in the number of warm days and nights. Also for Africa, for most areas with data, there has been an increase in the frequency of warm days and nights and a decrease in cold days and nights and an increase in extreme temperatures (Seneviratne *et al.*, 2012). However, a lack of data and studies means that there is only low to medium confidence in this assessment at the continental level.⁷⁰ With regard to heat waves/warm spells, a lack of evidence means that there is generally low confidence, but for Nigeria, Gambia and most of Eastern and Southern Africa, there has been an increase in the Warm Spell Duration Index and a decrease in extreme cold indices (Niang *et al.*, 2009).

⁶⁷ This section is mostly based on IPCC (2012), in particular chapter 3 and Table 3-2.

⁶⁸ See footnote 1.

⁶⁹ For more details see FAO, IFAD, UNICEF, WFP and WHO (2018).

⁷⁰ Low to medium implies low to medium agreement on limited to medium evidence (type, amount, quality and consistency).

Similarly, at the global level, it is likely that there have been increases in the number of heavy precipitation events in many regions since 1950, and, although with much variation, at subregional level. In Africa, the confidence in trends is low to medium due to a lack of data and studies. Southern Africa appears to have seen an increase in heavy precipitation (Trenberth *et al.*, 2007), but the assessment depends on the region and precipitation index used (IPCC, 2012). Central Africa saw a decrease in heavy precipitation over the last half century, although data limitations reduce confidence in this assessment (Aguilar *et al.*, 2009). For Southern and Western Africa, averaged rainfall intensity has increased (New *et al.*, 2006). For Eastern Africa, there is a lack of literature on changes in heavy precipitation, but for parts of Ethiopia, heavy precipitation declined from 1965 to 2002 (Seleshi and Camberlin, 2006).

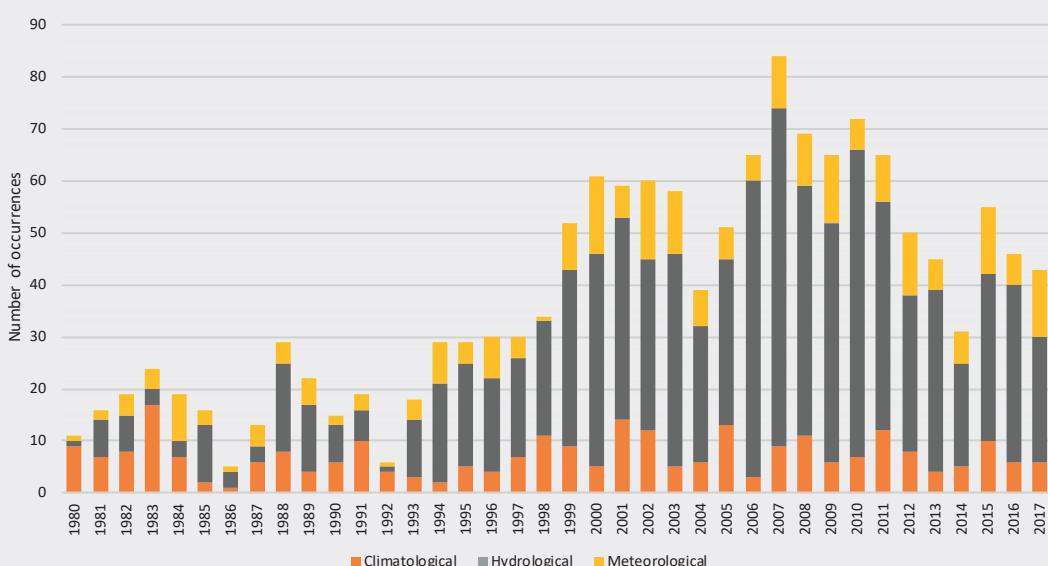
Global trends in droughts are subject to much uncertainty although there is some agreement with regard to increasing drought occurrences in some regions (IPCC, 2012). Although the continent has experienced severe drought years in specific ecological areas in 1983–84, no apparent continent-wide trends in rainfall have been observed in the twentieth century. More generally, African monsoon regions have been drying, due to the warming of the tropical oceans, and variability related to El Niño–Southern Oscillation (ENSO). In the different subregions of Africa, there is overall low to medium confidence regarding regional dryness trends. Western Africa, with medium confidence, experienced more intense and longer droughts since the 1950s (IPCC, 2012) while the Sahel has experienced increased interannual variability in recent years, compared to the previous 40 years (Ali and Lebel, 2009; Greene *et al.*, 2009). The western Sahel has remained dry and the eastern Sahel has returned to wetter conditions. There is insufficient evidence

for Eastern Africa, although for Ethiopia, Shiferaw *et al.*, (2014) report a shortening of intervals between droughts. However, Conway and Schipper (2011) find that while warming has occurred in Ethiopia and there is a tendency for lower rainfall, trends in rainfall variability depend on which region and time-period is considered. The authors find little evidence to conclude that the country has experienced consistent changes in the frequency or intensity of extreme events.

In summary, the IPCC (2012, 2014) assessments for historical extreme temperature and heavy rainfall trends over most of Africa is provided with low to medium confidence due to a partial lack of data and studies. This qualifier should be borne in mind when interpreting Figure 15, based on the International Disasters Database (EM-DAT) data, and which show that the number of medium- and large-scale natural disasters, in particular hydrological driven disasters, appear to have increased dramatically in frequency after 1998. The analysis below, based on EM-DAT data for 1980–2017, should not be taken as a historical analysis but rather a review of recent trends and patterns. Although trends and patterns emerge for this period, this does not indicate a historical trend or a prediction. The data is not complete and data collection will have improved over time. While the observed trends and patterns are not analysed with any statistical precision, they do, however, show that climate extremes are frequent and cause considerable damage in Africa and that there is much variation between regions and over time. They also underline the importance for accurate, historical data to provide evidence based advice for policy-makers.

FIGURE 15

NUMBER OF EXTREME METEOROLOGICAL, HYDROLOGICAL AND CLIMATOLOGICAL DISASTERS IN AFRICA, 1980–2017*



Source: EM-DAT

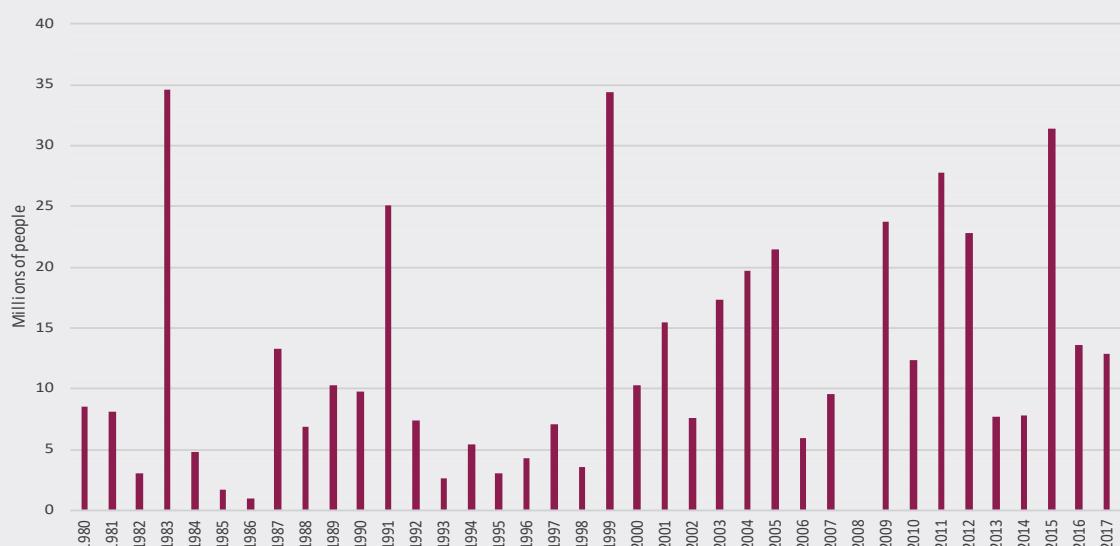
*EM-DAT classifications are: climatological includes droughts and wildfire; meteorological includes storms and extreme temperatures; hydrological includes landslides and floods.

Economic losses as measured in GDP are higher in developed countries than in developing countries; however, when they are expressed as a percentage of GDP, they are higher in developing countries and are particularly high in Small Island Developing States (SIDS) (IPCC, 2012). In addition, between 1970 and 2008 over 95 percent of deaths from natural

disasters happened in developing countries. Globally, IPCC (2012) finds that economic losses from extreme weather has increased, although there is high inter-annual and spatial variability. For Africa, Figure 16 suggests a rise in the number of people affected by natural disasters. However, it may be that inconsistencies and improvements in data collection/reporting account for some of the increase observed.

FIGURE 16

NUMBER OF PEOPLE AFFECTED BY EXTREME METEOROLOGICAL, HYDROLOGICAL AND CLIMATOLOGICAL DISASTERS IN AFRICA, 1980–2017

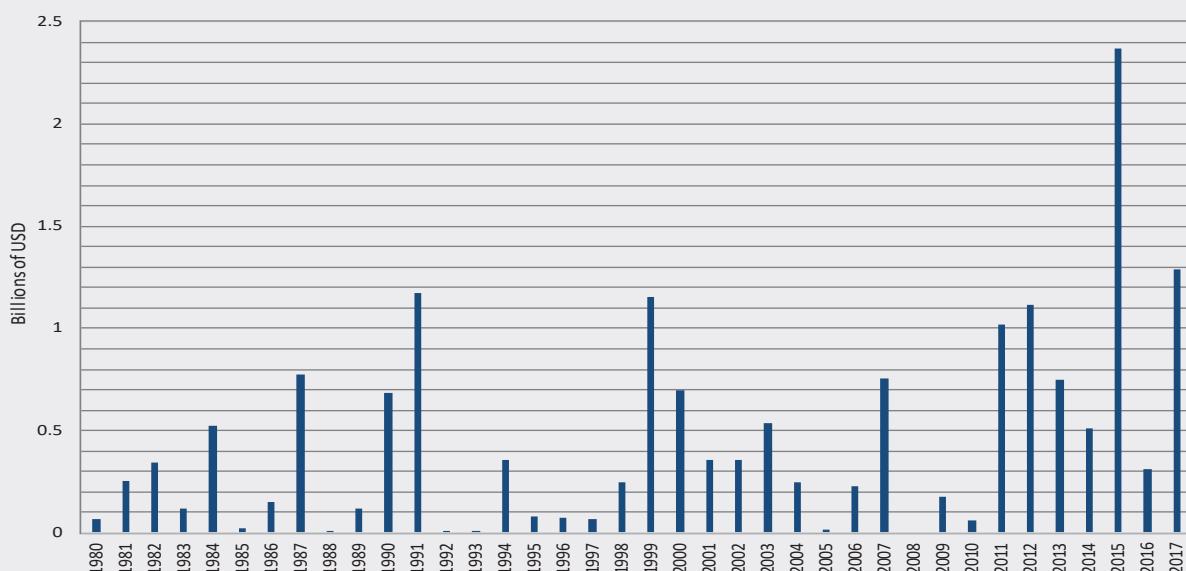


Source: EM-DAT

Africa also experienced an increase in the economic damage from climatological, meteorological and hydrological disasters (Figure 17). With regard to flood damage, Di Baldassarre *et al.*, (2010) note that it is difficult to separate natural climatic

fluctuations from human influences on flooding, especially when considering individual river basins. They conclude that climate has not been a consequential factor in the observed increase in flood damage.

**FIGURE 17
DAMAGE DUE TO EXTREME METEOROLOGICAL, HYDROLOGICAL AND CLIMATOLOGICAL DISASTERS IN AFRICA, 1980–2017**



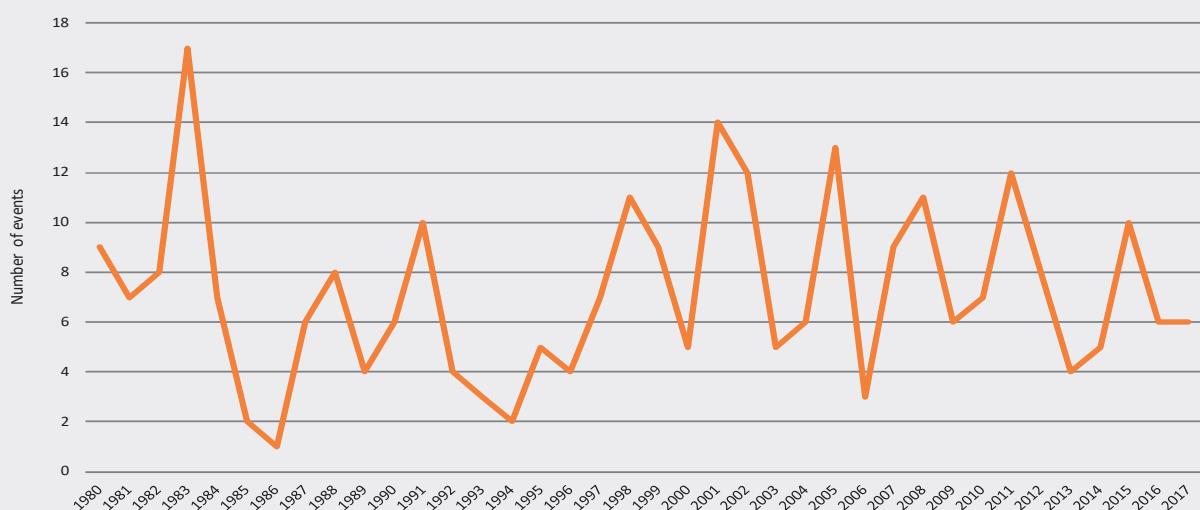
Source: EM-DAT

Figures 18 to 20 show the frequencies for each class of event, and there were on average 6.6 climatological events (a total of 227 droughts and 25 wildfires recorded), 29.6 hydrological events (a total of 778 floods and 37 landslides were recorded) and 5.9 meteorological events (a total of 217 storms and 6 extreme temperatures events were recorded) each year over the 1980–2017 period.

However, the number of average annual events changed dramatically from the first two decades to the last two. Climatological events occurred an average 5.9 times in the 1980–99 period and then

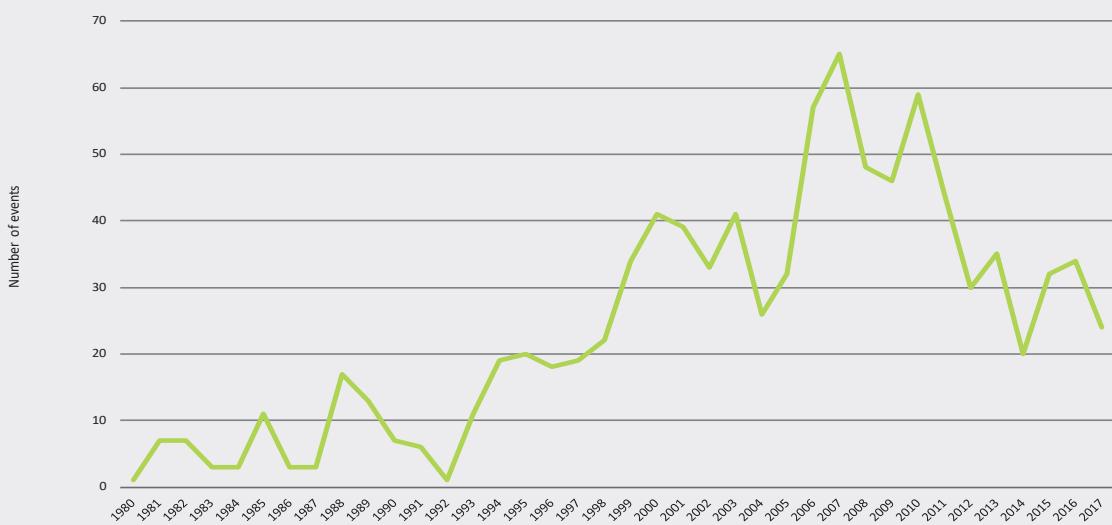
7.5 time in 2000–17. The graph also shows a trend of a gradual decline following the jump in events after 2000. The pattern is much more dramatic for hydrological events, which have risen steadily in frequency since 1980 and jumped significantly between 1996 and 2000 and kept rising until about 2007, after which the trend has been declining. The average number of events before 2000 was 9.7 while it has been 34.7 after 2000. Meteorological events were also much less frequent before 2000, averaging 3.7 per year while their frequency has risen to 8.3 after 2000. The post-2000 pattern is similar to that of climatological events, although less pronounced.

