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Department of  
Economic and  
Social Affairs

# Sustainable Development Outlook 2019

*Gathering Storms  
and Silver Linings*



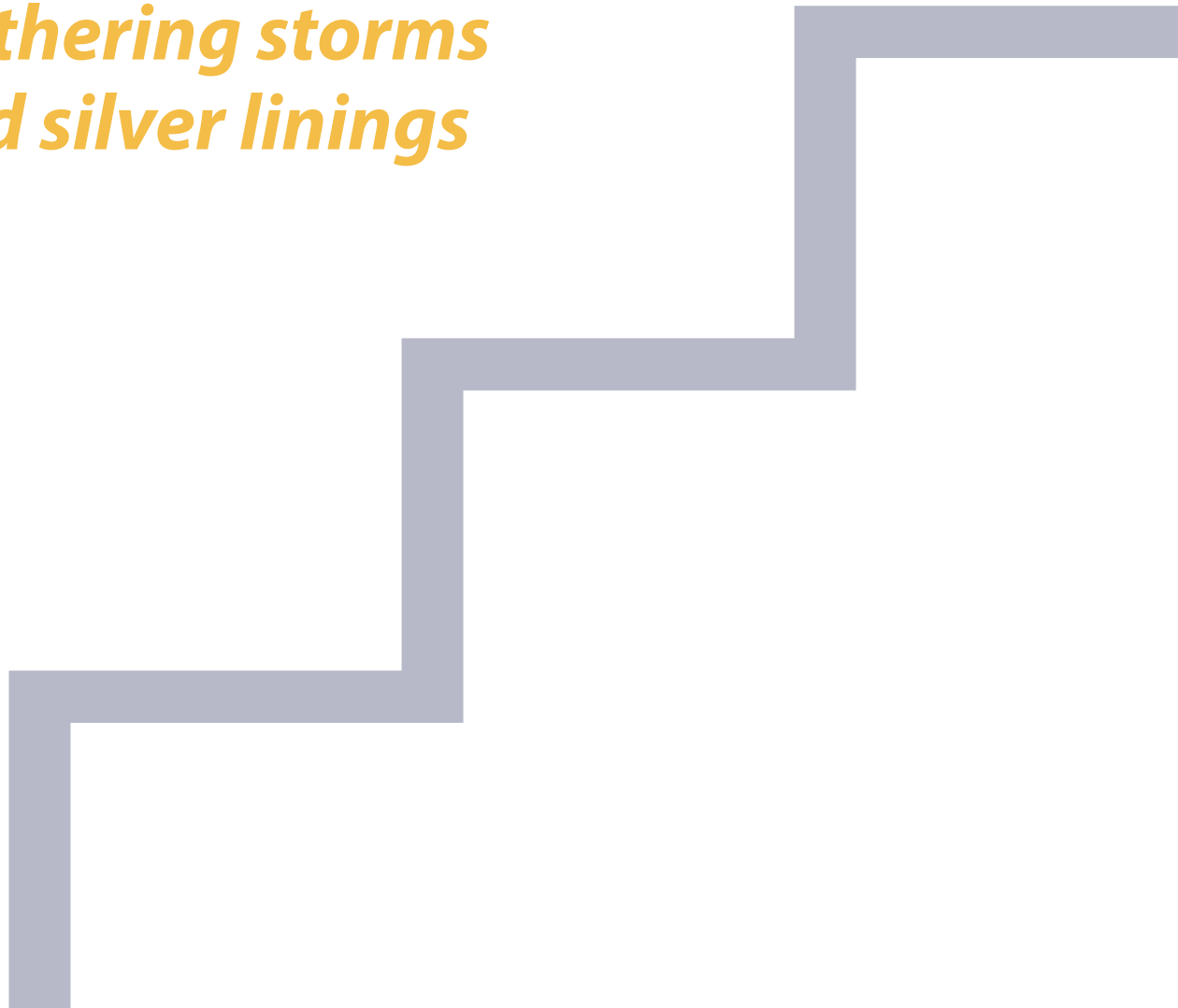


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## Foreword

The Sustainable Development Goals (SDGs) as enshrined in the 2030 Agenda for Sustainable Development embody our best hope for a sustainable future, but they are facing considerable challenges in implementation. The *Sustainable Development Outlook 2019: Gathering storms and silver linings* offers a candid overview of these compounding and mutually reinforcing challenges. Weakening global growth, rising income inequality, aggravating climate change, protracted conflicts, growing migration pressures and rapid technological changes are shaping the pace and trajectory of SDG progress. Strong political commitments at the national level—as manifest in more than 150 Voluntary National Reviews of the SDG progress during the past four years—underpin our collective resolve for overcoming these challenges and making sustainable development a reality for all.

The world must address the over-arching challenges of rising inequality and climate change to accelerate the SDG progress. Persistently high levels of inequality entrenches uncertainty and insecurity among people, reinforcing divisions and undermining trust in institutions and government. We must also fulfil our promise to fight climate change. The world continues to experience rising sea levels, extreme weather conditions and increasing concentrations of greenhouse gases. Both the frequency and intensity of extreme weather events are on the rise.

Technological advances and breakthroughs—if leveraged effectively—can deliver the basic needs of humanity and reduce economic insecurity. Enhancing and ensuring food, shelter, health and energy securities can be a catalyst for sustainable development. While frontier and technological breakthroughs offer the best hope for achieving the SDGs, they cannot be taken for granted. We must make meticulous societal choices and guide technology in the right direction to deliver the common good.

The challenges that the SDGs face today are truly global. No nation alone can overcome these challenges. The greening of our economies—creating millions of new green jobs, while addressing the challenges of inequality, climate change and fast-paced technological change—will increasingly require broader and stronger international cooperation. We must show that multilateralism can turn these challenges into opportunities and achieve sustainable development for all.



Mr. LIU Zhenmin  
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## Executive summary

There has been some significant progress made towards achieving the Sustainable Development Goals (SDGs) since their adoption in 2015. Thanks to the concerted efforts of many Governments and development partners, child mortality rates have continued to fall. Access to electricity has increased globally and the proportion of the urban population living in slums has been steadily declining. Hepatitis is on the retreat, with almost no new chronic hepatitis B virus infections.

Notwithstanding this progress, gathering storms of weakening global economic growth, rising income inequality, unabated global warming and climate change, and escalating conflict are posing serious threats to SDG implementation. On the other hand, rapid technological advances, especially renewable energy technologies, offer some hope for accelerating SDG progress.

The *Sustainable Development Outlook* identifies some of these key challenges and underscores the imperative of bold and urgent policy actions for addressing them. It identifies the interlinkages among these challenges, highlighting the need for addressing them with an integrated approach instead of tackling them as stand-alone challenges to be resolved sequentially and in isolation. The challenges highlighted here, of course, not only undermine SDG progress; they also risk changing the overall context of sustainable development, and, because they cut across all the SDGs and affect all countries, they can potentially undermine the overall implementation of the 2030 Agenda for Sustainable Development.

## Economic outlook

Against the backdrop of rising inequality and economic uncertainties, global growth will most likely average 3 per cent during the SDG period (2015–2030)—significantly below the global growth rate achieved during the Millennium Development Goals period. International trade, a long-time and proven engine of global growth, has slowed down since the global financial crisis in 2008. Global trade will continue to face downward pressure on multiple fronts. On the one hand, trade tensions are likely to persist amid rising populism, perceived national security priorities and concerns related to intellectual property rights. On the other, rapid technological changes—such as automation that enables reshoring of manufacturing; development of new materials and production technologies; and increased efficiency in resource usage, among others—are dramatically changing the volume, direction and the terms of trade. These changes are disrupting global value chains and export-led patterns of growth and development.

Should global trade remain tepid, it will weaken employment growth, worsen income inequality among countries and heighten the sense of uncertainty and insecurity. Slowing global trade and excessive external debt burdens will both remain a drag on global growth

and exacerbate the risks of an economic crisis. The risk of a further slowdown of global growth and even the possibility of an economic crisis—whether global or regional—looms large, which may further trim employment growth and derail SDG progress. With policy interest rates at historic lows and fiscal space already constrained in many countries, the world economy has less room today to manoeuvre and deal with a crisis or a recession than it did in 2008.

### Looking beyond growth

With the global economic outlook dampened by a multitude of economic headwinds, the international community must look beyond growth to achieve sustainable development. Clearly, economic growth alone—even double-digit growth rates—will not deliver the SDGs. While the pursuit of high rates of economic growth continues to dominate fiscal and monetary policy considerations, this does not necessarily take into account real and potential trade-offs with other SDGs. Growth in gross domestic product (GDP) does not always internalize high social and environmental costs that typically accompany high growth. Furthermore, GDP growth as the headline economic indicator remains an incomplete measure that does not fully capture the state of economic performance and well-being. The persistence of high levels of employment insecurity around the world—evidenced by the majority of global workforce engaged in informal employment and vulnerable work, even during a period of high growth and recovery from the crisis—proves the point that GDP growth cannot and does not imply increased well-being. Creating an adequate number of jobs that offer living wages and benefits will remain paramount for achieving the SDGs, as it will ensure that no one is left behind.

The steady decline in global trade undermines efforts to create an adequate number of well-paying jobs, making it increasingly difficult to absorb the growing number of young people entering the labour market. The world will need to create 600 million new jobs—more than 200 million in sub-Saharan Africa alone—between now and 2030 just to maintain the current rate of unemployment. Nearly 1.8 billion people, or one in three adults, will face chronic employment risks, including unemployment, vulnerable employment or leaving the work force altogether. Moreover, rapid technological change will further complicate the employment outlook for many countries, meaning future employment risks could be even greater than expected.

Given the critical importance of employment for the SDGs, Governments will need to adopt additional metrics to measure economic performance. The national and international measurements and indices of economic performance will need to measure and assess the creation of well-paying, decent jobs and the reduction of economic insecurity and vulnerability. The progress that countries make in reducing inequality, mitigating climate risks and preventing violence and conflicts must form an essential part of the measurement of economic performance and of progress on all three dimensions of sustainable development.

### Addressing inequality

Reflecting the pressing need to tackle inequality in all forms and manifestations, the 2030 Agenda embraced “leaving no one behind” as the cardinal principle to guide all sustainable development efforts at local, national, regional and global levels. The high levels of income and wealth inequality observed in most countries have emerged as the biggest stumbling block to SDG implementation. While the plethora of data and research show that inequality

is a threat to sustainable development, there is little evidence that the world is winning the fight against inequality. More people, communities and societies are facing rising inequality than ever before. Unless Governments and societies act quickly and decisively, mass campaigns, popular movements and social uprisings will increasingly bend political wills and force policy changes to address the scourge of inequality.

Inequality impedes sustainable development in multiple ways. Rising inequality of income, wealth and access to opportunities is discouraging skills accumulation, choking economic and social mobility and arresting human development. Inclusive and sustainable growth remains elusive without human development. Inequality is also entrenching uncertainty, vulnerability and insecurity, undermining trust in institutions and government and increasing social discord and tensions. Communities and societies are increasingly more susceptible to violence and conflicts amid growing inequality and trust deficits. Rebuilding trust in institutions will remain a priority, not only to prevent conflicts but also to foster sustainable development.

As inequalities manifest in wealth, income, access and outcomes, societies must address them in all these dimensions. The mutually reinforcing dynamics between inequality and employment insecurity and the urgency to tackle both must inform policy choices, given that larger shares of the population are trapped in vulnerable employment in highly unequal societies. Expanding skills and educational opportunities, creating decent and secure jobs that pay living wages, and strengthening social protection systems will therefore remain an overarching priority for reining in inequality. While less highlighted, regular and orderly migration and resettlement can also play a critical role in reducing inequality, in addition to preventing and mitigating against the impacts of conflicts and facilitating adaptation to climate change.

Addressing inequality will require a new mindset and a win-win approach to the redistribution of income, wealth and opportunities. Redistribution does not necessarily mean less for people at the top of the income distribution; it can mean more for everyone—more peace and stability for people at the top, more economic security and opportunities for those at the bottom, and more climate resilience and more sustainable development for all. Societies must redefine redistribution as a positive sum game and bring inequality to the front and centre of efforts to achieve the SDGs.

## Aggravating climate change

Alongside inequality, climate change poses the most ominous threat to the SDGs. The frequency and intensity of extreme weather events, which are closely associated with climate change, are on the rise. Arctic Sea ice cover has continued to decline, exposing more ocean and absorbing more sunlight, resulting in faster melting. The increased rate of permafrost thaws due to global warming is releasing more carbon dioxide (CO<sub>2</sub>) and methane from the ground underneath. Given that soils in the permafrost regions contain about 1,600 gigatons of carbon (twice the amount of carbon in the atmosphere now), aggravation of permafrost thaw could lead to an environmental catastrophe and rapid global warming much sooner than expected.

Climate change presents significant distributional consequences, with risks most pronounced for the developing countries. While climate change does not discriminate and can be felt everywhere in the world, some are affected more than others. Developing countries—particularly small island developing States and the least developed countries that are least able to cope—are more vulnerable to climate risks. The human cost and

economic damages as a share of GDP are significantly higher in developing countries than in the developed world, despite their relatively small contribution to total CO<sub>2</sub> emissions. In other words, climate change could worsen inequality, given countries' differentiated resilience.

### Reversing carbon emissions

Despite all the alarms about global warming and climate change, human activities are still increasing CO<sub>2</sub> emissions every year. After slowing down during 2012–2014 and remaining flat during 2015–2016, global CO<sub>2</sub> emissions have started to increase again, accelerating global warming and climate change. It is an inconvenient truth that curbing CO<sub>2</sub> emissions will remain a daunting challenge, not least because of the persistently high levels of inequality in per capita emissions levels. Average per capita emissions in high-income countries are 43 times higher than emissions per capita in low-income countries, dwarfing the level of income inequality that persists between high- and low-income countries. As people in developing countries achieve greater economic prosperity, their per capita emissions will rise. New pathways to development and prosperity must therefore leverage technology—especially renewable energy technologies—to decarbonize economic growth.

Reversing global warming and climate change will require bold, immediate and collective measures to reduce emissions by 45 per cent from their 2010 levels by 2030. The world needs to quickly move from this current level of emissions to net zero emissions, and then to net negative emissions to minimize climate risks and accelerate SDG progress. This will require dramatic and fundamental shifts in production and consumption patterns in both developed and developing countries.

### Curbing inequality: a must for bold climate action

Given the immediate and wide-ranging development challenges that climate change poses to the world, urgent climate action—accelerating mitigation and adaptation efforts and transitioning to low-carbon production and consumption patterns—must form the cornerstone of all SDG efforts, alongside improving resource efficiency and creating millions of decent jobs in the new green economy.

One emerging obstacle to strengthened climate action is inequality within countries. The developed/developing country divide that has impeded global progress on climate action is increasingly reinforced by the growing rich/poor divide in developed economies, challenging and preventing ambitious climate action. In fact, the working poor in developed countries are increasingly viewing global warming and climate change as elitist, urban concerns. The recent Yellow Vest movement in France is an early warning on further paralysis in climate action, absent significant reversal in inequality and improvement in the condition of the most vulnerable population groups in both developed and developing economies. A continued push for climate action without addressing the concerns of the most vulnerable will further inflame populism and reinforce opposition to climate action.

### Violent conflicts derailing SDG achievement

Alongside accelerating climate change, rising violent conflicts—especially those within countries—is another worrisome trend that challenges SDG progress. The intensity of



violent conflicts (measured by the number of battle-related deaths) has risen since 2012, with the Middle East alone accounting for more than 50 per cent of total fatalities. These conflicts are often the result of entrenched intragroup inequalities and livelihood insecurities against the backdrop of economic slowdown, climate-related disasters, forced displacement, epidemic outbreaks, ill-designed policies, and capricious behaviour of authoritarian regimes.

Conflicts often reverse decades of hard-won development gains. They also destroy political institutions and social norms, and erode trust and cooperation across ethnic, religious and other dividing lines and sow the seeds for perpetual conflict. In many instances, ethnic nationalistic and radical religious groups have taken advantage of people's grievances, and the inadequate government responses to address them, to radicalize and recruit a significant number of new members both nationally and internationally.

Growing evidence suggests that conflicts and climate change are increasingly and inextricably linked. Droughts and loss of livelihood induced by climate change are amplifying economic insecurity, increasing migration pressures and triggering violence and conflicts, while conflicts are, in turn, accelerating deforestation and environmental degradation. They are also undermining political and administrative capacities to cope with climate change. Reducing inequality, expanding economic opportunities and securing livelihoods—especially for the most vulnerable and marginalized population groups—must remain a priority for preventing conflicts and accelerating SDG progress in many developing countries.

## **Harnessing potentials of migration for sustainable development**

Migration pressures are rising against the backdrop of increasing number and intensity of conflicts, rising climate risks and persistent economic inequality. Moreover, high population growth is shrinking employment opportunities in the developing world, particularly in sub-Saharan Africa and South Asia. Safe, orderly and regular migration, both within and across countries, is a critical coping strategy, not only for escaping poverty and finding livelihood opportunities elsewhere but also for adapting to climate change. Yet, regular migration opportunities are increasingly limited for would-be migrants, as political power in a large number of destination countries has decisively shifted towards the right, which typically opposes migration. The perceived fear of migrants taking over the existing pool of jobs and spreading their cultural and religious practices in the host country is propelling right-wing populism and nativism, making immigrants unwelcome, even when the benefits of migration outweigh the costs. The populist backlash against immigration is also undermining international commitment to, and governance of, safe, regular and orderly migration and giving rise to a vicious cycle.

The weakening of the multilateral commitment to international governance of migration is evident as several countries, including the United States of America, have refrained from joining the Global Compact on Migration, preventing a global consensus on safe, regular and orderly migration. The picture is equally bleak for the management of refugee flows. While about 77 per cent of people in 10 European Union countries still support taking in refugees, the recent refugee crisis has resulted in the hardening of national borders, implementation of restrictive policies, and border externalization to third countries. Participation in the global refugee resettlement programme of the Office of the United Nations High Commissioner for Refugees has declined, with only 75,200 refugees accepted in 2017, a 54 per cent drop from the previous year. Against this backdrop, many developing countries with limited economic means are increasingly hosting large

numbers of refugees. Jordan, Lebanon and Turkey are home to many Syrian refugees, while Bangladesh has taken in about a million Rohingya refugees from Myanmar. In Africa, Uganda has sheltered the largest number of refugees on the continent. In Latin America, Brazil, Colombia and Peru are hosting many displaced people from the Bolivarian Republic of Venezuela.

The burden on developing countries to host sizeable numbers of refugees must be more evenly shared across the international community. A total of 13.4 million refugees faced uncertainties and protracted challenges in 2017, representing an increase of 1.8 million from the previous year. It would be neither fair nor sustainable if the lion's share of responsibility to care for this increasing number of refugees falls on a relatively small set of developing countries. Coordinated efforts across both developed and developing countries are critical to easing the uncertainties and challenges that many refugees continue to face, and ensuring that no one is left behind.

In supporting a more balanced assessment of migration, more emphasis should be placed on its positive potential for both receiving and sending countries that is often neglected in public discourse. Harnessing such potential will remain critical for SDG implementation. Ageing and declining populations in many developed countries make it a necessity to accept and welcome migrant workers from developing countries with large young populations facing limited economic prospects. A better and wider understanding of the benefits of migration can help counteract populist responses to immigration and facilitate and promote orderly migration. More effective multilateral cooperation will remain critical for leveraging the potential of migration to deliver various SDGs, including those on addressing climate change and reducing inequality.

## Technology: the best hope for the SDGs

The combined effects of unsettling developments in the global economy, persistent inequality, worsening climate change, rising violent conflicts, and intensifying migration pressure paint a pessimistic picture of the chances for achieving the SDGs by 2030. Amid these gloomy prospects, technological advances present the best hope for mitigating CO<sub>2</sub> emissions, improving food and energy security, and accelerating progress on other SDGs. However, technology is also a wild card, as it may exacerbate employment risks, increase insecurity and inequality, and undermine social cohesion, peace and stability. SDG outcomes will largely depend on policies and incentives that will ensure responsible and equitable deployment of new technologies.

The world must leverage and make the best use of technological innovations to meet the most urgent and basic needs of food, shelter, health and energy. These basic-needs SDGs are critical determinants for meeting other SDGs. Indeed, fulfilling the basic needs of humanity, including those of the most vulnerable people, will remain a necessary precondition for achieving the SDGs in their entirety.

The most recent technological advances have shown potential for drastically reducing costs and expanding access in the areas of food, housing, health care and energy. Given that people in developing countries spend as much as 80 per cent of their total income to meet their basic needs, technologies that allow more economically efficient means for satisfying such needs will be a key enabler in reducing vulnerability and inequality. In view of this, this report identifies four sets of technologies that illustrate the potential of how technological innovations can help to achieve sustainable development, if guided by policies that ensure their wide accessibility and proper deployment.

## Securing decent housing for all

One in five people in the world lives in inadequate housing, with nearly one billion still living in slums and informal settlements. Millions of displaced people are trapped in inadequate and often dangerous dwellings, putting their lives, dignity and futures at risk for an extended period. Technological innovations are offering cost-effective emergency shelters as well as longer-term solutions. They also allow a smoother transition to permanent housing and recovery opportunities for displaced populations.

Prefabricated housing and new construction materials carry the promise of providing adequate and affordable housing to displaced populations. For example, prefabricated construction methods are reducing construction costs by 30 per cent in sub-Saharan Africa: a basic two-bedroom prefabricated housing unit in Kenya can now cost about \$167. Advances in housing-related technologies may also help to solve the global housing crisis, build resilience against economic and natural disasters, and promote more environment-friendly construction approaches. For example, 3D printing presents the possibility of a paradigm shift in the construction industry, eliminating as much as 60 per cent of materials used and 30 per cent of construction time. It is now possible to build a 3D-printed concrete house within 24 hours for \$10,000.

## Satellite technologies revolutionizing agriculture

The number of malnourished people reached 821 million globally in 2017. Without substantial progress in boosting agricultural productivity and improving affordability, the number will continue to rise. Early warning and mitigation technologies for drought—especially in sub-Saharan Africa where droughts undermine the food security of subsistence farmers—can boost agricultural productivity and help eradicate hunger.

Satellites are already delivering promising results. The Famine Early Warning Systems Network, a network of satellites, ground measurements and data amalgamation algorithms, is providing information on climatic and agricultural market developments for 30 countries across Africa, Asia and Latin America and the Caribbean. Satellite technologies are also enabling farmers to respond to drought conditions. An initiative in Ethiopia involves satellite remote sensing to identify groundwater sources, with information relayed to communities and pastoralists in drought-affected areas, assisting them in digging more accurate boreholes. This has led to a 92 per cent success rate in drilling new water sources thus far, reducing costs and improving accessibility.

## Energy security within reach

Sustainable energy production and access is a catalyst for achieving many other SDGs. A number of developing countries have made large strides in improving access to electricity since 2000. Yet, 840 million people still lack access to electricity, and nearly 3 billion rely on inefficient and polluting cooking systems responsible for 2.6 million premature deaths due to indoor air pollution. Heavy dependence on fossil fuels perpetuates energy insecurity for millions of people worldwide and contributes to devastating global warming.

Decentralized, off-grid renewable energy systems that use solar photovoltaic, wind turbines, mini-scale hydropower generators or biomass present tremendous scope for increasing access to electricity while reducing emissions and global warming. New technologies are reducing the cost of renewables and making decentralized solutions, along

with the expansion of conventional grid connections, viable options. The significant uptake of renewable energy usage and the reduction in the use of fossil fuels are paving the way for the decoupling of economic growth and carbon emissions, making it possible to maintain the same growth rates with greatly reduced CO<sub>2</sub> emissions.

### **Mobile technology and access to health care**

Despite tremendous progress in medical science, at least half of the global population, especially the poor and marginalized, still lack access to essential health services. Mobile health services that make health information and basic health services accessible from mobile devices promise to drastically expand coverage and transform health outcomes for billions of people. But leveraging mobile technologies to promote universal health care will require significant improvements in Internet infrastructure.

Mobile connectivity is also helping to alleviate the global shortfall of health workers—estimated to be as large as 10 million—especially in remote locations. It is now possible for medical personnel anywhere in the world to remotely review radiological images, diagnose skin conditions, review pathological results, provide mental health services, and monitor patients. The combination of connected devices and the growing recognition of the role of digital technologies will substantially change how governments manage their health systems. Recognizing digital technologies' transformative effects on their health systems, 58 per cent of the 125 countries that participated in the latest survey by the World Health Organization report having national strategies to use digital technology for health (eHealth).

Notwithstanding their cost-reduction potential, the developments of these technologies alone do not necessarily mean that more people will automatically gain access to affordable housing, clean and renewable energy, or health care. Technological innovation must be managed and regulated, with special attention directed at the most vulnerable who are least able to pay for their basic needs. Policy measures need to be put in place to ensure that efficiency gains and cost reductions translate into affordability and improved access for those who are most likely to be left behind. In this light, the global community will be best served if it bears in mind that technologies will foster SDG achievement only if they are handled with caution.

## Chapter I

# Economic uncertainties, insecurity and inequality

### Global economic outlook

Four years ago, amid growing optimism for a better future, world leaders adopted a set of universal, integrated and comprehensive goals in the 2030 Agenda for Sustainable Development. The world economy was on the path to a resilient recovery from the Great Recession. Greenhouse gas emissions growth was trending downwards, presenting hopes for decoupling of economic growth and growth in CO<sub>2</sub> emissions. Conflicts were on the retreat, except for a few hotspots. Political will and the commitment to multilateralism emerged stronger than ever. A sustainable future, envisaged in the 2030 Agenda, seemed to be not only a vision but a real possibility. There were no strong headwinds or gathering storms on the horizon that could unravel sustainable development. Many silver linings—especially rapid technological change—reinforced the conviction that sustainable development was truly within reach, worldwide.

The optimism underpinning the ambitious Agenda was predicated on the great development success that the world achieved during the previous two and a half decades. The number of people living in extreme poverty had declined by more than half since 1990, falling from 1.9 billion to 836 million by the end of the Millennium Development Goals (MDGs) period in 2015. The maternal mortality rate had declined globally by 37 per cent since 2000, while the under-five mortality rate dropped by 47 per cent over the same period. Between 1990 and 2015, 1.9 billion people gained access to safe drinking water; the number of people with access to mobile phones increased ten-fold; and in the least developed countries (LDCs), the proportion of people with access to electricity more than doubled.

The Sustainable Development Goals (SDGs) recognize and promote the imperatives of equitable growth: that it is sustainable and that no one is left behind. However, rising income inequality and entrenched economic insecurity work against the achievement of equitable and sustainable growth, and they also hinder national and international efforts to combat climate change, which is increasingly a ticking time bomb. After slowing down during 2012–2014 and remaining constant from 2015–2016, global CO<sub>2</sub> emissions started to rise again in 2017. These factors, in turn, contribute to an increase in the frequency, intensity and likelihood of conflicts, undermining economic growth and exacerbating poverty. Linked to environmental catastrophe and slow-onset changes such as drought, the number of undernourished people, following a prolonged decline, rose from 777 million in 2015 to 815 million in 2016 (United Nations, 2018a). Conflict, which is often provoked or prolonged by factors including environmental catastrophe and the exacerbation of food and other insecurities, has also been on the rise since 2015.



Figure I.1  
Sustainable development drivers



Source: UN DESA. Photo credit/UN Photo.

Growing inequality, climate risks and conflicts are the gathering storms that now hang over the SDGs (figure I.1). Unfortunately for the 2030 Agenda, the world tolerated rising inequality for too long. Inequality is now undermining solidarity and social cohesion within and across countries and undermining multilateral processes that are sine qua non for achieving the SDGs. National and international efforts for accelerating SDG achievements must tame inequality and reverse its trends in order to reduce insecurity and rebuild trust and social cohesion—two necessary conditions for combating many global challenges, including climate change, conflicts and growing migration pressures.

Amid gathering storms, however, there are silver linings. As evident in voluntary national reviews and *The Sustainable Development Goals Report 2018*, countries that made the most progress towards the SDGs are those that translated the shared vision of the 2030

Agenda and its commitment to leave no one behind into national development strategies and comprehensive, multi-stakeholder interventions across the SDGs, supported by targeted spending.<sup>1</sup> Their experiences show that SDG progress requires action and implementation beyond promoting economic growth alone. Progress on addressing the often overlapping gender, income and geographical inequalities, for instance, has been made possible through progressive legal frameworks and policies to redistribute resources to vulnerable groups.<sup>2</sup> Progress towards combating and mitigating the effects of climate change has been made possible by concerted policy efforts and redirecting funds to decouple economic growth from environmental degradation. Moreover, promoting human rights and good governance has been made possible through active efforts. Today, more than 108 countries have implemented national policies on sustainable consumption and production, and 152 countries have now adopted national urban policies to promote sustainable urbanization.

Rapid technological change now offers the best hope for achieving the SDGs. While this change can create fears concerning employment prospects and inequality as well as a multitude of ethical concerns, it holds tremendous promise in contributing to, rather than holding back, sustainable development progress and prosperity. With proper policy and regulatory measures, technological advances could continue to propel rises in productivity and, as illustrated in chapter 3, address a wide range of development challenges, including climate change, inadequate housing, food and energy insecurity, and lack of full coverage of essential health services.

Among the development lessons from the MDG period, these were loud and clear: economic growth alone will not lift all people out of poverty, and national policies must look beyond gross domestic product (GDP) growth and play a catalytic role. Economic growth during the 25 years before 2015 left many behind, marked by lowered incomes and greater wealth inequality, increasing the sense of economic insecurity, marginalization and alienation. Strong and resilient economic growth, especially in many emerging economies, underpinned the great development strides during the past decades. GDP growth played an important role in reducing poverty and generating prosperity at an unprecedented scale and scope, yet it was at best a necessary condition for achieving broad-based human development. While GDP growth and human development went hand in hand, many countries achieved great progress in education and life expectancy—two important indicators of well-being—without necessarily achieving spectacular economic growth (figure I.2). There are countries that registered strong economic growth but little progress in human development, and others that achieved moderate economic growth but above-average progress in human development. Economic growth provided the foundation for broad-based development, but the combination of national policies—ranging from labour market policies that ensured growth of decent paying jobs to redistributive policies that protected the most vulnerable and marginalized population groups—played the most important role in ensuring that economic growth translated to human development.

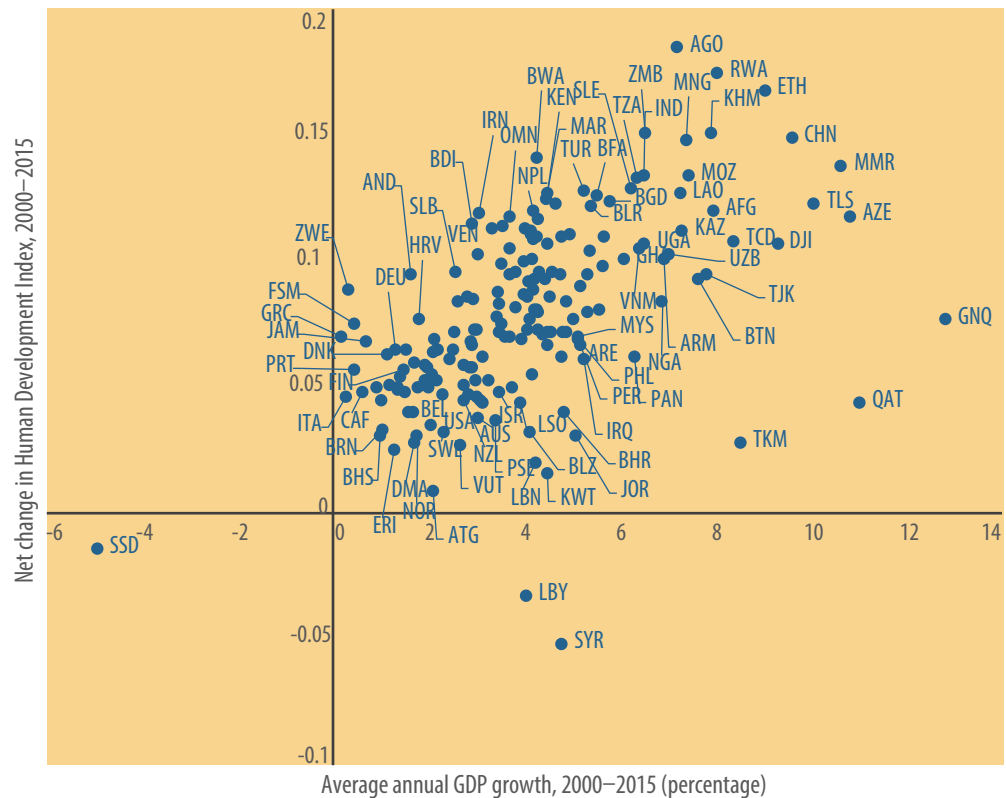
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**1** Countries including Benin, Cabo Verde, Canada, Egypt, Ireland, Paraguay and Togo mentioned allocating adequate funds to various SDG initiatives, and leveraging private money through public-private partnerships to achieve SDG targets related to infrastructure, sustainable cities, energy and climate change.

**2** Countries including the Bahamas, Cabo Verde, Jamaica and Lao People's Democratic Republic reported on policies implemented to address overlapping income and geographical inequalities. Egypt described how it is redirecting fiscal resources away from programmes of direct price subsidies towards cash transfer programmes for vulnerable groups, such as a monthly conditional cash transfer for households with children, while incentivizing poor households to invest in their children's health, education and nutrition.



Figure I.2  
GDP growth and human development, 2000–2015



Source: Human Development Data Bank and World Development Indicators database.

### Slowing growth

While growth in the absence of inclusive and sustainable policy frameworks will not lead to SDG progress, economic vitality is still crucial for increasing employment opportunities, raising incomes, and boosting government revenues for development spending. Yet, GDP growth is projected to average about 3 per cent during the SDG period (figure I.3), falling below the global growth level achieved during the MDG period of 2000–2015. The slowdown and stagnation in economic growth and global trade will dampen employment growth, further exacerbating underlying risks and threatening to reverse hard-won development gains.