**FIGURE 18
NUMBER OF CLIMATOLOGICAL DISASTERS (DROUGHTS AND WILDFIRES) IN AFRICA,
1980–2017**



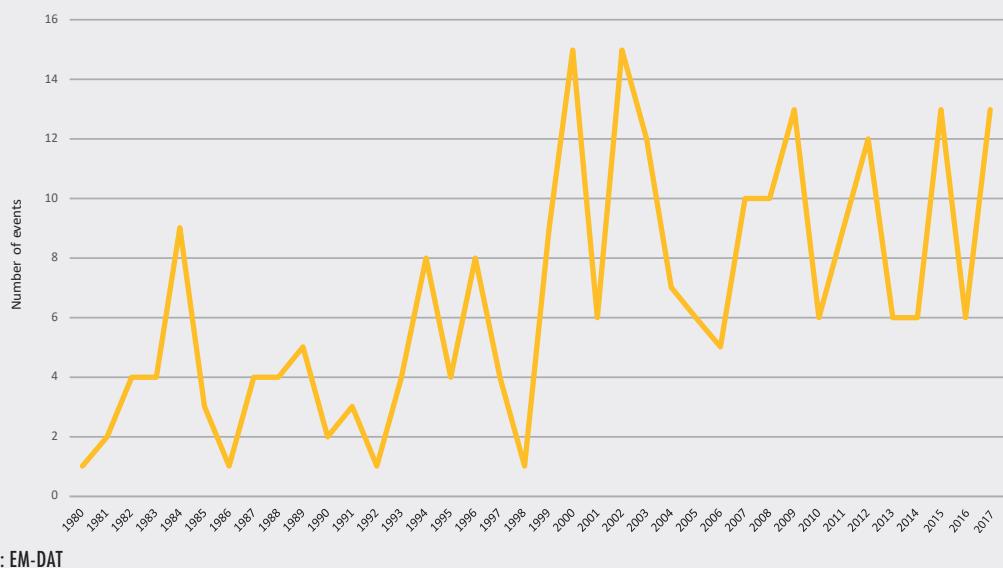
Source: EM-DAT

**FIGURE 19
NUMBER OF HYDROLOGICAL DISASTERS (LANDSLIDES AND FLOODS) IN AFRICA,
1980–2017**



Source: EM-DAT

**FIGURE 20
NUMBER OF METEOROLOGICAL DISASTERS (STORMS AND EXTREME TEMPERATURES) IN AFRICA, 1980–2017**

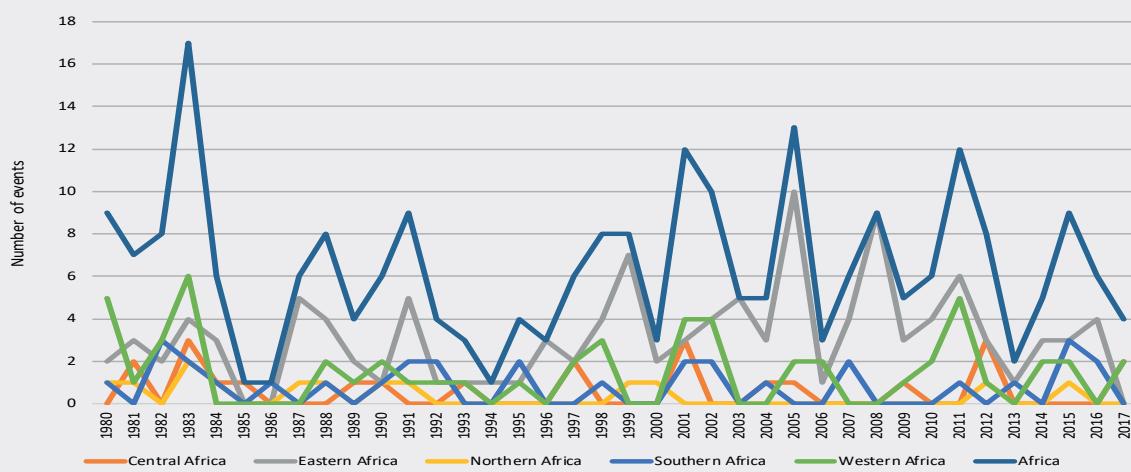


Source: EM-DAT

Figure 21 shows the number of droughts in Africa and in the subregions. Overall, Africa saw a very large number of droughts in the early 1980s, mostly occurring in Western and Eastern Africa, followed

by a period of relatively fewer droughts. The frequency of droughts increased after about 1995 until 2014, mostly due to more frequent drought occurrences in Eastern Africa, and, to a much lesser extent though, in Western Africa.

**FIGURE 21
NUMBER OF DROUGHT-RELATED DISASTERS IN AFRICA AND ITS SUBREGIONS, 1980–2017**

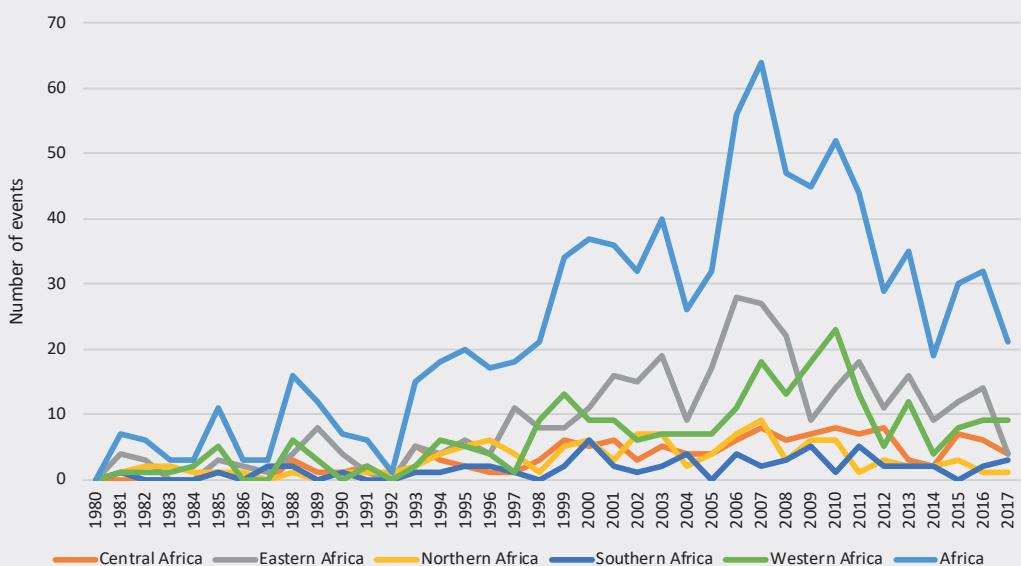


Source: EM-DAT

Figure 22 shows that flood events have, since the early 1990s, increased quite dramatically in number, peaking in 2007 and then dropping off steadily. The number of floods increased in all subregions during this period, and in relative terms also quite

dramatically in Central, Northern and Southern Africa, but the pattern was primarily driven by heightened drought occurrences in Eastern and, in particular in the late 2000s, in Western Africa.

**FIGURE 22
NUMBER OF FLOOD-RELATED DISASTERS IN AFRICA AND ITS SUBREGIONS,
1980–2017**



Source: EM-DAT

The evidence presented indicates a changing pattern for droughts and floods in most parts of Africa, with more events recorded since the mid-1990s, although there appears to have also been a declining trend in the last few years covered. However, it is important to note that official records of damaging rainfall and related flooding may be incomplete. For example, for the Niger, Tarhule (2005) uses newspaper articles to document 79 rainfall and flood events between 1970 and 2000, which

collectively damaged 5 580 houses and left 27 289 people homeless but were not officially recorded.

It is important to realize that even in the absence of climate change there are significant climate extremes that communities and countries should be prepared for. For example, Shanahan *et al.*, (2009) find that the multidecadal drought of the 1970s in Western Africa was not anomalous and that the climate system is capable of much more severe and larger droughts.⁷¹

⁷¹ The authors combine geomorphic, isotopic and geochemical evidence from the sediments of Lake Bosumtwi in Ghana to reconstruct the natural variability in African monsoons over the last three millennia.

PROJECTED CHANGES⁷²

Across the globe, changes in extreme climate patterns have been observed since the 1950s. However, while it is unequivocal that the climate system is warming (IPCC, 2014), there is much uncertainty pertaining to changes in climate variability, especially with regard to spatially more refined projections. For example, IPCC (2012) does not provide an assessment of projected changes in extremes at spatial scales smaller than for a large region. However, many projections indicate that global warming will lead to more frequent and intense extreme climate events. For example, Salinger (2005, p. 27) concludes that:

Global warming has been identified to lead to greater extremes of drying and heavy rainfall and increases the risk of droughts and floods that occur with ENSO events in many different regions, thus increasing climate variability from these sources.

More recently, the IPCC (2014) concludes that climate change-related risk from extreme weather events are already moderate and with 1 °C of additional warming, the risks are high.

Many projections have shown increasing climate variability with increasing frequencies of heat stress, drought and flooding (Thornton *et al.*, 2014). Baylis and Githeko (2006) find that some global models predict that climate change will lead to ENSO becoming more frequent, but they note that models are poor at predicting the effects of ENSO in Africa.

HEAT WAVES

Globally, it is very likely that heat waves will last longer and become more intense and frequent while the number of cold days will decrease significantly (IPCC, 2012). It is considered highly probable that by the end of the century, the summer average temperature in the tropics and subtropics will exceed the hottest summer on record between 1900 and 2006 (Battisti and Naylor, 2009).

However, the most recent IPCC (2014) noted that a partial lack of data and studies means that there was only a low to medium confidence in historical extreme temperature trends in most parts of Africa. Nevertheless, there is high confidence that the number of warm days will increase and the number of cold days will decrease in all parts of Africa and that heat waves become more frequent and/or last longer (IPCC, 2012).

DROUGHT/DRYNESS

An assessment of future drought risk, incorporating drought disaster frequencies, drought severity and levels of production, management and irrigation, found that Africa has the highest Disaster Risk Index value (Li *et al.*, 2009). While the IPCC (2012) reports low to medium confidence in increased dryness in Africa, projections show that all rainfed agriculture in Southern Africa below 15 °C is likely to fail one out of two years (Thornton *et al.*, 2014). In Eastern Africa and Southern Africa, except for the eastern part of the latter, greater dryness is anticipated with medium confidence, with southwestern parts of Southern Africa predicted to be at high risk of severe droughts (Niang *et al.*, 2009).

RAINFALL/EXTREME WET DAYS

There is low to high confidence in an increase in heavy precipitation across the region. For Western Africa, there is low to medium confidence in increased heavy precipitation with some parts predicted to receive more extreme rainfall days during May and July, while the Guinea Highlands and parts of Central Africa (Cameroon mountains) are expected to see an increase in intensity and frequency of extreme rainfall (Niang *et al.*, 2009). There is high confidence in increased heavy precipitation and the number of extreme wet days for Eastern Africa (Niang *et al.*, 2009). For Southern Africa, there is low confidence in predictions although there is some evidence of increased heavy precipitation in the southeast. Finally, predictions for tropical cyclone activity in the southeast of Southern Africa remain highly uncertain.

⁷²This and the following sections on heat waves, drought/dryness and rainfall/extreme wet days are based on IPCC (2012), in particular chapter 3 and Table 3-3.



RWANDA

A poultry and egg farm
supported by FAO in Gakenke
©FAO/Luis Tato

THE IMPACT OF CLIMATE VARIABILITY AND EXTREMES ON FOOD SECURITY AND NUTRITION

Climate variability and extremes is part of life, causing hardship every year for millions of people in Africa as elsewhere, and contributing to conflict (Box 6). Many cannot adequately prepare for, or cope with, shocks and disasters, and they often suffer damage to their health and nutrition and see their livelihoods disrupted or destroyed. Those already vulnerable suffer more. For example, in societies marked by low socio-economic status of women, more women die, directly or indirectly, through related post-disaster events such as epidemics or violence (Neumayer and Plümér, 2007).

The adverse effects of extreme climate events are especially severe in rural areas and in agriculture. An FAO review of natural disaster impact assessments

in developing countries found that some 26 percent of economic losses reported were in the agriculture sector; when only droughts are considered, the share rises to 83 percent (FAO, 2018f). In sub-Saharan Africa's semiarid and subhumid areas droughts and floods are the main causes of short-term fluctuations in food production. If such extreme events become more frequent and severe, they will threaten the stability of food supplies and thus food security (Schmidhuber and Rubiello, 2007). The available evidence, reviewed below, shows that extreme climate events will adversely affect food security and nutrition through a number of channels, ultimately impacting all four dimensions of food security.

Climate variability and extremes will weaken food production systems and the natural resource base, particular in those areas most at risk of degradation, desertification and intense water stress. Coupled with populations that are poor and lack the capacity to adequately prepare and who often live in countries with weak institutions and social protection systems and limited capacity to respond to shocks, extreme events are a clear and present danger to food security and nutrition of millions of people.

BOX 6 CONFLICT AND CLIMATE VARIABILITY AND EXTREMES

Last year's edition of the *Africa Regional Overview of Food Security and Nutrition* analysed the link between conflict and food insecurity, hunger and poverty. Conflict causes considerable human suffering and economic damage. At the same time, economic welfare is the factor most consistently linked to conflict (Bruce *et al.*, 2009). In Africa, where (rainfed) agriculture is often a very large sector employing a majority of the workforce, climate

variability and extremes can cause significant economic damage, through loss of crops and livestock, as well as population displacement (see FAO, 2017a). While extreme weather and production shocks are not the main drivers of violence in Africa, they cause food shortages and price spikes and weaken institutions and become conflict multipliers, especially in post-conflict situations (Buhaug *et al.*, 2015; OECD, 2016; Vallings and Moreno-Torres, 2005; FAO *et al.*, 2017)

AVAILABILITY OF FOOD⁷³

Increased climate variability is likely to increase production losses beyond those estimated from changes in mean variables alone. Droughts can have devastating effects on agricultural output and temperatures exceeding certain thresholds, even for short periods, during the developmental stage are likely to damage yields (Tubiello *et al.*, 2007; Deryng *et al.*, 2014). Estimates by Lesk, Rowhani and Ramankutty (2016) show that droughts and extreme temperature events reduced national agricultural production by, on average, 9–10 percent across the world and that recent droughts had a larger effect than earlier ones. They find no effect from floods or extreme cold.

Droughts cause damage, nearly exclusively in the agricultural sector, and in particular the livestock sector. In some particularly vulnerable places, such as small islands or in areas affected by large-scale climate extremes, the impact could be catastrophic. Analysis presented in FAO, IFAD, UNICEF, WFP and WHO (2018) shows that almost 36 percent of countries that experienced a rise in undernourishment since 2005 were affected by severe drought at the time. Drought may, therefore, be an important contributing factor to the rise in the prevalence of undernourishment in these countries, most of which (19 out of 27) are in Africa.

The recent El Niño experience is illustrative of the damage that comes with climate extreme events. Classified as one of the most intense and widespread of the past 100 years, it has harmed crop and livestock production, and agricultural livelihoods around the globe, threatening the food security and nutrition of 60 million people (FAO, 2016c). In Ethiopia, over 10 million people were in need of food and non-food assistance in 2016 and one study estimates that it led to a 13.6 percent fall in agricultural GDP (Melkamu Belina Negeri, 2017). In Somalia, drought affected Puntland and Somaliland, leaving nearly 4.7 million people food insecure in 2016. In addition, Eswatini, Lesotho, Malawi, and Zimbabwe declared drought emergencies. In the Southern Africa region, about 39.7 million people were food insecure at the peak of the 2016/17 lean season.

Fluctuations in rainfall can have profound impacts on agricultural output, especially in sub-Saharan Africa, where most of agricultural production is rainfed, and this also filters through to other sectors. For example, in dry years, South African GDP is only 83 percent that of wet years on average, and rainfall variations of 10 percent are reflected in GDP fluctuations of 1 percent (Jury, 2002). Accurate climatic predictions that allow for more effective planning could help reduce agricultural variability by about 20 percent, saving more than USD 1 billion each year (Jury, 2002).

In some countries, extreme climate events are relatively common. For example, Malawi faces drought conditions quite frequently, and Pauw and Thurlow (2009) estimate that losses due to drought average out to about 4.6 percent of maize output each year, and in the south of the country, on average 12 percent of maize output is lost to flooding. At the aggregate level, less severe, one-in-five year droughts, reduce GDP by about 1.1 percent while more severe, one-in-twenty-five year droughts, as experienced in 1991/92, reduce agricultural GDP by 21.5 percent.

In Zambia, climate variability reduces agricultural growth by 1 percentage point each year and maize production by at least 30 kg per capita (Thurlow, Zhu and Diao, 2009). Over a ten-year period, the authors find that climate variability reduces GDP growth by 0.4 percentage points each year and USD 4.3 billion in total. Reductions in output also raise food prices and lower real incomes in urban areas. Finally, a severe drought may increase poverty by up to 8 percentage points.

In Ethiopia, Dercon (2004) finds that a 10 percent fall in rainfall lowers food consumption by about 5 percent and that it does not fully recover for several years. And FAO (2015b) estimates that after each drought, calorie availability fell by 3.7 percent in Kenya, 3.3 percent in Ethiopia, 1.9 percent in Somalia and 0.2 percent in Djibouti.

Floods too can have a devastating impact on crop and livestock production. Widespread flooding in southern Mozambique in 2000 killed and displaced

⁷³ Stability of food availability and access to food is not discussed separately, but as part of this and the subsequent section.

many people and in addition destroyed 350 000 livestock. About 6 000 fisherfolk lost half their boats and gear and in all USD 3 billion (20 percent of GDP) was lost (Hellmuth *et al.*, 2007).

An increased frequency and intensity of storms, hurricanes and cyclones will harm aquaculture, mangroves and coastal fisheries. The production from inland fisheries and aquaculture is threatened by changes in precipitation and water management, increased stress on freshwater resources, and the frequency and intensity of extreme climate events (Brander, 2007; Porter *et al.*, 2014).

Not only droughts and floods cause losses. Crops need specific conditions in order to thrive, including optimal temperature and sufficient water. Up to a certain point, warmer temperatures may benefit the growth of certain crops in some parts of the world. However, if temperatures exceed a crop's optimal level, or if sufficient water and nutrients are not available, yields are likely to fall (Deryng *et al.*, 2014; Tubiello *et al.*, 2007). Worryingly, Battisti and Naylor (2009) report that most cropping areas in the world are likely exposed to record average temperatures by the end of the twenty-first century.

While droughts reduce yield and may completely damage crops, extreme heat only affects yield. Temperatures exceeding an absolute threshold at a particular developmental stage, even for short periods, can reduce yields (Porter and Semenov, 2005). A number of studies found that extreme daytime temperatures of around 30°C have a strong negative impact on crop yields (Porter *et al.*, 2014). For example, Lobell *et al.*, (2011) report that for each degree above 30, maize yields were 1 percent lower under optimal rainfed conditions. Rice yields fall by 90 percent with night temperatures of 32°C compared to 27°C (Mohammed and Tarpley, 2009). More broadly, Dell, Jones and Olken (2012) found that on average, a 1°C rise in temperature, in a given year, reduces agricultural growth by 2.7 percentage points, and economic growth by 1.3 percentage points. Such impacts will affect food security: a recent study by Asfaw and Maggio (2018) finds that an increase in temperature that exceeds the upper confidence interval by 1°C has a detrimental effect on food consumption (-29.8 percent) and caloric intake (-22.2 percent). While studies have established a relationship, Rowhani

et al., (2011) note that the impact of temperature and precipitation variability on yields is complex and depends, *inter alia*, on changes in phenology.

Apart from directly affecting crop production, extreme rainfall and temperature fluctuations may also have an impact on the prevalence and distribution of pests, weeds and crop and livestock diseases (Thornton *et al.*, 2014). This is because many weeds, insect pests and diseases thrive under warmer and wetter conditions. For example, the outbreak of Rift Valley fever and Blue Tongue in Eastern Africa has been linked to drought followed by high rainfall (Baylis and Githeko, 2006), possibly due to accelerated parasite development and an increase in vector populations. However, the links between climate variability and pests, weeds and diseases are not yet well understood (Thornton *et al.*, 2014).

ACCESS TO FOOD

Crop and livestock production are immediately affected by climate shocks, but the impacts can lead to widespread 'entitlement failure' by destroying livelihoods and inflating prices and without large-scale public interventions, hunger and famine follow (Devereux, 2007). For example, the Resilience Taskforce Sub Report (2015) finds that increasing climatic variability will reduce yields of staple crops and is likely to increase their long-term average prices as well as price volatility.

The immediate impact of the 2010–11 Eastern Africa drought, which affected large parts of Djibouti, Ethiopia, Kenya and Somalia, was the death of an estimated 143 000 to 273 000 people (about 4.6 percent) of the population in southern and central Somalia, about half of whom were children (Checchi and Robinson, 2013). Food production fell, and prices of staple foods in the affected areas rose dramatically. Compared to pre-disaster levels, wheat prices rose by 85 percent and maize prices by 55 percent in Kenya, and in Somalia maize prices rose 106 percent while red sorghum rose 180 percent (Coghlan *et al.*, 2014).

Significantly, livestock also suffered in these areas, with cattle mortality rates at 60 percent in Ethiopia. High livestock mortality meant that many owners would put their animals up for sale, leading to a collapse in prices and undermining pastoralists'

livelihoods. For example, about 60 percent of Kenya's cattle died and the price of a cow in northern Kenya fell from USD 220 to USD 30 (Coghlan *et al.*, 2014).

Regular droughts in Malawi have a strong impact on households' ability to access food. Droughts in particular affect small- and medium-sized family farmers more because they rely more on traditional varieties. A one-in-five year drought increases national poverty rates by 0.7 percentage points and a one-in-twenty-five year drought raises poverty by 16.9 percentage points. Flooding, even though localized, was also found to have a significant impact on poverty rates (Pauw and Thurlow, 2009). Averaged out over time, droughts and floods add each year 1.3 and 0.7 percentage points, respectively, to poverty rates (Pauw and Thurlow, 2009).

To alleviate production shortfalls and dampen price rises, countries typically increase imports of staple foods. Evidence presented in FAO, IFAD, UNICEF, WFP and WHO (2018) shows that for low- and middle-income countries, there is a high correlation between high temperatures and low rainfall and high cereal imports. In Africa, agricultural imports following a natural disaster are typically lower, and sometimes much lower, than the drop in domestic production. This is compensated for in part by humanitarian responses but in part it is reflected in lower food availability.

Droughts in particular can threaten food security at various levels, from local to regional. When such events threaten staple food production in globally significant producers it may threaten food security also in countries not directly affected by drought. Regional droughts, such as the North American Drought of 1988–89, which caused large drops in maize and soybean production, and the 2002–03 drought in Eastern Europe and Western Asia, which significantly reduced rice and wheat production, impact consumers in other countries through reduced supplies and higher prices. The Resilience Taskforce Sub Report (2015) notes that production of maize, soybean, wheat and rice is concentrated in a few countries with a large amount of overlap

across crops. Climate extremes in these countries have the largest impact on global availability of these crops and a combined shock across regions affecting these or several of these countries simultaneous may become more common. Benton and Bailey (2015) find that with the increasing frequency of extreme weather, there is a possibility that regional droughts happen simultaneously in key producing regions, leading to a potential loss of 5 to 10 percent of production of these major staple crops. They argue that while such a possibility is a 1 in 100 event, with climate change, the probability may be falling.

UTILIZATION OF FOOD

In the absence of insurance, rural households that experience shocks may reduce consumption or sell assets. Reducing consumption to preserve productive assets in the short run can irreversibly harm long-term physical and cognitive development of the youngest and most vulnerable members of a household. Gitau *et al.*, (2005) find that droughts impact dietary diversity and reduce overall consumption with long-term detrimental effects on stunting. Dercon and Porter (2010), for example, found that children in the particularly vulnerable age range of 12–36 months at the height of the 1984 Ethiopian famine were about 3 cm shorter due to the famine. Similarly, Hoddinott and Kinsey (1995) found a lasting negative impact, strongest in poor households, of drought on child growth in Zimbabwe (see also Part One). While growth rates are faster for undernourished children, they nevertheless do not catch up.

Households may also change their eating habits to adjust to changes in food availability, income or price rises. Household surveys from a number of countries, including Egypt, Ghana, Kenya, Malawi and Mozambique, find that dietary diversity is strongly associated with household consumption expenditure (Hoddinott and Yohannes, 2002). And evidence from Tanzania shows that people eat fewer meals per day and reduce intake of legumes and

fish during prolonged dry seasons and floods (Saronga *et al.*, 2016). In Malawi, Gelli *et al.*, (2017) found that households reduced food intake and dietary diversity significantly during the lean season. Absolute and relative price changes also affect household dietary diversity. If prices rise, consumers tend to maintain their level of staple food consumption by switching to cheaper, less diverse and nutritionally inferior diets.

Greater climate variability will also affect food safety and disease incidence. Under certain conditions, higher intensity rainfall and drought can facilitate the contamination of crops with toxins. In addition, extreme water-related events can increase the incidence of waterborne diseases, especially when there is human displacement and contamination of water sources. Diarrhoeal diseases reduce food intake and impair nutrient absorption, posing a serious threat in particular to children's nutrition and health.

In some parts of Africa, the conditions are unsuitable for endemic malaria, but those areas, with about 124 million inhabitants, are still at risk from epidemic malaria, the cause of between 12 and 15 percent of all malaria deaths (Hellmuth *et al.*, 2015). In these areas, rainfall variability explains about two-thirds of the incidence of malaria.

BUILDING RESILIENCE TO EXTREME CLIMATE EVENTS

The impacts of climate variability and extremes on food security, described in the above section, are experienced as shocks to people's income and food availability with serious implications for nutritional outcomes. And climate-related disasters not only have the potential to lead to increased levels of poverty and hunger but also undermines the socio-economic fabric of communities and households, destroying their resilience to anticipate, absorb, accommodate or recover from shocks in a timely and sustainable manner.

Importantly potential shocks also shape household decision-making simply because they may happen. Climate-related risks have a profound influence on rural livelihoods and explain why poor households remain poor (Alderman and Haque, 2007). For example, farmers in Shinyanga, a semiarid district in the western part of the United Republic of Tanzania, with limited options to maintain adequate consumption after a shock, were found to choose lower-return but safer, crops such as sweet potatoes, foregoing up to 20 percent of potential income as a kind of implicit insurance premium (Dercon, 1996). In Ethiopia (Elbers, Gunning and Pan, 2009) and Zimbabwe (Elbers, Gunning and Kinsey, 2007), the capital stock accumulated by farmers was estimated to be only 36 and 46 percent, respectively, of the level achievable in the absence of risk.

Climate shocks push many households into poverty with long-lasting impacts. Households may adopt negative coping strategies, such as selling cattle or other assets, reducing consumption or switching to cheaper foods, taking children out of school, borrowing and even begging. Households first engage in reversible coping strategies, such as switching to cheaper foods and reducing meals, but as these become exhausted, they have to engage in strategies that can be difficult to reverse, such as selling assets and exploiting natural resources in an unsustainable manner. As a consequence individuals' and households' livelihoods may be undermined for the longer term, even trapping them in chronic poverty.⁷⁴

For example, Dercon, Hoddinott and Woldehanna (2005) found that poverty in Ethiopia in 2004 was about 50 percent higher than it would have been in the absence of shocks. In the United Republic of Tanzania, Beegle, Dehejia and Gatti (2006) found that household income shocks increased the level of child labour, as school enrolment suffered. Recovery from shocks is often slow. Households affected by drought in Ethiopia and the United Republic of Tanzania had lower incomes compared to unaffected households, even ten years later (Beegle, De Weerdt and Dercon, 2008; Dercon, 2008). Perhaps unsurprisingly, the poor may recover more slowly from an income shock (Jalan and Ravallion, 2001).

⁷⁴ Households may become trapped in poverty for reasons other than natural disasters. For example, they may be too poor to consume the basic amount of nutrients needed for productive work, or to invest in education, or to accumulate the resources needed for entrepreneurship. Such constraints may leave many households below critical thresholds in terms of assets and resources, incomes or expenditures that they are unable to overcome.

INFORMAL SAFETY NETS ARE NOT ENOUGH

The floods of 2000 in South Africa's Limpopo province caused many deaths, displaced about 300 000 people, destroyed livelihoods and infrastructure, and left many communities facing water and food shortages (Khandlhela and May, 2006). Very few people had insurance, and for most, informal safety nets were important as an immediate source of assistance. However vital informal safety nets are, they are not adequate when disasters cover entire communities and many households are struggling simultaneously to recover, placing unbearable pressure on existing resources.

This is also true more generally. Households across Africa use burial and funeral societies and informal credit and savings schemes to avoid consumption fluctuations in case of the death of a household member. However, there is substantial evidence that shows such informal arrangements are more effective for idiosyncratic shocks, such as illness, that affect individual households than covariate shocks, such as drought or flooding, that affect entire communities. In general, they offer only partial insurance to the poor (Devereux, 1999; Dercon, 2011).

When the available risk-coping mechanisms are insufficient, the agricultural households cannot afford to plan for the longer term, as their very survival is threatened. Consequently, they adopt low-risk, low-return farming strategies, and rely on casual labour markets to obtain liquidity or more secure income (Dercon, 2002). For similar reasons, households may underinvest in the education and health of their children, or adopt negative risk-coping strategies such as distress sales of assets and/or reducing the quantity and quality of food consumption. Faced with threat to their livelihoods and even death and starvation, many individuals and households resort to migration.

Individuals, households and communities must have three capacities to cope and adapt to climatic (and other types) shocks and their impact:⁷⁵

- ➔ adaptive capacity, i.e. coping strategies, risk management and savings;
- ➔ absorptive capacity, i.e. use of assets, attitudes/motivation, livelihood diversification and human capital;
- ➔ transformative capacity, i.e. governance mechanisms, policies/regulations, infrastructure, community networks and formal social protection.

Needless to say, poor households are often lacking these capacities and institutional supports, and they remain particularly vulnerable. Government programmes are required to support the most vulnerable in obtaining the necessary capacities noted above. Interventions to support resilience should also consider people's exposure and level of vulnerability to climatic shocks. For example, Asfaw and Maggio (2018) find that in Malawi the negative welfare impacts of temperature shocks are more severe for households where land is solely managed by women. Impact and vulnerability will also be determined by environmental, social, economic and political factors that can negatively affect livelihoods. Lack of education and healthcare also exacerbate vulnerability. Repeated or compounding shocks dramatically increase vulnerability as assets and capacity to cope are continuously eroded. In order to be resilient to climate-related shocks, households must be able to adopt climate adaptation and mitigation processes. A major factor determining the ability to adopt such strategies is a household's level of poverty and marginalization in their community/society. Finally, interventions must consider the specific context to be effective as the nature and intensity of the shock and the fragility of the household/community/society will also determine what impact the shock will have and what tools are needed to be resilient in the face of such shocks (see also FAO, IFAD, UNICEF, WFP and WHO, 2018).

⁷⁵ See Annex 4 of FAO, IFAD, UNICEF, WFP and WHO (2018) for a more detailed definition.

SHOCK-RESPONSIVE SOCIAL PROTECTION IS NEEDED

While informal safety nets are critical supports for households experiencing either sudden shocks or protracted challenges, governments play a critical role in providing basic social protection entitlements to the most vulnerable. The immediate concern is to protect household food consumption and avoid negative coping strategies that have long term implications on the household's livelihood, asset base and welfare. Social protection interventions, such as cash or food transfers, have been shown to be effective at reducing food insecurity and poverty (FAO, 2015c). Many social protection programmes include a disproportionate number of female-headed households, as they are overrepresented among populations of extremely poor.⁷⁶

In addition, social protection can play an important role in positively shifting behaviours around households' decisions with regards to investment (Alderman and Yemtsov, 2014; Tirivayi, Knowles and Davis, 2013). First, social protection can help households manage risk if transfers are available at regular levels and predictable intervals. Reliable social protection programmes enable households to make investments and take advantage of economic opportunities they would otherwise consider too risky. Social protection can also reduce reliance on negative risk-coping strategies in the face of shocks. It is important that the design of social protection programmes considers that the impacts of transfer programmes vary with gender. For example, women and men may not invest in the same type of livestock: women generally focus on small animals while men focus on larger livestock. Transfers also impact men and women, and boys and girls differently, especially in terms of labour allocation and time use (FAO, 2015c). Governments should consider the large body of available evidence when designing

programmes to meet specific objectives based on local context.

Second, social protection programmes that provide cash relieve binding constraints that cause poor agricultural households to engage in suboptimal use of assets and inputs. Poor households, and particularly women, often find it difficult to borrow money due to lack of collateral or the relatively high expense of small loans. Cash transfers have been found to reduce the need for borrowing, facilitate household saving and alleviate credit and liquidity constraints. When payments are regular and predictable, they can improve access to credit by serving as collateral (Barrientos, 2012). Households are thus empowered and enabled to make more productive decisions.

Third, the impact of social protection programmes is also felt in the communities and local economies in which these programmes are implemented. Social protection allows households to renew or strengthen their participation in informal social networks for risk-sharing and reciprocal exchange. Moreover, properly conducted public works programmes can provide important public infrastructure and assets to facilitate household investment and economic activity (Alderman and Yemtsov, 2014).

Social protection programmes in Ethiopia, Ghana, Kenya, Malawi and Uganda show that regular long-term cash transfers can help households absorb the negative impacts of shocks and are protective against households falling deeper into poverty. However, although the transfers help individuals and households mitigate against certain risks and manage shocks as they occur, social protection programmes are not usually designed to support community level resilience building, shock mitigation, or shock responsive enough to react quickly in a crisis to support in recovery. However, the importance of shock-responsive social protection is a growing field of inquiry and more countries and stakeholders

⁷⁶ The vast majority of programmes target women in male-headed households as direct beneficiaries (FAO, 2015c). For example, in sub-Saharan Africa, recipients in Ghana's LEAP, Zambia's Child Grant, Zimbabwe's Harmonized Social Cash Transfer (HSCT) and Lesotho's Child Grants Programme (CGP) are, respectively, 81, 98, 64 and 67 percent women. In Ethiopia's PSNP, Kenya's Cash Transfer for Orphans and Vulnerable Children (CT-OVC) and Malawi's Social Cash Transfer (SCT), 73, 65 and 83 percent of recipients, respectively, were female-headed households. The information are based on data from FAO's Protection to Production project (PtoP) (see also Tirivayi, Knowles and Davis (2013)).

are looking to build effective social protection systems that include early warning systems and shock responsive instruments.

Malawi, which is extremely prone to disasters and also has about half the population living below the national poverty line, has recognized this and has made shock-responsive social protection a national priority (Holmes *et al.*, 2017), which is reflected in efforts to build resilience into the next Malawi National Social Support Programme (MNSSP). For example, during the 2016/17 humanitarian response, beneficiaries of the Social Cash Transfer Programme, which targets the 'ultra-poor' that make up about 25 percent of the population,⁷⁷ also received humanitarian assistance. While seemingly straightforward, this is a contentious issue as communities resent that cash transfer beneficiaries appear to benefit twice (Holmes *et al.*, 2017).⁷⁸

For Malawi, social protection must include building resilience to seasonality of agriculture, which often requires emergency assistance for households that cannot meet food consumption needs during the lean season. In addition, social protection programmes must be adaptable and scalable in a timely manner to be able to respond to shocks. This requires updated design features, programme processes tailored to emergency contexts, and funding mechanisms at the ready that together create a flexible system that is able to respond as shocks occur. Unified registries that collect data on poor and vulnerable households can be a useful tool to support targeting when shocks do occur. They are also critical instruments to support integrated delivery of the package of services households require to be truly resilient (Holmes *et al.*, 2017).

There are other important aspects of building resilience where social protection programming can play a role. For example, public works, when appropriate, can proactively mitigate the effects of climate-related shocks by protecting natural resources and strengthen community assets. In addition, social protection beneficiaries can be linked to other empowering interventions, such as water and

soil management, adoption of drought-resistant varieties, and livelihood diversification.

INVESTING IN RESILIENCE

While African governments must invest more of their national budgets into social protection as a central element in increasing food security and building resilience from natural disasters for the poor, it is not a panacea and other actions are needed to build resilience throughout the food system.