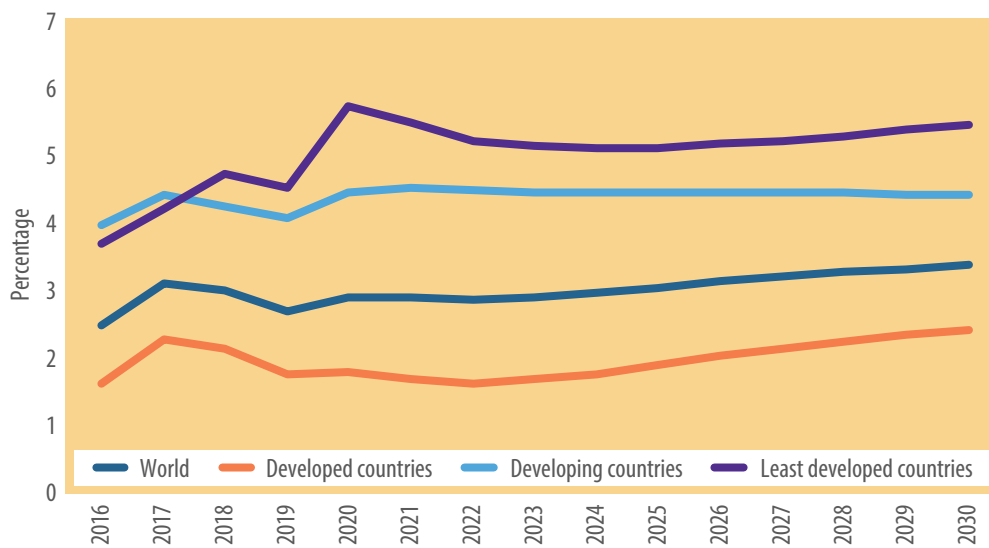
Persisting uncertainty regarding the trade and investment outlook, low commodity prices, rising debts, conflict risk and climate concerns threaten positive forecasts. The potential for a growth slowdown, driven by falling consumption and investment, is still very real. Should any of these significant downside risks materialize, they could put a global economy already characterized by rising economic insecurity in an even more precarious situation. The trends and risks across a host of macroeconomic variables and their implications for the SDGs will be detailed later in this section.

World trade witnessed unprecedented growth since the early 1990s, against the backdrop of the expansion of the rule-based multilateral trading system under the auspices of the World Trade Organization (WTO). However, average annual export growth fell from over 9 per cent during 1990–2007 to under 5 per cent during 2008–2017 (figure I.4), amid subdued global demand for commodities, stalled liberalization, overall

unease about the global economic trajectory, and looming threats of protracted trade disputes. Rapid advances in renewable energy technologies and the development of new materials will change the volume, direction and terms of trade for many commodity-exporting economies. Automation will accelerate the reshoring of manufacturing from developing countries back to developed ones, disrupting global value chains and export-led patterns of growth and development. Slowing global trade will weaken employment growth, worsen income inequality among countries, and heighten uncertainty and insecurity.

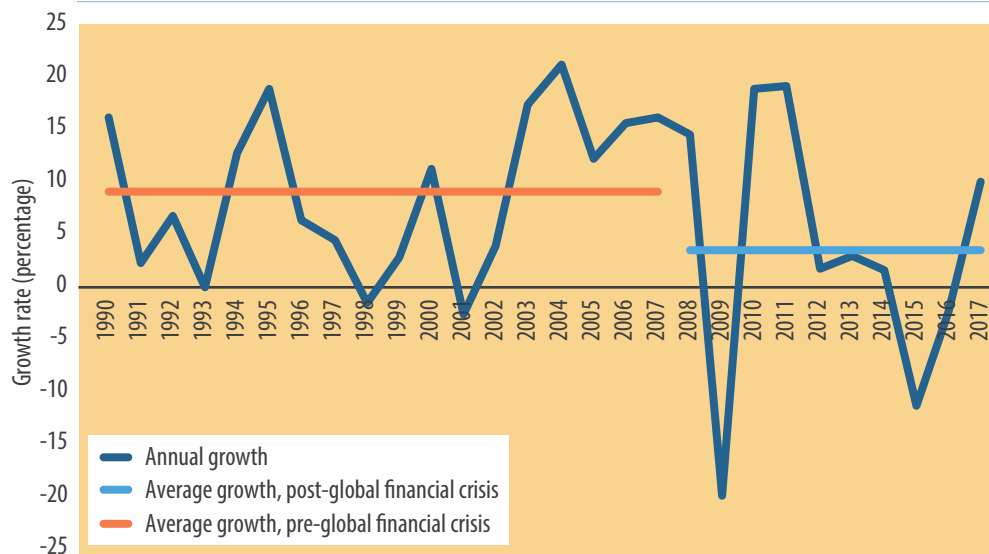
Regional free trade agreements, customs unions and other agreements have also played an important role in fostering trade. Meanwhile, BRICS (Brazil, the Russian

Figure I.3  
Growth-rate projections, by country groupings, 2016–2030



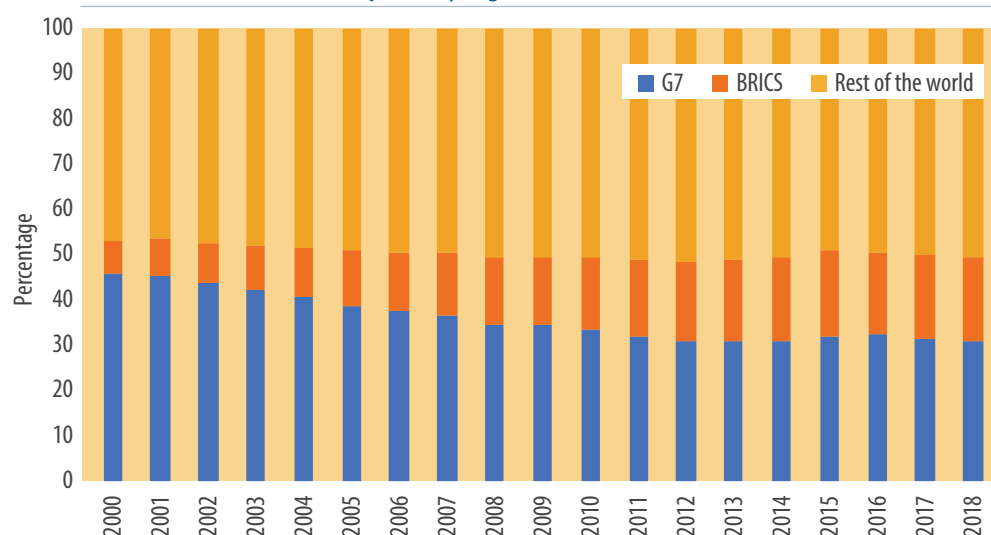
Source: UN DESA World Economic Forecasting Model.

Figure I.4  
Global exports of goods and services, annual growth and average growth rate for pre- and post-global financial crisis periods, 1990–2017



Source: UN DESA calculations, based on data from UNCTADStat (2019).

Figure I.5  
Total world merchandise exports, by region, 2000–2018



Source: UN DESA calculations, based on data from UNCTADStat (2019).

Federation, India, China and South Africa) have been playing a larger role in global merchandise trade and have in fact been a driving engine behind global trade growth, with rich countries representing a declining proportion (figure I.5). This reflects changing global dynamics and centres of production, growing consumption in emerging markets and other developments; but it also reveals the means through which a disruption in global trade practices, routes and value chains would impact the trajectory of trade growth.

### Lingering trade tensions

Rising income and wealth inequality are brewing anti-trade and anti-multilateralism sentiment in many developed countries. The continued stalling of the Doha Round of trade negotiations has further fuelled skepticism about multilateralism, prompting withdrawals from multilateral arrangements, and an increasing shift to bilateral and plurilateral trade arrangements, while encouraging certain countries to introduce trade restrictions in response to grievances. Since the global financial crisis, 800 new trade protective measures were introduced globally per year on average (Kutlina-Dimitrova and Lakatos, 2017), particularly in steel, metal products, cars and other vehicles, and appliances (Global Trade Alert, 2019). The festering trade disputes between China and the United States of America—the two largest trading nations—have had ripple effects through global value chains. Bilateral merchandise trade between the two has fallen by more than 15 per cent from September 2018 through mid-2019 (United Nations, 2019a).

Trade disputes are already taking a visible toll: economic uncertainties have increased, exacerbating economic insecurity for millions who are vulnerable to trade shocks. The Economist Intelligence Unit's list of global risks in 2019 identifies the US-China trade conflicts as the highest risk event in both intensity and probability (The Economist Intelligence Unit, 2019). In 2019, the WTO World Trade Outlook Indicator, which measures the trajectory of global trade, provided its weakest estimate since March 2010 (World Trade Organization, 2019). Trade developments also affect the overall economic

climate for investment, consumption and growth, and threaten the fragile recovery and global employment situation.

Meanwhile, the rule-based multilateral trading system is also facing structural and institutional challenges, which may have long-lasting impact on the global trading system even after the ongoing trade disputes are resolved. Vacancies in the WTO courts of appeals mean that a quorum cannot be reached, while reappointment bids have repeatedly been blocked. Should trade restrictions escalate, the direct and indirect effects throughout the economy would be complex, intertwined and severe. Several studies have examined what the quantitative impacts of imposing larger tariffs by China and the United States would be. A few selected analyses are detailed below (table I.1).

Economic research unequivocally demonstrates the high cost of a trade war for world GDP. Unilateral protectionist policies often ignore the indirect and spillover effects of these measures on global value chains, which involve a significant amount of value addition and re-exports, thus bringing few of the simplistically predicted wins of limiting imports. While lingering trade tensions will disrupt existing value chains and may potentially create opportunities for other countries involved in these value chains, the net effect on the global economy and on sustainable development will be negative, given the high adjustment costs, transition costs and dead-weight losses associated with these disruptions.

Bearing in mind the growing costs of protracted trade disputes and potential weakening of the rule-based multilateral trading system, countries are increasingly looking for alternative avenues to sustain aggregate demand and economic growth. The United Nations Economic Commission for Latin America and the Caribbean (ECLAC) (2018), for example, has pointed to regional integration initiatives among Latin American countries to diversify trade in terms of products and partners and build new domestic demand for higher-value goods. There has been considerable progress towards the African Continental Free Trade Agreement (AfCFTA), which went into effect on 30 May 2019. Regional trade in Africa is conducive to higher-value, industrialized sectors, with manufactured goods accounting for 43 per cent of intra-African exports. It stands in contrast to external trade, which largely features primary goods and commodities, with manufactured goods accounting for only 18 per cent of these exports (United Nations Economic Commission for Africa, 2017).

These regional approaches aim to provide an alternative for developing countries to realize ambitions in export-led industrialization, as the realistic space for newcomers to follow the development experiences of East Asian countries is becoming narrower.

Table I.1  
Effects of larger tariffs by China and the United States of America

Change made	Effect	Study
Reverting to most-favoured-nation rates with greater costs of traded services	Global trade falling by 2.1% and global real income by 0.3% annually three years after change, relative to baseline	Kutlina-Dimitrova and Lakatos (2017)
Increasing tariffs to legally allowed bound rates (tripling in size) with greater costs of traded services	Global trade falling by 9% and global real income by 0.8% annually three years after change, relative to baseline	Kutlina-Dimitrova and Lakatos (2017)
United States places 25% tariff on the \$505 billions of imports from China, and China retaliates with a tariff hike half this size	Global GDP growth reduced by 0.7 percentage points in 2019, with sizable negative effect on the two countries themselves	Mesquita (2019)

Source: UN DESA, based on Kutlina-Dimitrova and Lakatos (2017) and Mesquita (2019).

Automation of an increasing number of productive activities; falling logistics and energy costs in developed countries; the advent of many low-cost new materials and minerals; and persistently high costs of production due to limited infrastructures in developing countries all challenge the ability to replicate quick-wins in manufacturing. These new entrants will need to harness a variety of opportunities presented by new sectors and activities that face growing demand and in which they can build a competitive edge.

### Growing employment and wage uncertainties

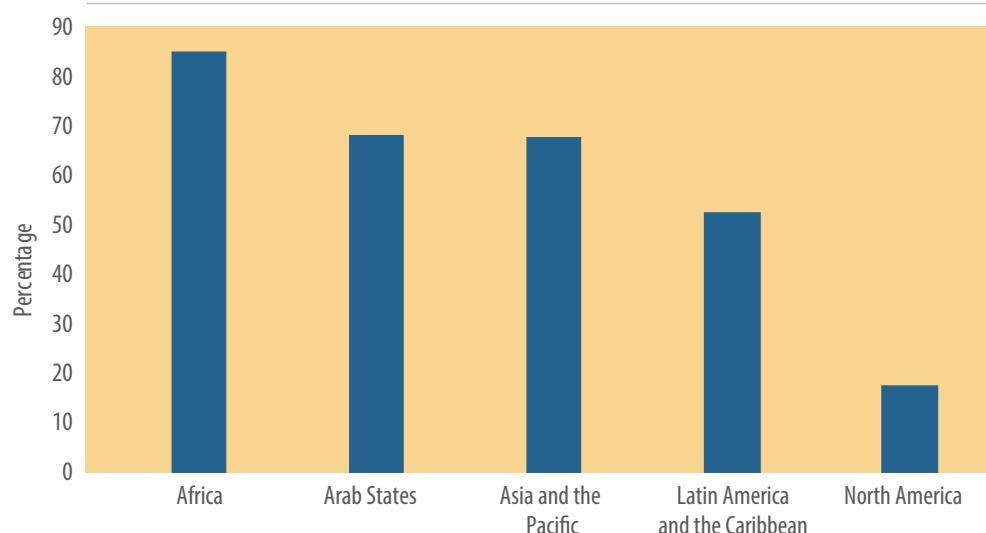
A decade after the 2008–2009 global financial crisis, global unemployment levels have finally fallen back to pre-crisis levels at 5 per cent, with a jobs boom being experienced across many developed and developing countries alike. But similar to GDP growth masking other economic vulnerabilities, aggregate unemployment numbers obscure more critical trends in labour force participation rates and informal as well as vulnerable employment, which remain a challenge in many developing countries. Employment insecurity and vulnerability in the era of the gig economy, part-time work and underemployment are also growing concerns in many developed economies.

Policies that promote quality work, not just the quantity or volume of employment, will remain critical for combating inequality and economic insecurity. Decent work—which delivers a fair income and provides security in the workplace, social protection for families, and better prospects for personal development and social integration (International Labour Organization, 2019a)—is a tenet of SDG 8 and relevant across all SDGs.

The International Labour Organization (ILO) estimates that as of 2018, 3.3 billion people were employed, but that the majority lack material well-being, economic security and equal opportunity. The number of individuals engaging in informal, contractual, and part-time work has been on the rise, with an estimated 61 per cent of the global workforce informally employed (International Labour Organization, 2019b). 93 per cent of the world's informal employment takes place in emerging and developing countries with several regions having more than half of all employment in the informal economy (figure I.6), with those living in rural areas most likely to be informally employed (Stuart, Samman and Hunt, 2018). Masking the real challenges in employment, global real wage growth has fallen to its lowest rate since 2008, reaching just 1.8 per cent (International Labour Organization, 2019b). In most countries, wage growth has not kept up with the pace of productivity due to a host of factors such as skills-biased technology, the weakening of labour market institutions (International Labour Organization, 2016/17), a prevalence of low-paying jobs, more part-time and temporary contracts (United Nations, 2018b), and a gap in needed proactive labour policies. Wages have increasingly been distributed unevenly across income groups in nearly all countries since the 1980s, remaining stagnant for the bottom 50 per cent of society, yet rising substantially for the top 10 per cent and 1 per cent (Alvaredo and others, eds., 2018). Meanwhile, cities and urban areas which generate jobs in new sectors also feature rapidly increasing costs of living, compounding the sense of economic insecurity.

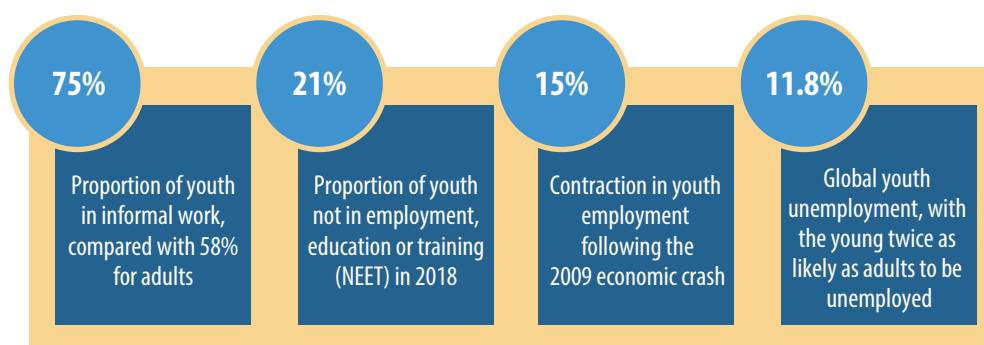
Informal workers do not benefit from social protections and national labour legislation and are not entitled to certain employment benefits. While global working poverty has decreased over the last three decades, in low-income countries, the pace of poverty reduction is not expected to keep up with employment growth, which will result in an increased number of working poor. These trends have led to a growing cohort of young “discouraged workers” who withdraw from the workforce altogether (United Nations, Department of

Figure I.6  
**Informal employment as a proportion of total employment, by region, 2016**



Source: ILO (2018a).

Figure I.7  
**Employment challenges facing youth**



Sources: ILO (2019b); UN DESA (2019b).

Economic and Social Affairs, 2019b). In lower-income countries, where withdrawing from employment is often not a viable option, participation rates do remain higher, albeit facing greater vulnerable and informal prospects as outlined above.

Finding productive and decent work is a particular challenge for youth (figure I.7). These challenges are especially acute in Africa, which has the youngest population in the world and 12 million young people entering the work force every year (ibid.). A lack of job creation despite high macroeconomic growth results in one-third of this “youth bulge” being unemployed and discouraged, one-third in vulnerable employment, and only one in six in waged employment (African Development Bank, 2015). Notably, sub-Saharan Africa has the world’s highest percentage of working-poor youth at 70 per cent (United Nations, Department of Economic and Social Affairs, 2019b). The high prevalence of underemployment and discouraged workers will remain a trigger of conflicts and migration, as will be discussed in chapter II.

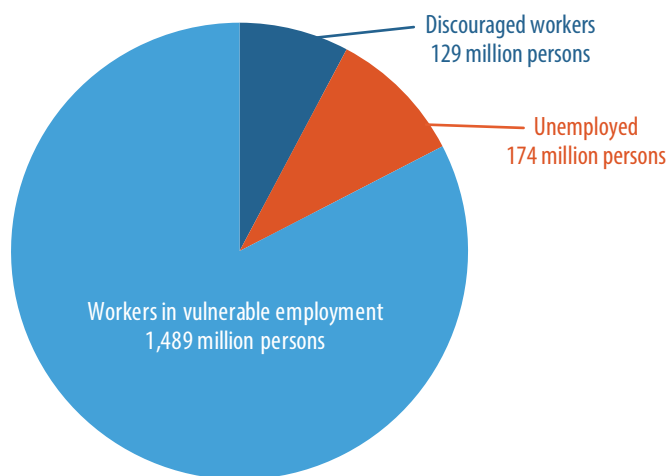
Informal employment increases the risk of vulnerability and socioeconomic exclusion and acts as an obstacle to sustained economic growth (United Nations, Department of Economic and Social Affairs, 2019b). Employment and wage insecurity also lead people

to seek solutions through protests, voting and migration. In general, the ILO finds that a one percentage point change in the unemployment rate is related to change in its social unrest index—which measures protests sparked by economic and political uncertainty—by 0.54 points (International Labour Organization, 2019b). In the United States, for example, it is estimated that 4 in 10 Americans live in highly (15 per cent) or moderately (25 per cent) economically insecure households. Economic insecurity also influences voting patterns, fueling support for anti-establishment populist parties, and especially for far-right parties (Burgoon and others, 2018; Rydgren, 2013; Betz, 1994). It also fuels migration; according to a Gallup World Poll (Esipova and others, 2018), 15 per cent of adults in the world expressed a desire to move abroad between 2015–2017, up from 13 per cent in 2010–2012.

Population growth and economic slowdown are likely to exacerbate inequality and insecurity and pose additional challenges to achieving SDG 8 and the 2030 Agenda. The world is expected to grow to 8.6 billion people by 2030, with a 21 per cent increase in the working-age population (United Nations, 2017a). To keep pace with the growth of the global working age population, over 600 million new jobs (about 40 million per year) need to be created (International Labour Organization, 2019b). Due to the geographical distribution of population growth, 91 per cent of this job creation will need to occur in low-income and lower-middle-income economies. Sub-Saharan Africa and Southern Asia, where most population growth will occur, will be home to 38 per cent of the global labour force by 2030, up from 26 per cent in 1990 (International Labour Organization, 2018b). As youth are the largest cohort among international migrants, a mismatch in employment opportunity will continue to spur migration to neighbouring countries and beyond. Meanwhile, rapidly ageing populations in many developed and some developing countries—another prominent global demographic trend—also contribute to the prevailing sense of economic insecurity, highlighting the importance of policies that protect the economic well-being of the elderly.

In a business-as-usual scenario, assuming a labour force participation rate of 63 per cent among those of working age and a vulnerable employment rate of 45 per cent,<sup>3</sup> 147 million additional people will be in vulnerable employment by 2030 (figure I.8). Presuming a continuing global unemployment rate of 5 per cent, the number of unemployed

Figure I.8  
Employment prospects and risks for 15–64 age group in 2030



Source: UN DESA calculations, based on various ILO estimates including ILOStat (2019).

<sup>3</sup> This represents a general continuation of current trends.



people will increase by nearly 20 million by 2030, at which point there will also be more than 32 million additional people outside of the labour force. This will not only serve to exacerbate economic inequalities and insecurities, but also continue to bear large consequences in the form of protests, conflict, voting behaviour and extra migration. Overall, in formulating policy levers to deal with this, it will be vital to pay attention to underlying insecurities related to employment and wage concerns that are often obscured by macroeconomic figures.

## Rising debt burden

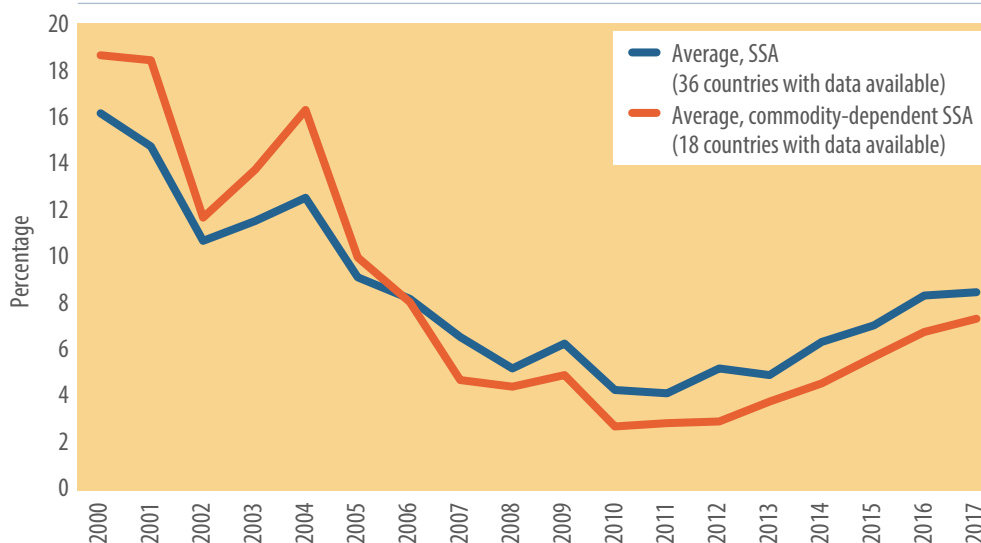
The global debt stock currently stands at \$247.2 trillion, an 86 per cent increase since the start of the global financial crisis (United Nations, 2019b). For low- and middle-income countries, debt inflows surpassed equity inflows in 2017 for the first time in four years, and by the end of 2017, one-third of low-income countries had debt-to-gross national income ratios of over 60 per cent and debt-to-export ratios of over 150 per cent (World Bank, 2018a). Developing countries are increasingly issuing external bonds, feeding global investors' appetites for new opportunities, with eight African countries raising \$28 billion in external bond issuances in 2018 and five more countries set for 2019, further adding to public debt (United Nations, Department of Economic and Social Affairs, 2019a).

Commodity price fluctuations, and price declines in particular, have led countries to borrow to plug gaps in committed expenditures. Weak oil prices had initially caused Cooperation Council for the Arab States of the Gulf (GCC) countries to draw down reserves and introduce a value added tax, but persisting spending needs have ballooned public debt. For example, public debt in Saudi Arabia rose from 1.6 per cent of GDP in 2014 to 18.0 per cent in 2018 (*ibid.*). In the European Union, many countries have total public debt-to-GDP ratios above or near 100 per cent. In extreme cases, such as that of Japan, gross public debt including local government debt is estimated to have reached 200 per cent of GDP in 2018 (*ibid.*).

While the static level of debt alone is not necessarily a cause for alarm, debt service payments detract fiscal resources from government spending and could have other negative economic spillover effects on SDG progress. LDCs have been facing growing debt servicing expenditures, albeit at levels below five per cent of GDP (United Nations, 2019b). Organisation for Economic Cooperation and Development (OECD) countries have managed to reduce debt servicing costs, with government financing shifting to long-term fixed rate financing instruments (Organisation for Economic Cooperation and Development, 2019, pp. 10-11). Also, there is to some extent less re-securitization of debt, thus less chance of a shock event having exponential ripple effects throughout the global financial market, and banks are more capitalized (United Nations, Department of Economic and Social Affairs, 2019a). However, experiences do vary across OECD countries and borrowing costs are starting to creep up.

On the other hand, lower-income countries are less equipped to deal with high debt, and do not have as generous debt servicing arrangements. As developing countries become re-indebted for the first time in decades, high absolute levels represent a significant threat, particularly in the absence of nuanced servicing instruments. Figure I.9 illustrates that debt service as a share of exports and income has been increasing for the past ten years, returning to previous highs in countries in sub-Saharan Africa. These include commodity-dependent countries that have been spending and borrowing against high returns on fuel and mineral

Figure I.9  
**Total debt service as a percentage of exports of goods, services and primary income, average for sub-Saharan Africa (SSA), 2000–2017**



Source: UN DESA calculations, based on World Development Indicators database.

exports.<sup>4</sup> Falling global commodity prices in recent years have therefore increased their debt-related risks.

If these trends continue, and if external shocks—such as upward pressure on interest rates, which could lead to a national debt crisis (e.g., default), causing loss of confidence in the economy—reinforce them, they will reduce aggregate demand, increase unemployment, cripple the national currency, and induce regional spillover effects. This then diverts resources from health, education and other sustainable development-related expenditures, as has been seen in Argentina, Greece and elsewhere, contributing to social unrest and political upheaval. Future credit channels will be limited, hindering further economic development and financing for structural transformation. Perceptions and speculation play outsized roles in causing a rapid loss of confidence, and in the cross-border nature of such an event.

Importantly, uncertainty regarding the ability to service debt burdens is rising now in a very different international economic environment than the environment preceding previous debt crises. A default now would occur amidst threats to multilateral lending and assistance, new lenders who are untested in dealing with default, and markets which react more quickly to such developments.

This default threat is driven by riskier investments. Globally, about 80 per cent of leveraged loans issued are “covenant-lite”—that is, they do not require certain minimum financial ratios of borrowers (ibid.). Estimations also illustrate that nearly a quarter of corporate bonds in Brazil, China and India are at high risk of default, as are 18 per cent of

<sup>4</sup> Based on the United Nations Conference on Trade and Development (2019) *State of Commodity Dependence 2019* report, “dependence on commodity export” means more than 60 per cent of total merchandise exports composed of said commodities, focusing here on exports of fuel, minerals, ores and metals (excluding agricultural product export dependence due to the ubiquity of this definition for SSA countries).

outstanding bonds in the United States energy sector (Lund and others, 2018). Meanwhile, 40 per cent of LDCs are at high risk of, or are already in, debt distress (United Nations, 2019b).

Some countries and regions are facing increasing debt pressure due to the nature of their economic growth models. There is concern that as growth slows in China, monetary policy and government spending to counter this trend—whether through supporting new growth initiatives or mitigating effects of slowing growth—could put upward pressure on debt. Absolute levels of debt may continue to rise as commodity prices remain low for resource-dependent countries, such as those in the GCC and many throughout Africa, and spending needs persist.

Another challenge is that countries may not be using their new debt to finance productive growth strategies, but rather for shorter-term consumption or the servicing of old debt. Even well-intentioned investments in infrastructure and other needs may balloon debt at a faster rate than ensuing projects will contribute to growth and revenue generation.

Given these rising debts, servicing burdens and vulnerabilities, the threat of individual or collective defaults and their potential impact on the sustainable development agenda need to be recognized, including households' limited ability to mitigate in emergency and crisis situations. Countries must continue their efforts to diversify their sources of financing as stipulated by the Addis Ababa Action Agenda, address illicit financial flows (IFFs) that deprive sovereign states of tax revenue, and build capacities for monitoring and addressing debt levels. Countries should also endeavour, when possible, to structure borrowing in local currencies, as current debt in foreign currency adds further burdens in the context of the appreciating dollar and in crisis situations where access to foreign currency is scarce. Indeed, the proportion of total global debt that is issued in dollars has been gradually increasing,<sup>5</sup> which makes countries' debt servicing burden more contingent on the movement of the dollar. Overall, the lack of coordination in global responses to debt crises speaks to the need for a better global financial infrastructure for development financing, given the inability of existing institutions and frameworks to handle these issues.

## Rising inequality

Rising inequality of income, wealth and access to opportunities discourages skills accumulation, chokes economic and social mobility and human development, and, consequently, depresses economic growth. Inequality also entrenches uncertainty, vulnerability and insecurity, undermines trust in institutions and governments, increases social discord and tensions and could possibly trigger violence and conflicts. More than two thirds of the world population are now experiencing rising income and wealth inequality, which is significantly undermining the prospects for SDG achievement. Ensuring equality has intrinsic value, as the existence of inequality is typically associated with deviation from meritocracy and fairness in terms of livelihood opportunities (United Nations Development Programme, 2013). As meritocracy and fairness are essential moral requirements across different country and culture contexts, containing inequality (thereby helping to satisfy such requirements) would in itself be of significant importance to people around the world. Moreover, given the interrelationships in the processes of inequality and development, tackling inequality would have material implications for the achievement of sustainable development. Perhaps the most discussed relationship is that between inequality and growth.

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<sup>5</sup> Among a grouping of 52 issuing currencies.

There is strong evidence of a correlation between high inequality and lower growth (Organisation for Economic Cooperation and Development, 2015; Ostry, Berg and Tsangarides, 2014), contradicting the previously widely held presumption that inequality is good or even necessary for growth.<sup>6</sup> Possible transmission channels through which inequality hampers growth include the former's effect on human capital accumulation. High inequality implies a high number of poor who do not have the ability to finance their own education or their children's, particularly when a deep financial market is absent (Galor and Moav, 2004). Also, high inequality is often associated with political instability, which could depress investment and subsequent economic growth (Keefer and Knack, 2002).

### **Inequality restricting upward social mobility**

High inequality is closely linked with low social mobility (figure I.10), as it has been shown that intergenerational mobility in income is generally lower when inequality is higher (Corak, 2013; Narayan and others, 2018; Organisation for Economic Cooperation and Development, 2018). In highly unequal societies, not only do lower-income households face substantial financial constraints to investing in education that enables their children to move up the socioeconomic strata, they might also be less willing to invest, as it might be seen as a futile effort in a society that is perceived to be unfair (Solt, 2008). The inability and unwillingness of the lower-income households to invest in human capital formation would directly lead to lower social mobility, which in turn further exacerbates the existing inequality. More broadly speaking, higher inequality in economic and political power undermines people's trust in public institutions. Concentration of power at the top end of economic distribution enables a public decision-making process that does not necessarily account for, and satisfy, the needs of those outside that stratum. Also, as will be discussed later in this chapter, high inequality reinforces a sense of economic insecurity, creating anxiety that one's economic aspirations cannot be achieved. The resulting lack of trust could destabilize traditional public institutions, making them ineffective at formulating and implementing policies that advance sustainable development outcomes.

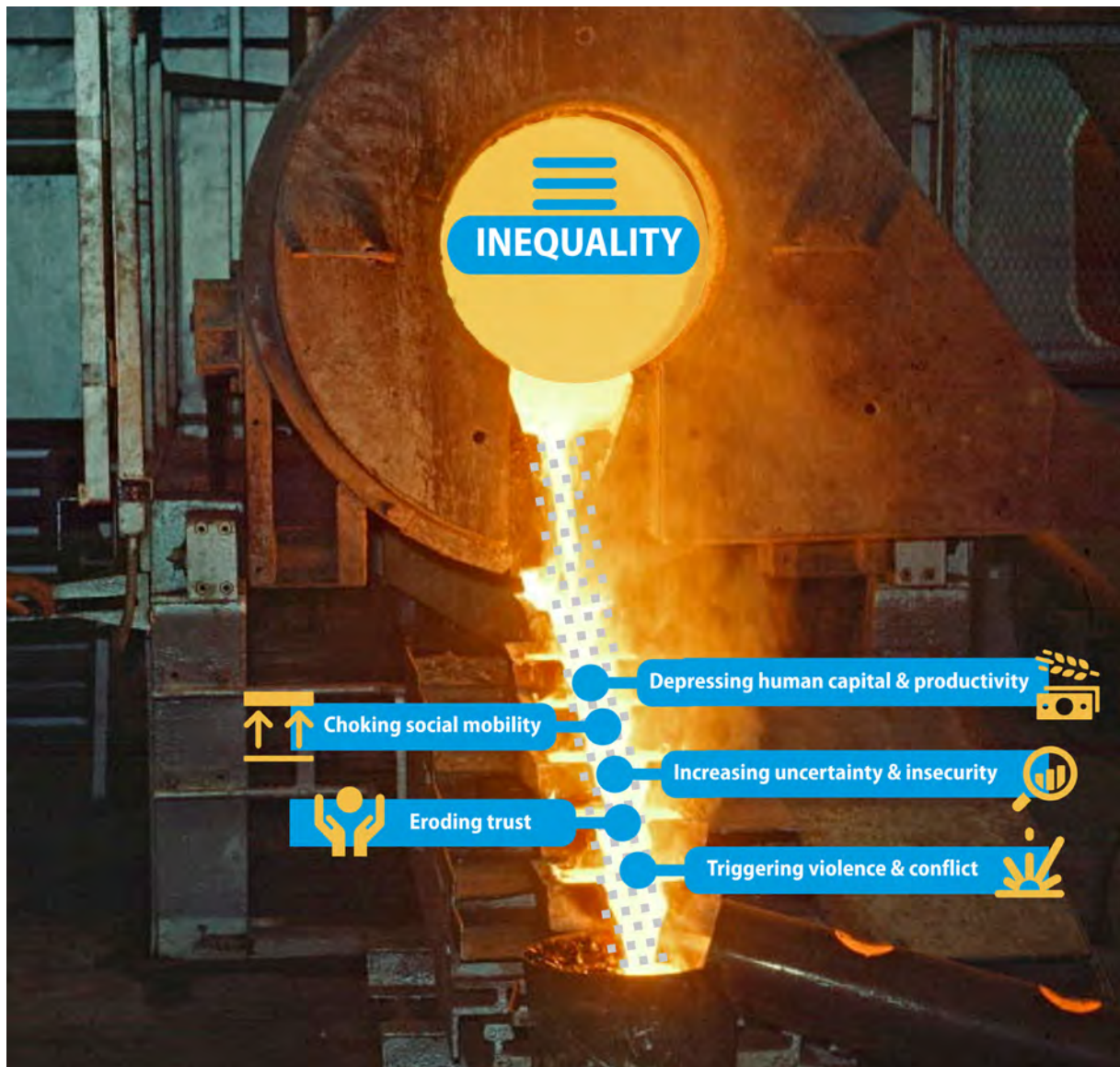
There is also the argument that higher inequality would lead the majority of the public to support policies that are unfavourable to business investment, such as very high taxes (Persson and Tabellini, 1994). However, this line of argument seems to run contrary to what is observed in many parts of the world, where the pervasive narrative is that higher economic inequality goes hand in hand with more concentration of economic and political power. For example, Gilens and Page (2014) have found that, in the case of the United States, the public policy preferences of the rich dominate that of the majority.