Climate extremes disrupt production, reducing food availability and causing prices to rise, and when faced with soaring prices, governments often respond with export restrictions. Export restrictions and bans have been found to worsen price increases and add to uncertainty regarding food supplies that food-importing countries face (HLPE, 2011). Following the 2007 and 2008 dramatic rise in staple food prices, the two most widely applied market and trade policy measures were reduction of tariffs or custom fees (Demeke, Pangrazio & Maetz, 2008), but over 30 countries, including many in Africa, imposed export restrictions, exacerbating the price shock for food-importing countries (Benton and Bailey, 2015).

The free movement of food products can help transfer produce from surplus to deficit areas, reducing output fluctuations and dampening price spikes. In general, production shocks are less pronounced at the regional level than at the country level, and it is more efficient to pool regional resources through trade than to maintain stocks in each country.

Some governments intervene directly to stabilize prices through state marketing boards and food reserves. However, Minot (2014) finds that those countries with the most active interventions in maize markets, i.e. Kenya, Malawi, Zambia and Zimbabwe, experienced higher price volatility compared to countries that make less effort to

⁷⁷ Those living on less than half the \$1.90 a day are considered to be in extreme poverty.

⁷⁸ Social protection in Malawi is not confined to social cash transfers but includes school meals and public works, as well as several other programmes, although these are all administered separately.

manage prices. Buffer stocks or an emergency food reserve can help stabilize domestic food prices; however, they are expensive to maintain (HLPE, 2011).

Over the longer term, investing in infrastructure, such as irrigation and the management of dams and rivers in river basins, is necessary to strengthen the resilience to drought of farming communities, and the rural and urban communities, more generally. It is important to include hydrological variability so as not to underestimate the returns from irrigation

(Box 7). Restoring degraded land is also an important part of strengthening the resilience of communities. Increasing the level of organic carbon in soils improves nutrient and water intake by plants, possibly countermanding some of negative impacts of extreme events, and it reduces soil erosion and increases water retention (FAO, 2013). Soil and water conservation helps increase soil water content and maintain humidity during soil spells through improved soil structure. Trees provide shade and biomass and add a source of income during the dry season.

BOX 7 WATER MANAGEMENT IN ETHIOPIA: REDUCING THE IMPACT OF SHOCKS

Ethiopia is one of the countries that are most vulnerable to climate variability and extremes. Water resources are abundant, but agriculture in Ethiopia is mostly rainfed and very sensitive to rainfall fluctuations. Although droughts cause substantial damage to agriculture and the economy, the high degree of variability – geographically and in time of water availability in general – is considered to cause even greater harm. Moreover, failing to account for hydrological variability considerably underestimates the returns to irrigation and drainage, which are highest in times of drought and flood.

FAO estimates that 2.7 million hectares can potentially be irrigable; however, only 11 percent of this area was equipped for irrigation in 2001, and this is among the lowest percentages in Africa (Mendes and Paglietti, 2015). Since then, the International

Water Management Institute reports the area to have grown to 610 000 hectares in 2010.

Increasing the area under irrigation is essential to boost agricultural productivity as well as stabilizing production. Appropriately designed irrigation and drainage investments can help mitigate the impact of extreme climate events. In addition, more water storage capacity can help reduce the impacts of water shocks. Not only are large-scale reservoirs needed but also small-scale water storage for households. Investments will have higher returns when designed as multipurpose projects, such as watershed management, fisheries, drinking water, hydropower, etc. (World Bank, 2006). Effective investments in managing water resources will improve food security through increasing and diversifying production and incomes and stabilizing prices.

Research and Development will play a fundamental role in helping farmers adapt to climate extremes. Greater emphasis must be placed on crops which do well under hot and dry growing conditions, or which are more drought-resistant.⁷⁹ Greater climatic variability and extremes will also raise the incentive to adopt climate-smart practices, such as drought-tolerant seeds. A recent study by Lunduka *et al.*, (2017) for Eastern Zimbabwe found that households that grew drought-tolerant maize (DTM) harvested 247 kg/acre and earned about USD 240/hectare more than households that did not use DTM. Already, in Malawi, Mozambique, Zambia and Zimbabwe, drought-tolerant maize varieties are adopted by 74, 44, 19 and 23 percent of farmers, respectively, and a 2013 survey in the same countries, plus Angola and Kenya, found that farmers consider drought tolerance as the most or second most important quality that their seeds must have (Lunduka, 2018).⁸⁰

Although the yields of drought-tolerant varieties are superior to other varieties under stress and optimal conditions, uptake faces a number of barriers, both on the supply and the demand side (Fisher *et al.*, 2015). The main constraints identified are unavailability, inadequate information, lack of resources, high seed price and farmers' perceptions of seed attributes. Differences in constraints between countries shows that policies must be context-specific.

Insurance is another important element that can shield farm households from the adverse effects of climate-related extreme weather events. However, agricultural insurance, unless free or subsidized, is not affordable to poor farmers. Furthermore, agricultural insurance schemes are not widespread due to the myriad of associated information problems. Index-based insurance schemes are an innovative approach that has been increasingly explored in recent years and which can help overcome some of these problems. Most common are weather index-

based schemes, where the contracts are based on deviations from a weather-related index, such as rainfall over time. All policy-holders within a defined area receive payouts based on the same contract and measurement at the same station, eliminating the need for in-field assessment (IFAD and WFP, 2011).

Insurance is rare in sub-Saharan Africa, but there are some examples of weather index-based insurance schemes. For example, in Ethiopia, Nyala Insurance, a private insurance company, offers weather index-based insurance to farmer members of a cooperative, thus achieving some economies of scale. The company insures all farmers in the cooperative, and the cooperative is responsible for paying the premium and for distributing potential payouts (Meherette, 2009). The WFP–Oxfam's Rural Resilience Initiative (R4) has, since 2016, provided approximately 37 000 farmers in Ethiopia, Malawi, Senegal and Zambia with index-based insurance to extreme weather events/climate-related shocks. The initiative allows farmers to pay insurance premiums either in cash, or in some places, with labour. A limitation of weather index-based insurance is that historical daily rainfall data are needed to make such a scheme operational.

STRONGER, COORDINATED EFFORTS ARE NEEDED

Following the International Decade for Natural Disaster Reduction, disasters are not anymore seen as temporary disruptions that should be dealt with through humanitarian assistance and specific interventions. Rather, it is recognized that sustainable development is not possible without coherent and effective disaster risk reduction (DRR) strategies.⁸¹

At the international, regional and country level, DRR is guided by the Sendai Framework (SF). Adopted in 2015, it commits all countries to prepare national and local disaster risk reduction strategies

⁷⁹ See also the section "Climate change and food security and nutrition" in Part Two.

⁸⁰ The survey was undertaken by the Drought-Tolerant Maize for Africa (DTMA) project. Running from 2007 to 2015, the project was implemented jointly among the National Agricultural Research Systems (NARS) by CIMMYT (Eastern and Southern Africa) and IITA (Western Africa) in 13 countries across sub-Saharan Africa (SSA). By January 2016, about 200 distinct drought-tolerant maize varieties were released under DTMA across the target countries (CIMMYT, 2015).

⁸¹ The policy objective of anticipating and reducing risk is called disaster risk reduction (DRR). Although often used interchangeably with DRR, disaster risk management (DRM) can be thought of as the implementation of DRR, since it describes the actions that aim to achieve the objective of reducing risk (UNISDR, 2015).

by 2020. The SF has established four priority areas: (1) understanding disaster risk, (2) strengthening disaster risk governance, (3) investing in disaster risk reduction for resilience, and (4) enhancing disaster risk preparedness. The Sendai Framework Monitor allows tracking the progress in implementing the SF across sectors. Critical gaps exist in all areas of international cooperation, many aspects of early warning, and risk information and disaster risk reduction strategies. The African Union's Programme of Action (PoA) for the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–30 in Africa was adopted in 2017 at the Africa Regional Platform for DRR. The PoA gives strategic direction to integrate DRR into regional climate change adaptation strategies, to mobilize domestic resources, and to accelerate implementation of the SF global targets.

The Common African Position to the 2017 Global Platform for DRR underscores the importance that African countries give to DRR for the realization of the Agenda 2063. However, in many countries, limited political commitment and domestic resource allocation makes proper implementation difficult. Building resilience requires a change in the conventional approach to disaster risk reduction (DRR) – from simply reacting to extreme events to prioritizing the reduction and active management of risks. On a yearly average, less than 5 percent of all humanitarian funding has gone to disaster preparedness and prevention; and less than 1 percent to those countries most in need. Investment in DRR from official development aid (ODA) disbursements was in the range of 0.4 percent in 2010 and 2011 across all sectors (UNISDR and OECD, 2013).

Efforts to establish a coordinated structure at the regional, subregional and national level to facilitate the implementation of the SF is supported by international efforts such as the Capacity for Disaster Reduction Initiative (CADRI). This global partnership, composed of 15 UN and non-UN organizations, works towards strengthening countries' capacities

to prevent, manage and recover from the impact of disasters. This initiative helps countries develop nationally tailored disaster risk reduction plans in line with the Sendai framework. In Africa, CADRI currently supports Benin, Burkina Faso, Burundi, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Madagascar, Mali, Mauritania, Namibia, Niger, Nigeria, Sao Tome and Principe and Zimbabwe, and it is active at the subregional level in Cairo, ECCAS (Gabon), ECOWAS (Nigeria), Johannesburg, SADC (Botswana) and Western Africa (Senegal).

Understanding disaster risk means being able to better predict when and what type of disasters would strike and who and what are vulnerable. Formulating strategies and decision-making relies on accurate data that can establish a baseline and allow for the monitoring of the agreed global targets of the Sendai Framework⁸². A data readiness review established that reporting countries (87 out of 193 countries, with 10 from Africa) are mostly able to collect a critical mass of disaster loss data, but some serious shortcomings prevent an adequate monitoring of the global targets (UN, 2017c).⁸³

Prediction of climate shocks at regional and national levels is essential but significant gaps in data collection exist, making short- and long-term predictions and projections difficult. For example, Conway *et al.*, (2009) note that the number of weather stations fell dramatically from the 1980s, which, along with other factors, complicates efforts to monitor climate variability accurately. Building capacity to collect, analyse and disseminate the relevant information and data is essential for informed decision-making at all levels (UNGA, 2017).

A recent initiative to generate and communicate early warnings about dangerous hydrometeorological and climate risks in least developed countries and Small Island Developing States, is the Climate Risk and Early Warning Systems (CREWS).⁸⁴ Other initiatives that aim to strengthen cooperation, planning and preparedness for disasters are the

⁸² The baseline for the Sendai Framework Disaster Risk Reduction global targets are the average loss data for the period 2005 to 2015, the implementation period of the Hyogo Framework (the precursor to the SF).

⁸³ Twenty-one African countries have operational databases (UNGA, 2017).

⁸⁴ This is a collaborative effort between the WMO, World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the United Nations International Strategy for Disaster Reduction (UNISDR).

International Network for Multi-Hazard Early Warning Systems and the Global Meteorological Alarm System.

Cooperation at subregional level is essential as weather events outside a country often impacts farmers within that country. In the late 1990s the WMO, National Meteorological and Hydrological Services (NMHSs), regional institutions and other international organizations initiated Regional Climate Outlook Forums, which brought together national, regional and international climate experts to produce regional climate outlooks. An example of such cooperation is the Southern African Regional Climate Outlook Forum (SARCOF), which is a regional climate outlook prediction and application process adopted by the 14 countries comprising the SADC Member States (Box 8).⁸⁵

Emergency preparedness and response is a further important element of DRR. Early warning is an important part of this and the Integrated Food Security Phase Classification (IPC) is an example of integrating climate risk monitoring into food security and nutrition monitoring. IPC is a set of

analytical tools and processes to analyse and classify the severity of acute and chronic food insecurity, specifically designed to provide actionable information to decision-makers in both emergency and development contexts. In addition, the IPC identifies the risk factors to monitor – including seasonal rainfall patterns and the progression of extreme climate events such as droughts – and generates food security projections to inform early warning and action. More than 40 countries worldwide are now implementing the IPC, including countries in Africa, Asia, Central America and the Caribbean, and the Near East (FAO, IFAD, UNICEF, WFP and WHO, 2018). Other important elements of emergency preparedness are contingency planning, setting up humanitarian response mechanisms, strategic reserves of food and seeds, safe storage facilities, livestock shelters, etc. It also includes building knowledge and capacities of governments and organizations, communities and individuals to anticipate, respond and recover. This includes shock-responsive social protection, which can also be designed to bridge the humanitarian response/development divide that exists, especially within the context of protracted crisis.

BOX 8 DISASTER EARLY WARNING AND PREPAREDNESS IN MOZAMBIQUE

Mozambique is extremely prone to flooding, tropical storms, droughts and, to a lesser extent, earthquakes. In the last 50 years, the country suffered over 100 000 fatalities from 68 natural disasters (UNECA, 2015). The three biggest floods occurred in the twenty-first century (2000/01, 2007/08 and 2013).

Recurrent natural disasters have cost about 1.1 percent in terms of lost annual GDP growth. The 2000/01 flood reduced GDP growth to 1 percent, instead of the expected 10 percent.

At the same time, inflation rose from 2.9 percent in 1999 to 12.7 percent in 2000. Overall water related disasters have cost the country USD 1.75 billion between 1980 and 2003 (UNECA, 2015). The 2000/01 flooding was the worst in 150 years. Heavy rains in Southern Africa caused flooding in five rivers that run through Mozambique to the Indian Ocean. In addition, five consecutive cyclones hit Mozambique. About 700 people died and 650 000 people were displaced. The flooding had been predicted by

⁸⁵ Such regional forums have also been established for the Sudano-Sahelian area (PRESASS: Prévisions climatiques saisonnières en Afrique soudano-sahélienne), Central Africa (PRESAO: Prévisions climatiques saisonnières en Afrique centrale), the Gulf of Guinea countries (PRESAGG: Prévisions climatiques

saisonnières en Afrique, pays du Golfe de Guinée), the South West Indian Ocean countries (SWIOCOF: South West Indian Ocean Countries Climate Outlook Forum), and the Greater Horn of Africa (GHACOF: Greater Horn of Africa Climate Outlook Forum).

the Southern African Regional Climate Outlook Forum (SARCOF) and the country's flood planning and preparedness, supported by international support and management of the disaster, were considered as generally good (Hellmuth *et al.*, 2007).

However, the flooding also showed up shortcomings. Accurate prediction of extreme weather events is essential, as is accurate short-term modelling of events once they unfold. Effective communication to the population proved difficult and highlighted the importance of the national and local media for this role. Finally, Mozambique today has a tropical cyclone warning system distinct from the flood early warning system.

After the floods of 2000, Mozambique moved to put in place a Master Plan for Disaster Prevention and Mitigation in 2006. The Government has linked Disaster Risk Reduction to national development objectives, in particular poverty reduction. For example, water resource management considers crop irrigation together with flood control and strategic seed reserves while also advocating for the introduction of drought-resistant plants (GFDDR, 2014).

The country carried out a flood risk analysis, showing that 40 out of 126 districts are prone to flooding, and 5.7 million people in these districts are vulnerable. The country has

established early warning systems and the use of community radios stations to effectively diffuse DRR information locally.

Instrumental in DRR has been the creation and strengthening of the National Disaster Management Institute (INGC). Housed in the Ministry of State Administration to facilitate closer cooperation with line ministries and provincial government, the institute is today focused on disaster response and vulnerability reduction. Overall humanitarian support is coordinated by the National Emergency Operations Center (CENOE), a part of INGC which when not responding to a disaster, focuses on vulnerability reduction and disaster mitigation (GFDDR, 2014).

In addition, the country has invested significantly in retrofitting and making schools and public spaces safer. About 7 to 10 percent of the reconstruction and recovery funding in Mozambique is allocated to disaster risk reduction aimed at resilience-building (Van Niekerk, 2015). Mozambique has also been a leader in the integration of the climate change agenda and disaster risk reduction, thus contributing to a common risk profile for the country. Finally, Mozambique, with nine of its rivers originating in neighbouring countries, has recognized the importance of regional cooperation for early warning and water resource management.

Rainfall and temperature predictions are one set of indicators used by the Malaria Early Warning Systems (MEWS), developed by partners of the Roll Back Malaria initiative and now implemented in several African countries. Accurate rainfall prediction

can allow countries and regions to prepare for a higher threat from epidemic malaria. For example, in September 2005, SARCOF predicted above-normal rainfall for most of Southern Africa and in response, the Malaria Outlook Forum (MALOF) was able to

provide an assessment of the vulnerability to malaria outbreaks, based on this updated rainfall forecast.⁸⁶ Subsequently higher rainfall and malaria outbreaks resulted in a much lower malaria incidence for this level of rainfall due to better preparation.

Accurate climate information is essential and it must reach decision-makers, down to the local level, and lead to disaster preparations in a timely manner. Much work remains to be done in this regard.⁸⁷ For example, regional early warning systems predicted the impending drought in Djibouti, Ethiopia, northern Kenya and Somalia in 2010–11. However, response at the necessary scale happened only when the crisis point was reached (Coghlan *et al.*, 2014).

GREATER COHERENCE AND COORDINATION BETWEEN CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION AND MANAGEMENT POLICIES IS NEEDED

Climate change in combination with poor development planning, poverty and environmental degradation increases the risk of a climate event becoming a disaster (World Bank, 2013c). A collective approach that combines climate change adaptation (CCA) with disaster-resilient development is an opportunity to address climate and disaster risks within the context of broader development goals.

While CCA and disaster risk reduction and management (DRR/DRM) originated from different disciplines⁸⁸ they are converging in their approaches and will continue to do so as the focus on resilience to climate variability and extremes is growing. However, there are disconnects in policy frameworks for CCA and DRR/DRM that require greater coordination to integrate efforts and reduce inefficiencies (FAO, IFAD, UNICEF, WFP and WHO, 2018). Efforts to integrate and build coherent CCA and DRR/DRM policies are ongoing and the 2030 Agenda recognizes the need to strengthen partnerships through improved information flows and the sharing of responsibility in an effort to link humanitarian responses with longer-term strategies to build food system resilience, improve food security and nutrition and foster CCA (FAO, IFAD, UNICEF, WFP and WHO, 2018). Continued progress in this direction will depend on collaboration among many institutions and actors that must work across sectors to coordinate a number of policy dimensions.

Policy-makers must work towards scaling up actions to strengthen the resilience of people's livelihoods, food systems and nutrition to climate variability and extremes through context-specific integrated DRR/DRM and CCA policies, programmes and practices that are also nutrition-sensitive.

⁸⁶ A number of indicators, including rainfall and temperature, are used in these assessments (Thomson and Connor, 2001).

⁸⁷ See also the section "Climate change and food security and nutrition" in Part Two for a discussion of some of the initiatives around climate information services.

⁸⁸ See FAO, IFAD, UNICEF, WFP and WHO (2018) for more details.

⁸⁸ See FAO, IFAD, UNICEF, WFP and WHO (2018) for more details.



A woman riding her
canoe as she goes
fishing.
©FAO

ANNEX

ANNEX TABLE 1 Prevalence of undernourishment (%)

Regions/subregions/countries	2005	2010	2011	2012	2013	2014	2015	2016	2017
WORLD	14.5	11.8	11.5	11.3	11	10.7	10.6	10.8	10.9
Africa	21.2	19.1	18.8	18.6	18.3	18.3	18.6	19.7	20.4
Northern Africa	6.2	5	5	8.3	8.2	8.1	8	8.5	8.5
Algeria	8.8	6.3	5.6	5	4.7	4.6	4.6	4.7	n.a.
Egypt	5.4	4.5	4.5	4.4	4.4	4.4	4.6	4.8	n.a.
Libya	n.a.								
Morocco	5.7	5.2	4.9	4.6	4.2	4	3.9	3.9	n.a.
Western Sahara	n.a.								
Tunisia	5.6	4.8	4.6	4.5	4.5	4.5	4.7	4.9	n.a.
Sudan	–	–	–	25.4	25.2	25.1	25.1	25.2	n.a.
Sub-Saharan Africa	24.3	21.7	21.3	21	20.7	20.7	21.1	22.3	23.2
Central Africa	32.4	27.8	27.1	26	24.9	24.2	24.1	25.7	26.1
Angola	54.8	40.4	38.2	35.1	30.8	27	24.8	23.9	n.a.
Cameroon	20.3	11.5	10.1	8.7	7.4	6.5	6.5	7.3	n.a.
Central African Republic	39.5	32	33.6	38.6	46.9	55.2	60.3	61.8	n.a.
Chad	39.2	40	38.9	37.7	37.1	37	38.4	39.7	n.a.
Congo	40.2	40.5	39.5	39.2	38.7	38.2	37.7	37.5	n.a.
Democratic Republic of the Congo	n.a.								
Equatorial Guinea	n.a.								
Gabon	10.9	10.8	10	9.4	9	8.8	9.1	9.4	n.a.
Sao Tome and Principe	9.4	14.6	15.5	14.8	12.9	10.7	9.8	10.2	n.a.
Eastern Africa	34.3	31.3	30.7	30.9	30.4	30.2	30.5	31.6	31.4
Burundi	n.a.								
Comoros	n.a.								
Djibouti	32.2	22.3	21.3	20.2	19.3	19.1	19.4	19.7	n.a.
Eritrea	n.a.								
Ethiopia	39.7	30.7	29	26.9	24.7	22.8	21.4	n.a.	n.a.
Kenya	28.2	23.5	22.5	21.6	20.8	20.8	22.5	24.2	n.a.
Madagascar	35	31.8	32	33.3	35.5	38.4	41.1	n.a.	n.a.
Malawi	26.1	21.8	21.7	21.7	22.1	23.2	24.5	26.3	n.a.
Mauritius	5.2	5.1	5.4	5.5	5.5	5.6	5.8	n.a.	n.a.
Mozambique	37	30	28.9	28.6	29.1	29.8	30.4	30.5	n.a.
Rwanda	45.3	35	33.5	32.3	31.6	32.1	34	36.1	n.a.
Seychelles	n.a.								
Somalia	n.a.								
South Sudan	n.a.								
Uganda	24.1	30.9	31.6	32.4	33.7	35.5	38.6	41.4	n.a.
United Republic of Tanzania	34.4	34.6	33.6	33	32.6	32.2	32.1	32	n.a.
Zambia	51.1	50	48.8	47.7	46.1	44.9	44.4	44.5	n.a.
Zimbabwe	42.2	41.9	41.3	41.9	44.4	47	48.2	46.6	n.a.
Southern Africa	6.5	7.1	6.9	6.9	7.1	7.4	7.9	8.2	8.4
Botswana	31.9	28.5	26.5	25.2	24.9	25.5	26.8	28.5	n.a.
Eswatini	17	23.2	22.7	22.1	21.5	21.3	21	20.7	n.a.
Lesotho	11.7	12.7	13.1	13.3	13.3	13.1	12.9	12.8	n.a.
Namibia	25.1	37.4	36.1	33.5	30.5	28	26.1	25.4	n.a.
South Africa	4.4	4.4	4.4	4.5	4.8	5.3	5.8	6.1	n.a.
Western Africa	12.3	10.4	10.3	10.4	10.4	10.7	11.4	12.8	15.1
Benin	15.4	11.8	11.3	10.8	10.2	9.6	10.4	n.a.	n.a.
Burkina Faso	24.9	21.2	20.7	20.3	20.2	20.3	20.8	21.3	n.a.
Cabo Verde	14	15.3	15.1	14.7	14	13.3	12.7	12.3	n.a.
Côte d'Ivoire	20	21.9	21.6	21.5	21.4	21.3	21.1	20.7	n.a.
Gambia	15.1	9.3	9.1	9.4	9.7	9.9	9.8	9.6	n.a.
Ghana	9.3	5.3	5.5	5.9	6.3	6.4	6.3	6.1	n.a.
Guinea	21.3	17.6	17.3	16.9	16.8	17	18.5	19.7	n.a.
Guinea-Bissau	24.4	22.2	22.2	22.8	24.1	25.4	26.1	26	n.a.
Liberia	39.4	36.5	36.7	37.2	37.6	38	38.4	38.8	n.a.
Mali	11.1	6.9	6.7	6.4	6.1	5.9	5.9	6	n.a.
Mauritania	12.1	8.2	7.8	7.2	7.1	7.2	9.4	11.3	n.a.
Niger	15.1	11.3	10.9	10.6	10.3	10.2	12.3	14.4	n.a.
Nigeria	6.5	6.2	6.5	6.7	7.1	7.8	9	11.5	n.a.
Senegal	21.6	13.1	13	12.7	12.4	12.2	11.7	11.3	n.a.
Sierra Leone	37	27	25.2	24.5	24.7	25.4	25.7	25.5	n.a.
Togo	26	21	20.1	19.1	18.1	17.2	16.2	16.2	n.a.

ANNEX TABLE 2 Number of undernourished (Millions)

Regions/subregions/countries	2005	2010	2011	2012	2013	2014	2015	2016	2017
Africa	196	200.2	202.3	205.2	207.5	212.5	222	241.3	256.5
Northern Africa	9.7	8.5	8.7	17.6	17.7	17.8	18.1	19.5	20
Algeria	2.9	2.3	2.1	1.9	1.8	1.8	1.9	1.9	n.a.
Egypt	4.2	3.8	3.8	3.9	3.9	4	4.3	4.6	n.a.
Libya	n.a.								
Morocco	1.7	1.7	1.6	1.5	1.4	1.4	1.3	1.4	n.a.
Western Sahara	n.a.								
Tunisia	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	n.a.
Sudan	--	--	--	9.2	9.3	9.5	9.7	10	n.a.
Sub-Saharan Africa	176.7	181	182.5	187.6	189.8	194.7	203.9	221.9	236.5
Central Africa	36.2	36.5	36.7	36.4	36	36.1	37.1	40.8	42.7
Angola	10.7	9.5	9.2	8.8	8	7.3	6.9	6.9	n.a.
Cameroon	3.5	2.3	2.1	1.8	1.6	1.4	1.5	1.7	n.a.
Central African Republic	1.6	1.4	1.5	1.7	2.1	2.5	2.7	2.8	n.a.
Chad	3.9	4.8	4.8	4.8	4.9	5	5.4	5.7	n.a.
Congo	1.5	1.8	1.8	1.8	1.8	1.9	1.9	1.9	n.a.
Democratic Republic of the Congo	n.a.								
Equatorial Guinea	n.a.								
Gabon	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n.a.
Sao Tome and Principe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Eastern Africa	113.5	119.1	120.1	113.3	114.5	117.1	121.4	129.6	132.2
Burundi	n.a.								
Comoros	n.a.								
Djibouti	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n.a.
Eritrea	n.a.								
Ethiopia	30.5	28.1	27.6	26.8	25.5	24	22.8	21.9	n.a.
Kenya	10.2	9.7	9.6	9.4	9.3	9.6	10.6	11.7	n.a.
Madagascar	6.4	6.7	7	7.4	8.2	9.1	10	10.7	n.a.
Malawi	3.4	3.3	3.4	3.5	3.7	4	4.3	4.8	n.a.
Mauritius	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
Mozambique	7.7	7.3	7.2	7.3	7.7	8.1	8.5	8.8	n.a.
Rwanda	4.1	3.6	3.5	3.5	3.5	3.6	4	4.3	n.a.
Seychelles	n.a.								
Somalia	n.a.								
South Sudan	n.a.								
Uganda	6.9	10.5	11.1	11.8	12.6	13.8	15.5	17.2	n.a.
United Republic of Tanzania	13.6	16	16	16.2	16.5	16.8	17.3	17.8	n.a.
Zambia	6.2	6.9	7	7	7	7	7.1	7.4	n.a.
Zimbabwe	5.5	5.9	5.9	6.2	6.7	7.2	7.6	7.5	n.a.
Southern Africa	3.6	4.2	4.1	4.2	4.4	4.6	5	5.2	5.4
Botswana	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	n.a.
Eswatini	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	n.a.
Lesotho	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	n.a.
Namibia	0.5	0.8	0.8	0.8	0.7	0.7	0.6	0.6	n.a.
South Africa	2.1	2.3	2.3	2.4	2.6	2.9	3.2	3.4	n.a.
Western Africa	33	31.9	32.6	33.7	34.9	36.9	40.4	46.3	56.1
Benin	1.2	1.1	1.1	1.1	1	1	1.1	1.1	n.a.
Burkina Faso	3.3	3.3	3.3	3.4	3.5	3.6	3.8	4	n.a.
Cabo Verde	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
Côte d'Ivoire	3.7	4.5	4.5	4.6	4.7	4.8	4.9	4.9	n.a.
Gambia	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n.a.
Ghana	2	1.3	1.4	1.5	1.7	1.7	1.7	1.7	n.a.
Guinea	2.1	1.9	1.9	1.9	1.9	2	2.2	2.4	n.a.
Guinea-Bissau	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	n.a.
Liberia	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.8	n.a.
Mali	1.4	1	1	1	1	1	1	1.1	n.a.
Mauritania	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	n.a.
Niger	2.1	1.8	1.9	1.9	1.9	2	2.4	3	n.a.
Nigeria	9.1	9.9	10.5	11.2	12.2	13.8	16.4	21.5	n.a.
Senegal	2.4	1.7	1.7	1.7	1.8	1.8	1.8	1.7	n.a.
Sierra Leone	2.1	1.7	1.7	1.7	1.7	1.8	1.9	1.9	n.a.
Togo	1.5	1.4	1.3	1.3	1.3	1.2	1.2	1.2	n.a.

REFERENCES

- ACET (Africa Center for Economic Transformation). 2014. 2014 African Transformation Report. Growth with Depth. Accra.
- Ackah, C. & Medvedev, D., 2010. Internal Migration in Ghana. Determinants and Welfare Impacts. Policy Research Working Paper 5273. Washington, DC, World Bank.
- Adams, Jr., R.H. & Page, J. 2005. Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Development*, 33(10): 1645–1669.
- Adams, Jr., R.H., Cuecuecha, A. & Page, J. 2008. The Impact of Remittances on Poverty and Inequality in Ghana *Policy Research Working Paper* 4732. Washington, DC, World Bank.
- AfDB (African Development Bank Group). 2013. Supporting the Transformation of the Private Sector in Africa *Private Sector Development Strategy, 2013-2017*. Abidjan.
- AfDB. 2016. Feed Africa Strategy for agricultural transformation in Africa 2016-2025. Abidjan.
- AfDB. 2018a. *African Economic Outlook 2018*. Abidjan.
- AfDB. 2018b. Jobs for Youth in Africa. *Strategy for Creating 25 Million Jobs and Equipping 50 Million Youth 2016-2025*. Abidjan.
- AfDB, Organisation for Economic Co-operation and Development, United Nations Development Programme and United Nations Economic Commission for Africa. 2012. *African Economic Outlook 2012: Promoting Youth Employment*. Paris, OECD Publishing. <http://dx.doi.org/10.1787/aeo-2012-en>.
- Afrika, J.-G.K. & Ajumbo, G. 2012. Informal Cross Border Trade in Africa: Implications and Policy Recommendations. *Africa Economic Brief*, 3(10).
- AGRA (Alliance for a Green Revolution in Africa. 2015. *Africa Agriculture Status Report: Youth in Agriculture in Sub-Saharan Africa*. Issue No. 3. Nairobi.
- Aguilar, E., Aziz Barry, A., Brunet, M., Ekang, L., Fernandes, A., Massoukina, M., Mbah, J., Mhanda, A., do Nascimento, D.J., Peterson, T.C., Thamba Umba, M., Tomou, M. & Zhang, X. 2009. Changes in temperature and precipitation extremes in western central Africa, Guinea Conakry, and Zimbabwe, 1955-2006. *Journal of Geophysical Research – Atmospheres*, 114, D02115.
- Ahaibwe, G., Mbowa, S. & Lwanga, M.M. 2013. Youth Engagement in Agriculture in Uganda: Challenges and Prospects. *Research Series No. 106*. Kampala, Economic Policy Research Centre.
- Aker, J.C., Klein, M.W., O'Connell, S.A. & Yang, M. 2010. Are Borders Barriers? The Impact of International and Internal Ethnic Borders on Agricultural Markets in West Africa. CGDEV Working Paper 208. Washington, DC, Center for Global Development.
- Akresh, R., Verwimp, P. & Bundervoet, T. 2007. Civil War, Crop Failure and Child Stunting in Rwanda. *Policy Research Working Paper Series 4208*. Washington, DC, World Bank.
- Alderman, H. & Haque, T. 2007. Insurance against covariate shocks: the role of index-based insurance in social protection in low-income countries of Africa. *World Bank Working Paper No. 95. Africa Human Development Series*. Washington, DC, World Bank.
- Alderman, H. & Yemtsov, R. 2014. How can safety nets contribute to economic growth? *World Bank Economic Review*, 28(1): 1–20.
- Ali, A. & Lebel, T. 2009. The Sahelian standardized rainfall index revisited. *International Journal of Climatology*, 29(12), 1705–1714.
- Alibhai, S., Buehren, N. & Papineni, S. 2015. Female Entrepreneurs who succeed in Male-Dominated Sectors in Ethiopia. *Gender Innovation Lab. Policy Brief Issue 12*. Washington, DC, World Bank.
- Amuedo-Dorantes, C. 2014. The good and the bad in remittance flows. *IZA World of Labor* 2014: 97. doi: 10.15185/izawol.97.
- Anyanwu, J.C. & Erhijakpor, A.E.O. 2010. Do International Remittances Affect Poverty in Africa? *African Development Review*, 22(1): 51–91.
- Asfaw, S. & Maggio, G. 2018. Gender, Weather Shocks and Welfare: Evidence from Malawi, *The Journal of Development Studies*, 54:2, 271–291, DOI:10.1080/00220388.2017.1283016
- AU (African Union). 2012. *Synthesis Paper on Boosting Intra-African Trade and Fast Tracking the Continental Free Trade Area*. Addis Ababa.
- AU. 2015a. *Agenda 2063. The Africa We Want. A Shared Strategic Framework for Inclusive Growth and Sustainable Development. First Ten-Year Implementation Plan 2014–2023*. Addis Ababa.
- AU. 2015b. *Africa Regional Nutrition Strategy 2015–2025*. Addis Ababa.
- AU. 2017a. *AU Roadmap on harnessing the demographic dividend through investments in youth. In response to AU Assembly Decision (Assembly/AU/Dec.601 (XXVI) on the 2017 theme of the year*. Addis Ababa.
- AU. 2017b. *The Revised Migration Policy Framework for Africa and Plan of Action (2018–2027)*. Draft. Addis Ababa.