The most recent data depicts a world that, despite some progress, is still facing significant inequality and is far from achieving the goal of leaving no one behind. Between-country income inequality has narrowed in past decades, as shown by the convergence of population-weighted income levels, but that is largely driven by populous Asian countries (Lakner and Milanovic, 2016). Outside of Asia, few developing countries in other regions have seen notable narrowing of their large income gap with the developed world (United Nations, 2017b). At the same time, within-country income inequality (as measured by the Gini coefficient) has risen in countries that are home to more than two thirds of the world

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<sup>6</sup> It should be noted that some evidence supports a non-linear relationship between inequality and growth, suggesting the detrimental effect of the former on the latter is only noticeable at high inequality levels. For reference, see Hong, Li and Peng (2014).

Figure I.10

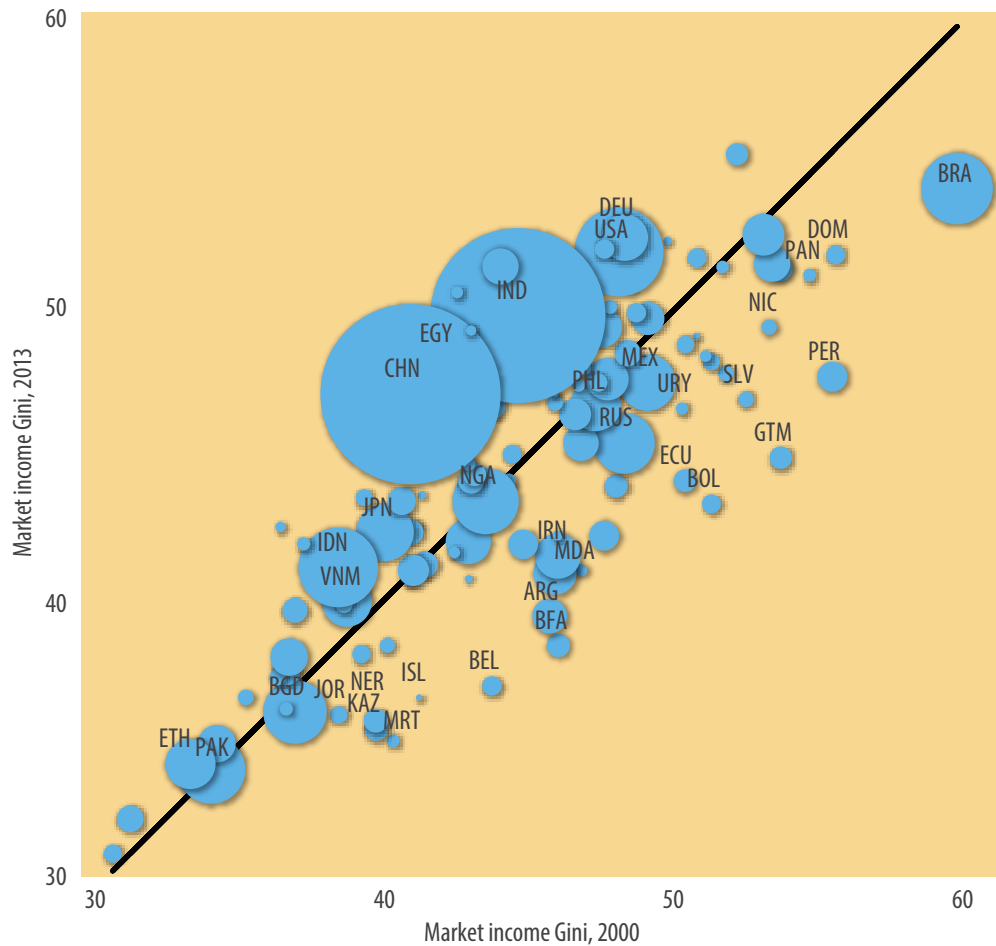
**Inequality moulding economic and social dynamics**

Source: UN DESA. Photo credit/UN Photo.

population (figure I.11). Africa and Latin America and the Caribbean have seen some of their countries' Gini coefficient decline but remain at a relatively high level. In terms of the income share of top income groups—another indicator of income inequality—data has shown that many countries have seen the top 10 per cent income group's national income share increase since 1980, albeit at varying speeds (Alvaredo and others, eds., 2018). These include some countries that experienced a decline in their Gini coefficient. Even in places where income inequality as measured by different indicators has come down in recent years, wage growth and job creation for those at the lower end of the income spectrum is not proceeding fast enough to help those being left behind to completely escape poverty (United Nations, 2018b). Latest estimates show that 8.6 per cent of the world



Figure I.11  
**Within-country income inequality, 2000 vs. 2013**



**Source:** UN DESA elaboration, based on data from the Standardized World Income Inequality Database Version 8.0 (Solt, 2019). The straight line is the 45-degree line. A country placed above (below) the line means it had higher (lower) income inequality in 2013 than in 2000. The size of a circle is proportional to the country's population size in 2013.

population still lived below the extreme poverty line in 2018 (United Nations, 2019d). As will be discussed in more detail in the next section, social protection coverage remains low in some developing regions. Overall, only 48 per cent of the world's population was effectively covered by at least one type of social protection cash benefit as recently as 2015 (International Labour Organization, 2016/17). The gross primary school enrollment ratio has reached over 100 per cent globally, but the gross secondary enrollment ratio remained at about 77 per cent in 2017, with the ratio for low-income countries stagnating at about 40 per cent since 2011 (World Bank, World Development Indicators database).

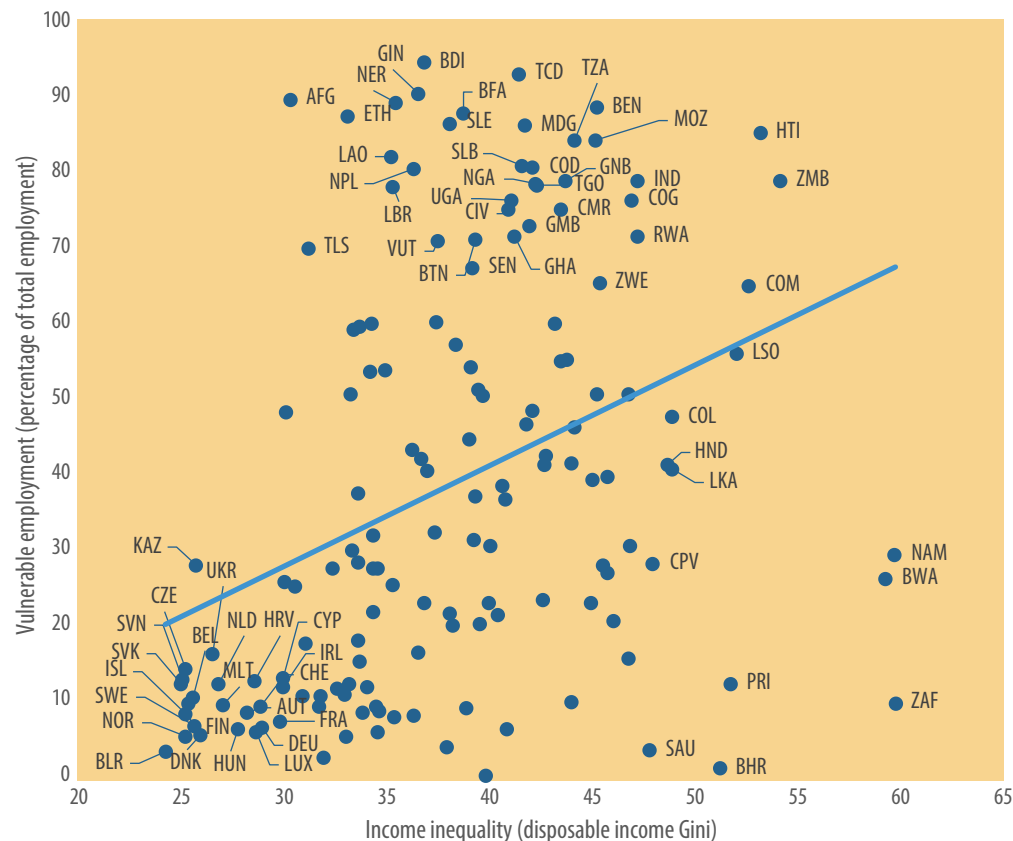
### Mutually reinforcing inequality and vulnerability

The high levels of vulnerable and informal employment discussed earlier, especially in developing countries, could reinforce the pervasive and persistent inequality. Vulnerable and informal employment are typically associated with precarious and poor labour conditions, where workers do not enjoy the same levels of employment protection and perks (including training) that those on more standard work contracts enjoy (Organisation for Economic Cooperation and Development, 2015). Workers in vulnerable and informal

employment are also subject to substantial wage penalties and earning instability, higher probability of job losses and slower wage growth. Given the gap in wages and other benefits between those in standard employment and others in vulnerable and informal employment, a rise in the latter could lead to greater income inequality. On the other hand, higher inequality could also contribute to the rise in vulnerable and informal employment. It is argued that highly unequal societies tend to have lower union density and coverage and fewer employment protections (Zafirovski, 2005), which could be linked to the argument that high concentration of political power allows the rich to impose their public policy preference upon the rest of the society. Bluntly put, wealthy members of the society, who tend to draw a greater portion of their income from capital, might be less interested in strengthening labour institutions that protect the rights of workers. Indeed, cross-country level data has shown that there is a positive correlation between vulnerable employment and inequality (figure I.12), providing some support for the validity of the aforementioned dynamics between the two factors.

If the economic headwinds turn into another major financial crisis, the subsequent slowdown in growth would have profound negative impacts on many development outcomes, including poverty reduction (Conceição and others, 2009; Ötoker-Robe and Podpiera, 2013). The poorest, however, might not necessarily suffer the greatest proportionate income losses, given that they might be shielded from the worst damages of a financial crisis by the same factors that kept them poor in the first place, namely geographic isolation and lower

Figure I.12  
Vulnerable employment and income inequality, 2010–2017 average



**Source:** UN DESA calculations, based on ILO estimates and data from the Standardized World Income Inequality Database Version 8.0 (Solt, 2019).

**Note:** Selected countries with high vulnerable employment or income inequality were labelled. The straight line is the line of best fit.

connectivity to the national and global markets (World Bank, 2008). On the other hand, middle-income households could suffer disproportionately when compared to richer households during a crisis. Negative effects of labour market developments, changes in terms of trade, and reduced access to financial services tend to fall more on middle-income households (Brown, 2013), whereas richer households typically do better at hedging in advance, leave the market faster as crises approach, and tend to receive compensation as bank bailouts occur (World Bank, 2008). Empirical evidence has shown that financial crises do tend to be followed by a rise in income inequality (Atkinson and Morelli, 2011), but with some exceptions when active counteracting policies, such as compensatory transfer or progressive taxation, might have played a role (Calvo, 2013). In contrast, experiences from the global financial crisis provide a more definitive account that crises worsen wealth inequality: the housing prices collapse affected those at the lower part of economic spectrum more severely, while the quick rebound in financial markets largely benefited the wealthiest households (Kuhn and others, 2018; Mian and Sufi, 2014). This stands in contrast to the observed, post-crisis income inequality in a considerable number of countries that actually saw some stabilization or decline in income inequality, highlighting the possibility of decoupling between income and wealth inequalities.

### Reducing inequality remains a challenge

Reducing inequality in all forms and manifestations is a top priority, as more inequality means more people are being left behind. Inequalities of income and wealth are important indicators, but there are other forms and manifestations of inequality that also urgently need to be addressed—for example, access to education, social protection, clean water and sanitation, technologies, land and natural resources, etc. Efforts to address these different forms of inequality need to be coordinated to maximize their effects, as addressing one form of inequality without complementary efforts to address other related forms could prove counterproductive. For example, the equalizing effects of attaining universal health care would be significantly compromised by the population's uneven access to clean water and sanitation. In addition to being comprehensive and coordinated, efforts to address inequality must also be carried out quickly. While inequality could increase rapidly within a short period of time, the reverse might not necessarily be true. A state of high economic inequality often goes hand in hand with a high concentration of political power. In seeking to protect their own interests, those with political clout have the incentive to actively prevent the introduction of inequality reduction measures, effectively creating an inequality trap (Islam, 2015; World Bank, 2005). Acknowledgment of the possibility that such inequality traps exist adds urgency to the task of tackling inequality, inequity and exclusion.

Leaving no one behind—the overarching principle of the SDGs—will remain beyond reach unless societies make a deliberate choice to turn inequality on its head. As inequality manifests in wealth, income, access and outcomes, societies must address inequality in one or all these dimensions, taking into account country-specific factors and constraints. Expanding skills and educational opportunities, creating decent and secure jobs that pay living wages, and strengthening social protection systems will remain paramount for taming inequality in all its forms and manifestations. In addition, regular and orderly migration and resettlement can also play a critical role in reducing inequality, while also preventing conflicts and facilitating adaptation to climate change.

Besides its impact on the income gap between countries, trade globalization has often been blamed as the key culprit behind the rise of within-country income inequality in both



developed and developing countries. For developed countries, critics of trade globalization attribute stagnant wage growth in manufacturing sectors and the disappearance of many manufacturing jobs altogether to trade globalization. Also, international trade could lead to the rising capital intensity of manufacturing sectors in developed countries, which would result in a higher share of capital in national income. As capital tends to be more unevenly distributed across populations (compared to labour income), it could worsen income inequality. All of these developments have fueled the popular resentment of the political classes. As for developing countries, critics argue that skill levels required to engage in manufacturing activities that shift from developed countries are typically considered high in developing countries; as a result, such shifts might actually benefit those who are more skilled (relative to their fellow compatriots) and are therefore already better off economically. This popular narrative—that trade globalization is the main driver of within-country income inequality—has not actually been supported by strong empirical evidence outside of some anecdotal country cases that focus on the contemporaneous rise of trade openness and income inequality. Cross-country data from past decades show limited correlation between trade openness and within-country inequality. Empirical exercises that control for other potential drivers of income inequality also provide mixed results on whether trade openness worsens income inequality (Urata and Narjoko, 2017). In fact, recent cross-country studies suggest that even though trade openness does play a role in affecting income inequality, its impact is secondary to that of technological advancement, financial openness (which reflects cross-border financial flows), and financial deepening (which reflects the development of domestic financial systems).<sup>7</sup> Mismanaged domestic policies—such as weakening of labour bargaining power, inadequate investment in education, skills development and social safety nets, and fiscal consolidation—have likely also played significant roles in driving income inequality upward (Farber and others, 2018; Heimberger, 2018; Honkkila, 1999; Woo and others, 2017; World Bank, 2018b).

All in all, the weakening of the multilateral trading system and the international trade slowdown, if they persist, would hinder the progress of achieving the goal of leaving no one behind through dragging down income growth and putting upward pressure on the cost of goods and services, directly affecting the progress on poverty and hunger eradication and other sustainable development outcomes. At the same time, efforts to revitalize international trade must be complemented by creating more effective redistribution mechanisms that compensate those on the short end of the asymmetric impact of international trade, minimizing its hampering effect on leaving no one behind.

## Growing insecurity and uncertainty

From looming economic risks to rising frequency of extreme weather events, and from growing incidences of violent conflicts to rapid technological change, people around the world are facing increasing uncertainty and insecurity. While economic insecurity has gained increasing attention in public and political discourse, its implications for sustainable development are not fully explained and understood. Economic insecurity—

<sup>7</sup> For example, see Jaumotte and others (2013) and Organisation for Economic Cooperation and Development (2011). Reviewing theoretical and empirical literature, Helpman (2016) also reached the conclusion that the cumulative effect of trade globalization on wage inequality has been modest, explaining only a small portion of the rise in wage inequality within countries.

as defined in Hacker (2018), United Nations (2008), and Western and others (2012), for example—generally represents the degree to which individuals, communities and countries are exposed to adverse events with significant economic consequences that they are not adequately prepared to cope with and recover from, ultimately preventing them from fulfilling their aspirations. A rising sense of economic insecurity alters economic, social and political behaviours of the public, and can thus have significant implications for sustainable development.

This definition of economic insecurity is not limited to the fear of falling back into, or not being able to escape from poverty, even though it is a major cause of economic insecurity for many. It also extends to include people's distress that they will not, given their circumstances, be able to advance to their desired level of economic well-being. Non-economic factors such as conflicts, climate change and lack of access to basic infrastructure (such as shelters and electricity) and public services (such as health care and weather information) can also affect the sense of economic insecurity. In other words, the use of the adjective "economic" describes the nature of the consequences (such as income and wealth losses), rather than their causes.

The sense of anxiety associated with not being able to attain one's aspirations cannot be sufficiently captured by any single conventional economic indicator such as income level, income growth and its volatility, or inequality. The difficulty in objectively measuring economic insecurity means that economic and social policies often ignore the implications of economic insecurity for sustainable development. First, economic insecurity can undermine trust in institutions and discourage civic participation. Second, it limits the ability of individuals and households to cope with adverse shocks and entraps them in a suboptimal economic and psychological state. This demands a more integrated risk management approach, rather than an ad hoc approach that focuses largely on responses to major adverse events when they materialize. Third, economic insecurity has an irreducibly subjective, psychological component, the study of which should compel more policymakers to begin considering the deep, complex drivers behind economic behaviours, and to go beyond concerns for income or consumption maximization that are mechanistically assumed of economic agents in conventional economic models.

### **Pervasive economic uncertainty**

There are two mutually reinforcing factors that contribute to and shape economic insecurity: (i) the state and perception of economic uncertainties (i.e., uncertainties that influence people's economic behaviours); and (ii) people's ability to manage such uncertainties. Economic uncertainty is typically associated with economic volatility, but fluctuations of economic indicators only partly capture the full variety of uncertainty that people, communities and countries face. Moreover, economic insecurity stems from fear of hardship-causing losses, such that higher volatility, largely driven by rapidly rising income levels, would not be considered a sign of rising economic insecurity. In short, volatility is not equivalent to the uncertainty that causes economic insecurity, which highlights the need to go beyond the former in assessing the latter.

In practice, economic uncertainty comes in different forms, including (i) rapid-onset changes (such as financial crises, trade disputes, geopolitical events and natural hazards) that are largely unexpected shocks; (ii) slow-onset changes (such as global warming and technological change) that are expected in terms of their occurrence, but the extent of their effects are uncertain; and (iii) regular volatility of economic variables (such as output,

inflation, trade, capital flows and financial market performance) that are largely expected both in terms of occurrence and magnitude.

All three forms of uncertainty are looming large, manifesting at both economy-wide and sectoral levels. An early-2019 poll shows that the average estimate of economists surveyed regarding the chances that a recession will hit the US economy in the following year—which would have major ramifications for global economy—is at a seven-year high.<sup>8</sup> Climate change-related uncertainties are also on the rise. There is a high probability that a large part of the tropics would be exposed annually to what is currently considered a 100-year flood by 2050, unless aggressive emissions mitigation policies are introduced (Vousdoukas and others, 2018).<sup>9</sup> As will be discussed in chapter 2, violent conflicts have been spreading and increasingly taking on new forms, such as non-State as opposed to inter-State conflicts, starting from about 2010, reversing a declining trend that was witnessed from the end of the cold war onward (United Nations and World Bank, 2018). Indeed, more countries experienced more violent conflicts in 2016 than any other year in the past three decades (Allansson, Melander, and Themnér, 2017; Gleditsch and others, 2002; Sundberg, Eck, and Kreutz, 2012).

If not reversed, global warming will continue to trend upward and bring devastating damage to the world, although actual impacts remain uncertain. The United Nations *World Economic and Social Survey 2018* highlighted that technological changes would likely continue to proceed rapidly, but there are persistent, and perhaps increasing, uncertainties about their impacts on labour markets, development conditions, institutional settings and the social fabric.

Economic uncertainty also has a significant subjective element. Movements in the objective measures of economic uncertainty might not necessarily be significant enough to change people's assessment of uncertainty, and therefore their economic behaviours. However, textual analysis of economic reporting of news media on uncertainty—a proxy of public perception of uncertainty—does show that there has been a clear upward trend of perception of economic uncertainty across countries of different development levels in the past 20 years (figure I.13). In other words, economic uncertainty has been rising in both the objective and subjective sense.

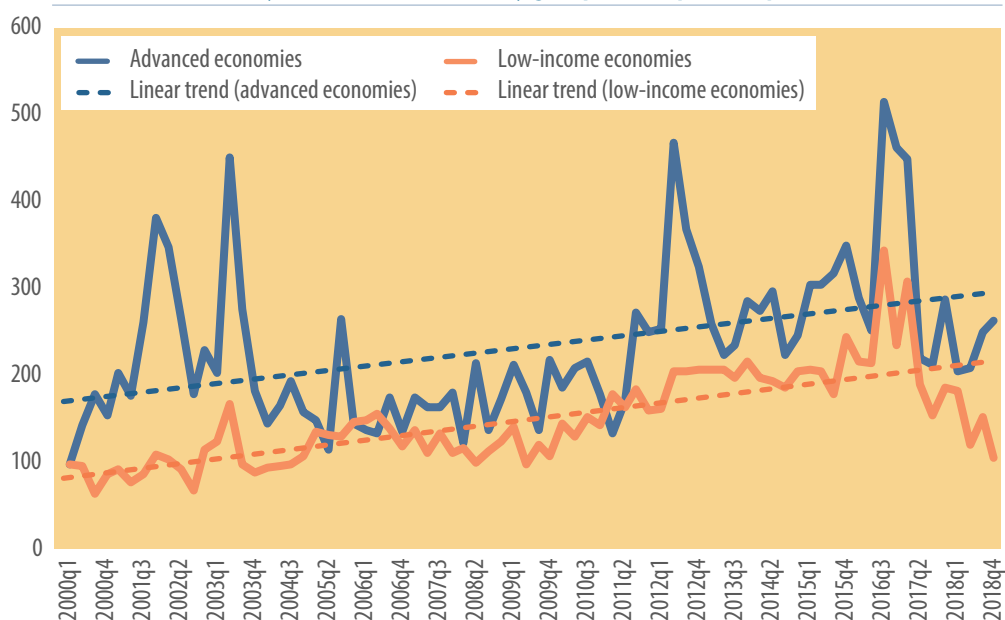
### Coping with uncertainty

The rise of economic uncertainty is, however, only half of the economic insecurity story. Higher uncertainty does not directly translate into greater economic insecurity. Whether people feel economically secure or not also depends on how well they are prepared for the different forms of uncertainty. There are several mechanisms through which people can deal with uncertainty, which include social insurance, market insurance, self-insurance (such as precautionary saving) and self-protection (such as investment in human capital and migration). The first three reduce the severity of a potential loss, while the last one reduces the chances of loss occurring when risks materialize through expanding alternative

<sup>8</sup> See <https://www.wsj.com/articles/economists-see-u-s-recession-risk-rising-11547132401>.

<sup>9</sup> At the same time, insurance companies around the world have been prompted by the rising frequency of severe weather events to build models that can better estimate and incorporate the impact of these events. Using catastrophe models that employ increasingly sophisticated algorithms that analyse data on natural disasters and properties in predicting climate change-related losses, insurance companies—with the appropriate support of policymakers—could play an active role in improving societal adaptive capacity for climate change impacts and reducing related economic insecurity (Surminski, Bouwer, and Linnerooth-Bayer, 2016).

Figure I.13  
Economic uncertainty index, selected country groups, 2000q1–2018q4



**Source:** UN DESA elaboration, based on Ahir and others (2019).

**Note:** The economic uncertainty index is constructed based on frequency counts of the term “uncertainty” and its variants in the quarterly Economist Intelligence Unit country reports on major economic and political developments. The frequency count is scaled by the total number of words in each report.

economic options that people can pursue. Addressing different forms of uncertainty requires different combinations of preparedness mechanisms that complement each other, and the desired combination also depends on the specific context of the country or the community.

Data reveal large disparities in people’s capacities for coping with economic uncertainties and insecurity. Developed countries generally see much higher social protection coverage than countries in developing regions (figure I.14). In Africa and Asia and the Pacific, less than 45 per cent of their populations are covered by at least one social protection benefit. Overall, 52 per cent of the world population was not covered by any social protection benefit in 2015, forcing them to seek ways to deal with uncertainties through market and informal institutions and self-insurance and protection.

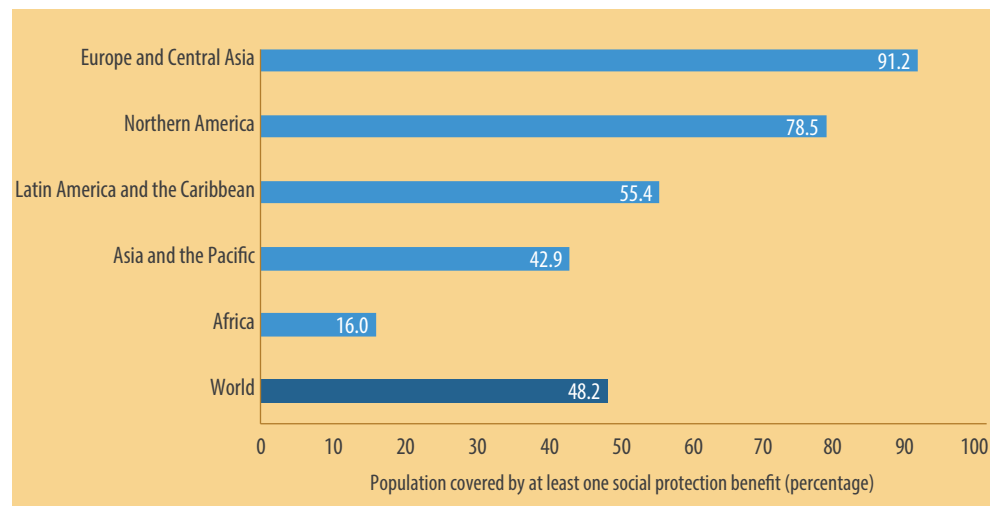
Reliance on individual and household support for coping with economic uncertainty does not necessarily reduce economic insecurity, as even those who are not income poor might lack sufficient assets to absorb the impact of an unexpected shock. On average, about 40 per cent of the total population of an OECD country is “economically vulnerable,” defined as not accumulating enough financial wealth to live at the annual income poverty line for three months without income (figure I.15). Data also shows that a significantly higher share of the population is economically vulnerable than those who are income poor, which suggest that economic vulnerability is a much more widespread phenomenon than income poverty (Hacker, 2018).

With international migration becoming increasingly difficult—as stricter immigration restrictions, hardening of borders and “border externalization” (i.e., transfer of border management to third countries) are limiting migration flows—this important tool for people to manage risks, uncertainty, and insecurity is increasingly unavailable. The inability to migrate leaves people trapped in places where they are exposed to adverse conditions, such as conflicts and climate change, exacerbating their sense of insecurity (The Government Office for Science, London, 2011).

In sum, economic uncertainties are rising around the world, at a time when preparedness for managing these uncertainties is inadequate for many people. There is a strong likelihood that the sense of economic insecurity will further strengthen, unless governments and the international community make concerted efforts to reduce uncertainties and improve preparedness. Failure to do so will have significant implications for the achievement of sustainable development.

Figure I.14

### Percentage of the total population covered by at least one social protection benefit (effective coverage), by region, 2015

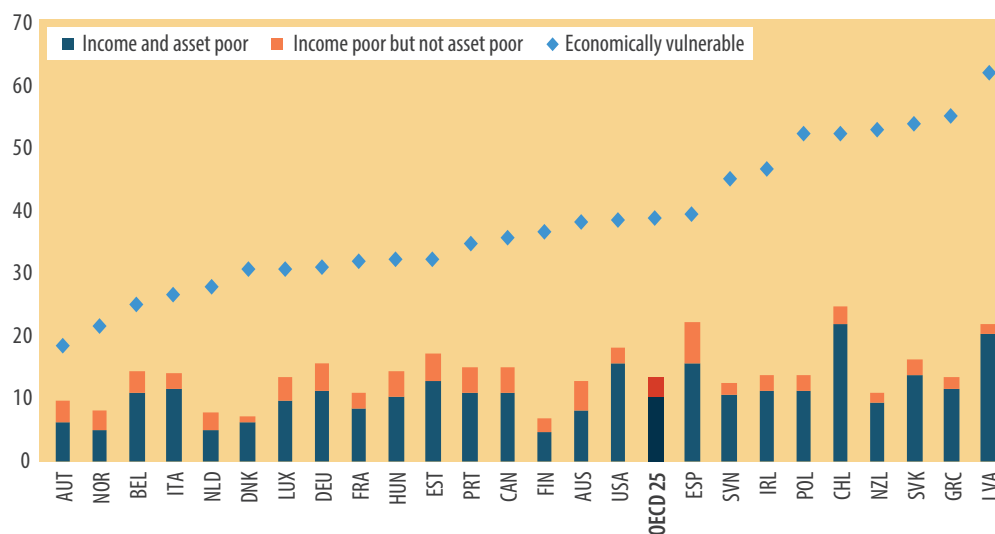


**Source:** UN DESA calculations, based on ILO World Social Protection Database (2017).

**Note:** Coverage corresponds to the sum of persons protected by contributory schemes and recipients of contributory and non-contributory benefits expressed as a percentage of the total population. Regional and global estimates weighted by the number of people.

Figure I.15

### Income and asset-based poverty: share of individuals who are income poor, asset poor or economically vulnerable, by OECD country, latest available year



**Source:** Hacker (2018), based on OECD Wealth Distribution Database (2017).

**Note:** The “income poor” are those with equivalised income below 50 per cent of median income in each country. The “income and asset poor” are those with equivalised income below 50 per cent of the median and equivalised liquid financial wealth below 25 per cent of the annual income poverty line (3-month buffer). The “economically vulnerable” are those who are not “income poor” but have equivalised wealth below 25 per cent of the annual income poverty line. Liquid financial wealth includes cash, quoted shares, mutual funds and bonds net of liabilities of own unincorporated enterprises. The OECD average is the simple country average.

## Inequality, insecurity and uncertainty

The prevalent, heightened sense of economic insecurity often has first-order effects on aggregate economic output. Existing empirical evidence suggests that uncertainty has direct impacts on economic decisions of households and firms, holding up consumption, investment and trade as economic agents become unsure of their economic future and decide to wait until the uncertainty dissipates (Bloom, Bond, and Van Reenen, 2007; Jackson, Kliesen, and Owyang, 2019; Novy and Taylor, 2014). Moreover, households and firms paralysed by uncertainty could become less sensitive to changes in business conditions and policy actions (Bloom, 2014). Such a cautious approach could quickly take hold of an economy as people tend to follow the actions of others, displaying the so-called herding behavior, especially during economic uncertainty. Furthermore, heightened uncertainty also means policymakers are more susceptible to ill-informed decision-making, which would be incongruent with careful long-term planning. Together, these dynamics pose a major conundrum for policymakers as they need to introduce quick and assertive policy actions with incomplete information.

Across countries, multiple indicators that capture different aspects of economic insecurity correlate with economic inequalities (figure I.16). A greater level of inequality intensifies the feeling of economic insecurity caused by uncertainties, as it presents the possibility of much worse economic outcomes—relative to a low-inequality case—if one ends up on the wrong side of the spectrum of possible economic outcomes. On the other hand, rising economic insecurity has differentiated impacts on different population groups that could further worsen inequality, hampering efforts to leave no one behind. Higher-income households are typically more diversified in terms of family income sources, hence less exposed to economic uncertainty and shocks. The United Nations *World Economic and Social Survey 2016* highlights that households' resilience to climate events is a function of their socioeconomic conditions: differences in access to assets; unequal opportunities to access quality health services, education and employment; inequality with respect to opportunities to participate in policymaking processes; and the perpetuation of discrimination embedded in cultural and institutional norms underpin the aggravation of the exposure and vulnerability of disadvantaged population groups to climate hazards.

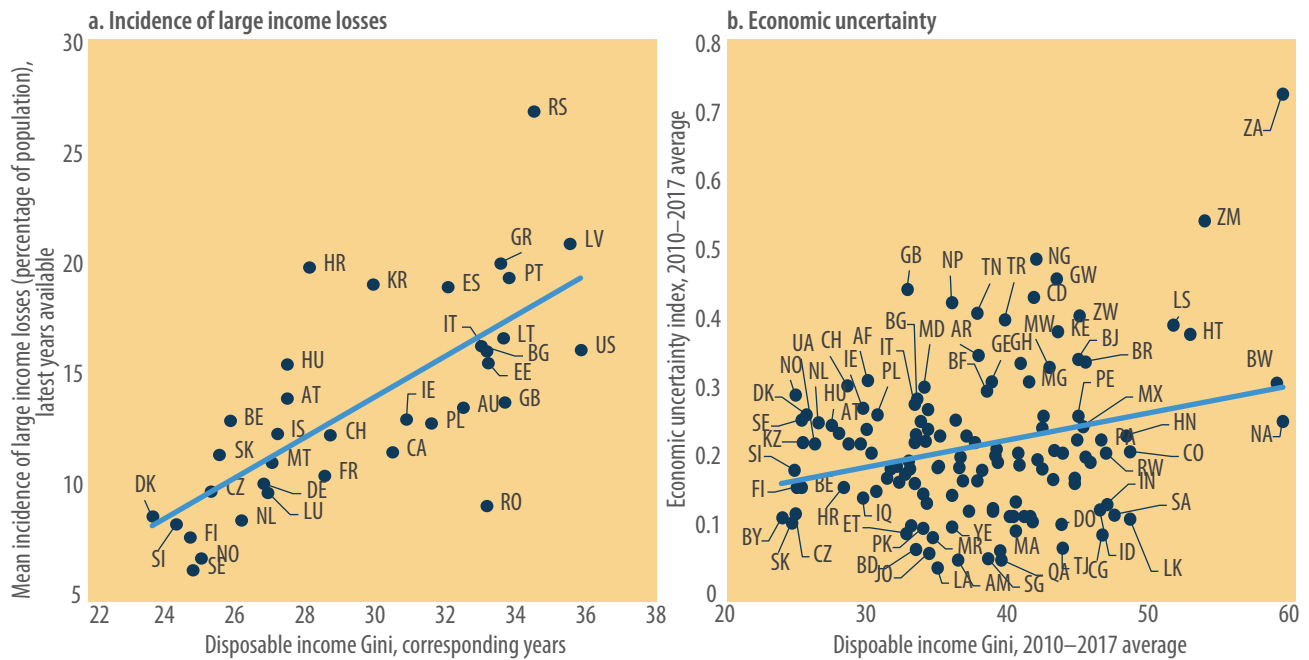
The distributional effect of economic insecurity could also manifest in terms of its link with cognitive performance. Both laboratory exercises and quasi-experiments in the field have shown that people have considerably different levels of cognitive performance depending on the gap between their needs and the resources available to fulfill them (Mani and others, 2013). The greater the needs gap, the more it captures one's attention, generates intrusive thoughts, and reduces cognitive capacities. The inability to reach one's aspirations—a key feature of economic insecurity—is analogous to the inability to close the needs gap. This suggests that those facing greater economic insecurity (typically those already less well off) would face a greater “cognitive tax” that would drag down their productivity and widen their well-being gap with others.

## Trust: a collateral damage

Rising economic insecurity undermines trust, both the public's trust in national and multilateral institutions and to some extent interpersonal trust (figure I.17 illustrates the negative, cross-country correlation between economic insecurity and trust in government and in the United Nations). Mistrust in Governments increases when the public perceives the Government as ineffective at ensuring that economic gains are equitably shared. Studies



Figure I.16  
Income inequality and economic insecurity measures



**Source:** UN DESA calculations, based on World Uncertainty Index dataset (Ahir and others, 2019), OECD Wealth Distribution Database (2017), and the Standardized World Income Inequality Database Version 8.0 (Solt, 2019).

**Note:** The pairwise correlation coefficient between disposable income Gini and (i) incidence of large income losses is 0.72 (statistically significant at 0.01 per cent level) and (ii) economic uncertainty is 0.27 (statistically significant at 0.5 per cent level). Each dot represents an economy. The straight lines are lines of best fit.

in multiple countries have shown that households that consider themselves as economically insecure tend to have notably less trust in political institutions (Wroe, 2014; 2016). There is also preliminary empirical evidence showing that economic insecurity linked to increases in unemployment was a contributing factor, in part, to voting for non-mainstream parties (especially populist and nationalist) in a number of developed countries in recent years (Algan and others, 2017). This deterioration of public trust in turn can slow down economic growth and sustainable development via several channels, including less public compliance with rules and regulations, delay of consumption and investment as households and firms becoming more risk averse, and less effective and efficient policymaking (Organisation for Economic Cooperation and Development, 2013).<sup>10</sup>

The retreat of countries from multilateral processes that the world has seen in recent years cannot be separated from the deterioration of public trust in institutions. Distrust in national institutions has spilled over into distrust in multilateral institutions. The distinction between the elites and regular workers that occurs at national levels has been projected onto the international sphere, with national forces capitalizing upon social discontent by framing

<sup>10</sup> Deepening of interpersonal distrust, which is shown to have some association with rising economic insecurity, could also lead to slower growth as it impedes the information sharing so crucial for innovation. Interpersonal distrust also encourages a more widespread instance of opportunistic behaviours, directing more resources to protective purposes such as monitoring (hence less resources for more productive activities), and weakening contract enforcement that underpins daily economic transactions (Bjørnskov, 2017).





in institutions and interpersonal trust, subsequently contributing to establishing a more effective multilateral system that would be instrumental in achieving the goal of leaving no one behind and in further reinforcing economic security. At the same time, all these positive developments interact with sustainable economic growth, supporting each other in an upward development spiral. The flip side of this is the possibility of entering a vicious cycle, if the sense of economic insecurity becomes entrenched. Such a development would further erode trust, multilateralism and growth, and leave many people, communities and countries in the world behind, further fuelling people's anxiety over their economic future.

Last but not least, technology features prominently in different parts of this cycle. Rapid technological change, such as in automation, brings economic uncertainty, but also allows the creation of better risk management mechanisms. Additionally, it has the potential of altering the role of trust in underpinning economic transactions. For example, blockchain technologies—featuring a decentralized approach to accounting, advanced cryptography and smart contracts that eliminates the need to rely on centralized institutions or middlemen to facilitate transactions—are touted as a means to establish trust in essentially any kind of transaction. This is not to say trust becomes unnecessary; its focus simply shifts. Parties to each transaction still need to trust that technologies will operate as intended, and that the institutions that govern these technologies will address issues when the technologies fail to deliver. In the end, what blockchain provides is an alternative trust system, and whether it could help to better facilitate economic transactions depends on the existing trust system's effectiveness. Technological advances also enter the inequality discussion, given their differentiated impacts on people (such as varied employment effects on workers with different skills) and the persistent between- and within-country technological divide (United Nations, 2018c). All of these show that discussion on economic insecurity and its impacts must not be devoid of the shifting technology context, which has been changing in an unprecedented way, in terms not only of speed and scale but also complexity.

## Leaving no one behind

Leaving no one behind will require ambitious investments in order to reduce vulnerability, insecurity and uncertainties. Existing estimates have shown that, for many countries, the additional investment needed to realize this objective is substantial but attainable. In education, the total cost of delivering universal pre-primary, primary and secondary education in low-income and lower-middle-income countries will have to increase, on average, from 3.5 to 6.3 per cent of GDP during 2012–2030 (United Nations Educational, Scientific and Cultural Organization, 2015). In health, in an ambitious scenario where most countries attain the SDG 3 health targets, it is estimated that health expenditure would have to increase to a population-weighted mean of 7.5 per cent of GDP across countries by 2030 (Stenberg and others, 2017). In social protection, creating a universal social protection floor that covers cash transfers for children, maternity benefit, benefit for persons with severe disabilities, and pensions for older persons would cost an average of 4.2 per cent of GDP across low-income and lower middle-income countries as of 2015 (Ortiz and others, 2017). In water and sanitation, annual capital investments required during 2015–2030 to extend safely managed water supply and sanitation services to the unserved, thereby achieving SDG targets 6.1 and 6.2, is estimated to be about 0.39 per cent of the aggregate GDP of 140 countries examined (Hutton and Varughese, 2016). Overall, it is estimated that \$2.5 trillion additional investment will be needed to achieve the SDGs in developing countries (United Nations Conference on Trade and Development, 2014). Table I.2 shows

estimated additional annual investment needs in selected sustainable development areas through 2030.

### Investments for meeting basic needs

Whereas some countries can rely on their domestic resources to fulfil the aim of leaving no one behind, others would need access to international financing until they develop sufficient fiscal capacity. Given that median tax revenue for middle-income countries and least-developed countries was 18 and 13 per cent of GDP, respectively, in 2017 (United Nations, 2019b), the high estimates of investment as a percentage of GDP for some countries mean Governments would not be able to finance efforts towards leaving no one behind entirely by themselves. Measures need to be introduced to incentivize the private sector to engage in sustainable investing on a greater scale, which could include pricing externalities, mandating corporations' disclosure on social and environmental issues, and clarifying fiduciary duty and asset-owner preferences (ibid.).

In order to mobilize more funding towards efforts to leave no one behind, countries should also identify and recover foregone revenues, misrepresented economic activity and IFFs that are depriving States of needed funds for development financing. The High-level Panel on Illicit Financial Flows from Africa estimated that IFFs being taken out of Africa alone total over \$50 billion per year—more than foreign direct investment, official development assistance and other flows that are going into the continent. This figure has since doubled as methods such as transfer mispricing, base erosion and profit shifting are being uncovered. Extractive sectors disproportionately contribute to more than half of these

Table I.2

#### Investment needs in selected sustainable development areas

Sustainable development areas	Targeted outcomes	Scope of countries	Average additional annual investment needed through to 2030
Hunger	Zero hunger	All countries	\$265 billion to \$1,484 billion
Health and nutrition	Achievement of SDG 3 targets, and selected health-related targets under other SDGs	67 LICs and MICs that account for 95 per cent of the total population in all LICs and MICs	\$134 billion (2016–2020); \$371 billion (2026–2030)
Education	Universal pre-primary, primary and secondary education	LICs and LMICs	\$191 billion
Drinking water, sanitation and hygiene	Achieve universal and equitable access to safe and affordable drinking water for all; and achieve access to adequate and equitable sanitation and hygiene for all and ending open defecation	140 countries that account for 85 per cent of the world's population: mostly LICs and MICs, and HICs with low coverage of basic water, sanitation and hygiene services	\$71 billion to \$158 billion

Sources: FAO, IFAD, and WFP (2015); UNESCO (2015); Stenberg et al. (2017); Hutton and Varughese (2016).

Note: LICs, MICs, LMICs and HICs stand for low-income countries, middle-income countries, lower-middle-income countries and high-income countries, respectively.

IFFs. If addressed, these sums could go a long way towards bridging the financing gaps identified above.

In cases where there are simply not enough resources—domestic or international—to achieve the goal of leaving no one behind in the immediate future, countries would have to proceed gradually, given what is available. Countries might have to adjust the relative balance on funding for areas that are critical for ensuring no one is left behind. Global initiatives should consider putting relatively more focus on funding social protection programmes, which, in recent years, have been even more underfunded than education and health and nutrition in low-income countries (Manuel and others, 2018). Countries could also improve investment efficiency and redirect savings in attaining desired health and education outcomes (box I.1). For example, estimates have shown that, through better allocation of resources to target vulnerable groups and greater emphasis on service quality, developing countries in the Asia-Pacific region can save more than 30 per cent of resources without compromising on current performance in the health and education sectors.

#### Box I.1

#### SDG investment needs in Asia and the Pacific

The Asia-Pacific region has emerged as an economic powerhouse. However, heightened inequality and environmental degradation are threatening people's well-being and the sustainability of past development gains. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (2018) reveals that if current trends continue, the region is unlikely to reach most Sustainable Development Goals (SDGs) by 2030.

Against this backdrop, the *Economic and Social Survey of Asia and the Pacific 2019* (ESCAP, 2019) calls upon countries to raise their ambitions beyond economic growth and to invest more strategically to achieve the SDGs. The report employed various costing models such as intervention-based costing and computable general equilibrium models to produce more updated and SDG-aligned sectoral estimates. It shows that an additional average annual investment of \$1.5 trillion would allow Asia-Pacific developing countries to end extreme poverty and ambitiously move towards universal health coverage, quality education and enabling infrastructure, while staying on track to limit climate change. Equivalent to about 4 per cent in terms of the annual average gross domestic product (GDP) of the Asia-Pacific region during 2016–2030, the investment requirements are within reach for many countries, given their fiscal space and potential to leverage private investment. However, the gap is widest in countries which can least afford to narrow it, rising to 16 per cent of GDP in least developed countries. In terms of composition, most of the additional investment need in South Asia is for social protection, health and education, given the relatively high incidence of poverty and hunger and large child and youth population, compared to East Asia which would need to step up on clean energy and climate action. While quality dimensions are hard to capture, the analysis also revealed considerable variation in learning and health outcomes among countries with similar levels of investment. This could be attributed to geographical factors, but also differences in governance quality and investment efficiency.

Source: UN ESCAP.

## Reducing inequality and managing uncertainty

In periods of high uncertainty, policymakers must be extra cautious about how to communicate uncertainty to the public (Aikman and others, 2010). As people's behaviours are heavily influenced by their beliefs about future policy actions, policymakers need to ensure that public policy actions are properly explained and understood, and the information communicated results in public actions that are consistent with the intended policy objectives. National actions should be supported by multilateral efforts to contain, minimize or mitigate risks that exacerbate uncertainties and economic insecurity. At the top of the order is the imperative of taming wealth and income inequality. As will be discussed in chapter 2, rising in-country inequality will continue to paralyse climate action. It will also add fuel to rising nationalism and populism in many parts of the world.

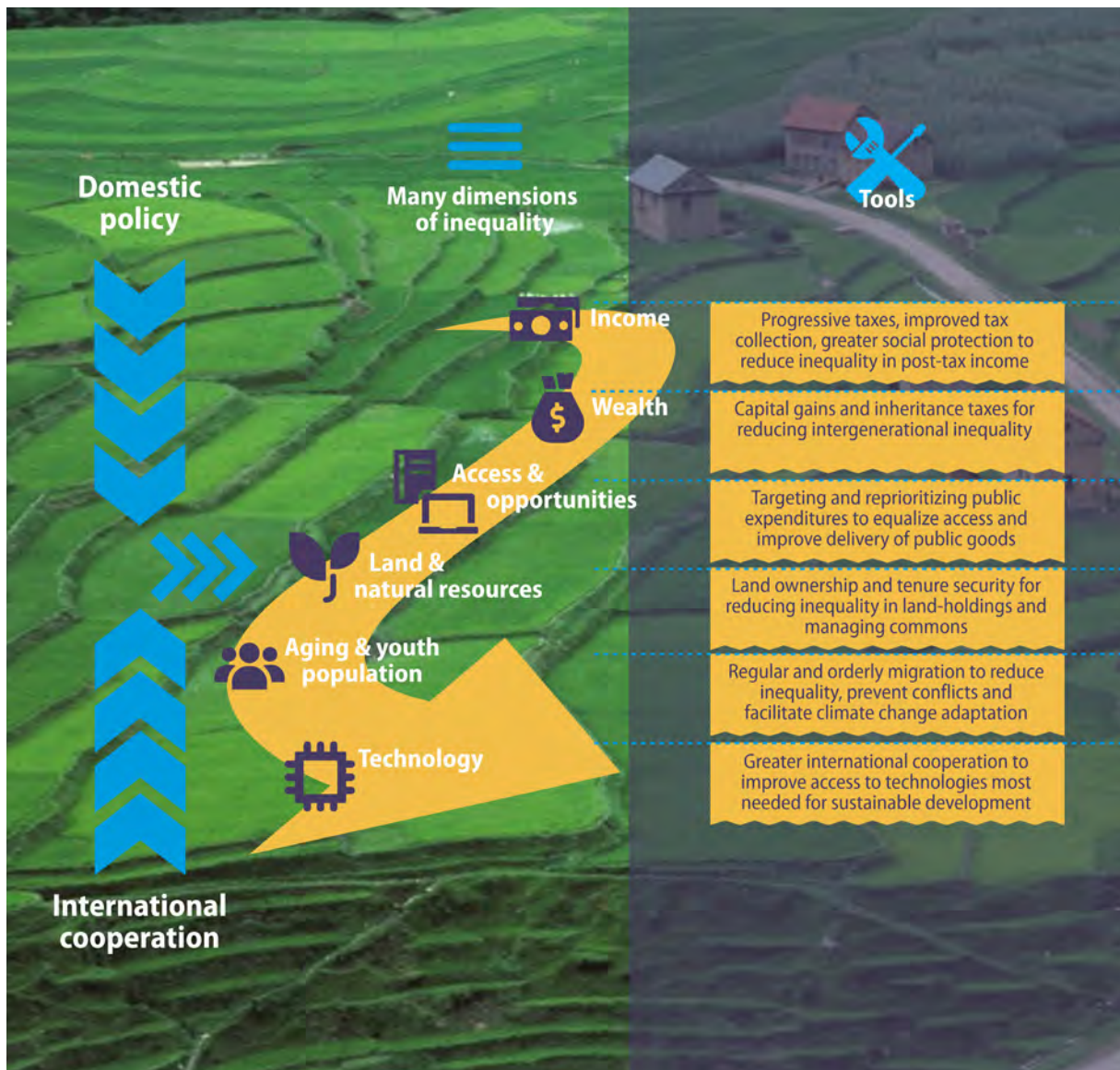
Reducing inequality will require a new, win-win approach to redistribution of income, wealth and opportunities. According to various public surveys, widening income inequality has resulted in a growing public demand for income redistribution, particularly in countries that were most heavily affected by the global financial crisis (International Monetary Fund, 2014). Between the late 1990s and late 2000s, public support for redistribution increased in almost 70 per cent of the advanced and developing economies surveyed, with a 30 percentage point increase in public support in countries where the income Gini increased by over 20 per cent. However, demands for redistribution will not always materialize, as introducing such policies will be more difficult when the rich have more political influence than the poor (Stiglitz, 2012).

Redefining redistribution will remain critical for making it a reality. Redistribution need not mean less for people at the top of the income distribution. It can mean more for everyone: more peace and stability for people at the top, more economic security and opportunities for those at the bottom, and more climate resilience and sustainable development for all. Societies must redefine redistribution as a positive sum game in order to bring inequality to the front and centre of efforts to achieve the SDGs. Carefully designed progressive taxation programmes that promote innovation, entrepreneurship and job creation will remain an important tool for reducing inequality (figure I.18). Likewise, capital gains taxes and inheritance taxes can help reduce intergenerational inequality that persists across generations. At the same time, more efficient public expenditure frameworks, ensuring the best bang for the buck for tax revenues, can play an important role in expanding health-care and educational opportunities and reducing inequality in access to basic public services.

Fiscal policies are critical means by which Governments can affect income distribution, increasing provision and access to basic services that support all citizens, and the poor in particular. However, in recent decades, fiscal redistribution's impact on income inequality has become less pronounced, with inequality widening around the world. This is related to the unwinding of progressive tax schemes, the reduction of income tax rates (especially at higher income levels), recent pressures of austerity on benefits, and gains accruing to the wealthiest segments of society. Redistributing purchasing power, as opposed to redistributing income, may be more effective in reducing inequality in consumption and access to opportunities. As higher-income households have lower propensities to consume marginal incomes received, and lower-income households have higher propensities to



Figure I.18  
Fighting inequality



Source: UN DESA. UN Photo/John Isaac.

consume, redistribution towards the poor could help to support aggregate consumption and provide impetus for sustained economic growth.

Redistributive social fiscal policies can include cash-equivalent benefits, such as adjustments to direct and indirect taxes, and indirect subsidies, as well as non-cash in-kind benefits, such as spending on health and education services (Lustig, 2017). To take some examples, several countries in Latin America have piloted successful conditional cash transfer (CCT) programmes, which have enjoyed strong social support and political backing, and

are oft-cited for their developmental impact to reduce inequality and poverty.<sup>11</sup> In other countries, there have been significant pushes for a “living wage” to provide a minimum wage that can more realistically keep pace with rising costs of living. Proposals for a universal basic income (UBI) have emerged in various parts of the world to provide all, or a large proportion of the population, with a set amount of basic condition-free funds, which would not discourage people from entering the labour market as other distributive policies might (Francese and Prady, 2018). Yet, the vast majority of countries lack the resources to finance UBI, and some of its advocates aim to offload responsibilities in caring for workers from the private sector to spending by the State.

In many developing countries, more equitable access to land and natural resources can help address inequality, especially in the rural economy, through effective land reforms and improving tenure rights. Managing safe and orderly migration will remain another important tool for addressing inequality and uncertainties.

Tackling inequality would be more effective when complemented by efforts to address uncertainties, as the two have been shown to be closely linked. Given that uncertainty cannot be completely eliminated, greater attention will be needed to maximize complementarities across different risk management programmes (United Nations, 2008), ensuring these programmes do not crowd each other out and that all kinds of risks are addressed. For example, a workfare programme can be beneficial for families with able-bodied working-age members during periods of high economic distress, but it would be infeasible for families without a working age member. In this case, social protection and transfer programmes would be more effective in ensuring their well-being. Social and market insurances that spread risk across a pool of people are often efficient at dealing with idiosyncratic risks that are generated by individual and isolated events such as an illness or an accident, but they become much less effective in dealing with adverse events that hit a large number of people simultaneously, such as major financial crises or extreme weather events. In this situation, ex ante risk mitigation strategies, such as saving schemes that encourage accumulation of assets that help households during difficult times, and ex post risk coping mechanisms, such as emergency loan programmes, become crucial.

Policies to address inequalities must take into account the distributional impacts of growth patterns ex ante. Greater attention must be paid to the quality of growth, not merely its quantity. This will require, first and foremost, a shift in mindset at national and international levels away from the exclusive focus on GDP growth. There is a clear need for rethinking the measurement of economic performance that looks beyond GDP growth. Economic performance of countries and Governments must be gauged against alternative measures, tracking reduction in inequality, success in tackling climate change and preventing conflicts. The news headlines should not highlight “the fastest growing economy” or “the slowest growing economy,” but rather highlight “the country that achieved

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<sup>11</sup> In Brazil and Mexico, innovative means-tested CCT programmes have been used to link family benefits to the number of children, and condition continued eligibility on attendance of children at health clinics and schools. These programmes are considered cost-effective: Brazil’s programme (Bolsa Família) and Mexico’s programme (Oportunidades) cost the two countries 0.5 per cent and 0.8 per cent of their GDP in 2012, respectively, but had significant impacts on reducing inequality and poverty and promoting positive education and health outcomes for about a quarter of each country’s populations (IMF, 2014). In doing so, these transfers help break the intergenerational transmission of poverty by discouraging parents from employing counterproductive responses to cope with economic shocks, such as withdrawing children from school.



greatest reduction in inequality” or “the country that has made the greatest progress in curbing emissions and decoupling growth from carbon-based production”.

Structural transformation and industrial policies have re-emerged not only as acceptable but as an integral strategy for many emerging and developing countries in addressing inequality and promoting inclusive growth. Beyond well-noted examples in the rise of East Asia, there are several more recent cases of developing countries and emerging markets successfully employing this strategy. For example, Ethiopia has witnessed a significant transition since the early 2000s towards higher agricultural productivity and diversified industrial activities, through coherent policy design and implementation (box I.2). A key lesson from such countries is that economic successes that create jobs, raise incomes and promote sustainability require a proactive approach from States and policymakers, and that leaving such ambitious goals to conventional market-based approaches will not yield structural transformation. A progressive growth strategy is therefore a vital policy lever to address and avert systemic inequalities, but one must note it is insufficient on its own, as illustrated by persistently low wages in the case of Ethiopia above. This again highlights the imperative of strong redistributive policies.

The redistribution illustrated in this section helps vulnerable households hedge against uncertainties, breaking the vicious cycle of slower growth, higher debt and economic insecurity. Such redistribution needs to seriously address how resources are shared across society and break down barriers in access which have long existed. When combined with

#### Box I.2

#### Economic transformation through development planning in Ethiopia

Ethiopia’s transformation from a low-value smallholder to a higher productivity agricultural sector, and eventually into diversified manufacturing activities, is the result of long-term economic planning and strong political will at the highest levels of the State. The country’s agricultural reforms focused on land access, boosting productivity, enhancing rural livelihoods and prioritizing value-added agricultural activities over primary products (African Center for Economic Transformation, 2017). This led to the first stage of the country’s growth miracle, with GDP growing by double digits since 2004 and significantly outperforming the region. As a result, GDP per capita increased from \$490 in 2000 to \$1,899 in 2017.<sup>a</sup>

Agro-industries in Ethiopia promoted cut flowers, leather tanning, and greater roasting and higher-value activities in the already strong coffee sector. The country’s industrialization strategy built on these successes and focused on value addition in new sectors, particularly light manufacturing, textiles and others. This involved a long-term vision for transformation supported by an allocation of resources which dedicated new government institutions and promoted foreign partnerships and investment—for example, through large industrial parks—all under the guidance of the “developmental state” (United Nations Economic Commission for Africa, 2016). These partnerships are advertised to investors from emerging markets as a win-win, with large returns from the low cost of doing business in Ethiopia, provided that higher-value activities, skills and training are brought to the country. The implications for job creation and higher-income activity is clear, with employment in industry increasing from 7 per cent of total employment at the turn of the millennium to 12 per cent in 2018, and the growth rate of manufacturing value added increasing from an annual average of 7 per cent during 2000–2009 to 15 per cent in 2010–2018.

<sup>a</sup> In current United States dollars, PPP.

Source: UN DESA, based on World Bank, World Development Indicators database.

other enabling policies, they help to bridge divides in opportunity, reduce inequalities and alleviate some economic insecurities.

The quest to reduce inequalities and manage insecurities must also be paralleled by the pursuit of environmental sustainability, for environmental degradation has serious effects on distribution and economic security. It has been well established that in order to reach the environmental sustainability element of the SDGs, a combination of sustainable consumption and production, natural resource management and action on climate change is needed. This involves a host of ambitious policies regarding emissions reduction, switching to renewable energy, new green technologies, more efficient use of commodities in production processes, responsible consumption patterns, and so forth (United Nations, 2015). Yet the status of renewable technologies, their ubiquity, start-up costs, and inadequate incentives and policy mechanisms have thus far prevented uptake on the scale needed to achieve the SDGs. Even regions such as the European Union which are adopting more renewable-based energy production are only doing so at a pace which matches energy demand, which does not have a net effect on replacing carbon-based methods (United Nations, 2019c). Furthermore, as prices for outdated and carbon-intensive energy and production methods remain low, progress in switching to renewable energy is further slowed.

In facing these headwinds for achieving environmental sustainability, it is important to note that developing new green sectors does not have to mean sacrificing economic growth. The Global Commission on the Economy and Climate (2018) estimates that bold climate actions could deliver \$26 trillion in economic gains and create 65 million new low-carbon jobs through 2030.

Such resource transitions will have significant implications for commodity-dependent developing and emerging markets, which rely on resource exports for growth, foreign exchange and government revenues. Yet green sectors can also provide significant opportunities for these countries. For example, low-carbon technologies such as those facilitated by advanced batteries already are and will have further pull on mineral demand. New sectors also provide opportunities in resource value chains for higher-value economic activities. As resource dependence alone does not deliver the sustainable economic transformation envisaged by the SDGs, these countries should therefore move ahead with resource diversification policies. Investments in renewable energies and reducing climate change risks will go a long way in reducing uncertainties about the future.

Absent a reversal of growing inequality and rising insecurity and uncertainties, the outlook for sustainable development will remain bleak. Policies must address the root causes of inequality to deliver the 2030 Agenda for Sustainable Development. Mitigating short-term economic risks will require multi-pronged approaches for resuscitating global trade and ensuring that benefits of trade are more equitably distributed within and between countries. Addressing climate change risks will require new strategies for building resilience for communities, while ensuring fair and equitable access to opportunities for climate adaptation. The future of sustainable development will critically hinge on the success of the international community in meeting the twin objectives of reducing inequality and enhancing climate resilience.

Projections by the United Nations Department of Economic and Social Affairs shed light on the balance between growth and inequality reduction needed to help countries eradicate extreme poverty, and the implications this would have for policy tradeoffs. Despite much progress towards the MDGs and now SDGs, close to 10 per cent of the globe live below the extreme poverty line of \$1.90 per day. Baseline estimates suggest 650 million will remain in extreme poverty by 2030, with nearly two thirds residing in Africa.

Given that poverty reduction can be seen as a combination of lifting average incomes and reducing the degree of income inequality, results of scenario analyses illustrate the importance of pursuing an innovative mix of inclusive growth and redistributive policies in eradicating poverty. Without reductions in inequality, it is projected that per capita income growth in LDCs would have to grow at a wholly unrealistic 17 per cent per annum for poverty to be eradicated by 2030, whereas the estimated 2.5 per cent of LDC growth in 2018–2019 would need to be complemented by inequality reduction of 75 per cent. In this view, it is clear that past improvements in inequality, which averaged 0 over the 15 years to 2015, or the deterioration during the preceding period of another 15 years, are woefully inadequate in addressing poverty and achieving sustainable development.



## Chapter II

# Achieving SDGs amid aggravating climate change, conflicts and population displacement

## Introduction

The aggravation of climate change effects, violent conflicts, and population displacement in recent years has made achievement of the Sustainable Development Goals (SDGs) more challenging than anticipated. Overcoming challenges in these three areas requires more urgent and drastic reduction of greenhouse gas emissions; more efforts to pre-empt and resolve violent conflicts and to help conflict-affected countries refocus attention on development; and more effective national and global management of safe, regular and orderly migration. More importantly, efforts are needed to reduce inequality and insecurity both between and within countries, which drive all three challenges above, and to uphold multilateralism, which is necessary for dealing with each of them.

Climate change processes are accelerating towards the point of no return—that is, where trends become irreversible. This can be seen, for example, in glacier melting, permafrost thawing, and the rise of ocean temperatures. In tandem with this, damages caused by climate-related processes are increasing rapidly, disproportionately affecting the least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS), and holding them back from achieving faster progress towards the SDGs. Climate change is also increasingly becoming a major driver of population displacement, which similarly affects the developing world to a disproportionate extent.

Voluntary emissions reduction targets so far do not match the cuts necessary to keep the temperature rise within safe limits. As the discussion in Chapter 3 will show, while technologies that can bring about these reductions are already available, the national and international political will necessary to tackle climate change remains lacking. Meanwhile, the Yellow Vest movement in France and similar movements elsewhere have shown that the burden-sharing issue in the context of climate change applies not only across countries but also within countries. In fact, dealing with within-country inequality and rising economic insecurity has become a precondition for success in climate action at both national and global levels.

While inter-State conflicts have remained under control, intra-State violent conflicts have increased in number and scope in recent years. The number of battle-related deaths

from intra-State conflicts reached an all-time high in 2014 and continues to remain high. The number of groups participating in conflicts has increased, and the demarcation line between inter-State, intra-State, and supra-State conflicts has become blurred, requiring new approaches to deal with these conflicts of a hybrid nature. Countries suffering from conflicts continue to lose large parts of their gross domestic product (GDP), physical infrastructure and human capital, making it difficult for them to be on track towards achieving the SDGs. Conflict-ridden countries lagged in the Millennium Development Goals (MDGs); it is important to avoid a repeat of that experience regarding the SDGs. Existing multilateral mechanisms, such as the United Nations Security Council, need to play a more proactive role in preventing conflicts. Holding to account actors who create and perpetuate conflicts is also important. Addressing basic development challenges, ensuring fairness and rule of law, and reducing inequality and insecurity can relieve many of the stresses that trigger violent conflicts. Meanwhile, livelihood insecurities caused by climate change have become another source of conflict, adding further rationale for effective and urgent climate action as a means to mitigate not only climate change but violent conflict as well.

The number of both forcibly displaced people and voluntary migrants has increased in recent years, due to the intensity and protracted nature of many conflicts. Furthermore, climate change, either by directly effecting livelihood stresses or by indirectly exacerbating violent conflicts, has emerged as a major driver of population displacement. Orderly, safe, and regular migration, as the recently adopted Global Compact on Migration points out, can be beneficial for countries of both origin and destination. However, large-scale migration—both voluntary and involuntary—in recent years has fostered anti-immigration sentiments and the rise of populism in some developed countries. These political changes have led to the weakening of multilateral efforts necessary for dealing with climate change and violent conflicts, which are precisely the drivers of disorderly, unsafe, and irregular migration—creating a vicious cycle. Achieving the SDGs requires breaking this vicious cycle, reinvigorating multilateralism, and addressing the underlying problems of inequality and insecurity.

In dealing with increasingly interlinked challenges (i.e., climate change, violent conflicts and migration), an energetic multilateral response is absolutely necessary but often missing. Intergovernmental cooperation is at the heart of the multilateral processes to strengthen climate action and migration governance. Similarly, it is clear that the impact of inequality is more pervasive than was previously thought. On the one hand, many of the violent conflicts and ensuing population displacement, as well as the rise of social discontent and anti-immigration sentiments, are rooted in citizens' growing concern about economic inequality and insecurity. On the other hand, climate action and effective migration governance are impeded not only by cross-country inequality but also within-country inequality. Going forward, it will be important to bear in mind the multifaceted ways in which the reduction of inequality can help achieve the SDGs. A better understanding of the complex interaction between these interlinked challenges, and their inextricable relationship to inequality and insecurity, will also be necessary to accelerate progress toward the SDGs.

The scope of multilateral efforts does not need to be limited to action by national Governments. Multi-stakeholder cooperation has been an important feature of the SDG formulation process. Global cooperation of non-State actors can therefore be an important complement to cooperation at the government level.