REFERENCES

- AU. 2018. Biennial Report to the AU Assembly on implementing the June 2014 Malabo Declaration. The 2017 Report to the January 2018 Assembly. Addis Ababa, Assembly of the Union, Thirtieth (30th) Ordinary Session, 28th – 29th January 2018, Addis Ababa, Ethiopia.
- Barrientos, A. 2012. Social transfers and growth: what do we know? What do we need to find out? *World Development*, 40(1): 11–20.
- Battisti, D.S. & Naylor, R.L. 2009. Historical Warnings of Future Food Insecurity with Unprecedented Seasonal Heat. *Science*, 323.
- Baylis, M. & Githeko, A.K. 2006. The effects of climate change on infectious diseases of animals. Report for the foresight project on detection of infectious diseases. London, Department of Trade and Industry.
- Beaman, L., Duflo, E., Pande, R. & Topalova, P. 2012. Female Leadership Raises Aspirations and Educational Attainment for Girls: A Policy Experiment in India. *Science*, 335: 582–586. DOI: 10.1126/science.1212382
- Beegle, K., De Weerdt, J. & Dercon, S. 2011. Migration and Economic Mobility in Tanzania: Evidence from a Tracking Survey. *The Review of Economics and Statistics*, 93(3): 1010–1033.
- Beegle, K., Dehejia, R.H. & Gatti, R. 2006. Child labor and agricultural shocks. *Journal of Development Economics*, 81: 80–96.
- Bell, M. & Charles-Edwards, W. 2013. Cross-national comparisons of internal migration: An update on global patterns and trends. Population Division Technical Paper No. 2013/1. Population Division, Department of Economic and Social Affairs. New York, United Nations.
- Benson, C. & Clay, E. 1994. The Impact of Drought on sub-Saharan African Economies: A Preliminary Examination. ODI Working Paper 77. London, Overseas Development Institute.
- Benton, T. & Bailey, R., 2015. Extreme Weather and Food Shocks. Op-Ed Contributor, the Opinion pages. The New York Times, Sept. 2015.
- Berhane, G., Hoddinott, J., Kumar, N., Taffesse, A.S., Diressie, M.T., Yohannes, Y., Sabates-Wheeler, R., Handion, M., Lind, J., Tefera, M. & Sima, F. 2013. Evaluation of Ethiopia's Food Security Program: documenting progress in the implementation of the Productive Safety Nets Programme and the Household Asset Building Programme. Washington, DC, IFPRI.
- Berhane, G., Gilligan, D.O., Hoddinott, J., Kumar, N. & Taffesse, A.S. 2014. Can social protection work in Africa? The impact of Ethiopia's Productive Safety Net Programme. *Economic Development and Cultural Change*, 63(1): 1–26.
- Berhane, G., Hoddinott, J., Kumar, N. & Margolies, A. 2017. The Productive Safety Net Programme in Ethiopia: impacts on children's schooling, labour and nutritional status, 3ie Impact Evaluation Report 55. New Delhi: International Initiative for Impact Evaluation (3ie).
- Bezu, S. & Holden, S. 2014. Are Rural Youth in Ethiopia Abandoning Agriculture? *World Development*, 64: 259–272.
- Boko, M., Niang, I., Nyong, A., Vogel, C., Githeko, A., Medany, M., Osman-Elasha, B., Tabo, R. & Yanda, P. 2007: Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J. & Hanson, C.E. Eds. Cambridge University Press, Cambridge UK, 433–467.
- Bracking, S. 2003. Sending Money Home: Are Remittances Always Beneficial to Those Who Stay Behind? *Journal of International Development*, 15(5): 633–44.
- Brander, K.M. 2007. Global fish production and climate change. *PNAS*, 104(50): 19709–19714.
- Brenton, P. & Isik, G. Eds. 2012. De-Fragmenting Africa. Deepening Regional Trade Integration in Goods and Services. Washington, DC, World Bank.
- Brooks, J. & Matthews, A. 2015. Trade Dimensions of Food Security. OECD Food, Agriculture and Fisheries Papers, No. 77. Paris, OECD Publishing. <http://dx.doi.org/10.1787/5js65xn790nv-en>.
- Buhaug, H., Benjamin, T.A., Sjaastad, E. & Theisen, O.M. 2015. Climate variability, food production shocks, and violent conflict in Sub-Saharan Africa. *Environmental Research Letters*, 10. doi:10.1088/1748-9326/10/12/125015.
- Burke, M., Miguel, E., Satyanath, S., Dykema, J. & Lobell, D. 2009. Warming Increases the Risk of Civil War in Africa. *Proceedings of the National Academy of Sciences*, 106 (49): 20670–20674.
- Cadot, O. & Gourdon, J. 2012. Assessing the price-raising effect of non-tariff measures in Africa. CEPII, WP No 2012-16. Paris, Centre d'Études Prospectives et d'Informations Internationales.
- Castaldo, A., Deshingkar, P. & McKay, A. 2012. Internal Migration, Remittances and Poverty: Evidence from Ghana and India. Migrating out of Poverty Research Programme Consortium, Working Paper 7. Brighton, UK, University of Sussex.

Checchi, F. & Robinson, W.C. 2013. Mortality among populations of southern and central Somalia affected by severe food insecurity and famine during 2010–2012. Rome and Washington, DC, FAO and FEWS NET.

Christiaensen, L., Demery, L. & Kuhl, J. 2011. The (evolving) role of agriculture in poverty reduction: an empirical perspective. *Journal of Development Economics*, 96(2): 239–254.

CIMMYT. 2015. DT Maize. A Quarterly Bulletin of the Drought Tolerant Maize for Africa Project 4(4) December 2015. CIMMYT, Nairobi.

Codjoe, S.N.A. & Owusu, G. 2011. Climate change/variability and food systems: evidence from the Afram Plains, Ghana. *Regional Environmental Change*, 11(4):753–765.

Coghlan, C., Muzammil, M., Ingram, J., Vervoort, J., Otto, F. & James, R. 2014. A sign of things to come? Examining four major climate-related disasters, 2010–2013. A preliminary study for Oxfam's GROW Campaign. Oxfam Research Reports. Oxford, UK, Oxfam.

Collier, P. & Dercon, S. 2014. African Agriculture in 50 Years: Smallholders in a Rapidly Changing World? *World Development*, 63(C): 92–101.

Conway, D. & Schipper, E.L.F. 2011. Adaptation to climate change in Africa: Challenges and opportunities identified from Ethiopia. *Global Environmental Change*, 21: 227–237.

Conway, D., Persechino, A., Ardooin-Bardin, S., Hamandawana, H., Dieulin, C. & Mah, G. 2009. Rainfall and Water Resources Variability in Sub-Saharan Africa during the Twentieth Century. *Journal of Hydrometeorology*, 10: 41-49. DOI: 10.1175/2008JHM1004.1

Crush, J. & Caesar, M. 2016. Food Remittances: Migration and Food Security in Africa. SAMP Migration Policy Series No. 72. Waterloo, Canada, Southern African Migration Programme (SAMPA).

Dale, A., Fant, C., Strzepek, K., Lickley, M. & Solomo, S. 2017. Climate model uncertainty in impact assessments for agriculture: A multi-ensemble case study on maize in sub-Saharan Africa. *Earth's Future*, 5:337-353. DOI:10.1002/2017EF000539

De Haan, A., Kirsten, J. & Rweleamira, J. 2003. Migration and Rural Assets: Evidence from Surveys in three Semi-Arid Regions in South Africa, India and Botswana. Department of Agricultural Economics Working Paper 2003-06. Pretoria, University of Pretoria.

De Haas, H. 2007. Remittances, Migration and Social Development A Conceptual Review of the Literature. Social Policy and Development Programme Paper Number 34. Geneva, UNRISD. United Nations Research Institute for Social Development (UNRISD).

Dell, M., Jones, B.F. & Olken, B.A. 2012. Temperature Shocks and Economic Growth: Evidence from the Last Half Century. *American Economic Journal: Macroeconomics*, 4(3): 66–95. <http://dx.doi.org/10.1257/mac.4.3.66>.

Demeke, M., Pangrazio, G. & Maetz, M. 2009. Country responses to the food crisis: Nature and preliminary implications of the policies pursued. Initiative on Soaring Food Prices, Rome, FAO.

Deotti, L. & Estruch, E. 2016. Addressing rural youth migration at its root causes: A conceptual framework. Rome, FAO.

Dercon, S. 1996. Risk, crop choice, and savings: evidence from Tanzania. *Economic Development and Cultural Change*, 44(3): 485–513.

Dercon, S. 2002. Income risk, coping strategies and safety nets. UNU/WIDER Discussion Paper No. 2002/22. Helsinki, United Nations University World Institute for Development Economics Research.

Dercon, S. 2004. Growth and shocks: evidence from rural Ethiopia. *Journal of Development Economics*, 74: 309– 329.

Dercon, S. 2008. Fate and fear: risk and its consequences in Africa. *Journal of African Economies*, 17(AERC Suppl. 2): ii97–ii127.

Dercon, S. 2011. Social protection, efficiency and growth. CSAE Working Paper 2011-17. Oxford, UK, Centre for the Study of African Economies, Oxford University.

Dercon, S. & Porter, C. 2010. Live aid revisited: long-term impacts of the 1984 Ethiopian famine on children. CSAE Working Paper 2010-39. Oxford, UK, Centre for the Study of African Economies, Oxford University.

Dercon, S., Hoddinott, J. & Woldehanna, T. 2005. Shocks and consumption in 15 Ethiopian villages, 1999–2004. *Journal of African Economies*, 14(4): 559–585.

Deryng, D., Conway, D., Ramankutty, N., Price, J. & Warren, R. 2014. Global crop yield response to extreme heat stress under multiple climate change futures. *Environmental Research Letters*, 9: 034011. doi:10.1088/1748-9326/9/3/034011.

Development Initiatives. 2017. *Global Nutrition Report 2017: Nourishing the SDGs*. Bristol, UK, Development Initiatives.

Devereux, S. 1999. Making less last longer: informal safety nets in Malawi. IDS Discussion Paper No 373. Brighton, UK, Institute of Development Studies.

REFERENCES

- Devereux, S. 2007. The impact of droughts and floods on food security and policy options to alleviate negative effects. *Agricultural Economics*, 37(s1): 47–58.
- Di Baldassarre, G., Montanari, A., Lins, H., Koutsoyiannis, D., Brandimarte, L. & Blöschl, G. 2010. Flood fatalities in Africa: from diagnosis to mitigation. *Geophysical Research Letters*. DOI: 10.1029/2010GL045467.
- Diallo, B., Soulé, B.G. & Staatz, J.M. 2017. Historical Patterns of Agricultural Integration and Trade: The Case of Cereals in West Africa. Chapter 3 in Staatz, J.M., Diallo, B. & Me-Nsop, N.M. Strengthening Regional Agricultural Integration in West Africa: Key Findings & Policy Implications. Basel, Switzerland and East Lansing, Michigan, USA, Syngenta Foundation for Sustainable Agriculture and Michigan State University.
- Diao, X., Hazell, P., Resnick, D. & Thurlow, J. 2006. The role of agriculture in development: Implications for sub-Saharan Africa. Research report 153. Washington, DC, International Food Policy Research Institute.
- Díaz-Bonilla, E. 2015. Lost in translation. The fractured conversation about trade and food security. Background Paper for The State of Agricultural Commodity Markets 2015–16. Rome, FAO.
- Dorosh, P.A., Dradri, S. & Haggblade, S. 2009. Regional trade, government policy and food security: Recent evidence from Zambia. *Food Policy*, 34: 350–366.
- Ebeke, C.H. 2010. The Effect of Remittances on Child Labor: Cross-Country Evidence. *Economics Bulletin*, 30 (1): 351–64.
- Elbers, C., Gunning, J.W. & Kinsey, B. 2007. Growth and risk: methodology and micro evidence. *World Bank Economic Review*, 21(1): 1–20.
- Elbers, C., Gunning, J.W. & Pan, L. 2009. Growing out of poverty under risk: evidence from rural Ethiopia. Paper presented at the CSAE Conference 2009 on Economic Development in Africa, 2–24 March 2009, St Catherine's College, Oxford, UK.
- Engel, J. & Jouanjean, M-A. 2013. Barriers to trade in food staples in West Africa: an analytical review. ODI Report. London, Overseas Development Institute.
- Fanzo, J., McLaren, R., Davis, C. & Choufani, J. 2017. Climate Change and Variability. What are the Risks for Nutrition, Diets, and Food Systems? IFPRI Discussion Paper 01645. Washington, DC, International Food Policy Research Institute.
- FAO. 2013a. The State of Food and Agriculture. Food Systems for Better Nutrition. Food and Agriculture Organization of the United Nations.
- FAO. 2013b. Climate Smart Agriculture. Sourcebook. Rome.
- FAO. 2015a. The State of Agricultural Commodity Markets 2015–16. Trade and food security: achieving a better balance between national priorities and the collective good. Rome, FAO.
- FAO. 2015b. The impact of natural hazards and disasters on agriculture and food security and nutrition. A call for action to rebuild resilient livelihoods. Updated May 2015. Rome.
- FAO. 2015c. The State of Food and Agriculture. Social protection and agriculture: breaking the cycle of rural poverty. Rome.
- FAO. 2016a. The State of Food and Agriculture. Climate Change, Agriculture and Food Security. Rome.
- FAO. 2016b. Climate change and food security: risks and responses. Rome.
- FAO. 2016c. 2015–2016 El Niño Early action and response for agriculture, food security and nutrition. Report. Working Draft (July 2016) Update #9. Rome.
- FAO. 2017a. Africa Regional Overview of Food Security and Nutrition. The Food Security and Nutrition–Conflict Nexus: Building Resilience for Food Security, Nutrition and Peace. Accra.
- FAO. 2017b. Crops Prospects and Food Situation. No. 1, March 2017. Rome.
- FAO. 2017c. The future of food and agriculture – Trends and challenges. Rome.
- FAO. 2017d. The state of food and agriculture. Leveraging food systems for inclusive rural transformation. Rome.
- FAO. 2017e. Forced migration and protracted crises. A multilayered approach. Rome.
- FAO. 2017f. Strengthening sector policies for better food security and nutrition results. Climate Change. Policy Guidance Note 5. Rome.
- FAO. 2018a. GIEWS (Global Information Early Warning System). Food Price Monitoring and Analysis Tool. Rome. (Available at <http://www.fao.org/giews/food-prices/tool/public/#/home>).

FAO. 2018b. Crop prospects and food situation. Quarterly Global Report #2, June 2018. Rome.

FAO. 2018c. Northeastern Nigeria – Adamawa, Borno and Yobe. Situation Report. June 2018. Rome.

FAO. 2018c. GIEWS (Global Information and Early Warning System). Country Briefs. Uganda, 28–February–2018. Rome. (Available at <http://www.fao.org/giews/countrybrief/country.jsp?code=UGA>).

FAO. 2018d. FAOSTAT. Online statistical database (available at <http://faostat.fao.org>).

FAO. 2018e. Climate Change and its impact on the work and activities of FAO: Building resilience to address extreme vulnerability of Africa's agriculture and rural livelihoods. Document prepared for the Thirtieth FAO Regional Conference for Africa, Khartoum, the Sudan, 19–23 February 2018.

FAO. 2018f. 2017 The impact of disasters and crises on agriculture and food security. Rome.

FAO, IFAD & WFP. 2015a. The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome, FAO.

FAO, IFAD & WFP. 2015b. Achieving Zero Hunger. The critical role of investments in social protection and agriculture. Rome, FAO.

FAO, IFAD, WFP & WHO. 2017. The State of Food Security and Nutrition in the World. Building resilience for peace and food security. Rome, FAO.

FAO, IFAD, UNICEF, WFP and WHO. 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome.

FAO, IFAD, WFP & IOM. 2018 Forthcoming. The Linkages between Migration, Agriculture, Food Security and Rural Development. Rome, FAO.

Filmer, D. and Fox, L. 2014. Youth Employment in Sub-Saharan Africa. Africa Development Series. Washington, DC: World Bank
doi:10.1596/978-1-4648-0107-5. License: Creative Commons Attribution CC BY 3.0.

Fine, D., van Wamelen, A., Lund, S., Cabral, A., Taoufiki, M., Dörr, N., Leke, A., Roxburgh, C., Schubert, J. & Cook, P. 2012. Africa at Work: Job Creation and Inclusive Growth. Washington, DC, McKinsey Global Institute.

Fisher, M., Abate, T., Lunduka, R.W., Asnake, W., Alemayehu, Y. & Madulu, R.B. 2015. Drought tolerant maize for farmer adaptation to drought in sub-Saharan Africa: Determinants of adoption in eastern and southern Africa. *Climatic Change*, 133:283–299 DOI 10.1007/s10584-015-1459-2.

Fox, L., Haines, C., Muñoz, J.H. & Thomas, A. 2013. Africa's Got Work to Do: Employment Prospects in the New Century. IMF WP/13/201. Washington, DC, International Monetary Fund.

FSIN (Food Security Information Network). 2018. Global Report on Food Crises. Rome, World Food Programme.

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 Paper 8536. Washington, DC, World Bank.

Gelli, A., Aberman, N.L., Margolies, A., Santacroce, M., Baulch, B. & Chirwa, E. 2017. Lean-Season Food Transfers Affect Children's Diets and

Household Food Security: Evidence from a Quasi-Experiment in Malawi. *The Journal of Nutrition*, 147(5):869–878. doi:10.3945/jn.116.246652.

GFDRR (Global Facility for Disaster Reduction and Recovery). 2014. Recovery from Recurrent Floods 2000–2013. MOZAMBIQUE. Recovery Framework Case Study. Washington, DC.

Gitau, R., Makasa, M., Kasonka, L., Sinkala, M., Chintu, C., Tomkins, A. & Fileau, S. 2005. Maternal micronutrient status and decreased growth of Zambian infants born during and after the maize price increases resulting from the Southern African drought of 2001–2002. *Public Health Nutrition* 8(7): 837–843.

Government of Sierra Leone, WFP and FAO. 2015. State of Food Security in Sierra Leone 2015. Comprehensive Food Security and Vulnerability Analysis.

Greene, A.M., Giannini, A. & Zebiak, S.E. 2009. Drought return times in the Sahel: A question of attribution. *Geophysical Research Letters*, 36, L12701.

Haggblade, S., Me-Nsope, N.M. & Staatz, J.M. 2017. The Role of Staple Food Substitution and Trade in Moderating Major Food Shocks in Sahelian West Africa. Chapter 6 in Staatz, J.M., Diallo, B. & Me-Nsope, N.M. Strengthening Regional Agricultural Integration in West Africa: Key Findings & Policy Implications. Basel, Switzerland and East Lansing, Michigan, USA, Syngenta Foundation for Sustainable Agriculture and Michigan State University.