## Combating climate change

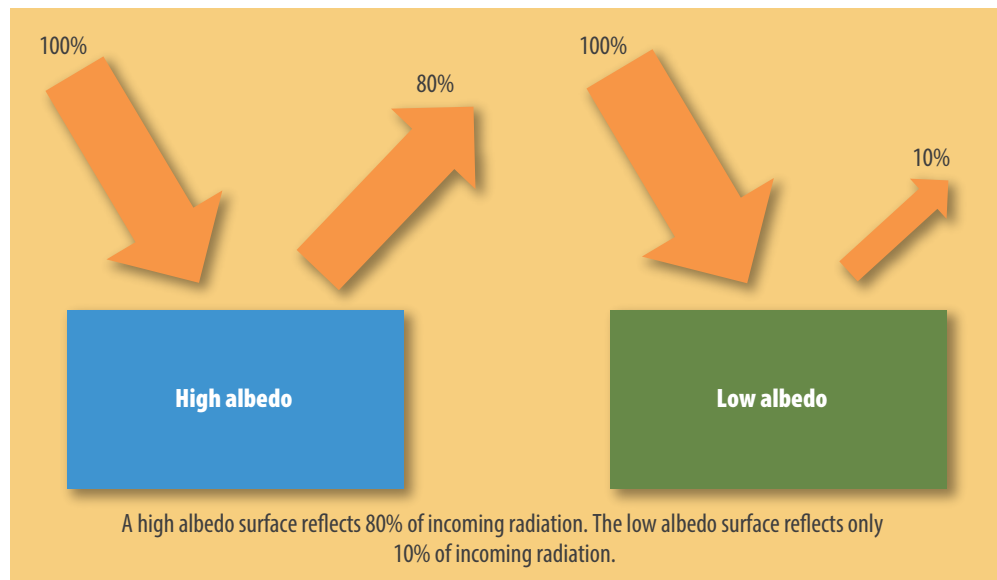
### Acceleration of climate change processes

Climate change processes are accelerating at an alarming pace and intensity. The phenomenon is manifesting in many forms, with debilitating ecological and environmental effects. Some of these are as follows:

- (i) *Melting of glaciers and ice sheets*: As glaciers and ice sheets melt, less of the sun's rays are reflected back and more heat is absorbed, increasing the rate of melting. The Arctic sea ice extent has declined by about 10 per cent, and the average winter ice thickness has thinned by approximately 1.8 m over the 1979–2012 period (Intergovernmental Panel on Climate Change, 2014; Box and others, 2019). Melting ice, in turn, is further warming the atmosphere, since the open ocean absorbs more of the sun's energy than ice, a phenomenon known as reduced albedo (figure II.1). Similar phenomena of accelerated melting can be seen in the Antarctica ice sheet and glaciers in different parts of the world (Noël and others, 2017; Zemp and others, 2019).
- (ii) *Permafrost thawing*: As the Arctic is warming, frozen soils (*permafrost*) in parts of Northern Alaska and the Russian North have started to thaw, often for the first time in thousands of years. In addition to the albedo effect mentioned above, permafrost thaw is releasing methane and other greenhouse gases into the atmosphere (Turetsky and others, 2019; Box and others, 2019). This process is accelerating climate change, as soils in the permafrost region hold twice as much carbon—almost 1,600 billion tons—as the volume of carbon currently (2015) in the atmosphere.
- (iii) *Ocean warming and sea level rise*: The upper 75 metres of the ocean has been warming by an average of 0.11°C each decade during 1971–2010 (Intergovernmental Panel on Climate Change, 2014). However, it seems that ocean warming has been accelerating since the 1990s (Cheng and others, 2019), setting a new record in 2018. Along with the temperature, the levels of oceans and seas are also rising at an accelerated pace. The sea level rose by 16–21 centimetres between 1900 and 2016 (Sweet and others, 2017). More precise data gathered from satellite measurements reveal an accelerating rise of 7.5 centimetres from 1993 to 2017 (World Climate Research Programme, 2018), which is a trend of roughly 30 cm per century. Given the ocean's large mass and high heat capacity that allow it to store huge amounts of energy, sea levels could continue to rise for millennia, even if greenhouse gas concentrations could be contained at the present level.
- (iv) *Other evidence of acceleration*: Accelerated climate change is also evident in the number of warm days and nights; the frequency and severity of extreme weather events, such as heat waves, droughts, forest fires, and intense rainfall and floods; the number of species vanishing and being threatened; the collapse of viable ecosystems; continuing land degradation, etc. The Centre for Research on the Epidemiology of Disasters (CRED) reports that climate-related disasters account for 91 per cent of all 7,255 recorded natural disasters that occurred from 1998 to 2017.



Figure II.1  
Effects of high versus low albedo

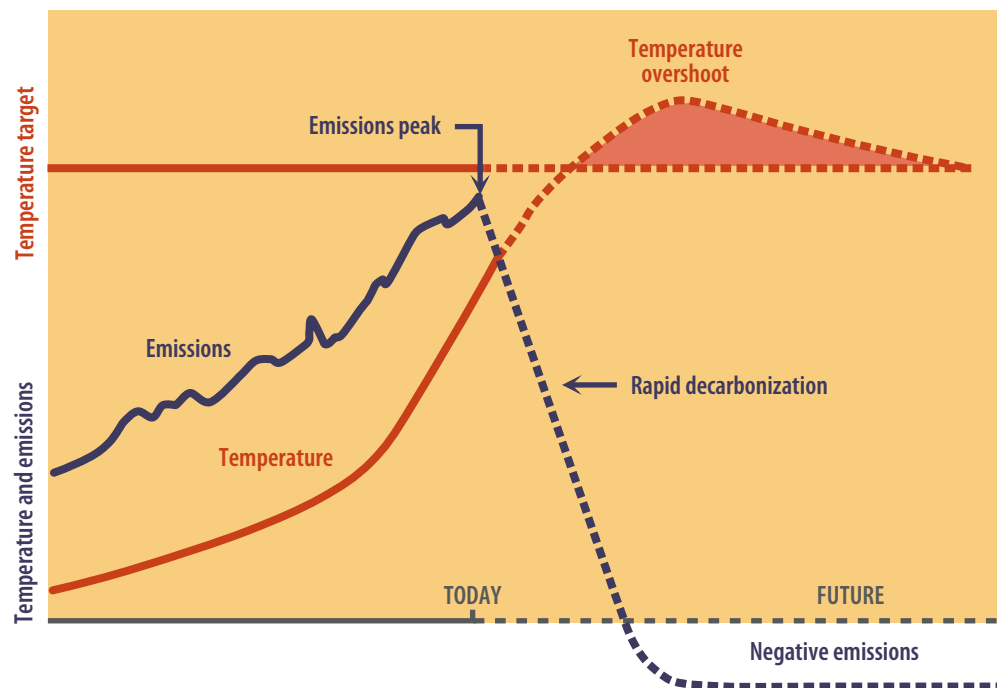


Source: North Carolina Climate Office (2019).

### Temperature overshooting and lack of adequate climate action

Climate change acceleration is leading to temperature overshooting, which refers to the possibility that the global temperature will exceed the limits before it possibly decelerates in the future (figure II.2). This means that the world may witness catastrophic consequences much sooner than was previously anticipated, and some of these will be irreversible.

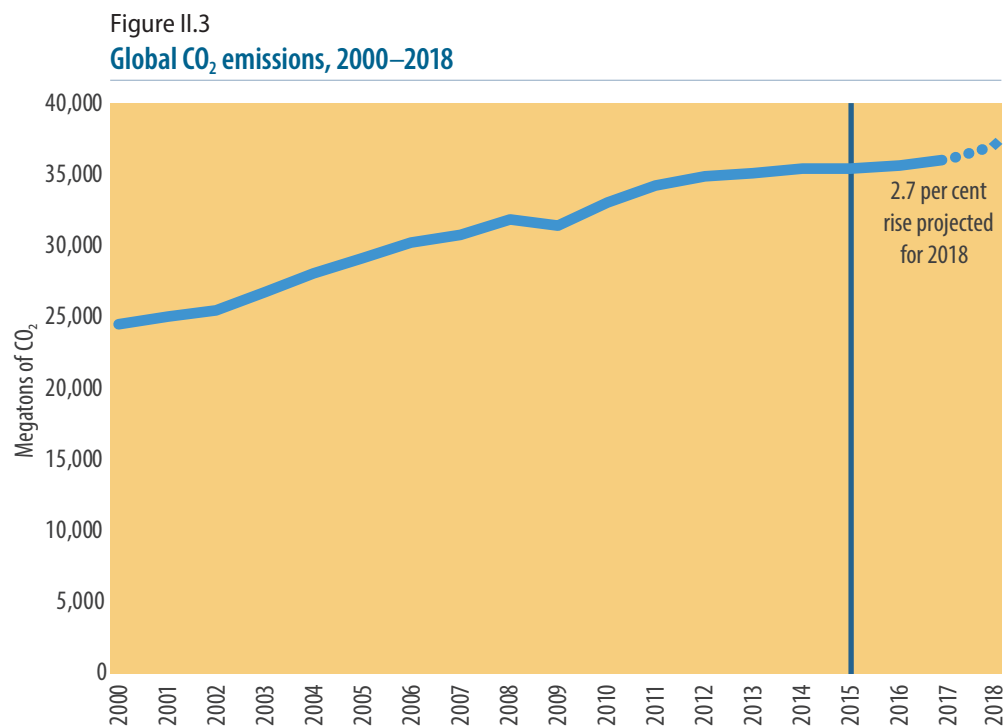
Figure II.2  
Schematic presentation of temperature overshoot



Sources: UN DESA, based on World Meteorological Organization and United Nations Environment Programme (2019).

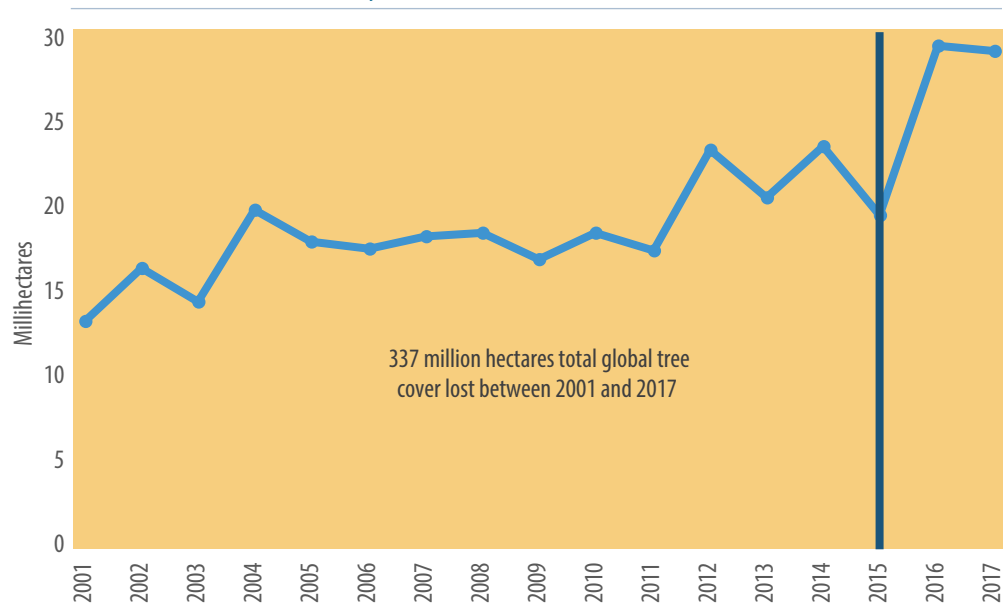
Human-induced warming has already reached approximately 1°C above pre-industrial levels in 2017 and *is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at current rate* (Intergovernmental Panel on Climate Change, 2018, emphasis added). Warming is more pronounced in some parts of the world than others. As a result, over a quarter of the global population lives in regions that have already experienced more than 1.5°C of warming in at least one season. This means that the overshooting of global warming is now more likely than ever before and soon may even exceed the 2°C target set in the Paris Agreement on Climate Change.

Unfortunately, voluntary climate actions—announced and undertaken by the States Members of the United Nations in line with the Paris Agreement—fall far short of meeting the urgency of this challenge. After slowing down between 2012 and 2014, and remaining stable in 2015 and 2016, global CO<sub>2</sub> emissions levels started to increase again in 2017, and are estimated to have increased by another 2.7 per cent in 2018 (figure II.3).



Power generation using coal has been an important driver of this increase (Olivier and Peters, 2018). Another important driver has been deforestation and changes in land use. The rate of deforestation has steadily increased since the SDGs were adopted in 2015, and 337 million hectares—a land area larger than India—of global tree cover has been lost between 2001 and 2017 (figure II.4). Deforestation has wide-ranging adverse effects on the global environment and ecology, including loss of biodiversity.

Figure II.4  
Global annual tree cover loss, 2001–2017



Source: Global Forest Watch, available from <https://www.globalforestwatch.org/dashboards/global?category=forest-change>.

### Accelerated climate change and challenges for the SDGs

Along with the acceleration of climate change, damages to economies are increasing rapidly, making SDG achievement more difficult. The physical effects of climate change are often classified into two categories, namely *slow-onset* effects, such as sea level rise, desertification, and droughts, and *rapid-onset* effects, such as extreme weather events, including floods and storms. Both types of effects are taking a toll on SDG progress. Climate-related disasters cause direct losses of assets that have a market value, such as property and infrastructure, as well as losses of assets that do not have a market value, such as loss of life and damage to natural and cultural assets. They also produce indirect losses, including lost outputs resulting from reduced productive capital and capital redirected to rehabilitation and reconstruction.

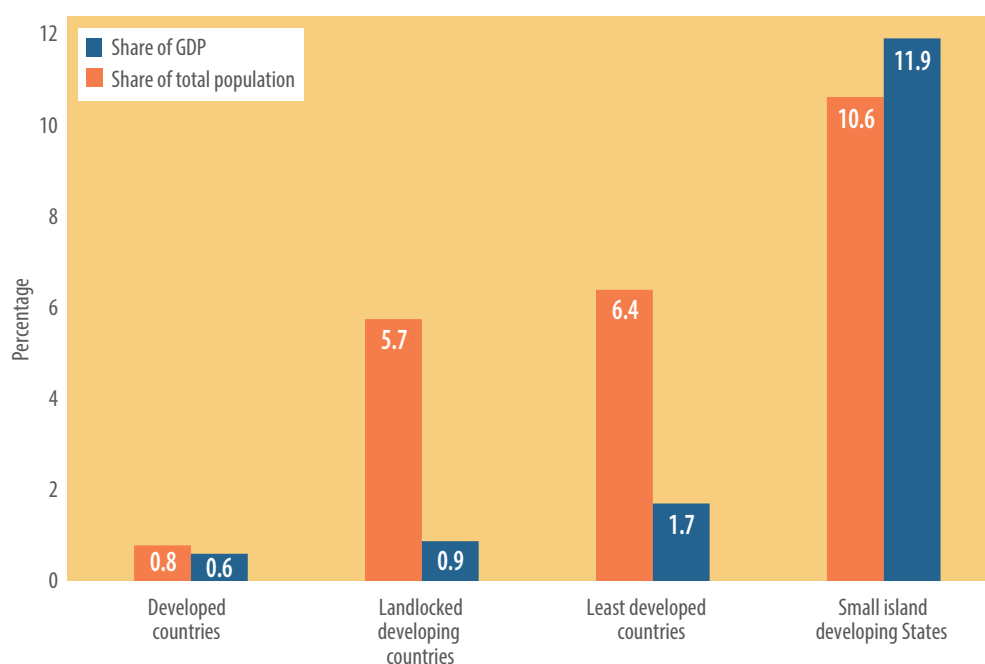
Accelerated climate change is undermining SDG implementation in all regions of the world; even developed countries are suffering substantial climate-induced economic losses. For example, the National Oceanic and Atmospheric Administration (NOAA) (2019) reports that, in 2018, there were 14 different natural disasters in the United States of America, ranging from hurricanes to wildfires to winter storms, with a total damage of \$91 billion. Eighty percent, or \$73 billion, of the total damage was attributable to just three events: Hurricane Michael in Florida, Hurricane Florence in the Carolinas, and wildfires in the West, including California. According to the Fourth National Climate Assessment Report (U.S. Global Change Research Program, 2018), the US economy could lose more than 10 per cent of its GDP by the end of the century if global warming continues at its current pace.

The SDG challenges posed by climate change are more severe for developing countries. Since 2000, georeferencing has found that, on average, 130 people died per million in low-income disaster-affected areas, compared to just 18 people per million in high-income countries. According to data from EM-DAT, since 1998, 97 per cent of the affected population (with 91 per cent in middle-income countries and 6 per cent in low-income countries) and 90 per cent of deaths caused by disasters (with 68 per cent in middle-

income countries and 22 per cent in low-income countries) were in developing economies (Mizutori and Guha-Sapir, 2018). The share of the population affected by climate-related disasters during 1999–2017 was only 0.8 per cent in developed countries. By comparison, it was 5.7 per cent for LLDCs, 6.4 per cent for LDCs, and 10.6 per cent for SIDS. Similarly, while annual damages caused by climate-related disasters during 1999–2017 amounted to only 0.6 per cent of GDP for developed countries, it was 0.9, 1.7 and 11.9 per cent of GDP for LLDCs, LDCs and SIDS, respectively (figure II.5).

Figure II.5

### Effects of climate-related disasters on selected groups of countries, 1999–2017, measured by per cent of population affected and per cent of GDP lost



Source: UN DESA, based on data from EM-DAT: The Emergency Events Database, World Development Indicators database and UNdata.

Developing countries face more damages from slow-onset effects of climate change as well. Sea level rise poses an existential threat to many low-lying developing countries. The Marshall Islands and the Maldives are expected to lose as much as 7.6 and 7.5 per cent of GDP per year, respectively, by 2050 (table II.1). Economic loss due to sea level rise will also have multiplier effects on economic development by destroying key economic sectors such as the tourism industry. As noted in many of the Voluntary National Reviews submitted by SIDS for the High-level Political Forum in 2018, sea level rise directly threatens activities and infrastructure, which are key to economic growth in nations such as the Bahamas, where sea level rise threatens 36 per cent of major tourism properties, 38 per cent of airports, 14 per cent of road networks, and 90 per cent of sea ports (see box II.1).

Similarly, countries, particularly in the Saharan region, are losing much of their terrestrial ecosystem services due to land degradation. Drought, which reduces crop yields, livestock, fisheries, and aquaculture, threatens food availability and food security at both global and regional levels. Guha-Sapir and others (2013), for instance, show that droughts often inflict significant losses on national economies, in some cases causing damage equal to or greater than 0.5 per cent of GDP in the affected countries.

Table II.1

**Estimated annual damages from sea level rise by 2050**

Country	Estimated annual damage (percentage of GDP)
Marshall Islands	7.6
Maldives	7.5
Tuvalu	4.6
Kiribati	4.1
Tonga	2.5
Palau	1.9
Federated States of Micronesia	1.8
Nauru	1.7

**Source:** Asuncion and Lee (2017).

The experience of Cyclone Idai, which hit Mozambique, Zimbabwe, Malawi, and Madagascar in March 2019, illustrates the heavy toll that climate-related disasters are taking on developing countries' capacity to achieve the SDGs. Considered to be the most devastating natural disaster that has ever hit the Southern Hemisphere, Idai caused total damages exceeding \$1 billion, amounting to about 2.56 per cent of the combined GDP of the three most affected countries, namely Malawi, Zimbabwe and Mozambique (table II.2). Mozambique was hit by another cyclone, Cyclone Kenneth, a month later, causing further damage (Zacarias, 2019). The experience of Idai supports the estimates made by Arndt and Thurlow (2015), who predict that climate change will reduce Mozambique's GDP by about 13 per cent by 2050.

## Box II.1

**Voluntary National Reviews of the Sustainable Development Goals**

It is not surprising that the States Members of the United Nations themselves increasingly highlight aggravation of climate change impacts as challenges to the achievement of the Sustainable Development Goals (SDGs). More countries highlighted climate change-related challenges in their Voluntary National Reviews (VNRs) in 2018 than in 2017. Of the 46 countries presenting VNRs in 2018, as many as 13 identified climate change as a key impediment to their SDG progress. For example, the Bahamas noted that over the last three years, three major category-three or higher hurricanes cost the country \$678 million, or 5 per cent of its GDP. Similarly, Jamaica noted damage from unusually heavy rain; Namibia mentioned higher incidence of drought and floods; and Bahrain reported greater intensity of sand storms. Many countries reported increasing water scarcity, greater pressure on agricultural land, etc., that can be traced to climate change. In addition to direct damage to physical capital stock, many VNRs noted the indirect effect of climate change on their economies and development efforts. For example, Kiribati noted that climate change threatened to disrupt the country's number one economic resource—the tuna fishery—by impacting tuna migratory flows. The VNRs also note that climate change is making it harder to achieve a wide range of SDGs, including SDG 1 (poverty), SDG 2 (food security), SDG 5 (gender equality), SDG 6 (clean water), SDG 7 (affordable and clean energy), SDG 9 (infrastructure), SDG 11 (sustainable cities and communities) and SDG 14 (life below water).

**Source:** UN DESA.

Table II.2  
Effects of Cyclone Idai

Country	Fatalities	People affected	Damage (2019 USD)	GDP	Damage as a percentage of GDP
Malawi	60	922,900	N/A	7.33	-
Mozambique	468	1,850,000	N/A	12.90	-
Zimbabwe	259	250,000	N/A	18.90	-
Total	787	3,022,900	≥\$1 billion	39.13	2.56

Source: Emergency Response Coordination Centre (ERCC) (2019).

Climate change and adverse weather conditions—which affect food availability and prices, and prolong armed conflict—are also considered to have been key drivers behind the recent rise in global hunger and are among the leading causes of severe food crises (Food and Agricultural Organization, 2018a).<sup>1</sup> The number of food insecure people has been on the rise since 2014. The largest increases have occurred in sub-Saharan Africa, where the total number of undernourished people increased from 195 million in 2014 to 237 million in 2017. This presents a heightened risk of falling far short of achieving the SDG target of hunger eradication by 2030 (SDG 2), and the possibility of reversing the progress already made.<sup>2</sup>

## Reduction of within-country inequality: a precondition for climate action

Since the United Nations Conference on Environment and Development (Rio Earth Summit) in 1992, burden-sharing concerns have dominated the multilateral discourse on climate change, exposing a divide between developed and developing countries. First, there are concerns that greenhouse gas (GHG) emissions—concentrated in a few industrialized economies—have been primarily responsible for global warming and climate change. By contrast, GHG emissions from a majority of developing countries were, until recently, insignificant. Second, there are concerns regarding the distribution of damages caused by climate change. Climate change damages and their costs are disproportionately borne by developing countries. This is due to the geographic location and other physical characteristics of many developing countries. The third concern is the limited capability of many developing countries to withstand, and cope with, the effects of climate change. Here again, developing countries, in general, are at a disadvantage, due to their inadequate and underdeveloped financial, technological, human and institutional capabilities.

<sup>1</sup> Agriculture and food security are also critical to achieving other SDGs, including poverty eradication (SDG 1), health and well-being (SDG 3), clean water (SDG 6), decent work (SDG 8), climate action (SDG 13), the protection of ecosystems on land (SDG 14) and in water (SDG 15), and peace (SDG 16) (Intergovernmental Panel on Climate Change, 2014; Pérez-Escamilla, 2017).

<sup>2</sup> As will be elaborated upon in section two, drought and water scarcity, through their intermediary effects on food and other livelihood insecurities, are also key drivers behind the occurrence of or prolonged nature of conflict, and thus migration.



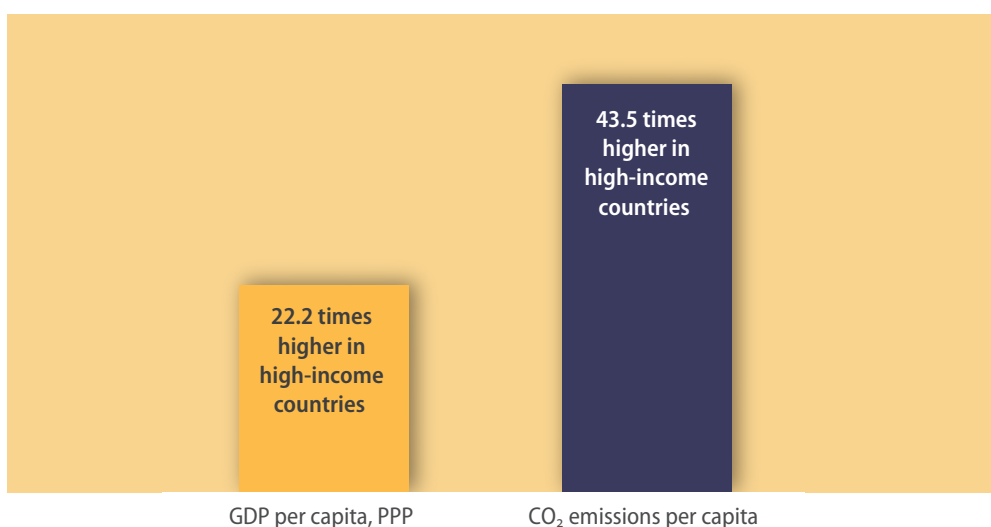
Curbing CO<sub>2</sub> emissions will remain a daunting challenge, given the persistently high degree of inequality in per capita emissions levels between high- and low-income countries. Average per capita emissions in high-income countries is 43 times higher than emissions per capita in low-income countries, dwarfing the level of income inequality (figure II.6). As people in developing countries achieve greater economic prosperity, their per capita emissions will rise. New pathways to development and prosperity must leverage technology—especially renewable energy technologies—to decarbonize economic growth.

It is increasingly clear that burden-sharing is not only a cross-country concern, but also a concern in within-country contexts. Research has shown that, within a country, the rich generate more per capita emissions, while also suffering proportionately less damage from climate change than the poor. In addition, they also have greater financial and other capacities to avoid and deal with damages caused by climate change.

The fact that the poor and the disadvantaged within countries suffer disproportionately greater losses from climate effects was already observed by the International Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). Proceeding from this observation, subsequent researchers noted the possibility of a vicious cycle between climate change and within-country inequality, whereby inequality causes disadvantaged people to suffer more damage from climate change, thus exacerbating their initial inequality (Islam and Winkel, 2017). This vicious cycle is reinforced by the fact that unequal societies tended to have more climate-damaging consumption patterns. Recent experience has shown that unequal burden-sharing can be another factor reinforcing this vicious cycle, as shown in figure II.7.

Increasing inequality and heightened insecurity are fomenting social discontent and protest. The Yellow Vest movement in France (box II.2) exemplifies the linkages between growing social discontent and challenges in climate action. Similar protests have spread to other countries. The yellow vest itself has also become a symbol of anti-establishment feeling and frustration over increasing inequality and insecurity, rising living costs, unemployment, corruption, and poor public services, and has been donned by protesters in many other places, including Germany, Iraq, Israel, Taiwan Province of China, and the United Kingdom of Great Britain and Northern Ireland (Branzati and Lucardi, 2019).

Figure II.6  
**Inequality in per capita income and emissions, 2016**



Source: UN DESA estimates, based on data from the World Carbon Project and the World Development Indicators database.

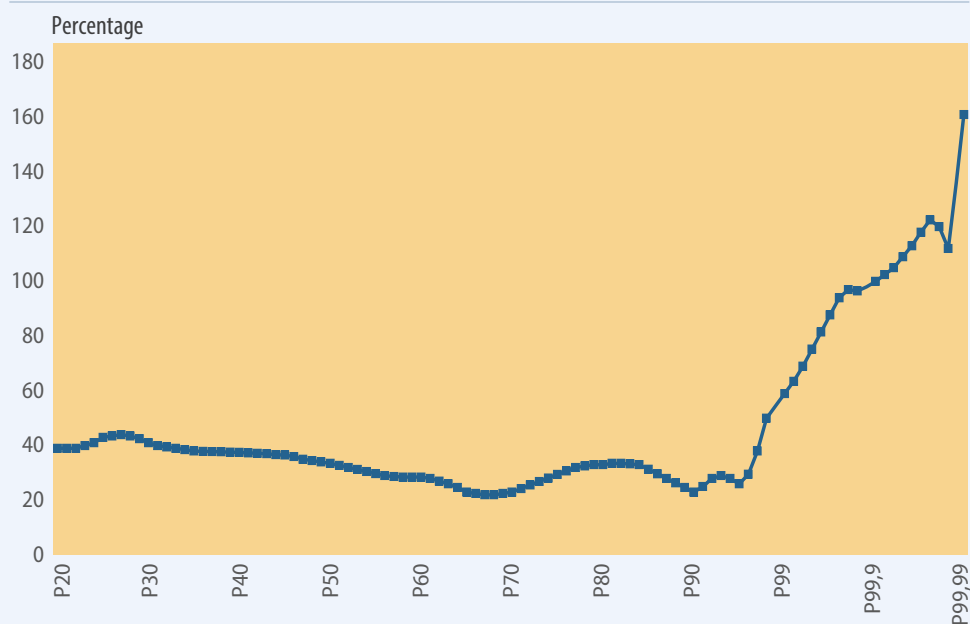
## Box II.2

**The Yellow Vest movement**

The Yellow Vest movement began as a protest against a proposed carbon tax in France in January 2018 (The Local, 2018), but quickly grew to encompass a range of issues related to growing inequality, rising living costs, reduced social welfare spending, and anti-elite sentiment. The movement's demands included progressive taxation, a rise in the minimum wage, stronger regulation of big businesses, expanded social safety-net programmes, a system of direct democracy, and new protections for vulnerable segments of the population (Williamson, 2018).

France has witnessed a general widening of inequality since 1983, following larger trends of growing inequality in the developed world. While the nation's median per capita income during 1983–2014 increased by only 34 per cent, the per capita income of those belonging to the top 0.01 per cent of the income distribution scale increased by 162 per cent (Garbinti, Goupille-Lebret and Piketty, 2018). Living costs also saw a substantial increase over the same period, particularly related to housing costs, which absorb 23 per cent of the average French person's disposable income compared to 10 per cent a generation ago (Thomas, 2019).

Figure II.2.1

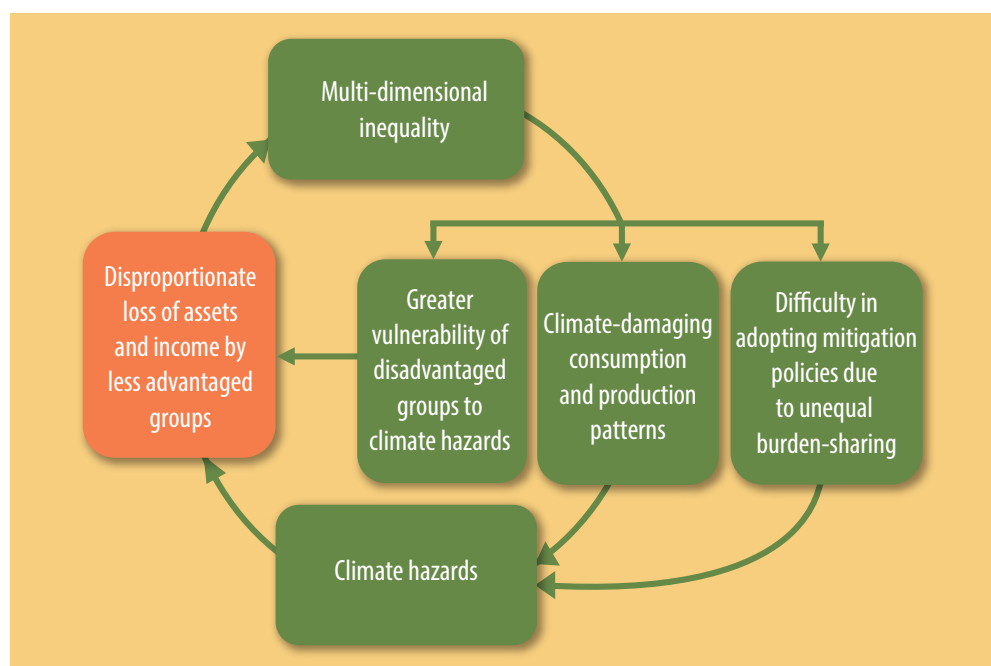
**Real income growth in France by percentile group between 1983 and 2014**

Source: Garbinti, Goupille-Lebret and Picketty (2018).

While the Yellow Vest protests have taken place in cities, most participants commuted from surrounding peri-urban and suburban areas to take part. Having been priced out from living in urban centres where there is access to public transportation, these individuals are more reliant on their cars for their livelihoods. As a result, protestors have relayed to media outlets that they oppose the carbon tax not because they are against climate action, but rather because they feel the tax places an unfair burden for climate change mitigation on lower-income earners. In response to the large protests, the French Government ultimately cancelled the planned carbon tax and instead implemented a range of measures aimed at alleviating economic hardship for the lower and middle classes.

Source: UN DESA.

Figure II.7  
**Vicious cycle between climate change and inequality**



Source: UN DESA.

Growing income and wealth inequality and accompanying social discontent is giving rise to populist political stances that present economic growth and environmental sustainability as mutually incompatible. Exploiting social discontent as a means of mobilizing electoral support, populist politics are increasingly framing climate-friendly policies as an elitist agenda that ignores the economic needs of the working-class population. A recent example of this stance is the announcement that the Affordable Clean Energy policy in the United States, which promotes the production and use of coal, will replace the Clean Power Plan, as a means for creating jobs in economically depressed parts of the country.

A similar policy reversal is seen in Brazil where, after decreasing for about a decade, inequality started to rise again, beginning in 2014. Ignoring the impacts of rising inequality on growth and employment, restrictions on development in the Amazon forests and indigenous reserves are cited as the cause of lack of jobs and income in Brazil (Viscidi and Graham, 2019; Harper, 2018). As a consequence of the roll back on restrictions, deforestation in the Amazon, which is often considered the “earth’s lungs,” has risen by nearly 14 per cent since 2017, representing the highest loss of forest cover in the Amazon in a decade (Londoño and Friedman, 2018). These examples show that persistent and increasing social inequality may make it difficult to adopt climate-friendly policies. Against the backdrop of increasing inequality in a large number of countries, populism and opposition to climate action may very well spread and undermine multilateral efforts to combat climate change. Addressing inequality has thus become a precondition for successful climate action at both national and global levels.

## Tasks ahead to combat climate change

Climate change is accelerating and reaching a point when reversal will be all but impossible. Self-reinforcing processes are at work in ice sheet melting, permafrost thawing, and in the rise of ocean temperature and sea levels. Drastic reduction of carbon emissions can no longer be postponed. Climate change knows no national boundaries and is becoming increasingly costly for developed countries as well as for developing countries. However, damages for certain groups of developing countries—particularly small island developing States and low-lying coastal countries—are many times greater, as a proportion of GDP and population, than those in developed countries. The world must scale up efforts not only to contain global warming and climate change but also to strengthen the capacities of low-income households, communities and countries to adapt and cope with the adverse impacts of climate change.

Burden-sharing is no longer of concern only to developing countries. It is also a concern for the poor and most vulnerable in developed countries, who are often the least able to bear the cost burden for mitigating climate change. Addressing within-country inequality—especially in developed countries, which have contributed more to global warming and climate change—has become a precondition for success in climate action at both national and global levels. Carefully designed carbon taxes that ensure the burden does not fall on the poor will remain an important tool for mitigating CO<sub>2</sub> emissions. There needs to be a global consensus on the price of carbon to accelerate mitigation efforts. Along with the use of fiscal tools, Governments and societies must make multilateral efforts to change production and consumption patterns. Promoting recycling and zero waste, drastically reducing the use of fossil fuels, transitioning to renewable energy resources, changing land use patterns and creating a circular economy will remain critical for achieving zero emissions growth.

The world must address the twin challenges of climate change and inequality in tandem. Addressing inequality will enable more comprehensive and effective climate action at national and international levels. Deploying appropriate technologies for accelerating mitigation efforts (as discussed in chapter III) will remain critical.

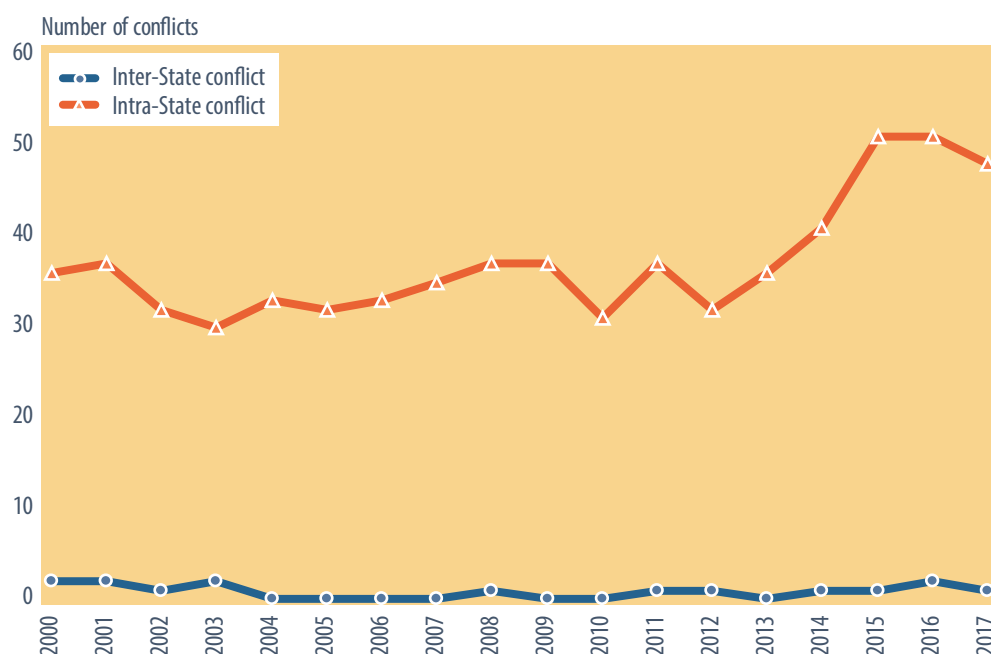
## Achieving SDGs amid rising violence and conflicts

### Aggravation of conflicts in recent years

Violence and conflicts continue to pose grave threats to sustainable development. The experience with the MDGs show that conflicts are extremely costly for development. While the number of inter-State conflicts has remained low and steady, the number, scope, and damage caused by intra-State conflicts have increased in recent years, despite declining slightly in 2017 (figure II.8).<sup>3</sup> The Uppsala Conflict Data Program recorded 51 and 47

<sup>3</sup> The Uppsala Conflict Data Program (UCDP) defines inter-State conflicts as a combat between sovereign States, while intra-State conflicts involve armed rebellion by non-State actors challenging the sovereignty of incumbent Governments within a sovereign State. Intra-State conflicts can contest either the control of the Government or the control of a subnational territory. The UCDP uses a threshold of 25 battle deaths as a threshold for inclusion in their conflict database, while an inter-State or intra-State conflict is defined as a conflict that exceeds 1000 battle deaths. Intra-State conflicts or civil conflicts can be divided into ethnic and non-ethnic conflicts. The rise of the latter has been higher than the reduction of the former during 2000–2017.

Figure II.8  
Trends of inter-State and intra-State conflicts, 2000–2017



Source: Cederman and Pengl (2019).

internal state-based violent conflicts in 2015 and 2016, respectively.<sup>4</sup> The number of conflicts that had at least 1,000 battle-related deaths has more than tripled (Pettersson and Eck, 2018; Cederman and Pengl, 2019).

Intra-State conflicts have also become more complex and protracted, involving a growing number of groups. The number of armed groups involved in a civil war averaged 8 in 1950 and increased to 14 by 2010. An increasing number of armed groups, having no or little formal connection to a State (hence called non-State armed groups) are participating in conflicts (United Nations and World Bank, 2018; Walch, 2019). In the Syrian Arab Republic alone, for instance, more than 1,000 active armed groups were operating in 2014, including Syrian opposition groups, extremist transnational groups, such as the Islamic State (commonly referred to as ISIL) with foreign fighters in their ranks, and various affiliated groups (United Nations and World Bank, 2018).

Intra-State conflicts have increasingly become internationalized, with 18 out of 47 violent conflicts involving foreign Governments in 2016 (Cederman and Pengl, 2019; United Nations and World Bank, 2018). Moreover, violent conflicts are no longer concentrated in low-income countries. Since 2010, these have spread to middle-income countries with functioning institutions, such as Iraq, the Syrian Arab Republic, Ukraine and Venezuela (Bolivarian Republic of) (United Nations and World Bank, 2018).

Globalization, radical changes in communications technology, and the spread of illicit trade and finance across borders have allowed radical extremist groups to expand their digital footprint and recruit foreign fighters more easily. As of 2018, as many as 41,490 people from 80 countries, including high-income developed countries, joined the Islamic State in Iraq and the Syrian Arab Republic as foreign fighters (Cook and Vale, 2018). In the United Kingdom, more British Muslims have become foreign fighters for jihadist groups abroad than serve in the country's armed forces (Weaver, 2015). This reflects a globalized

<sup>4</sup> The main form of intra-State conflict.

world in which local identity-based grievances, inequality, a sense of alienation and local rebellions intersect with facets of globalization and become interwoven into global conflicts (Sassen, 2004; Gade, 2018).

### Drivers of conflict

Most intra-State violent conflicts are rooted in group-based grievances arising from inequality, exclusion, and feelings of injustice. Differences in access and opportunities across groups that are based on identities, such as ethnicity, region and religion, create the potential for violence when these grievances are not resolved peacefully through political processes (Østby, 2008; Justino, 2017; United Nations and World Bank, 2018).

In the Middle East, the civilian protests against ruling regimes often transformed into violent intra-State conflicts when divisions along religious sects and tribal and ethnic identities overwhelmed the division between the State and civil society. In addition to intra-group inequalities, sudden changes in political status and exclusion, specific policies implemented, or brutal repression by regimes can foster a deep-rooted sense of exclusion and injustice, which can trigger the outbreak of violence. In Darfur, for example, a change from the indigenous *hakura* system of inheriting land rights, which offered more flexibility, to the more rigid system of private property served as an important source of conflict.

Perceptions of group-based exclusion and inequality can also be instrumental in the outbreak of conflict, even when they are inaccurate (Gurr, 1970). A study undertaken across four states in Nigeria found that members of ethnic groups that were objectively richer than other groups self-reported higher levels of exclusion and were more likely to support and engage in violent conflict (Rustad, 2016).

While these grievances do not always lead to the outbreak of conflict, they can be transformed into violent conflict when armed groups or other elite actors assign blame to another entity, such as the State or a certain population group. Often, the elite mobilizes these grievances to foment conflict and advance their own interests (United Nations and World Bank, 2018).

In most cases, grievances accumulate over time before boiling over into conflicts. In Myanmar, for example, the Rohingyas, as an ethnic minority group, have been facing discrimination that undermined their civil, political, educational and economic rights for decades. The historical reasons for the discrimination are complex, but when the Rohingyas were stripped of their citizenship in 1982, rendering them stateless and making armed resistance and conflicts more likely (Parnini and others, 2013). Facing persecution, the Rohingyas had fled previously to Bangladesh in 1978, 1991–1992 and 2016 (United Nations Office for the Coordination of Humanitarian Affairs, 2018). Today, 1.1 million Rohingya refugees remain stranded in Bangladesh, awaiting a political resolution of their predicament (United Nations High Commissioner for Refugees, 2019a).

### Climate change as a new driver of conflicts

In addition to the traditional sources of conflict noted above, climate change has emerged as another driver of conflicts. Evidence suggests that climate change can act as a “threat multiplier” that increases the risk of conflict by exacerbating the underlying causes of conflicts, such as socioeconomic and political inequalities and food and other livelihood insecurities. Several studies, for instance, report a positive correlation between higher food prices caused by adverse climatic conditions and the outbreak of urban unrest in some

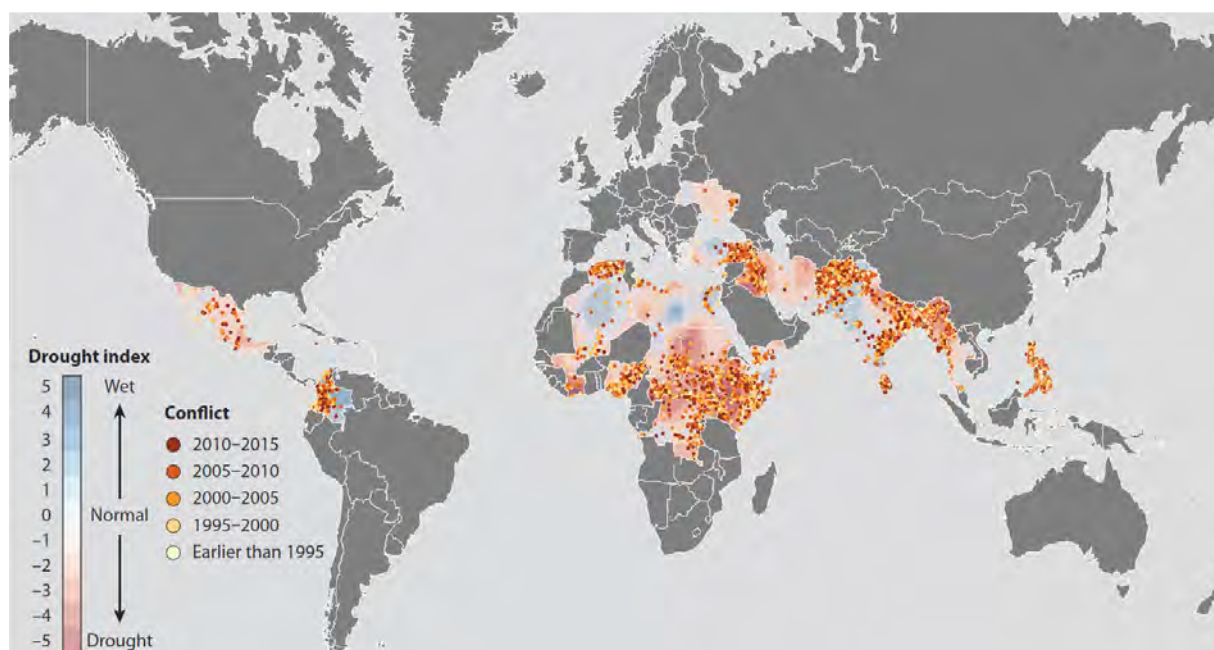


African countries (Smith, 2014), civil conflicts (Fjelde, 2015; Raleigh and others, 2015), and the incidence of social unrest globally (Bellemare, 2015; Koubi, 2019a).

The link between climate change and conflict has been and will be particularly pronounced through its effect on water, especially due to slow-onset effects of climate change such as droughts (World Bank, 2016). The Uppsala Conflict Data Program Georeferenced Event Dataset version 17.1,<sup>5</sup> assessing all regions of the world between 1989 and 2014, finds that civil conflicts are generally located in countries and regions suffering from droughts, which are often attributed to climate change processes. Figure II.9 shows that drought and conflict coexist in countries or regions that already suffer from adverse climatic changes, are highly dependent on agriculture for income and food generation, have fewer adaptation capacities to cope with these changes, and suffer from high degrees of group-based tension and exclusion. More specifically, Schleussner and others (2016) report that the initiation of civil conflict follows drought, especially in situations where there is a high degree of ethnic fractionalization, while Von Uexkull and others (2016) find a significant statistical correlation between drought and conflict in areas where minority groups are excluded from political participation. As discussed in chapter III, deploying satellite-enabled technologies for finding water sources and pre-empting drought can play an important role in reducing food insecurity and preventing potential conflicts.

More broadly, a meta-analysis of 50 studies surveying the link between climate change and conflict at all scales and across all major regions of the world found that a 1 per cent standard deviation increase in temperature or rainfall anomaly is associated with an 11.1 per cent change in the risk of intergroup conflict (Hsiang, Burke and Miguel, 2013).

Figure II.9  
Drought trends and civil conflict, 1989–2015



**Source:** Palmer Drought Severity Index (2005–2014). Results are screened for countries with more than one recorded civil conflict event per year. Conflict incidents occurring during the 2005–2014 period are shaded darker than conflicts occurring during the 1989–2004 period. Data: NOAA PDSI and UCDP GED v17.1. Koubi (2019a).

<sup>5</sup> See [ucdp.uu.se/downloads/ged/ged171.pdf](http://ucdp.uu.se/downloads/ged/ged171.pdf).

Whether or not livelihood stresses caused by climate change will lead to conflicts depends, to a great extent, on the strength of institutions. As noted above, decades of drought in the 1970s and 1980s prompted large movements of people in the Darfur region but did not initially lead to conflict. This was due partly to the existence of a prevailing *hakura* landholding system that was able to flexibly adapt rights and resources for newly arriving groups (Null and Risi, 2016). However, following the dismantling of the *hakura* system in the post-colonial period, the increased intensity of climatic disasters, in combination with displaced populations' need for land to support their livelihoods, created a breeding ground of tensions that eventually escalated into violence in 2003 (Adger and others, 2014; Null and Risi, 2016).

Similarly, in the Syrian Arab Republic, the withdrawal of government subsidies, as part of the economic liberalization policies adopted in 2000, aggravated economic insecurities for rural farmers, many of whom were still recovering from the effects of the drought of the 1990s. The rural-urban population displacement that ensued contributed to resource scarcity in major Syrian cities, which had already accepted a large number of refugees from Iraq. Thus, a combination of climate change effects and ill-timed and ill-considered policies contributed to the conflict that erupted in 2011 (Kelley and others, 2015) (box II.3).

While lack of funds and capacities or mismanagement of a crisis can lead to climate-related conflicts, environmental catastrophes have *not* produced conflict in other cases. For example, Hurricanes Mitch and Katrina in the United States, each of which led to the displacement of thousands of people, did not result in violent outbreaks, due to greater infrastructure and mobilizing capacities that exist in many developed countries for dealing with the after-effects of such shocks (Gleditsch, Nordas and Salehyan, 2007).

In light of these factors, estimates of the frequency and propensity of future climate-related conflicts vary considerably. On the one hand, Burke and others (2009) predict that if future conflicts in sub-Saharan Africa are, on average, as deadly as present conflicts, and assuming linear increases in temperature until 2030, climate change might prompt the increase of civil conflict incidence by roughly 54 per cent, or an additional 393,000 battle deaths by 2030. On the other hand, based on a statistical model of the historical effect of key socioeconomic variables on country-specific conflict incidence for the period 1960–2013, Hegre and others (2016) forecast an annual incidence of conflict for the 2014–2100 period along five shared socioeconomic pathways. The study concludes that broader socioeconomic development, expressed by higher growth in education and poverty alleviation, could help in offsetting most of the conflict risk in developing countries associated with reduced economic growth due to the implementation of policies to curb GHG emissions.

## Impact of conflicts on SDG achievement

Conflicts have been appropriately described as “development in reverse” (Collier and others, 2003). They lead to loss of life, infrastructure and income, dragging countries afflicted by conflict even further behind in their ability to achieve the SDGs.

### *Loss of life*

The loss of human life represents the most immediate negative impact of violent conflict. The number of deaths from violent conflicts, after declining in the previous decade, has increased in recent years. Whereas Africa had the highest number of fatalities due to violent

## Box II.3

**Climate change as a contributing factor to conflict in the Syrian Arab Republic**

While political grievances played the main role in the Syrian conflict, climate change effects also contributed to the outbreak of violent conflict in 2011. Prior to the recent conflict, a drought from 2007–2010 resulted in the collapse of crops and livestock, causing a 10 per cent drop in incomes for 800,000 Syrians by 2009 and heightening food and other livelihood insecurities. Combined with ill-timed government policies, this led to the internal displacement of 1.5 million Syrians, contributing to resource scarcity and intercommunal tensions in receiving areas (Kelley and others, 2015).

While droughts had occurred in the Syrian Arab Republic in the 1950s, 1980s and 1990s, the drought of 2007–2010 had more lasting consequences due to the lingering effects of previous droughts, population growth, and inadequate governance and resource management. For instance, during 1985–2010, the Government implemented policies that ignored growing water scarcity and droughts, focusing instead on increasing agricultural production through irrigation and subsidies for diesel fuel (*ibid.*). During this period, the area of Syrian irrigated land doubled, 60 per cent of which was irrigated with groundwater, resulting in a steep decline of groundwater levels (De Châtel and others, 2014). In 2000, economic liberalization policies, which included cancelling state subsidies, led to spikes in the price of fuel and fertilizer, hurting small-scale farmers. These subsidy cuts sparked discontent and conflict at a time when small farmers relied on diesel subsidies to pump water to their fields and transport produce to the market (Null and Risi, 2016).

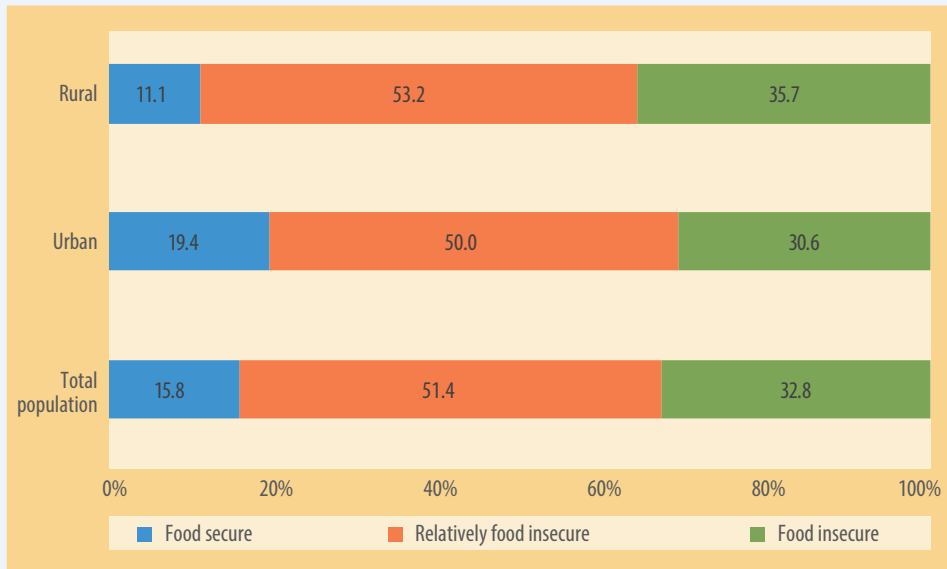
The 2007–2010 drought disproportionately affected the rural poor and heightened economic, social and political insecurities in the country and region in general. As a result, many families migrated to urban areas. During 2007–2008, the total stock of internal migrants increased from 20 to 30 per cent of the population, and as many as 1.3 million Syrians migrated to cities like Damascus and Aleppo. Many of these destinations had already received 1 million Iraqi refugees during 2003–2007, following the war in Iraq. In 2010, internally displaced populations and Iraqi refugees constituted 20 per cent of the Syrian urban population, marking a 50 per cent increase in urban population in only 8 years (Kelley and others, 2015). This placed further strains on already overstretched public services, contributing to social discontent. While the direct causal link between the drought and conflict is not always easy to establish, it is likely that frustration over the Government's poor management of the crisis, in combination with rising economic insecurities and other tensions against the backdrop of the Arab Spring, contributed to the fragile situation which preceded the outbreak of the Syrian Conflict (Null and Risi, 2016).

Prior to the conflict, the Syrian Arab Republic had been more on track towards achieving the MDGs than most countries in the region, making huge strides in improving food security, reducing infant mortality, and widening access to education, particularly for girls. Between 2011 and 2015, however, agricultural output fell by nearly 60 per cent, resulting in significant increases in food insecurity (figure II.3.1). On average, 33 per cent of the total population suffered from food insecurity, including 35.7 per cent in rural areas. Salaries and pensions, which were the main source of income for 68 per cent of Syrians, dropped by 10 per cent in 2015. About 13.5 million people needed some form of social protection, and poverty and inequalities widened within both rural and urban populations (United Nations Economic and Social Commission for Western Asia, 2018).

Eight years since the start of the conflict, inequalities and multiple insecurities have become further entrenched, deepening barriers to achieving sustainable development and peace. As of 2017, about 6 out of every 10 Syrians live in extreme poverty, with 6.1 million neither working nor attending any type of school or training. The unemployment rate is now 55 per cent and is particularly high for youth (World Bank, 2017). Prior to 2011, about 80 per cent of the Syrian economy was dependent on small and medium-sized enterprises, most of

(continued)

Figure II.3.1  
Food insecurity during the conflict, 2015



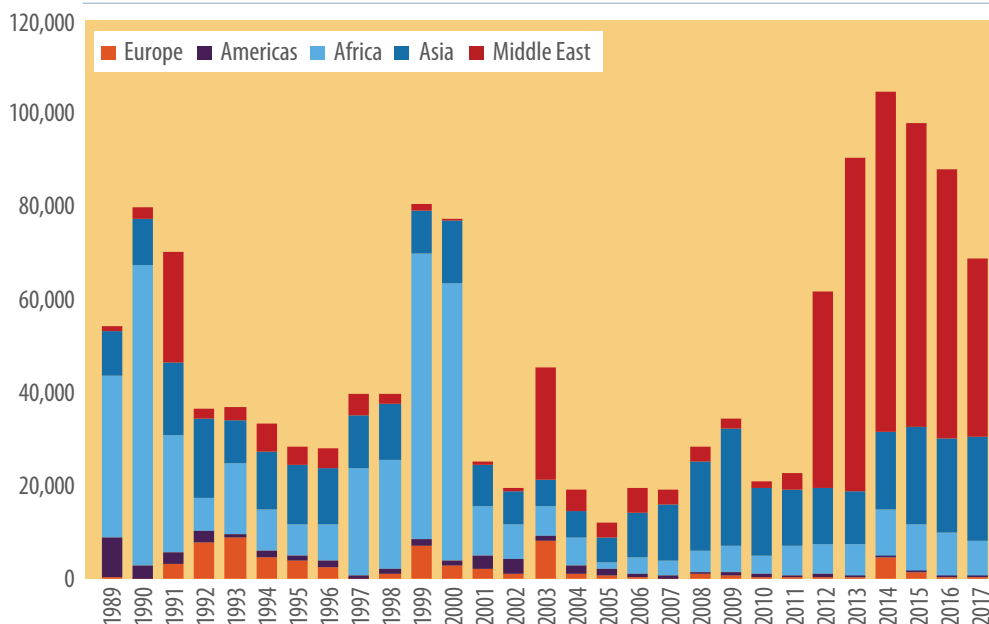
Box II.3  
(continued)

Source: World Food Programme (2015).

them in the informal sector. Most of the wealth in the Syrian Arab Republic is currently controlled by big business elites, several of whom became wealthier due to the war economy. This further concentration of wealth comes at a time when salaries have fallen, while prices have increased tenfold (Abboud, 2017; Makki, 2018). Ensuring that the Syrian Arab Republic can achieve the mutually reinforcing goals of peace and sustainable development will require assessing the role that inequalities and insecurities played in prompting violent conflict.

Source: UN DESA.

Figure II.10  
Battle-related deaths in different regions, 1989–2017

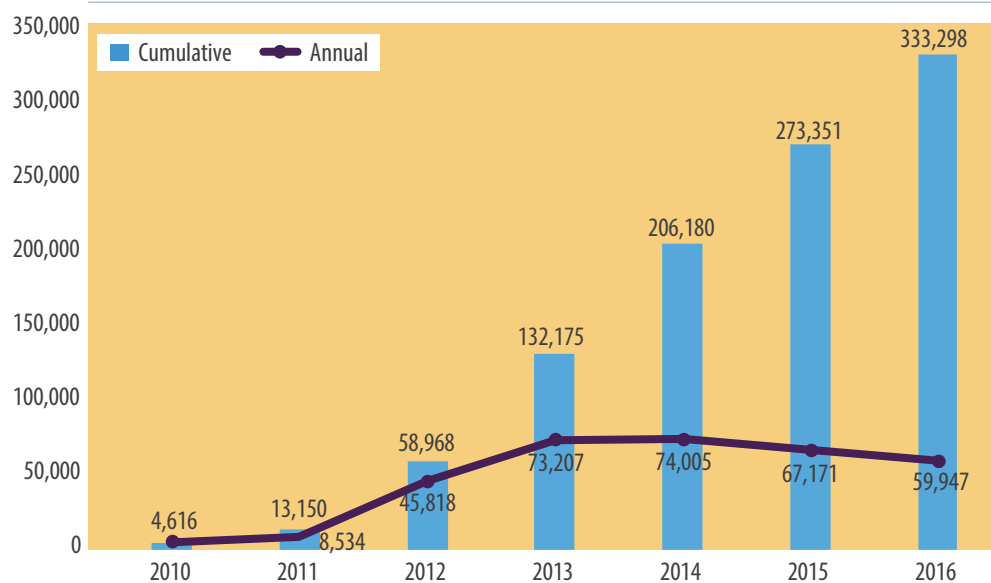


Source: Cederman and Pengl (2019).

conflicts in the 1990s, the Middle East and North Africa (MENA) region now accounts for most of the fatalities (figure II.10) (Cederman and Pengl, 2019).

Within the MENA region, the Syrian Arab Republic and Yemen accounted for the largest numbers of deaths. As of early 2017, the conflict in the Syrian Arab Republic had resulted in an estimated 470,000 deaths (World Bank, 2017). As of 2019 there have been recorded 233,000 deaths in Yemen (Moyer and others, 2019) (figure II.11). Outside of MENA, the total accumulated numbers of fatalities are as follows: Sudan, 49,000; Somalia, 32,000; Democratic Republic of the Congo, 19,344; and Colombia, 19,300 (Cederman and Pengl, 2019).

Figure II.11  
Annual and cumulative number of conflict-related deaths in the Arab region, 2010–2016



Source: United Nations Economic and Social Commission for Western Asia (2018).

### Economic damages

Violent conflict can also shift policymakers' attention away from addressing development objectives. During conflicts, public spending is typically shifted from public service delivery and development programmes to military and other security-related spending. For each average conflict year, the share of military spending increases by about 30 per cent (Collier and others, 2003). Higher levels of spending on security typically persist throughout the first decade even after a conflict has ended. In addition to diminished funds for public services, conflict also results in diminished incentives for private investment. Civil wars reduce international trade by 20 per cent in the first conflict year and up to 50 per cent when the conflict lasts longer than 15 years (Cederman and Pengl, 2019).

Though sustainable development is not the same as an increase in GDP (Sen, 1980), changes in GDP still provide a useful indicator for assessing the availability of resources that can be deployed for achieving the SDGs (Cederman and Pengl, 2019). According to earlier studies, GDP per capita grows 2.2 per cent slower during conflict than during peacetime (Collier, 1999). More recently, the simulations carried out by Gates and others (2012) found that five consecutive conflict years with more than 1,000 battle deaths would reduce income per capita by 20 per cent relative to a no-conflict counterfactual. When it

comes to assessing the speed and extent of post-conflict recovery, the analyses in Gates and others (ibid.) show that the negative impact of short wars (1–2 years) is reversed after roughly five peaceful years, whereas longer wars are associated with a permanent reduction in per capita incomes of at least 10 per cent.

For Afghanistan, Iraq and the Syrian Arab Republic, the economic impact of violence was equivalent to over 50 per cent of their respective GDP. According to the World Bank (2017), Syrian GDP in 2016 was about 70 per cent below the no-conflict scenario and 63 per cent lower than in the last pre-conflict year of 2010. The cumulative income losses for the Syrian Arab Republic between 2011 and 2016 are estimated to be at \$226 billion, about four times the country's GDP in 2010 (ibid.). Violent conflicts have also hampered economic development in recent years in several other countries. In the years between 2011 and 2017, the ongoing conflict in Yemen caused the country's GDP to contract by 38 per cent, while public revenues declined by about 50 per cent in 2015, and by another 20 per cent in 2016 (ibid.).

### *Loss of infrastructure and physical capital*

Damage to buildings, physical infrastructure, and a country's physical capital stock reduces the economic capacity of a country and its potential to achieve the SDGs. The World Bank (2017) documented the pervasive destruction to the critical infrastructure of the Syrian Arab Republic caused by conflict. According to the World Bank's assessment, the Syrian conflict destroyed or damaged 27 per cent of the country's housing stock, 66 per cent of all medical facilities, 63 per cent of schools and other educational facilities, as well as 12 out of 18 power plants (ibid.). Water and sanitation sectors were also affected. In the cities of Aleppo, Hama, and Idlib, about 60 per cent of all water towers were damaged or destroyed, leading to a complete breakdown of the public provision of clean water in Aleppo (Arshad and Aoun, 2017). The electricity generation and supply were drastically reduced in large parts of the country (Cederman and Pengl, 2019).

### *Impact on human development*

Economic loss and infrastructure destruction caused by conflicts, as noted above, have had debilitating impacts on the achievement of SDGs in many countries, reversing hard-won gains in development. Lack of investment due to GDP loss negatively affects achievement of SDGs related to human development, including poverty (SDG 1), food security (SDG 2), public health (SDG 3), education (SDG 4), gender equality (SDG 5), water and sanitation (SDG 6), energy (SDG 7), growth and employment (SDG 8), infrastructures (SDG 9) and sustainable cities (SDG 11).

By affecting low-income countries and most vulnerable groups disproportionately, thus reinforcing poverty and conflict traps, conflicts also serve to push those left behind even further behind in development progress, widening inequality both between and within countries (SDG 10) (for details, see World Bank, 2017; and Cederman and Pengl, 2019).

### **Tasks ahead regarding conflicts**

Given the devastating effects of conflicts, the best strategy to facilitate achievement of the SDGs will require more concerted efforts to prevent violent conflicts. National and international efforts must pay closer attention to the underlying and interlinked sources of conflict such as inequality, discrimination, persecution, unfair treatment, exclusion of par-



ticular groups and livelihood stresses caused by climate change. Protecting and promoting human rights of all population groups and guaranteeing rule of law will remain critical.

This will require strengthening institutions that deal with and diffuse the underlying sources of conflicts, as the example of Darfur illustrates. Perception of fairness and legitimacy will remain critical for restoring trust in institutions. Citizen participation in decision-making—particularly at the local level—and respecting local customs and traditions can help ensure that different groups remain committed to peaceful means for resolving conflicts.

The rise in the number of participant groups; the comingling of intra-State-, State-, and supra-State- level actors in the same conflict; the easy worldwide recruitment of combatants; and the increasing prevalence of conflict in middle-income countries with functioning institutions have made it necessary to go beyond the traditional state-based methods of conflict resolution. More flexible approaches, involving more stakeholders, and utilizing globalized technologies for peaceful ends will have to be devised and deployed.

The prosecution of those who foment and perpetuate violent conflicts is critical. Those who commit crimes against the humanity in the process need to be brought to justice. This requires more energetic, timely, and comprehensive use of the International Court of Justice and other international tribunals. Given the enormous death toll and destruction suffered by countries experiencing violent conflicts, it is urgent that the international community helps these countries not only to end conflicts and restore peace but also to rebuild, so that they can get back on track towards achieving the SDGs.

All of the above requires energetic multilateral efforts. In today's political climate, however, countries are increasingly sensitive about their sovereignty and are only likely to accept outside help with regard to their intra-State conflicts if such assistance has the robust backing of the entire international community. Legitimacy and credibility of the multilateral institutions will critically hinge on their ability to remain objective in mediating conflicts—particularly in punishing those who play a pivotal role in triggering and perpetuating conflicts. The International Court of Justice, the International Criminal Court and other international tribunals will need stronger support from Member States to discharge their responsibilities objectively and effectively. At the same time, the United Nations Human Rights Council will need to play an enhanced role in identifying the early signs of tension and conflicts to strengthen prevention efforts.

## **Managing migration and population displacement**

Migration has always been an essential part of the human experience. Most migrants move voluntarily within and across national borders in search of jobs, opportunity, education, and a better quality of life for themselves and their families. However, not all such movements are voluntary, with conflicts, natural disasters and climate risks also forcing people to migrate. In 2018, 1 out of every 108 people worldwide was forcibly displaced—a stark increase from a decade ago, when this number stood at 1 out of every 160 people. This amounts to an average of 37,000 newly displaced people every day during the decade (United Nations High Commissioner for Refugees, 2019a).

While migration itself is not new, the context in which it occurs today has changed. Rising climate risks, the protracted nature of many conflicts, high population growth in some parts of the world, and lack of decent employment opportunities, along with persistent inequalities within and across countries, are all intensifying displacement and migration

pressures. Widening inequality and heightened economic insecurity and cultural anxieties, linked to globalization processes, have fostered resentment towards migrants and refugees in some receiving societies. Growing anxiety with migrants and refugees is finding political expression in parties that promote populist and anti-immigration sentiments and which have subsequently weakened the support of some states for multilateralism. The social and news media are also playing a role in making migration one of today's most salient and politicized issues.

Despite the weakening of support for multilateralism, there is nevertheless a growing recognition that migration is a contemporary global challenge that cannot be solved within national silos. The adoption of the Global Compact on Migration and the Global Compact on Refugees marked a historic step towards strengthening multilateral governance in this area. Going forward, further efforts will be needed to ensure that this momentum is capitalized upon, so that the benefits of migration can be effectively harnessed for the achievement of the SDGs.