REFERENCES

- Hatfield, J.L. & Prueger, J. 2015. Temperature extremes: Effect on plant growth and development. *Weather and Climate Extremes*, 10: 4–10.
- Hellmuth, M.E., Moorhead, A., Thomson, M.C. & Williams, J. Eds. 2007. *Climate Risk Management in Africa: Learning from Practice*. International Research Institute for Climate and Society (IRI). New York, USA, Columbia University.
- HLPE (High Level Panel of Experts). 2011. Price volatility and food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome, FAO.
- Hoddinott, J. & Yohannes, Y. 2002. Dietary diversity as a food security indicator. *Food Consumption and Nutrition Division Discussion Paper No. 136*. Washington, DC, IFPRI.
- Hoddinott, J. & Kinsey, B. 2001. Child growth in the time of drought. *Oxford Bulletin of Economics and Statistics*, 63(4): 409–436.
- Holmes, R. & Costella, C. with Bailey, M., Kruczakiewicz, A., Poulter, R., Sharp, K. & Scott, L. 2017. Towards A Shock Sensitive Social Protection System for Malawi. London, ODI and The Hague, Red Cross Climate Centre.
- IDMC. 2017. *Global Report on Internal Displacement*. Geneva, Switzerland, Internal Displacement Monitoring Centre.
- IFAD & WFP. 2011. Weather index-based insurance in agricultural development. A technical guide. Rome, IFAD.
- IFPRI (International Food Policy Research Institute). 2018. *Global Nutrition Report. Nutrition Country Profiles*. Washington, DC. (Available at: <http://globalnutritionreport.org/the-data/nutrition-country-profiles/>).
- ILO (International Labour Organization). 2017. *Global Employment Trends for Youth 2017: Paths to a better working future*. Geneva, Switzerland.
- ILO. 2018. *World Employment Social Outlook. Trends 2018*. Geneva, Switzerland.
- Imani Development. 2007. *Inventory of Regional Non Tariff Barriers: Synthesis Final Report*. Prepared for: Regional Trade Facilitation Programme. Lynwood Ridge, South Africa.
- IPCC. 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J. & Hanson, C.E. Eds. Cambridge University Press, Cambridge, UK, 976pp.
- IPCC. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor & P.M. Midgley (eds.)]. Cambridge, UK, and New York, NY, USA, Cambridge University Press.
- IPCC. 2014. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Pachauri, R.K. & Meyer, L.A. (eds.)]. IPCC, Geneva, Switzerland, Intergovernmental Panel on Climate Change.
- Jalan, J. & Ravallion, M. 2001. Household income dynamics in rural China. In S. Dercon, ed. *Insurance against poverty*. Oxford, UK, Oxford University Press.
- Josserand, H.P. 2013. *Assessment of Volumes and Value of Regionally Traded Staple Commodities*. Paper prepared for the Food Across Borders Conference, Accra – 29–31 January 2013.
- Jury, M.R. 2002. *Economic Impacts of Climate Variability in South Africa and Development of Resource Prediction Models*. Journal of Applied Meteorology, 41.
- Khandhla, M. & May, J. 2006. Poverty, vulnerability and the impact of flooding in the Limpopo Province, South Africa. *Natural Hazards*, 39:275–287. DOI 10.1007/s11069-006-0028-4.
- Kimani-Murage, E. 2015. Lessons other countries can learn from Kenya's ambitious nutrition plan. *The Conversation*. (available at: <https://theconversation.com/lessons-other-countries-can-learn-from-kenyas-ambitious-nutrition-plan-49921>).
- Koroma, S., Nimarkoh, J., You, N., Ogalo, V. & Owino, B. 2017. Formalization of informal trade in Africa. Trends, experiences and socio-economic impacts. Accra, FAO Regional Office for Africa.
- Lesk, C., Rowhani, P. & Ramankutty, N. 2016. Influence of extreme weather disasters on global crop production. *Nature*, 529. doi:10.1038/nature16467.
- Lesser, C. & Moisé-Leeman, E. 2009. *Informal Cross-Border Trade and Trade Facilitation Reform in Sub-Saharan Africa*. OECD Trade Policy Papers, No. 86. Paris, OECD Publishing. <http://dx.doi.org/10.1787/225770164564>.
- Li, Y., Ye, W., Wang, M. & Yan, X. 2009. Climate change and drought: a risk assessment of crop-yield impacts. *Climate Research*, 39:31–46.

Little, P.D. 2007. Unofficial Cross-Border Trade in Eastern Africa. University of Kentucky. Paper presented at the FAO workshop on "Staple Food Trade and Market Policy Options for Promoting Development in Eastern and Southern Africa," March 1-2, 2007, Rome, FAO.

Lloyd, S.J., Kovats, R.S. & Chalabi, Z. 2011. Climate change, crop yields and undernutrition: development of a model to quantify the impacts of climate scenarios on child undernutrition. *Environmental Health Perspectives*, 119: 1817–1823.

Lobell, D.B., Bänziger, M., Magorokosho, C. & Vivek, B. 2011. Nonlinear heat effects on African maize as evidenced by historical yield trials. *Nature Climatic Change Letters*. 1: 42–45.

Losch B., Fréguin Gresh S. & White, E. 2011, Rural Transformation and Late Developing Countries in a Globalizing World. A Comparative Analysis of Rural Change. Final Report of the RuralStruc Program, Revised Version. Washington, DC, World Bank.

Lucas, R.E.B. 1987. Emigration to South Africa's Mines. *The American Economic Review*, 77(3): 313-330.

Lunduka, R.W. 2018. Adoption and impact of climate smart maize varieties on total maize production and yield in Southern Africa. Presentation at IFPRI MaSSP. Available at <https://www.slideshare.net/IFPRIMaSSP/adoption-and-impact-of-climate-smart-maize-varieties-on-total-maize-production-and-yield-in-southern-africa>.

Lunduka, R.W., Mateva, K.I., Magorokosho, C. & Manjeru, P. 2017. Impact of adoption of drought-tolerant maize varieties on total maize production in south Eastern Zimbabwe. *Climate and Development*, DOI: 10.1080/17565529.2017.1372269.

Maertens, M., Minten, B. & Swinnen, J. 2009. Growth in high-value export markets in Sub-Saharan Africa and its development implications. LICOS Discussion Paper, No. 245. Leuven, Katholieke Universiteit Leuven.

Maertens, M., Minten, B., & Swinnen, J. 2009. Growth in high-value export markets in Sub-Saharan Africa and its development implications, LICOS Discussion Paper, No. 245.

Maïga, E., Christiaensen, L. & Palacios-Lopez, A. 2015. Are the youth exiting agriculture en masse? Paper presented at the STAARS Conference in Addis Ababa.

Mapfumo, P., Adjei-Nsiah, S., Fening, J.O., Anchirina, V., Issaka, R.N. & Giller, K. 2010. Farmers' Perceptions of Climate Change and Variability and Existing Opportunities for Adaptation in Wenchi Area of Ghana. *The International Journal of Climate Change: Impacts and Responses*, 2: 49–60.

Marcus, R. & Harper, C. 2015. Social norms, gender norms and adolescent girls: a brief guide. London, Overseas Development Institute.

Maur, J.-C. & Shepherd, B. 2015. Connecting Food Staples and Input Markets in West Africa. A Regional Trade Agenda for ECOWAS Countries. Report No. 97279-AFR, Washington, DC, World Bank.

Max-Planck-Institut für Meteorologie. 2018. What's the difference between 'weather' and 'climate'? MPI Website /Communication /Climate FAQ / (<https://www.mpimet.mpg.de/en/communication/climate-faq/whats-the-difference-between-weather-and-climate/>).

Mburua, R. 2015. Africa Climate Change Policy: An adaptation and development challenge in a dangerous world. Climate Emergency Institute.

McCorriston, S., Hemming, D.J., Lamontagne-Godwin, J.D., Parr, M.J., Osborn, J. & Roberts, P.D. 2013. What is the evidence of the impact of agricultural trade liberalization on food security in developing countries? A systematic review. London, EPPICentre, Social Science Research Unit, Institute of Education, University of London.

McKay, A. & Deshingkar, P. 2012. Internal Remittances and Poverty: Further Evidence from Africa and Asia. Migrating out of Poverty Research Programme Consortium, Working Paper 12. Brighton, UK, University of Sussex.

McMillan, M.S. & Harttgen, K. 2014. What is Driving the 'African Growth Mirable'? NBER Working Paper 20077. Cambridge, MA, USA, National Bureau for Economic Research.

Meherette, E. 2009. Innovations in insuring the poor: providing weather index and indemnity insurance in Ethiopia. 2020 Vision for Food, Agriculture and the Environment, Focus 17, Brief 8, December 2009. Washington, DC, IFPRI.

Melkomu Belina Negeri. 2017. The Effects of El Niño on Agricultural GDP of Ethiopia. *American Journal of Water Science and Engineering*, 3(4): 45-49. doi:10.11648/j.ajwse.20170304.11

Mendes, D.M. & Paglietti, L. 2015. Ethiopia. Irrigation market brief. Country Highlights. Rome, FAO Investment Centre.

Mercandalli, S. & Losch, B. Eds. 2017. Rural Africa in motion. Dynamics and drivers of migration South of the Sahara. Rome, FAO and CIRAD.

Minot, N. 2014. Food price volatility in sub-Saharan Africa: Has it really increased? *Food Policy*, 45: 45–56.

REFERENCES

- Mitaritonna, C. & Traoré, F. 2017. Existing Data to Measure African Trade. IFPRI Discussion Paper 01618. Washington, DC, International Food Policy Research Institute.
- Mohammed, A.R. & Tarpley, L. 2009. High nighttime temperatures affect rice productivity through altered pollen germination and spikelet fertility. *Agricultural and Forest Meteorology*, 149: 999–1008.
- Mohapatra, S., Joseph, G. & Ratha, D. 2009. Remittances and Natural Disasters: Ex-Post Response and Contribution to Ex-Ante Preparedness. Policy Research Working Paper 4972. Washington, DC, World Bank.
- Morrison, J. 2016. Managing food security risks and intra-regional trade in Africa. Rome, FAO.
- Mozaffarian, D., Afshin, A., Benowitz, N.L., Bittner, V., Daniels, S.R., Franch, H.A., Jacobs, D.R., Kraus, W.E., Kris-Etherton, P.M., Krummel, D.A., Popkin, B.M., Whitsel, L.P. & Zakai, N.A. 2012. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation*, 126(12): 1514–1563.
- Nakicenovic, N., Alcamo, J., Davis, G., de Vries, H.J.M., Fenner, J., Gaffin, S., Gregory, K., Grubler, A., Jung, T.Y., Kram, T., La Rovere, E.L., Michaelis, L., Mori, S., Morita, T., Papper, W., Pitcher, H., Price, L., Riahi, K., Roehrl, A., Rogner, H-H., Sankovski, A., Schlesinger, M., Shukla, P., Smith, S., Swart, R., van Rooijen, S., Victor, N., and Dadi, Z. Nakicenovic, N. & Swart, R. Eds. 2000. Special Report on Emissions Scenarios. Cambridge University Press for the International Panel on Climate Change, Cambridge, UK.
- Narayan, P., Narayan, S. & Mishra, S. 2011. Do Remittances Induce Inflation? Fresh Evidence from Developing Countries. *Southern Economic Journal*, 77(4): 914-933.
- Ncube, G. & Gómez, G.M. 2011. Local economic development and migrant remittances in rural Zimbabwe: building on sand or solid ground? Working Paper No. 523. The Hague, Institute of Social Studies.
- NDC Partnership, 2017. Country engagement strategy: a country-driven approach for collective impact on climate and development action. Bonn, Germany.
- Nelson, G.C., Rosegrant, M.W., Palazzo, A., Gray, I., Ingersoll, C., Robertson, R., Tokgoz, S., Zhu, T., Sulser, T.B., Ringler, C. & Msangi, S. 2010. Food security, farming, and climate change to 2050: scenarios, results, policy options. Washington, DC, IFPRI.
- Ness-Edelstein, B. & Adoum, C. 2017. Impact of Administrative Barriers on Time and Cost to Trade in West Africa. Bethesda, Maryland, USA: Abt Associates.
- Neumayer, E. & Plümper, T. 2007. The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981–2002. *Annals of the Association of American Geographers*, 97(3): 551-566. DOI: 10.1111/j.1467-8306.2007.00563.x.
- New, M., Hewitson, B., Stephenson, D.B., Tsiga, A., Kruger, A., Manhique, A., Gomez, B., Coelho, C.A.S., Masisi, D.N., Kulunaga, E., Mbambalala, E., Adesina, F., Saleh, H., Kanyanga, J., Adosi, J., Bulane, L., Fortunata, L., Mdoka, M.L. & Lajoie, R. 2006. Evidence of trends in daily climate extremes over southern and west Africa. *Journal of Geophysical Research*, 111, D14102.
- Niang, I., Ruppel, O.C., Abdurbo, M.A., Essel, A., Lennard, C., Padgham, J. & Urquhart, P. 2014. Africa. Chapter 22 in Barros, V.R., Field, C.B., Dokken, D.J., Mastrandrea, M.D., Mach, K.J., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. & White, L.L. Eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press.
- Li, Y., Ye, W., Wang, M. & Yan, X. 2009. Climate change and drought: a risk assessment of crop-yield impacts. *Climate Research*, 39: 31–46. DOI: 10.3354/cr00797.
- Lunduka, R.W. 2018. Adoption and impact of climate smart maize varieties on total maize production and yield in Southern Africa. IFPRI Malawi Strategy Support Program (MaSSP) Seminar. (Available at: <http://massp.ifpri.info/2018/03/01/adoption-and-impact-of-climate-smart-maize-varieties-in-southern-africa/>).
- Lunduka, R.W., Mateva, K.I., Magorokosho, C. & Manjeru, P. 2017. Impact of adoption of drought-tolerant maize varieties on total maize production in south Eastern Zimbabwe, *Climate and Development*. DOI: 10.1080/17565529.2017.1372269
- OECD. 2016. *States of Fragility 2016. Highlights*. Paris.
- Olowa, O.W., Awoyemi, T.T., Shittu, M. A. & Olowa, O.A. 2013. Effects of remittances on poverty among rural households in Nigeria. *African Journal of Agricultural Research*, 8(10): 872–883.
- Pannhausen, C. & Untied, B. 2010. *Regional Agricultural Trade for Economic Development and Food Security in Sub-Saharan Africa. Conceptual background and fields of action for development cooperation*. Eschborn, Germany, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) mbH.
- Pauw, K. & Thurlow, J. 2009. *Economic Losses and Poverty Effects of Droughts and Floods in Malawi. Malawi Strategy Support Program (MaSSP) Policy Note 2*. Washington, DC, International Food Policy Research Institute.

Playgo, I., de Milliano, M. & Handa, S. 2013. The cost of social cash transfer programs in sub-Saharan Africa. The Transfer Project Research Brief. Chapel Hill, NC, USA, Carolina Population Center, University of North Carolina.

Ponsot, F. & Obegi, B. 2010. Etude de capitalisation des initiatives et mécanismes en matière de transferts de fonds au Mali." Study conducted for the Centre d'Information et de Gestion des Migrations (CIGEM), Mali. Porter, J.R. & Semenov, M.A. 2005. Crop responses to climatic variation. *Philosophical Transactions of the Royal Society B*, 360: 2021–2035. doi:10.1098/rstb.2005.1752.

Porter, J.R., Xie, L., Challinor, A.J., Cochrane, K., Howden, S.M., Iqbal, M.M., Lobell, D.B. & Travasso, M.I. 2014. Food security and food production systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. & White, L.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 485–533.

Quisumbing, A.R., Meinzen-Dick, R., Raney, T.L., Croppenstedt, A., Behrman, J.A. & Peterman, A. Eds. 2014. Gender in Agriculture. Closing the Knowledge Gap. Dordrecht and Rome, Springer Science + Business Media B.V. and Food and Agriculture Organization of the United Nations.

Rakotoarisoa, M.A., Iafrate, M. & Paschali, M. 2011. Why has Africa become a net Food Importer? Explaining Africa agricultural and food trade deficits. Trade and Markets Division, Food and Agriculture Organization of the United Nations. Rome, FAO.

Ratha, D., Mohapatra, S., Özden, C., Plaza, S., Shaw, W. & Shimeles, A. 2011. Leveraging Migration for Africa. Remittances, Skills, and Investments. Washington, DC, World Bank.

Reardon, T. & Timmer, C.P. 2007. Transformation of markets for agricultural output in developing countries since 1950: how has thinking changed? In R. Evenson & P. Pingali, eds. *Handbook of agricultural economics*, pp. 2807–2855. Elsevier.

Republic of Kenya. 2012. National Nutrition Action Plan 2012-2017. Nairobi.

Resilience Taskforce Sub Report. 2015. Annex A. Climate and Global Crop Production Shocks. In Extreme weather and resilience of the global food system. Final Project Report from the UK-US Taskforce on Extreme Weather and Global Food System Resilience. UK, The Global Food Security programme.

RESULTS UK, Concern Worldwide, and University of Westminster. 2015. What Works for nutrition? Stories of success from Vietnam, Uganda and Kenya. London and Dublin.

Rosegrant, M.W., Koo, J., Cenacchi, N., Ringler, C., Robertson, R., Fisher, M., Cox, C., Garrett, K., Perez, N.D. & Sabbagh, P. 2014. Food Security in a World of Natural Resource Scarcity. The Role of Agricultural Technologies. Washington, DC, International Food Policy Research Institute.