### Population displacement and migration in recent years

The global stock of migrants and displaced persons increased from 309.3 million in 2015 to 328.7 million in 2018, as shown in table II.3. Conventionally, people who move voluntarily are called migrants, whereas those who move involuntarily are called forcibly displaced. The latter group can be divided into internally displaced people, i.e., those who remain within their countries, and externally displaced people, i.e., those who cross an international border. The latter category can be further divided into refugees, i.e., those who fulfill the criteria of the 1951 Geneva Convention, and asylum seekers, i.e., those who have applied for refugee status, but are yet to receive a decision. While the distinction between migrants and refugees has been debated in recent years due to the prevalence of “mixed migration”<sup>6</sup> and the fact that climate change is not included in the current classification of who constitutes a refugee, the definitions remain significant as they entitle individuals to different levels of international protection. The following provides a brief overview of the developments with regard to each of these components.

Table II.3

#### Stock of migrants and displaced people in different years (in millions)

Key components	2003	2015	2018
Internally displaced people	4.2	40.8	41.3
Externally displaced: refugees	9.7	21.3	25.9
Externally displaced: asylum seekers	1.0	3.2	3.5
International migration	184.0	244.0	258.0
Total	198.9	309.3	328.7

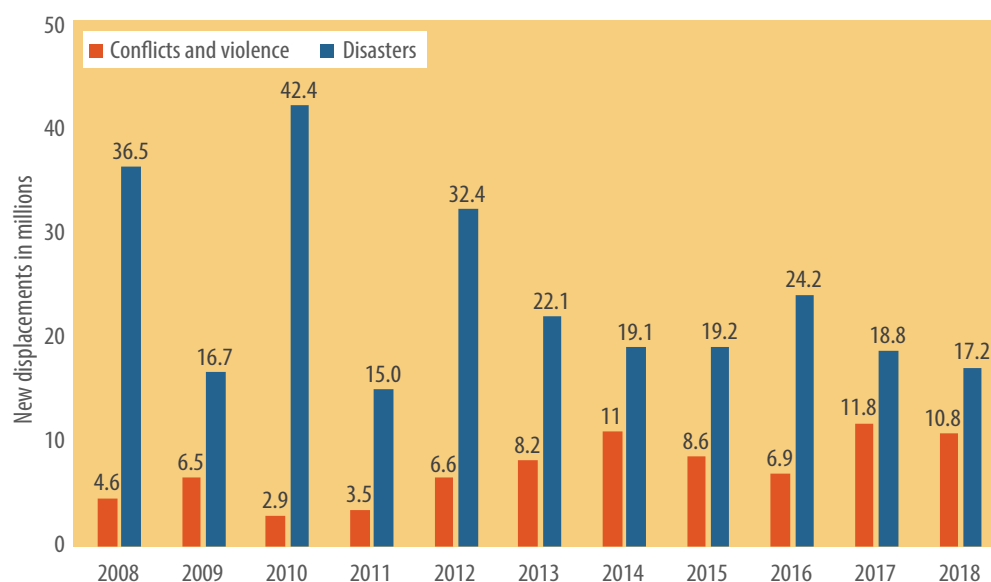
Source: UN DESA compilation.

<sup>6</sup> See Van Hear and others (2009) for more information on mixed migration.

### *Forced displacement: internal*

While conflicts can trigger large-scale population displacement, most internal displacement is the result of disasters and climate change effects. The total flow of new internal displacements during the 2015–2018 period was 117.5 million, of which 79.4 million and 38.1 million were disaster- and conflict-related, respectively (figure II.12). Of the 79.4 million new disaster-induced displacements, about 90 per cent were climate related. In 2018 alone, 17.2 million people were displaced by natural disasters. Ten major climate-related disasters accounted for more than half of them (figure II.13).

Figure II.12  
Internal displacement of people, 2008–2018



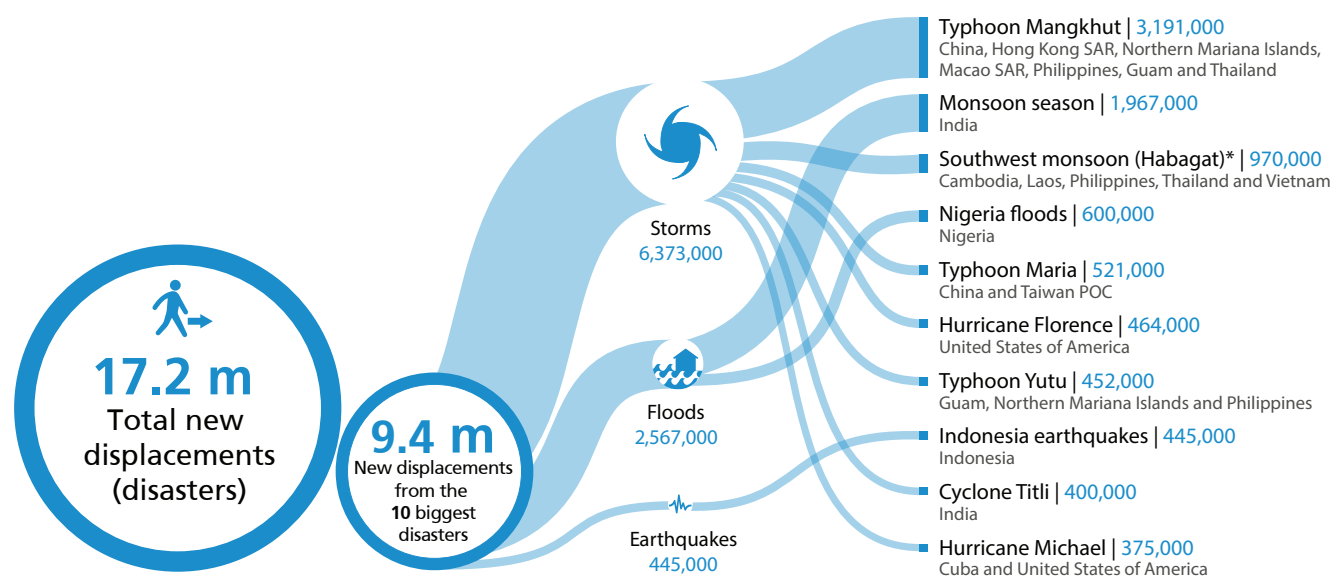
Source: Internal Displacement Monitoring Centre (2019).

The majority of internally displaced persons (IDPs) remain in developing countries. The stock of IDPs in developing countries was 41.3 million at the end of 2018 (United Nations High Commissioner for Refugees, 2019a). Colombia was the country with the largest number of IDPs (7.8 million), mostly displaced between 1995 and 2008, followed by the Syrian Arab Republic (6.2 million); Democratic Republic of the Congo (4.5 million); Ethiopia (2.6 million); Somalia (2.6 million); Nigeria (2.2 million); Afghanistan (2.1 million); Yemen (2.1 million); South Sudan (1.9 million); and Sudan (1.9 million). These ten countries accounted for some 34.0 million of the 41.3 million IDPs, or 82 per cent, at the end of 2018.

### *Forced displacement: external*

Violent conflicts are the primary driver of external population displacement. Globally, the total stock of refugees and asylum seekers increased from 24.5 million to 29.4 million between 2015 and 2018 (ibid.). The number of refugees in 2018 was 25.9 million, of which 20.4 million and 5.5 million were under the mandates of the United Nations High Commissioner for Refugees (UNHCR) and the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), respectively. At the end of 2018, about

Figure II.13

**The ten largest climate-related disasters triggering internal displacement in 2018**

Source: Internal Displacement Monitoring Centre (2019).

3.5 million asylum seekers were also waiting for a decision on their application. About 82 per cent of the 20.4 million refugees under the UNHCR mandate come from just 10 countries, all of which are classified as LDCs, with the exception of the Syrian Arab Republic.<sup>7</sup> Of them, 17.1 million (about 84 per cent) were hosted by developing countries, who comprised nine of the top ten host countries. Of them, the LDCs provided asylum to one-third of the total (6.7 million refugees) (ibid.). Altogether, five conflict-affected countries account for two-thirds of those externally displaced in recent years.

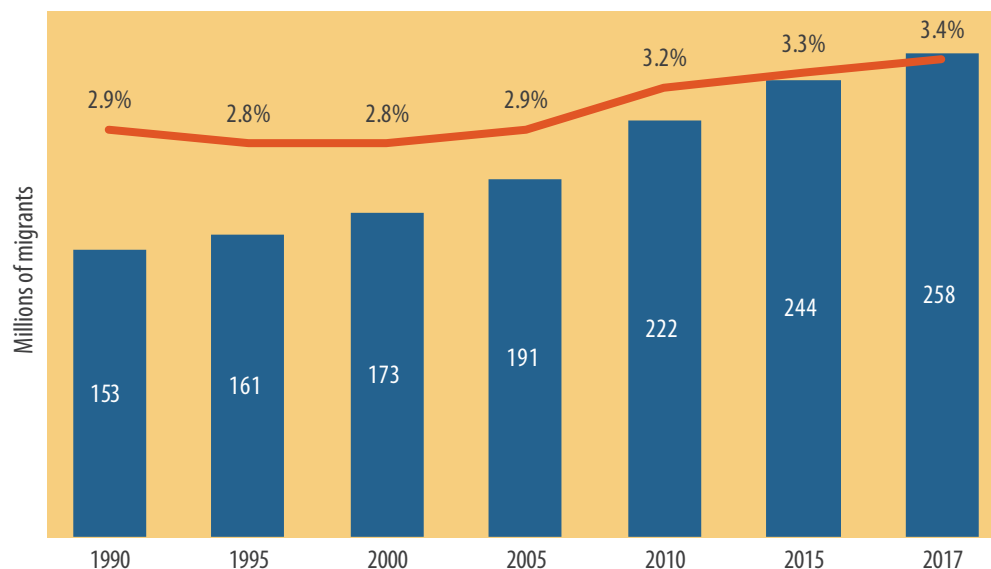
### *International migration*

The stock of international migrants increased from 244 million to 258 million from 2015 to 2017, accounting for 3.3 and 3.4 per cent of the world population, respectively (figure II.14). There has been a marked shift in the direction of migration patterns since World War II, particularly the decline of Europe as the region of origin into becoming, along with the Gulf countries, a major destination of both voluntary and forced migration. In 2017, about 30 per cent of the global migrant population, or 78 million, lived in Europe, 31 per cent in Asia, and 22 per cent in North America (United Nations, Department of Economic and Social Affairs, 2017).

Key drivers of voluntary migration across national borders are generally seen to be income and employment opportunities in the destination country as well as the presence of networks. With accelerating development, fertility rates often decline, population growth slows down, the pace of urbanization declines, and emigration becomes less common than immigration. Thus, the propensity for emigration tends to rise and then fall as countries

<sup>7</sup> In order of the number of refugees hosted, these countries are Syrian Arab Republic, Afghanistan, South Sudan, Myanmar, Somalia, Sudan, Democratic Republic of the Congo, Central African Republic, Eritrea, and Burundi (United Nations High Commissioner for Refugees, 2019a).

Figure II.14  
**Global migrant stock, cumulative number and as a percentage of world population, 1990–2017**



Source: UN DESA, based on International Organization for Migration reporting.

become more developed, reflecting the impact of development on migration patterns and trends (United Nations, 2017c).

Migration has been a key driver of population growth in the United States. In 1850, the United States was home to some 23 million people, 13 million fewer than France. As the country receiving the largest inflow of immigrants for nearly two centuries, the US population is now close to 330 million, larger than the combined population of France, Germany, Italy, the Netherlands and the United Kingdom. Between 1990 and 2015, the United States accounted for almost all the population growth for the “more developed regions,” as defined by the United Nations. Recent United Nations predictions also suggest that the same trend will continue until 2040 (Eberstadt, 2019).

More than half of the stock of international migrants at the end of 2017 were living in ten countries. The United States remains the top destination for migrants (50 million), followed by Saudi Arabia and Germany (12.2 million each); the Russian Federation (11.7 million); the United Kingdom (8.8 million); and the United Arab Emirates (8.3 million).

### Climate change as a driver of migration

The role of climate change as a contributing factor to conflicts was discussed earlier. Migration is often involved in this nexus, as climate change can force people to migrate by directly posing a threat to life and security, or by exacerbating underlying conflict drivers such as poverty, food and livelihood insecurity, resource scarcity, and poor governance, thereby also compelling people to move. Climate-induced migration can also contribute to conflict in some cases by complicating local identities in destination societies, communities and countries (Koubi, 2019b).

In the Lake Chad region, climate change-induced migration has been identified as a key factor behind the ongoing conflict in the area. Lake Chad, which offers a lifeline to

nearly 40 million people in Cameroon, Chad, Niger and Nigeria, has decreased by 90 per cent in the last 60 years due to over use of water and climate change impacts (United Nations Environment Programme, 2018). While herdsman and farmers lived harmoniously in the region in the 1960s, food insecurity heightened by drought resulted in forced migration of traditional herdsman, raising tension between various groups as they encroached upon farmland.

Recent qualitative studies have assessed the role that climate change has played in migration from Central America to the US border. These studies reveal that an increasing number of migrants from Guatemala, Honduras and El Salvador, who are dependent on agriculture for their livelihoods, are migrating due to climatic conditions. The World Food Programme found that El Niño drought conditions, which began in 2014, caused a significant increase in irregular migration to the US border (World Food Programme, 2017). According to an International Organization for Migration survey that interviewed people from a migrant caravan arriving at the border in Tijuana, Mexico, in 2018, of which 72 per cent were from Honduras, the majority were agricultural farmers fleeing for food security-related reasons, invariably linked to climate change-induced drought (International Organization for Migration, 2018).

Recent studies show that climate change will force people to migrate in ever larger numbers in the coming years. A new World Bank study entitled *Groundswell* (Rigaud and others, 2018) argues that climate change migration will mostly affect developing nations and involve significant internal displacement. Focusing on sub-Saharan Africa, South Asia and Latin America, the study considers slow-onset effects of climate change and finds that, if no action is taken, 143 million people in these three regions alone could become internally displaced by 2050. Climate change will also create “hotspots” of climate in- and out-migration, as people migrate from less viable areas with lower water availability and crop productivity and areas affected by rising sea levels and storm surges. This trend will have disproportionate impacts on the poorest people living in the poorest countries, further exacerbating inequalities both within and between nations.

Findings of these studies show that migration has become an adaptation strategy for those facing climate-induced disasters and conflicts resulting from them. However, not all are able to adopt this strategy, as migration requires resources. As a result, many disadvantaged people are becoming “trapped populations” (figure II.15). Determining how to help these trapped people is becoming a major policy challenge.

## Impact of migration on SDG achievement

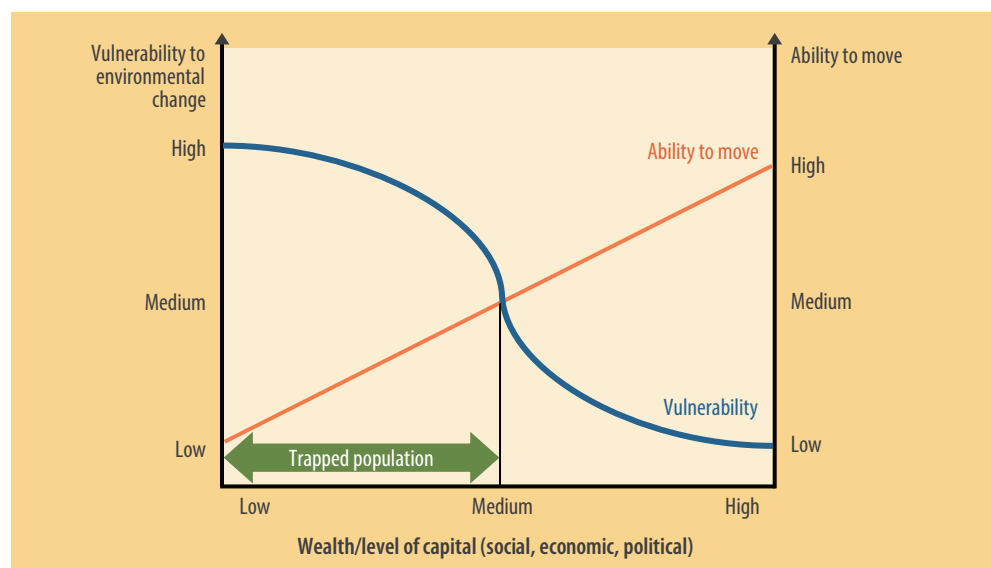
The large-scale displacement and migration of people discussed above is affecting SDG achievement in multiple ways. These effects vary across countries of origin and destination, across developing and developed countries, and between short- and long-term time frames. The following provides a brief review.

### *Developing countries of origin*

Population displacement and migration affect developing countries in both direct and indirect ways. For countries of origin, remittances sent by migrants are an important source of income, investment and foreign exchange, boosting economic growth and helping recipient households to improve their livelihoods. The volume of remittances is expected to reach \$485 billion in 2018, more than three times that of official development assistance



Figure II.15

**The relationship between vulnerability to environmental change and mobility**

Source: The Government Office for Science, London (2011).

(ODA), as reported by the Organization for Economic Development and Cooperation (OECD)/Development Assistance Committee (DAC) and exceeds foreign direct investment (FDI) (figure II.16).

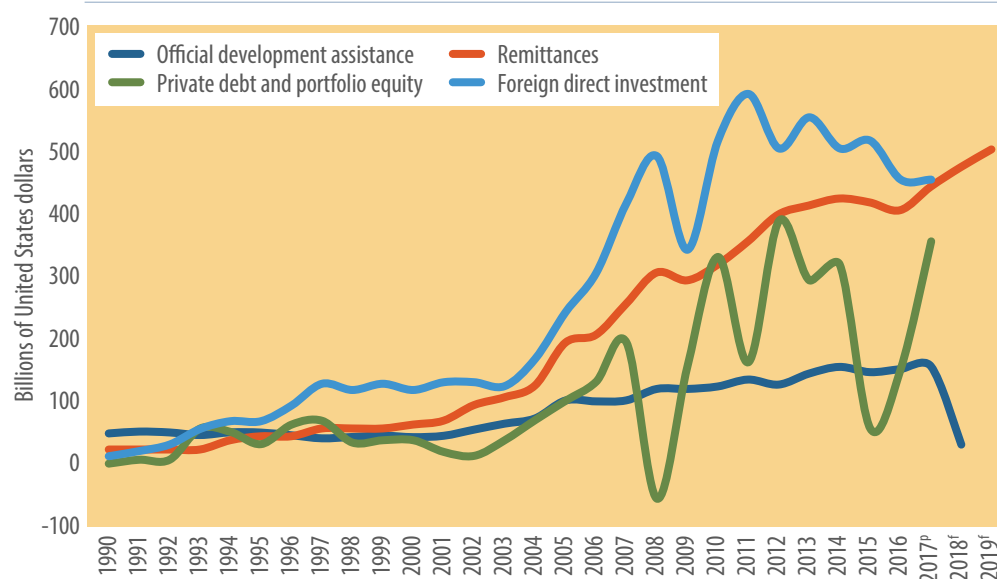
For many low-income countries, including LDCs, remittances have become a major source of income (table II.4). SDG achievement in these countries depends to a large extent on remittances. When it comes to SDG 1 (poverty), six of the top 10 remittance-receiving countries/areas in 2018 are either on track to achieve or maintain achievement by 2030;<sup>8</sup> two countries are moderately increasing achievement and only one is stagnating, according to the 2018 SDG Trend Dashboard.<sup>9</sup> An analysis of 71 developing countries reveals that a 10 per cent increase in per capita remittances leads to 3.5 per cent decrease in the share of poor people in the population (United Nations, 2019e). Remittance-receiving households have improved nutrition, particularly among children and the elderly in rural communities, where half of remittances are spent on agriculture-related expenses. Remittances also improve the health and well-being of receiving families, with infants born into remittance families having higher birthweight on average than non-remittance families.

Migration, however, also has some downsides for countries of origin. In particular, development may suffer if critical human capital is lost through migration. The evidence, however, suggests that for most countries of origin the positive effects of migration outweigh the negative (de Haas, 2018).

<sup>8</sup> The 2018 SDG Trend Dashboard uses a scale of 1–4 to denote whether a country is making progress on the SDGs. An average between 0–1 corresponds to a “decreasing” goal trend, between 1–2 to a “stagnating” goal trend, 2–3 “moderately improving goal trend”, 3–4 “on track” goal trend. A normalized score of exactly 3 denotes “maintaining SDG achievement”.

<sup>9</sup> No information is available on SDG progress in the West Bank and Gaza.

Figure II.16  
Trends in remittances, FDI, ODA and private debt and portfolio equity, 1990–2019



### Developing countries of destination

For developing countries of destination, refugees can lead to higher expenses as well as income. On the cost side, the February 2019 report by the Internal Displacement Monitoring Centre, based on case studies in eight developing countries, estimates the average economic costs related to one internally displaced person to be \$310. Applying this estimate, the total cost of caring for the 89.5 million IDPs during 2015–2017 would be at least \$29 billion. Recalling that 47 developing countries, of which 17 are low-income countries, experienced internal displacements in excess of 100,000 in this three-year period, these countries will clearly incur a heavy burden in caring for displaced population groups, with less resources

Table II.4

### Top 10 remittance-receiving countries/areas as share of GDP

Country/area	Remittances as a percentage of GDP (2018)
Tonga	35.2
Kyrgyz Republic	33.6
Tajikistan	31.0
Haiti	30.7
Nepal	28.0
El Salvador	21.1
Honduras	19.9
Comoros	19.1
West Bank and Gaza	17.7
Samoa	16.1

Source: UN DESA compilation.

left for their SDG purposes. Not surprisingly, only two of these 17 low-income countries are on track in realizing SDG 1 (poverty).

As noted earlier, the majority of externally displaced persons are also hosted by developing nations. In Jordan and Lebanon, 1 in 3 and 1 in 4 of the population are refugees, respectively. In 2018, for the fifth consecutive year, Turkey hosted the largest number of refugees worldwide, or 3.7 million, including many from the Syrian Arab Republic. Many other developing countries are also hosting a large refugee population: Pakistan (1.4 million); Uganda (1.2 million); Sudan (1 million); Lebanon (1.0 million); Islamic Republic of Iran (1.0 million); Bangladesh (1 million). While the majority of Venezuelans do not have refugee status, many developing and emerging economies in Latin America are also hosting large numbers of displaced Venezuelans and Venezuelan asylum seekers, including Colombia (1.2 million), Peru (0.7 million) and Ecuador (0.3 million) (United Nations High Commissioner for Refugees, 2019a).

Using the above-noted estimate of \$310 average annual economic cost associated with an IDP, the cost of hosting externally displaced people would amount to \$16 billion for the 2015–2017 period. For LDCs, who host about one third of externally displaced people, the cost would be about \$5.3 billion.

These challenges are further compounded by the fact that 12 of the 15 top refugee-hosting countries are fragile and conflict-affected States (FCAS)—as defined by the OECD and the World Bank. According to the Overseas Development Institute (ODI), only 18 per cent of FCAS are on track to achieve SDGs 1 through 7 and SDG 11 by 2030. Following current trends, ODI also predicts that deprivation and unmet basic needs will increasingly be concentrated in fragile and conflict-affected states. At present, for example, about 71 per cent of people in low- and middle-income countries who lack electricity are in FCAS. This share is projected to increase to 96 per cent (about 407 million people) by 2030.

With a high share of displaced persons concentrated in countries in fragile and conflict-affected States, Governments and the international community will have to extend their services to ensure that their basic needs are met. Countries in complex situations, however, already struggle from overstretched resources and reduced ODA from the international community.

As a result, many displaced persons find themselves in situations of “double marginalization” as their needs continue to be unmet in hosting developing countries. They often lack adequate shelter to lead a normal life (see discussion in chapter III on technological solutions for shelters). Refugee children are also five times more likely to be out of school than their native peers (United Nations High Commissioner for Refugees, 2016). Limited or non-existent access to education not only decreases the potential of displaced persons to become future productive members of society, but also hampers national economic prospects. Limited access to adequate health facilities for displaced persons, meanwhile, increases the likelihood that communicable diseases will spread throughout the population, leading to a reversal of outcomes on SDG 3. These forecasts suggest that fragile states and displaced populations will be even further away from achieving the SDGs in 2030 than they are today (Samman and others, 2018).

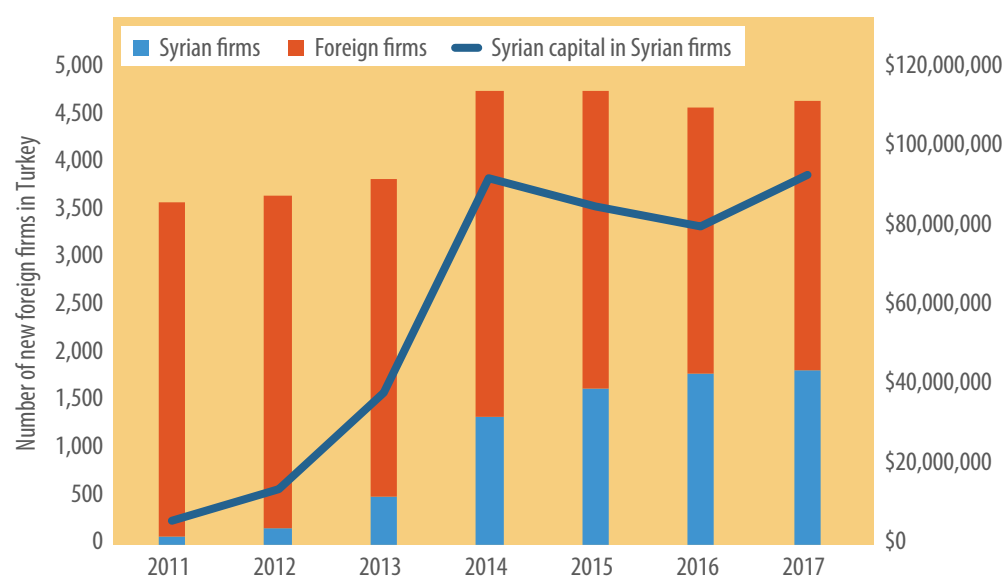
Internally displaced persons, refugees and asylum seekers have positive impacts on hosting developing countries as well. In many cases, they contribute positively to the economy and society of these countries in the form of investment, entrepreneurship and creation of new businesses (Alix-Garcia and Saah, 2010; Taylor and others, 2016). For example, many Syrians moving to Turkey in the aftermath of the 2015 refugee crisis have created higher-wage formal jobs for local citizens and enabled the occupational upgrading

of many workers (Del Carpio and others, 2015). It is estimated that Syrian refugees have invested \$334 million into the Turkish economy between 2011 and 2017, with more than 10,000 new businesses established (figure II.17). Syrian-owned firms, on average, employ 9.4 people, many of whom are native Turkish workers (Ramanchandran, 2017).

The net impact of IDPs and refugees on the host developing countries depends to a large extent on the policies pursued with respect to them (box II.4 briefly discusses the experiences of Turkey, Lebanon and Jordan).

Figure II.17

### Number of new firms established by Syrian refugees in Turkey, 2011–2017



Source: Esen and others (2017).

### Developed countries of destination

More than 3.3 million externally displaced persons escaping conflict in developing countries, mostly in the Middle East region, sought asylum in the European Union (EU) States during 2015–2017. Germany alone received nearly 1.5 million asylum seekers, while Sweden accepted the highest number of asylum seekers relative to its overall population, among all countries of the region. Eight EU countries—Germany, Italy, France, Sweden, Hungary, Austria, Greece, and the United Kingdom—each received more than 100,000 asylum applications in the three-year period, totaling 2.86 million (table II.5). In addition, more than 13 million people moved voluntarily to EU States during 2015–2017, a significant part of which was intraregional migration, bringing the total to 16.3 million, or 3.2 per cent of the region’s population at the end of 2017.

Immediate support for asylum seekers, as well as education and training costs for refugees, requires significant upfront investment by hosting countries. Asylum seekers need shelter and accommodation as well as provision for other basic needs, including schooling for their children. Upon securing refugee status, they generally can participate in the labour market. The cost for processing and accommodating asylum seekers for the first year is estimated at about €10,000 per applicant but can be significantly higher if integration support is also provided during this period (Organisation for Economic Cooperation and Development, 2017). For the 3.3 million asylum applicants during the 2015–2017 period,

## Box II.4

**Turkey, Lebanon and Jordan: hosting and integrating Syrian refugees**

Turkey, Lebanon and Jordan host the largest numbers of Syrian refugees in the world—3.6 million, 1.0 million, and 660,000, respectively (Kumar and others, 2018). Hosting so many refugees has placed huge economic strain on all three countries. Syrian refugees at the same time have contributed to economic growth through innovation, trade, and entrepreneurship.

Turkey is party to the 1951 Refugee Convention. Those fleeing from outside of Europe are only granted temporary protection status in Turkey (Dereli, 2018). Lebanon is not a signatory to the 1951 Refugee Convention, but has adopted an open-door policy whereby registered Syrian refugees can live and work in the country. However, Lebanon introduced new residency regulations in 2015 with which many refugees have been unable to comply (Human Rights Watch, 2017). Jordan is also not party to the 1951 Refugee Convention but maintained an open-border policy during 2011–2014. In 2016, following an attack by the Islamic State, Jordan closed its remaining border crossings and adopted a policy of deterrence (Hargrave, Pantuliano and Idris, 2016). While Turkey and Jordan continue to have official refugee camps, most Syrians have moved into informal settlements in cities, where opportunities are greater.

Amid a rising general unemployment rate (13 per cent in 2017) (Del Carpio and others, 2015), the presence of Syrians within the informal sector has resulted in wage deflation and contributed to a rise in job competition with natives in Turkey, igniting friction with locals (Icduygu, 2015). In Lebanon, Syrians are restricted as to which sectors they can work in, namely construction, waste management, agriculture and others, providing low-income (Chehayeb, 2018). In Lebanon, the high unemployment rate, and the fact that the first waves of Syrians took unskilled jobs for payment of only two thirds of the minimum wage, has created animosity among natives (Eldawy, 2019). In Jordan, employment restrictions have resulted in the majority of Syrians working in the informal sector (Stave and Hillesund, 2015), contributing to rising unemployment rates for Jordanians from 14.5 per cent in 2011 to 18.5 per cent in 2017 (Yahya, Kassir and El-Hariri, 2018). In all three countries, the presence of refugees in urban centres has also contributed to rent increases. In Jordan, for instance, the housing sector experienced inflation between 100 and 200 per cent in 2015 due to the Syrian presence, while water scarcity increased to 40 per cent for Jordanian households (REACH Initiative, 2015).

Despite these challenges, Syrian refugees have also spurred development processes within Turkey, Lebanon and Jordan. In Turkey, Syrian refugees established 1,599 new firms in 2015, up from 157 in 2012, while the share of Syrian companies in total foreign partnerships reached 23 per cent in 2015, up from 1.2 per cent in 2012 (Esen and Binatli, 2017). In Lebanon, many Syrian entrepreneurs have created businesses that have enriched social bonds between the two groups in urban centres (Alexandre and others, 2018). In Jordan, high amounts of international aid for refugee assistance received between 2012 and 2015 contributed to an increase in public investment and buoyed growth in gross domestic product (Francis, 2015).

Source: UN DESA compilation.

the 28 EU member States incurred a total processing and accommodation cost of about €33 billion. The share of this cost borne by individual EU countries depended on their respective share of the total number of asylum seekers. Thus, Germany spent €16 billion (0.5 per cent of GDP) on hosting refugees (*ibid.*), and expects to spend €78 billion on migration-related activities through 2022. Similarly, Sweden spent €6 billion on hosting and integrating migrants in 2015, or 1.35 per cent of the country's GDP.

Despite the immediate hosting costs that refugees and migrants impose on developed countries of destination, the benefits of migration in the long term have the potential to outweigh these expenditures if appropriate policies are put in place. Refugees and migrants,

Table II.5

**European Union countries receiving more than 100,000 asylum applications, 2015–2017**

Country	Number of asylum applications (2015–2017)	Share of population (2017) (percentage)
Germany	1,445,000	1.8
Italy	335,000	0.6
France	260,000	0.4
Sweden	218,000	2.2
Hungary	210,000	2.1
Austria	155,000	1.8
Greece	123,000	1.1
United Kingdom	115,000	0.2

**Source:** UN DESA compilation.

for example, can increase the working-age population in ageing economies; fill critical gaps in labour force participation; raise incomes; and bolster growth through investment, entrepreneurship, and trade.

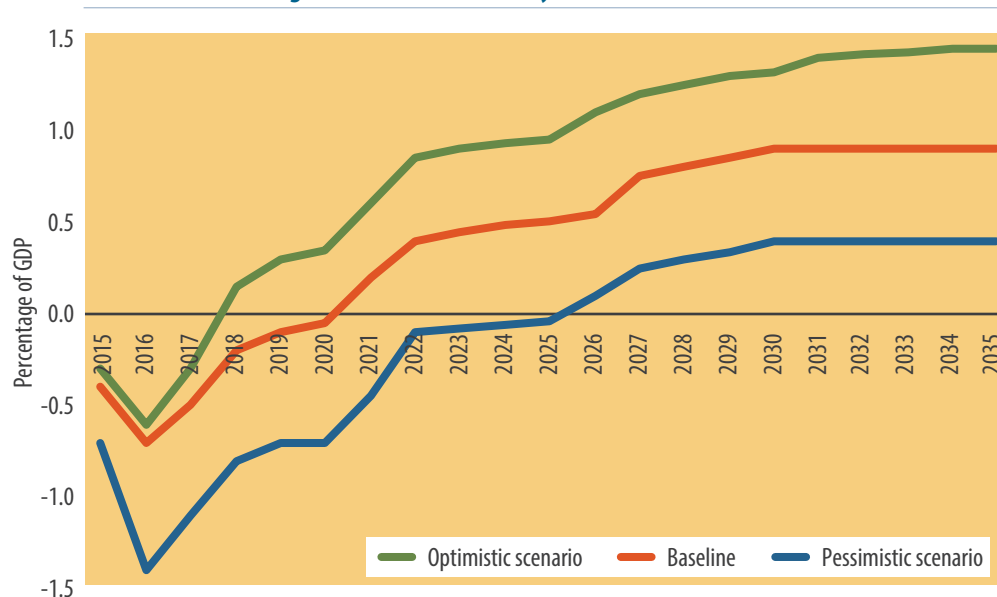
Migrants and refugees, able to participate in the labour force, also contribute through the payment of taxes and contributions to social security funds. The net fiscal effect of refugees on the economy is thus ultimately determined by how quickly and effectively they integrate into the labour market and start generating tax revenue (Clemens, Huang and Graham, 2018). According to Fratzscher and Junker (2015), while refugees had an immediate negative net effect on the German economy after 2015, even in a worse-case scenario, they will bolster GDP growth by 0.4 per cent by the year 2030 (figure II.18). In the absence of refugees, economists have predicted that German GDP growth would have declined due to its rapidly ageing population and diminished labour pool. Qualitatively similar results are likely to hold for many other developed countries.