Rowhani, P., Lobell, D.B., Linderman, M. & Ramankutty, N. 2011. Climate variability and crop production in Tanzania. *Agricultural and Forest Meteorology*, 151: 449–460. Salinger, M.J. 2005. Climate Variability and Change: Past, Present and Future – an Overview. *Climatic Change*, 70(1):9–29. DOI10.1007/s10584-005-5936-x.

Sander, C. & Maimbo, S.M. 2005. Migrant Remittances in Africa: A Regional Perspective. Chapter 2 in Maimbo, S.M., & Ratha, D. Eds. *Remittances Development Impact and Future Prospects*. Washington, DC, World Bank.

Saronga, N.J., Mosha, I.H., Kessy, A.T., Ezekiel, M.J., Zizinga, A., Kweka, O., Onyango, P. & Kovats, S. 2016. "I eat two meals per day" impact of climate variability on eating habits among households in Rufiji district, Tanzania: a qualitative study. *Agriculture and Food Security*, 5(14).

Sartorius, B., Veerman, L.J., Manyema, M., Chola, L. & Hofman, K. 2015. Determinants of Obesity and Associated Population Attributability, South Africa: Empirical Evidence from a National Panel Survey, 2008-2012. *PLoS ONE* 10(6): e0130218. doi:10.1371/journal.pone.0130218.

Saygili, M., Peters, R. & Knebel, C. 2018. African Continental Free Trade Area: Challenges and Opportunities of Tariff Reductions. UNCTAD Research Paper No. 15. Geneva, Switzerland, UNCTAD.

Schlenker, W. & Lobell, D.B. 2010. Robust negative impacts of climate change on African agriculture. *Environmental Research Letters*, 5(1), 014010, doi:10.1088/1748-9326/5/1/014010.

Schmidhuber, J. & Tubiello, F.N. 2007. Global food security under climate change. *PNAS*, 104(50): 19703–19708.

Sebahizi, P. 2017. Update on The Continental Free Trade Area Negotiations. Presentation at African Prosperity Conference. 12 September 2017, Accra, Ghana.

Seleshi, Y. & Camberlin, P. 2006. Recent changes in dry spell and extreme rainfall events in Ethiopia. *Theoretical and Applied Climatology*, 83(1-4), 181–191.

REFERENCE

- Seneviratne, S.I., Nicholls, N., Easterling, D., Goodess, C.M., Kanae, S., Kossin, J., Luo, Y., Marengo, J., McInnes, K., Rahimi, M., Reichstein, M., Sorteberg, A., Vera, C. & Zhang, X. 2012: Changes in climate extremes and their impacts on the natural physical environment. In: Field, C.B., Barros, V., Stocker, T.F., Qin, D., Dokken, D.J., Ebi, K.L., Mastrandrea, M.D., Mach, K.J., Plattner, G.-K., Allen, S.K., Tignor, M. & Midgley, P.M. Eds. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*. Cambridge, UK and New York, NY, USA, Cambridge University Press.
- Seyoum, Z. 2012. National experience on gender responsive program contribution for empowerment of rural women in Ethiopia: the case of Productive Safety Net Programme (PSNP). Federal Democratic Republic of Ethiopia Ministry of Agriculture, Women's Affairs Directorate. Presentation prepared for the Expert Group Meeting on Gender Responsive Social Protection in South-East Asia, Bangkok, Thailand, 13–14 November 2012.
- Shanahan, T.M., Overpeck, J.T., Anchukaitis, K.J., Beck, J.W., Cole, J.E., Dettman, D.L., Peck, J.A., Scholz, C.A. & King, J.W. 2009. Atlantic Forcing of Persistent Drought in West Africa. *Science*, 324 (5925): 377–380. DOI: 10.1126/science.1166352.
- Shiferaw, B., Tesfaye, K., Kassie, M., Abate, T., Prasanna, B.M. & Menkir, A. Managing vulnerability to drought and enhancing livelihood resilience in sub-Saharan Africa: Technological, institutional and policy options. *Weather and Climate Extremes*, 3: 67–79.
- Staatz, J.M., Diallo, B. & Me-Nsope, N.M. 2017. Conclusions, Policy Implications, and Lessons Learned. Chapter 14 in Staatz, J.M., Diallo, B. & Me-Nsope, N.M. *Strengthening Regional Agricultural Integration in West Africa: Key Findings & Policy Implications*. Basel, Switzerland and East Lansing, Michigan, USA, Syngenta Foundation for Sustainable Agriculture and Michigan State University.
- Tadesse, G., Algieri, B., Kalkuhl, M. & von Braun, J. 2014. Drivers and triggers of international food price spikes and volatility. *Food Policy*, 47: 11–128.
- Tambo, J. & Abdoulaye, T. 2013. Smallholder farmers' perceptions of and adaptations to climate change in Nigerian savanna. *Regional Environmental Change, Regional Environmental Change*, 11(2):375–388.
- Tarhule, A. 2005. Damaging Rainfall and Flooding: The Other Sahel Hazards. *Climatic Change*, 72: 355–377. DOI: 10.1007/s10584-005-6792-4.
- Taylor, J.E. and Dyer, G.A., 2009. Migration and the sending economy: A disaggregated rural economy-wide analysis. *The Journal of Development Studies*, 45(6):966–989.
- Tegegne, A.D. & Penker, M. 2016. Determinants of rural out-migration in Ethiopia: Who stays and who goes? *Demographic Research*, 34(34):1011–1044. Doi: 10.4054/DemRes.2016.35.34.
- Thomson, M.C. & Connor, S.J. 2001. The development of Malaria Early Warning Systems for Africa. *Trends Parasitol*, 17(9):438–45.
- Thow, A.M., Fanzo, J. & Negin, J. 2016. A Systematic Review of the Effect of Remittances on Diet and Nutrition. *Food and Nutrition Bulletin*, 37(1): 42-64.
- Thornton, P.K., Ericksen, P.J., Herrero, M. & Challinor, A.J. 2014. Climate variability and vulnerability to climate change: a review. *Global Change Biology*, 20:3313–3328. doi:10.1111/gcb.12581.
- Thurlow, J., Zhu, T. & Diao, X. 2009. The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia. IFPRI Discussion Paper 00890. Washington, DC, International Food Policy Research Institute.
- Tirivayi, N., Knowles, M. & Davis, B. 2013. The interaction between social protection and agriculture: a review of evidence. PtoP (From Protection to Production) report. Rome, FAO.
- Tsegai, D. 2004. Effects of Migration on the Source Communities in the Volta Basin of Ghana—Potential Links of Migration, Remittances, Farm and Non-farm Self-employment Activities. Deutscher Tropentag, Rural Poverty Reduction through Research for Development, October 5-7, 2004, Berlin.
- Traerup, S.L.M. & Mertz, O. 2011. Rainfall variability and household coping strategies in northern Tanzania: a motivation for district-level strategies. *Regional Environmental Change*, 11(3):471–481.
- Trenberth, K.E., Jones, P.D., Ambenje, P., Bojariu, R., Easterling, D., Klein Tank, A., Parker, D., Rahimzadeh, F., Renwick, J.A., Rusticucci, M., Soden, B. & Zhai, P. 2007. Observations: Surface and atmospheric climate change. In Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. & Miller, H.L. Eds. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK, and New York, NY, pp. 235–336.
- Tirivayi, N., Knowles, M. & Davis, B. 2013. The interaction between social protection and agriculture: a review of evidence. PtoP (From Protection to Production) report. Rome, FAO.
- Tubiello, F.N., Soussana, J.-F.O. & Howden, S.M., 2007. Crop and pasture response to climate change. *Proceedings of the National Academy of Sciences*, 104:19686–19690.

- UN (United Nations). 2011. The Millennium Development Goals Report 2011. New York, USA.
- UN. 2013. Population Facts. No. 2013/4. Department of Economic and Social Affairs, Population Division. New York, USA.
- UN. 2017a. World Population Prospects 2017. New York, USA, UN Department of Economic and Social Affairs, Population Division. Available at: <http://www.un.org/en/development/desa/population/>.
- UN. 2017b. Trends in International Migrant Stock: The 2017 revision. New York, USA. Department of Economic and Social Affairs, Population Division (United Nations database, POP/DB/MIG/Stock/Rev.2017).
- UN. 2017c. Disaster-related Data for Sustainable Development. Sendai Framework Data Readiness Review 2017. Global Summary Report. New York, USA.
- UN. 2018. Implementation of the United Nations Decade of Action on Nutrition (2016-2025). Report of the Secretary General. A/72/829. New York, USA.
- UNCCD (United Nations Convention to Combat Desertification). 2015. Climate change and land degradation: Bridging knowledge and stakeholders. Outcomes from the UNCCD 3rd Scientific Conference, 9-12 March 2015, Cancún, Mexico. Bonn, Germany, UNCCD.
- UNCTAD (United Nations Conference on Trade and Development). 2009. Economic Development in Africa Report 2009. Strengthening Regional Economic Integration for Africa's Development. Geneva, Switzerland.
- UNCTAD. 2016. African Continental Free Trade Area: Policy and Negotiation Options for Trade in Goods. Geneva, Switzerland.
- UNDP (United Nations Development Programme). 2016. Africa Human Development Report 2016. Accelerating Gender Equality and Women's Empowerment in Africa. New York, USA.
- UNECA (United Nations Economic Commission for Africa). 2010. Assessing Regional Integration in Africa IV. Enhancing Intra-African Trade. Addis Ababa.
- UNECA. 2011. Climate change and agriculture in Africa – analysis of knowledge gaps and needs. African Climate Policy Centre, Working Paper 7. Addis Ababa.
- UNECA. 2015. Assessment report on mainstreaming and implementing disaster risk reduction in Mozambique. Addis Ababa.
- UNECA. 2016. The Demographic Profile of African Countries. Addis Ababa.

- UNECA and Friedrich Ebert Stiftung. 2017. The Continental Free Trade Area (CFTA) in Africa – A Human Rights Perspective. Addis Ababa and Geneva, Switzerland.
- UNGA (United Nations General Assembly). 2017. Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030. Seventy-second session. Report of the Director General. Seventy-second session. Item 20 (c) of the provisional agenda. Sustainable development: disaster risk reduction. A/72/259. New York, USA.
- UNHCR (Office of the United Nations High Commissioner for Refugees). 2017. Global Trends. Forced Displacement in 2016. Geneva, Switzerland.
- UNICEF, WHO & World Bank. 2018a. Joint Child Malnutrition Estimates 2018 (available at <http://www.who.int/nutgrowthdb/estimates/en/>).
- UNICEF, WHO & World Bank. 2018b. Joint Child Malnutrition Estimates Expanded Database: Stunting, May 2018, New York, USA.
- UNICEF, WHO & World Bank. 2018c. Joint Child Malnutrition Estimates Expanded Database: Wasting, May 2018, New York, USA.
- UNICEF, WHO & World Bank. 2018d. Joint Child Malnutrition Estimates Expanded Database: Overweight, May 2018, New York, USA.
- UNISDR. (United Nations Office for Disaster Risk Reduction). 2015. Making Development Sustainable: The Future of Disaster Risk Management. Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland.
- UNISDR & OECD. 2013. Disaster risk reduction – donor effort. A survey of development co-operation providers. Geneva, Switzerland and Paris.
- USAID (United States Agency for International Development). 2011. Regional Agricultural Transport and Trade Policy Study. West Africa Trade Hub Technical Report #41. Washington, DC, United States Agency for International Development.
- USAID. 2012. Transport and Logistics Costs on the Lomé-Ouagadougou Corridor. West Africa Trade Hub Technical Report No. 47. Washington, DC.
- Vallings, C. & Moreno-Torres, M. 2005. Drivers of Fragility: What makes states fragile? Department for International Development, PRDE Working Paper no. 7. London, DFID.
- Van Niekerk, D. 2015. Disaster risk governance in Africa a retrospective assessment of progress in against the hyogo framework for action (2000-2012). *Disaster Prevention and Management*, 24(3): 397–416.

REFERENCES

- Vargas-Lundius, R., Lanly, G., Villarreal, M. & Osorio, M. 2008. International migration, remittances and rural development enabling poor rural people to overcome poverty. Rome, IFAD.
- Vorley, B. & Lançon, F. 2016. Food consumption, urbanisation and rural transformation: the trade dimensions. Working Paper. London, International Institute for Environment and Development.
- WFP (World Food Programme). 2017. At the Root of Exodus: Food Security, Conflict and International Migration. Rome.
- WHO. 2014a. Global Nutrition Targets 2025. Stunting Policy Brief (WHO/NMH/NHD14.3). Geneva, Switzerland.
- WHO. 2014b. Global Nutrition Targets 2025: Anaemia Policy Brief (WHO/NMH/NHD/14.4). Geneva, Switzerland.
- WHO. 2016. Report of the commission on ending childhood obesity. Geneva, Switzerland.
- WHO, UNICEF & WFP. 2014. Global nutrition targets 2025: wasting policy brief (WHO/NMH/14.8). Geneva, Switzerland, World Health Organization.
- Wiebe, K., Sulser, T.B., Mason-D'Croz, D. & Rosegrant, M.W., 2017. The Effects of Climate Change on Agriculture and Food Security in Africa. Chapter 2 in De Pinto, A. & Ulimwengu, J.M. Eds. A Thriving Agricultural Sector in a Changing Climate: Meeting Malabo Declaration Goals through Climate-Smart Agriculture. ReSAKSS Annual Trends and Outlook Report 2016. Washington, DC: International Food Policy Research Institute.
- WMO (World Meteorological Organization). 2018. Frequently Asked Questions (FAQ). (available at: http://www.wmo.int/pages/prog/wcp/ccl/faq/faq_doc_en.html).
- World Bank. 2006. Ethiopia: Managing Water Resources to Maximize Sustainable Growth A World Bank Water Resources Assistance Strategy for Ethiopia. Washington, DC.
- World Bank. 2011a. World Development Report 2011. Conflict, Security, and Development. Washington, DC.
- World Bank. 2011b. Facilitating Cross-Border Trade between the DRC and Neighbors in the Great Lakes Region of Africa: Improving Conditions for Poor Traders. Report No.:62992-AFR. Washington, DC.
- World Bank. 2012a. Managing risk, promoting growth. Developing systems for social protection in Africa. The World Bank's Africa social protection strategy 2012–2022. Washington, DC.
- World Bank. 2012b. Africa Can Help Feed Africa. Removing barriers to regional trade in food staples. Washington, DC.
- World Bank. 2013b. Growing Africa. Unlocking the potential of agribusiness. World Bank, Washington, DC.
- World Bank. 2013c. Building Resilience. Integrating Climate and Disaster Risk into Development. The World Bank Group Experience. Washington, DC.
- World Bank. 2014a. Youth Employment in Sub-Saharan Africa. Washington, D.C.
- World Bank. 2015a. Ethiopia. Poverty Assessment. Report No. AUS6744. Poverty Global Practice, Africa Region. Washington, DC.
- World Bank. 2017a. Hydromet in Africa. Brief, 11 September 2017. Washington, DC. Available at <http://www.worldbank.org/en/region/afr/brief/hydromet-in-africa>.
- World Bank. 2018. World Development Indicators (available at <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>).
- Yonetani, M., Albuja, S., Bilak, A., Ginnetti, J., Glatz, A-K., Howard, C., Kok, F., McCallin, B., Swain, M., Turner, W. & Walicki, N. 2015. Global Estimates 2015: People displaced by disasters. Geneva, Switzerland, Internal Displacement Monitoring Centre and Norwegian Refugee Council.
- Yoshino, Y., Ngungi, G. & Asebe, E. 2012. Enhancing the Recent Growth of Crossborder Trade between South Sudan and Uganda. Chapter 4, in Brenton, P., & Isik, G. Eds. 2012. De-Fragmenting Africa. Deepening Regional Trade Integration in Goods and Services. Washington, DC, World Bank.



KENYA

Emergency livelihood response
to support drought-affected
pastoralists.

©FAO/Luis Tato

REGIONAL OVERVIEW OF FOOD SECURITY AND NUTRITION

ADDRESSING THE THREAT FROM CLIMATE VARIABILITY AND EXTREMES FOR FOOD SECURITY AND NUTRITION

This year's edition of the *Africa Regional Overview of Food Security and Nutrition* reports that the food security situation on the continent continues to worsen. For Africa, 20.4 percent of the continent's population – 257 million people – are undernourished, up from 19.7 in 2016 – 241 million people. In sub-Saharan Africa, there are 237 million undernourished in 2017, up from 222 million in 2016.

The worsening situation in Africa is due to difficult global economic conditions and, in many countries, conflict and climate-related disasters, sometimes in combination. Economic growth slowed in 2016 due to weak commodity prices, in particular for oil and minerals. Food insecurity has worsened in countries affected by conflict, often exacerbated by drought or floods, and in Southern and Eastern Africa many countries have been adversely affected by prolonged drought. Notably, several countries have achieved sustained progress in reducing food insecurity in the face of challenging circumstances.

The deterioration of the food security situation and the lack of progress towards the WHO global nutrition targets makes it imperative for countries to step up their efforts, if they are to achieve a world without hunger and malnutrition by 2030. The need for greater efforts also emerges clearly from the findings of the inaugural biennial review of progress in implementing the goals of the Malabo Declaration. In addition to specific food security and nutrition policies, this year's report reviews four important cross-cutting topics, namely, youth employment, remittances, intraregional trade, and climate change. It highlights their interplay with the food system and their role in food security and nutrition.

The thematic part of the report presents an evidence-based assessment of the threat posed by more frequent occurrences of climate extremes and rising climate variability to food security and nutrition in the region. Climate change in combination with poor development planning, poverty and environmental degradation increases the risk of a climate event becoming a disaster. A collective approach that combines climate change adaptation with disaster-resilient development is an opportunity to address climate and disaster risks within the context of broader development goals.



ISBN 978-92-5-131157-8



9 789251311578

CA2710EN/1/12.18