### The vicious cycle

As the recently adopted Global Compact on Migration highlights, migration that is safe, orderly and regular has the potential to contribute positively to sustainable development in countries of both origin and destination. Humanitarian and economic rationales for accepting those who flee persecution, violence and conflicts can be mutually reinforcing and produce win-win outcomes for all. Furthermore, the complementarity between the demographic profiles of an ageing population in developed countries and a large and growing young population in developing countries can help accelerate SDG achievements in the long-term for both countries of origin and of destination. People in receiving societies, however, are often more influenced by immediate considerations than by long-term ones; additionally, they can be driven by concerns regarding national identity and culture rather than by economic rationale and reasoning (Inglehart and Norris, 2016).

In 2015, the sudden arrival of large numbers of asylum seekers in Europe became a politically charged issue and triggered anti-immigration sentiments among some population groups and political parties in many European countries. This anti-immigration sentiment grew against a backdrop of rising economic inequality, employment and livelihood insecurity, cultural anxieties and the uneven distribution of wealth and opportunities (see chapter I).

Figure II.18  
**Net benefits of refugees to German economy, three scenarios, 2015–2035**



Source: Fratzscher and Junker (2015).

The rise in political populism is often explained by two interrelated theories focusing on *economic insecurity* and *cultural backlash* (ibid.). According to the economic insecurity perspective, anti-immigration shifts in electoral behaviour can be linked to changes brought about by globalization; rising inequality; technological automation and collapse of manufacturing industry; global flows of labour, goods and people; the erosion of organized labour; shrinking welfare safety nets and the adoption of austerity policies. These changes have created a new class of people who feel left behind by economic globalization, and they turn to populist parties for solutions. The *cultural backlash* argument explains the rise in populism as a reaction against cultural change, including the perceived preference of elites for multiculturalism and cosmopolitanism as opposed to the nation. Scholars have also noted that larger cultural gaps between native populations and migrants lead to higher levels of voter support for populist parties (Inglehart 1990; Inglehart and Norris, 2016; Shehaj, Shin and Inglehart, 2019). The *perception* that migrants and refugees pose an economic, as well as cultural threat, has also been a significant factor in bolstering support for populist parties. These perceptions are utilized not only by elites and populist parties, but also by the mass media which can influence public attitudes towards asylum and migration (Berry, Garcia-Blanco and Moore, 2015).

As a result of these various factors, political parties with anti-immigrant views gained electoral support in many developed countries, including major destination countries for migrants and asylum seekers. According to a study by Harvard University and the Tony Blair Institute (Eirmann, Mounk and Gultchin, 2017), the populist vote in EU States increased from 8.5 per cent in 2000 to 24.1 per cent in 2017, with 17.7 per cent going to parties on the right. A review of directional shifts in the outcomes of parliamentary and presidential elections in Europe between 2015 and 2018 also shows a significant shift in political sentiments to the right (figure II.19), which typically embrace anti-immigration stances.



Governments formed by political parties with anti-immigrant views have tightened borders and introduced restrictive immigration policies, including border externalization measures such as those funded by the EU in Northern Africa. In addition, global commitments to the UNHCR resettlement programme have declined. While the number of refugees resettled through the programme increased slightly from 75,200 in 2017 to 81,300 in 2018, the gap between resettlement spots and those in need of them widened to 90 per cent. In fact, UNHCR estimates that today 1.4 million refugees are in need of resettlement (United Nations High Commissioner for Refugees, 2019a).

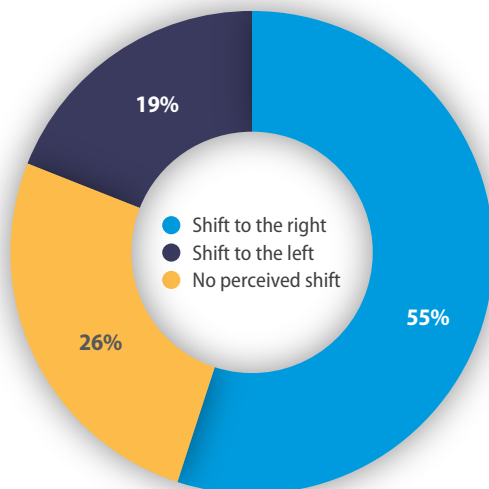
As a result of these policies and increased obstacles to reach traditional destinations such as Europe, there has also been a structural shift in international migration, with increasing flows of South-South migration. In 2017, global migration flows among countries in the (developing) South surpassed those between South-North countries, accounting for 37 per cent of the total as compared to 35 per cent by the traditional South-North routes (United Nations, 2017c). These directional shifts place an even greater burden on developing nations, which already host the majority of displaced populations, putting further strain on their ability to commit necessary financial resources to SDG implementation.

Many nations have recently adopted a more inward-looking stance, withdrawing from multilateral institutions and agreements aimed at addressing global challenges such as climate change, violent conflicts and migration. Weakened and fractured multilateral efforts for combating these challenges are further exacerbating national and local conditions that contribute to climate change, conflicts or migration, thus creating a vicious cycle (figure II.20).

Despite the rising sense of economic insecurity and cultural anxiety, a 2018 Pew Research Center survey found that 77 per cent of people in 10 EU countries still support taking in refugees fleeing war but are reluctant to do so because they lack confidence in the ability of the EU as an institution to equitably share the refugee burden. In Europe,

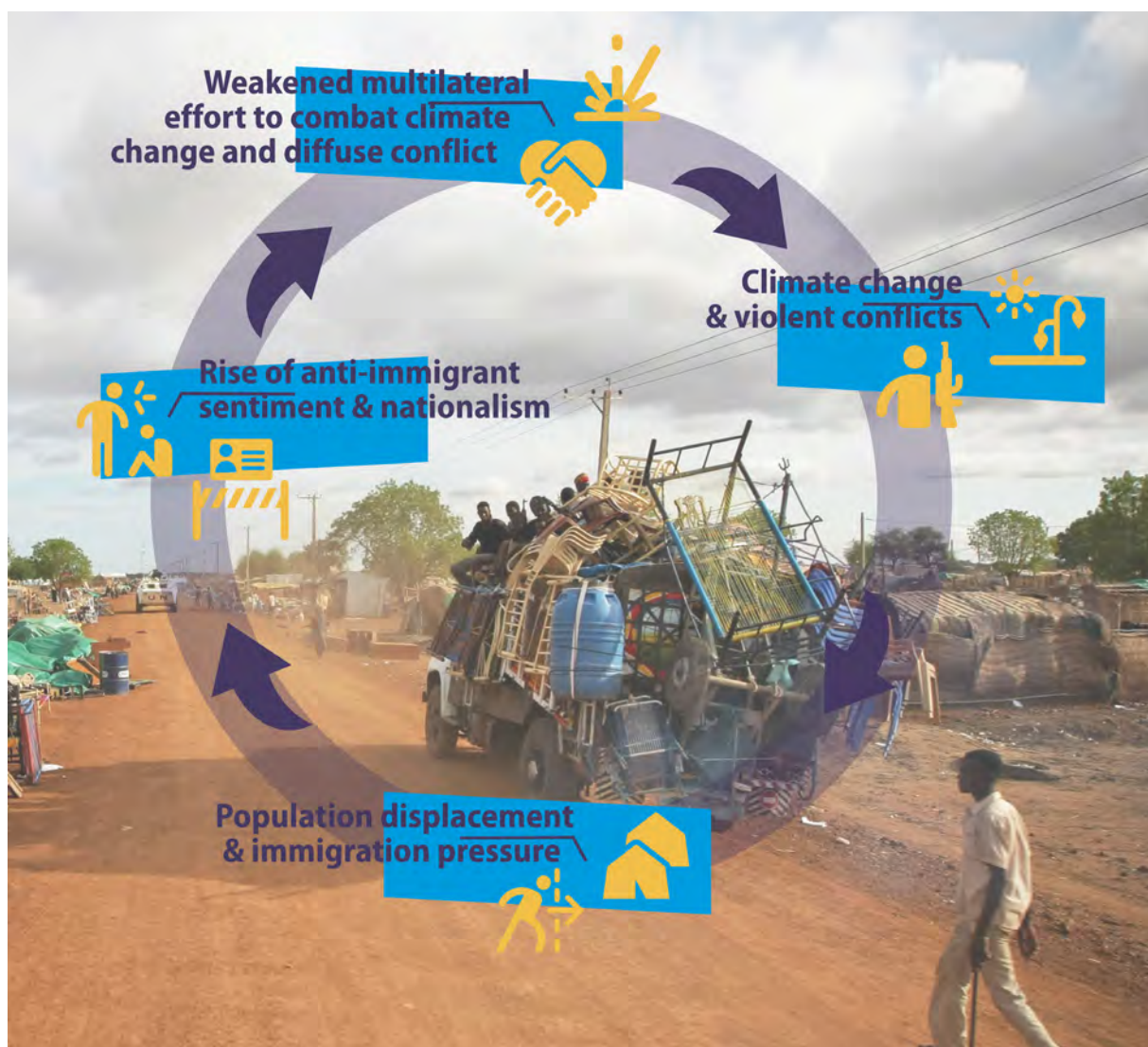
Figure II.19

### Shift in direction of election outcomes in Europe, 2015–2018



Source: UN DESA compilation, based on review of outcomes of parliamentary and presidential elections.

Figure II.20

**Vicious cycle: climate change, conflicts, displacement, rising nationalism and weakening multilateralism**

Source: UN DESA compilation. UN Photo/Stuart Price.

the migration crisis not only resulted in the collapse of the Dublin Regulation, but also prompted a number of restrictions on the EU Schengen system of passport-free travel, one of the great achievements of European integration (Swain, 2019). This suggests that unexpected, unregulated and disorderly migration, occurring against a backdrop of widening inequality and heightened insecurity, can unravel the foundation of multilateral and plurilateral efforts, thus making it an imperative for both countries of origin and countries of destination to manage these global challenges more effectively.

### Tasks ahead regarding migration and population displacement

The world must harness the full potential of migration—and minimize the economic, social and environmental costs of displacement—to accelerate progress towards achievement of

the SDGs. Migration pressures will continue to rise, not only for economic reasons but also due to conflicts and climate change. Neither the hardening of national borders nor the implementation of restrictive policies will stem migration flows. Rather, they will only push migrants, refugees and asylum seekers to irregular, unsafe and disorderly modes of migration, leading to higher rates of death, exploitation and abuse. Further, restrictive policies in areas of destination, such as in the labour market, will only lead to instances of brain waste. Disorderly, unsafe, and irregular migration is too costly; not only for destination countries and migrants and displaced persons, but also for sustainable development at large.

There is also a clear need to confront anti-immigration sentiments in many developed countries with the evidence and facts that illustrate that migration can produce win-win outcomes. In fighting anti-immigration biases, it may help to communicate more effectively just how much young migrant workers and refugees help resolve the labour market shortfalls or contribute to the national pension systems. Germany's apprenticeship programmes, for instance, which have focused on filling pre-existing shortages in the labour market by targeting young refugees, provides a good example in this regard.

It will remain imperative to advocate and convince all stakeholders—particularly political voices that oppose international commitment to safe, regular and orderly migration—that weakening multilateralism can generate a vicious cycle and undermine broader sustainable development objectives. There is a greater need for addressing the root causes—climate change, conflict and inequality—that are increasingly compelling or forcing people to migrate.

Going forward, multilateral efforts should be expanded to (i) promote voluntary guest labour programmes; (ii) develop better early warning systems to anticipate and better plan for future migration flows; (iii) ensure that policies aiming to stem migration, such as through border externalization measures, uphold human-rights and are in line with States' obligations under international law; and (iv) create sustainable resettlement options for communities and countries that are likely to face the existential threats of sea level rise and submergence, while ensuring that these resettlement options spread the burden of hosting displaced persons more equitably among nations.



## Chapter III

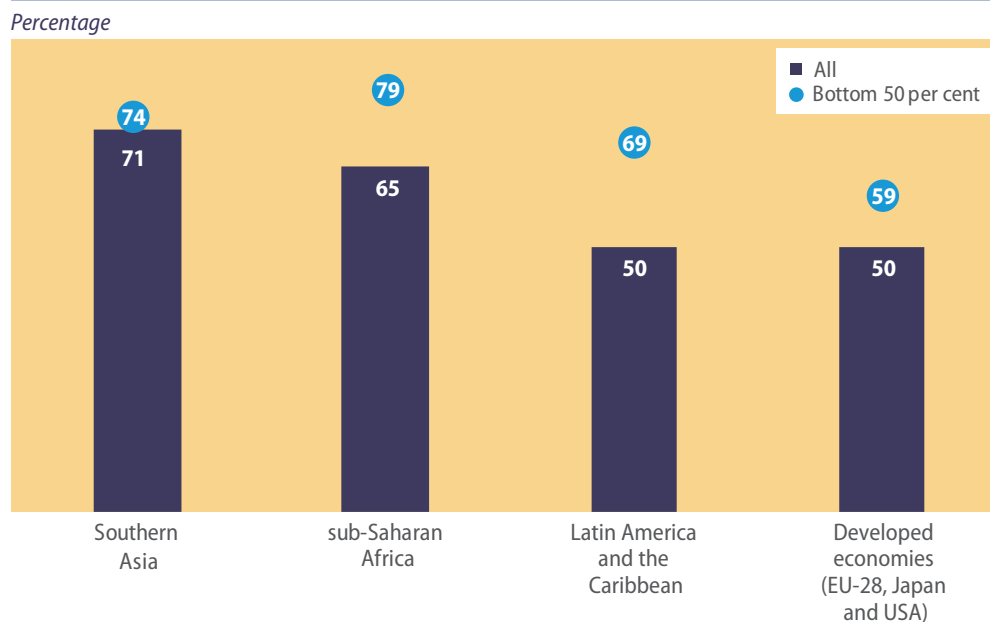
# Leveraging new technologies for achieving the SDGs

## Introduction

Rapid technological change is perhaps the most visible aspect of modern existence. Children are born in a world where they may be more familiar with smart phones, laptops and tablets than television sets. Cloning is no longer a science fiction fantasy. The *World Economic and Social Survey 2018* (United Nations, 2018c) highlighted the immense potential that frontier technologies bring to achieve a better world for all. The *Survey* cautioned that technology is a wild card, as it may exacerbate employment risks, increase inequality and undermine social cohesion, and underscored the need to manage technologies to contain their undesirable ethical, economic and social impacts.

Technological advances present the best hope for a sustainable future. They are capable of mitigating CO<sub>2</sub> emissions, improving food and energy security and accelerating progress on other Sustainable Development Goals (SDGs). They are the tailwinds, the silver linings, that will push the 2030 Agenda for Sustainable Development forward. This chapter focuses on how technologies could be leveraged to address the basic needs of all—including freedom from hunger, access to quality health care, provision of affordable housing for human dignity, and access to modern energy—so that all may thrive on a healthy planet. People in developing countries spend as much as 80 per cent of their total income to meet their basic needs (figure III.1). Technologies can drastically reduce the cost of, and expand

Figure III.1  
Spending on basic needs as a percentage of total household expenditure, by region



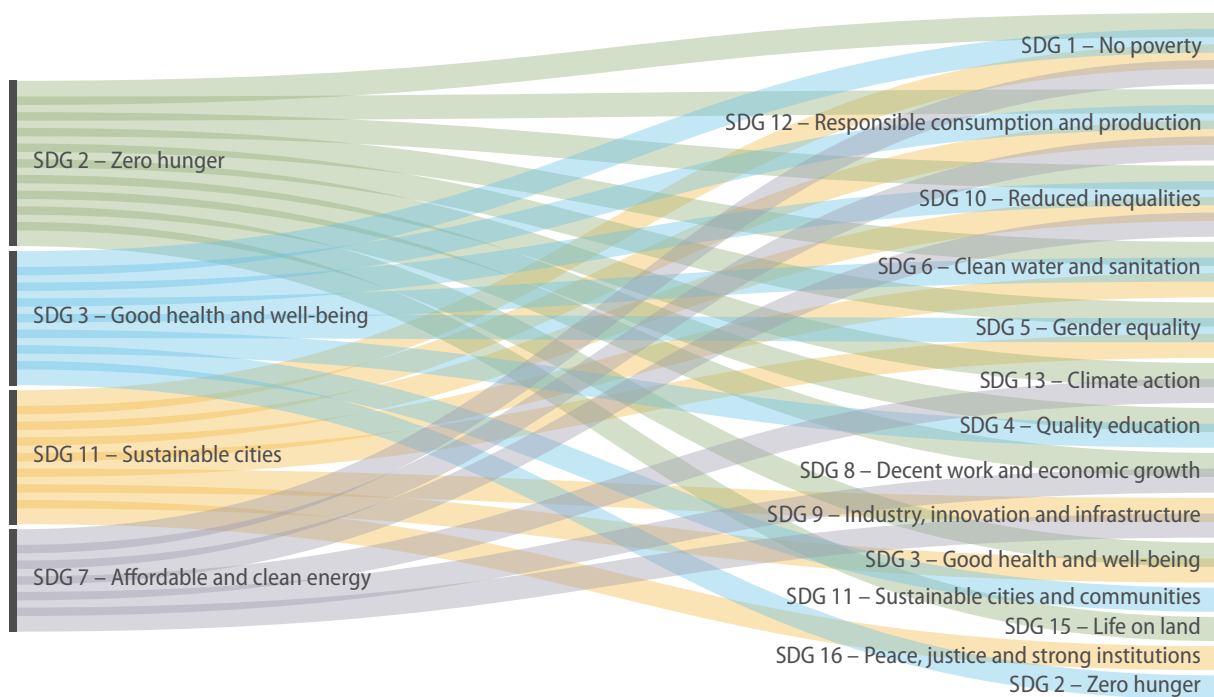
Source: UN DESA, based on various national and international sources.

access to, food, housing, health care and energy. Technologies deployed to ensure that the basic needs of humanity are met can be a key enabler for reducing vulnerability and inequality.

The provision of adequate, safe and affordable housing has been a persistent urban challenge. As many as 980 million urban households lacked decent housing in 2010, and another 600 million will by 2030. While the situation has improved noticeably since 1990,<sup>1</sup> over 1 billion people still lived in slums or informal settlements in 2016, with over half (589 million) living in Eastern, South-Eastern, Central and Southern Asia. New designs, materials and technologies could address many problems related to SDG 11 (sustainable cities and communities), including environmental sustainability and long-term urban planning. Innovations that are now being made for short- and medium-term shelter could offer a pathway to cheaper and better-quality affordable housing.

Hunger continues to be prevalent and has grown in recent years. The *State of Food Insecurity and Nutrition in the World* (Food and Agricultural Organization, 2018a) estimates that 821 million people worldwide—approximately 1 in 9—were undernourished in 2018, with 98 per cent of them residing in the developing world. Africa remains the continent with the highest prevalence of undernourishment, affecting one fifth of its population (more than 256 million people). Agriculture is central to achieving SDG 1 (eradicating extreme poverty) and plays a direct role in achieving SDG 2 (zero hunger). Over 70 per cent

Figure III.2  
Interlinkages between basic needs and the SDGs



Source: UN DESA.

<sup>1</sup> Between 1990 and 2016, the proportion of the global urban population living in slums fell from 46 per cent to 23 per cent.



of the world's extreme poor live in rural areas and they rely on agriculture as their main source of living. They are often the first and most severely affected victims of fast and slow onset of natural disasters. Technology can offer solutions to many of the underlying causes of lack of food access. Irrigation systems, disease resistant seeds and reliable weather-related alerts are important examples.

Major progress has been made in improving the health of millions of people, increasing life expectancy and fighting against communicable diseases. However, full coverage of essential health services is still not available for at least half of the global population. Like other SDGs, SDG 3 (good health and well-being) is interwoven throughout the 2030 Agenda and it can only be fully achieved with progress in achieving other Goals (United Nations, 2017d). Concerted efforts are required to save people from preventable diseases and addressing persistent and emerging health issues. The revolution in information and communication technologies, particularly mobile technologies, is having a large impact in making health services affordable and accessible to all. New devices, networks and software will continue to enable critical health services to be delivered efficiently, and at reasonable cost, to previously unserved or underserved groups, thus accelerating progress towards universal health coverage.

Energy powers and supports fulfilment of the basic needs and makes life easier. However, 840 million people around the world still lacked access to electricity in 2017 and close to 3 billion relied primarily on inefficient and polluting cooking systems. Achieving universal access to modern energy has become a foundational development goal and is a catalyst for the achievement of other SDGs, particularly Goal 13 (climate action), as energy production and consumption are among the largest sources of greenhouse gas emissions. Sustainable energy sources have the potential to drive economic growth, industrial development, sustainable livelihoods and improve social equality. Recent innovations in renewable energy technologies raised their share in total final energy consumption to 17.5 per cent in 2016 and, since 2012, the growth of renewables has outpaced the growth of total energy consumption. Technology diffusion and advances are making renewable energy cheaper and accessible to remote areas.

These challenges are closely interlinked. Governments, civil society, private sector actors and other stakeholders must address them simultaneously and comprehensively. New technologies to address challenges to humanity's basic needs provide a clear opportunity to harness further innovation and accelerate progress on many SDGs. This chapter illustrates, through specific examples, how new technologies can be used to fulfil these basic needs and explores policies that would be needed to take them from isolated cases to large-scale applications.

## **Ensuring adequate shelter for all**

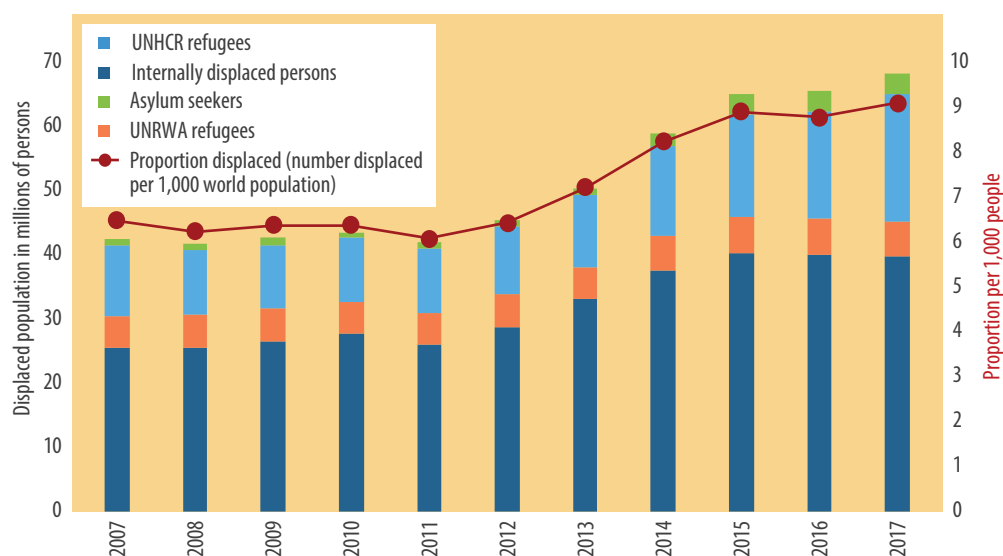
Together with food, safe, adequate and affordable housing comprise the most basic needs of humanity. Adequate and affordable housing fosters progress in health, education and economic opportunity, as well as in basic infrastructure, which helps communities build resilience against economic shocks and natural disasters. At present, 1.6 billion people



live in inadequate housing,<sup>2</sup> of which one billion live in slums and informal settlements.<sup>3</sup> The 2030 Agenda is mobilizing efforts and resources to ensure adequate, safe and affordable housing for all, including basic services and upgraded slums, by 2030 (SDG 11).

The 2030 Agenda prioritizes the housing needs of the poorest and most vulnerable, especially displaced populations. Having shelter is the most basic need of displaced populations, allowing them to survive and recover from the physical and psychological trauma of disasters, violence and conflicts. As seen in chapter II, the increasing number of conflicts has displaced millions of people. Millions of these displaced people are struggling in inadequate and often dangerous shelters for extended periods, with their lives, dignity and future at risk.<sup>4</sup> For example, 1.7 million Syrian refugees who fled the war have stayed in collective shelters, such as basements of public buildings or unfinished buildings, for more than five years. Children were born and raised in these shelters lacking basic services, privacy and comfort.

Figure III.3  
Displaced population by status and as a proportion of total population, 2007–2017



Source: United Nations High Commissioner for Refugees (2018), p.6.

- 2 The United Nations High Commissioner for Refugees defines a shelter as “a habitable covered space that provides a secure and healthy living environment with privacy, comfort and emotional support” (United Nations High Commissioner for Refugees, 2019b, p.1). According to the United Nations Human Settlements Programme (UN-Habitat), the following minimum conditions must be met before particular forms of shelter can be considered adequate housing: security of tenure; availability of services, materials, facilities and infrastructure; affordability; habitability; accessibility; location and cultural adequacy (United Nations High Commissioner for Refugees, 2014).
- 3 The United Nations defines slums as communities where more than 50 per cent of the population has no access to adequate housing, including water, sanitation, durable structure, adequate space and security of tenure. UN-Habitat defines informal settlements as (i) residential areas where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally, and (ii) unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing).
- 4 Only some 30 per cent of refugees and internally displaced persons (IDPs) across the world are housed by international organizations. The remaining 70 per cent are in rented accommodations, hosted by friends and family, or sleeping in home-made makeshift shelters or outside.

Shelters can be classified into three non-exclusive categories according to International Federation of Red Cross and Red Crescent Societies (IFRC) (2013), (figure III.4). *Emergency tent/temporary shelters* provide life-saving support to immediately accommodate displaced populations, prioritizing speed and lowering construction costs. The lifespan of such shelters is usually limited. *Transitional/progressive shelters* can be upgraded or re-used as semi-permanent structures. The last type of shelters—*core shelters/permanent housing*—are designed as future permanent housing, allowing and facilitating permanency and extension by the households with their own means and resources.

Humanitarian assistance forms the basis for many of these shelters for an increasing number of displaced people. Humanitarian shelters were considered only an option of last resort; however, with worldwide displacement on a level not seen since World War II (United Nations High Commissioner for Refugees, 2018), humanitarian shelters have

Figure III.4  
Types of shelters

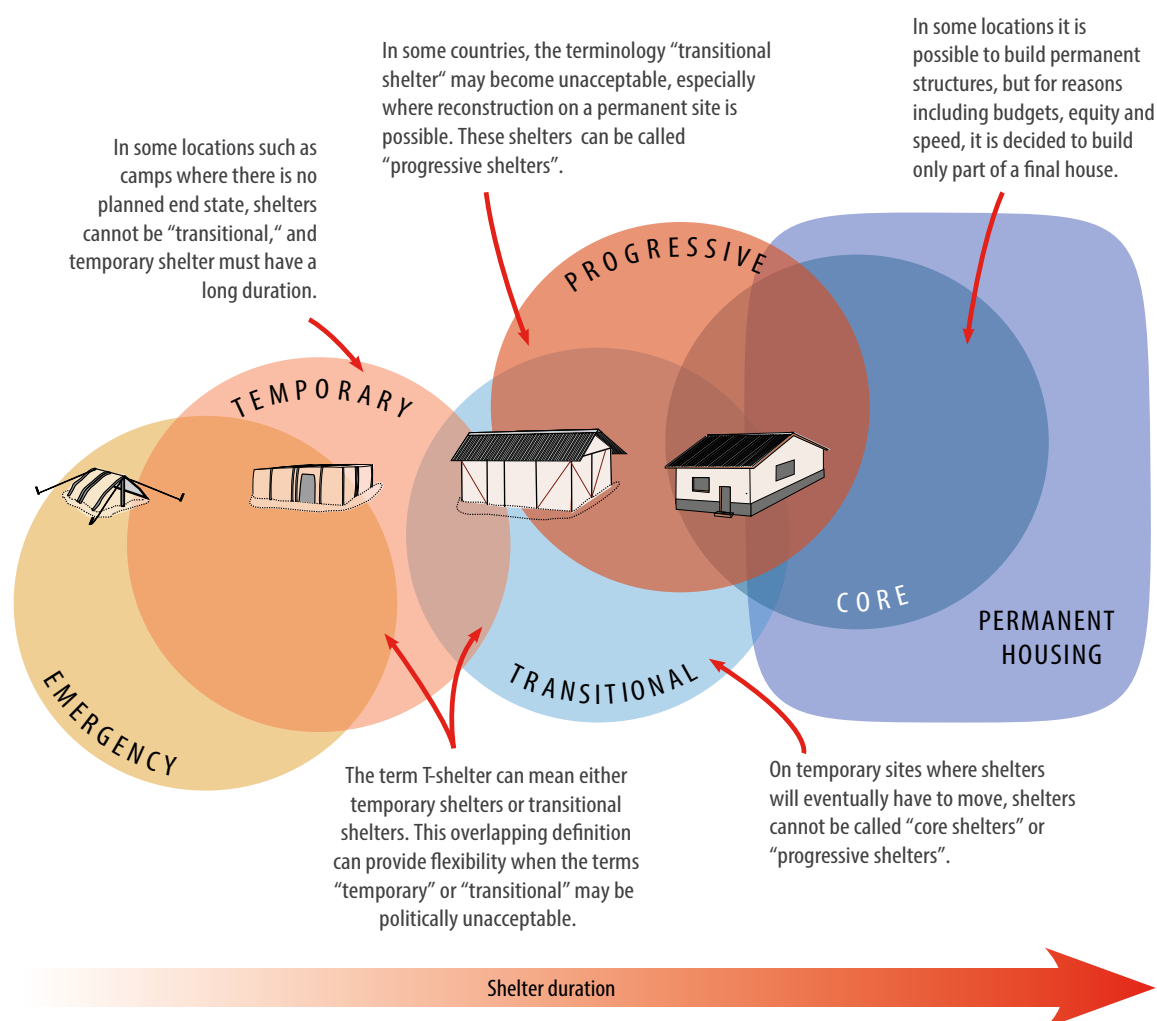


Illustration of overlaps between some of the different shelter terminologies in use. Individual designs might fall into many of the categories, it is the context that is important in agreeing on the terminology.

Source: IFRC (2013), p. 9.

become the only viable option. While such shelters are usually intended to offer temporary housing solutions, they have increasingly transitioned into long-term settlements or even mirror permanent residences in the face of large influxes. According to the United Nations High Commissioner for Refugees (UNHCR), the average time displaced people remain in humanitarian shelters is now 17 years, longer than the period the average US house buyer will stay in their home (Wood, 2017).

Technological innovations offer a glimmer of hope, not only for providing emergency shelters, but also offering longer-term relief and a smoother transition to recovery for displaced populations. This section discusses a set of material and construction technologies that have been and could be utilized to build and improve the shelters by lowering building and maintenance costs, increasing durability, conserving energy and adapting to local preferences in different contexts.<sup>5</sup> These technologies can also be applied on a wider scale and carry the potential for addressing SDG 11.

## Technology available at present and in the near future for shelters

### *Emergency tent and temporary shelters*

In urgent hours after a disaster, whether environmental or political, or when displaced people arrive in a new area, the first step is to get a roof over their heads as fast as possible. For decades, plastic sheeting has often been the best option. Development and innovation in material technology have made it possible to cost effectively deliver and install prefabricated tents. For example, temporary shelter, which is constructed from glass-reinforced plastic with perlite insulation can be flat-packed, so that up to 24 units can be transported by a single truck. Increasingly, lightweight insulations, such as thermal reflective multilayer systems (TRMS), are used for temporary shelters (Li and Cheng, 2006). Developed from space suits, TRMS contain different types of films in layers separated by air gaps. It reflects heat outside the structure during summer, while retaining heat during the winter months. Three or four times thinner than traditional materials, this technology can ensure high thermal performance as well as easy transport, assembly, modular design and reusability.

### *Transitional/progressive shelters*

As the majority of displaced people remain in shelters longer than predicted, the need for transitional/progressive shelters—something more than a tent but less permanent than a house—has never been greater. Compared to prefabricated tents, which can be used for 3–4 months, transitional/progressive shelters are designed to last for years as they take into account specific climate, topography hazards and environmental risks. One example is a family shelter designed for the transition period between the initial tent housing and the permanent resettlement that is large enough to be split into two compartments for separate living and sleeping spaces. The shelter can be transformed from a rectangular building with a pitched roof into a “storm-safe” prism shape by folding its wall down. In this configuration, the shelter is engineered to withstand wind speeds of 156 mph or 251 kph.

<sup>5</sup> These are some of many challenges associated with providing shelters for displaced people. Other challenges include sexual and gender-based violence, water, sanitation and hygiene, nutrition, health and education. Moreover, even camps comprised of neat and clean shelters nonetheless tend to isolate people in the camp from the wider host community, which makes ultimate resettlement and reintegration even harder (Zhang, 2015).

While shelters are typically designed for a transient displaced population, more shelters are now designed with the premise of meeting not only the individual's basic needs, but also creating a “home” and a “community”.<sup>6</sup> The change in perspectives has facilitated innovative approaches to improving the living conditions of displaced populations, including through the design of units intended for “long-term flexible occupation” as “a dignified home, not a shelter”.

### *Core shelters/permanent housing*

No longer temporary, permanent shelters prioritize longevity and sustainability. Multiple technologies, including off-grid energy systems and water purification systems, have been deployed for such purposes. It is fundamental that the construction of shelters—temporary or permanent—and housing in general minimize environmental impact and use local materials.

3D printing technology, for example, is allowing more localized production, promoting local employment, reducing labour costs and transport needs and reducing waste. For instance, 3D-printed houses made of concrete are presenting great hope for making housing affordable and a viable long-term solution to the needs of displaced persons. The concrete printer is able to build a single-storey, 600- to 800-square-foot (54- to 72-square-metre) home in 24 hours for \$10,000 (Reichental, 2018). The structure includes a living room, kitchen, bedroom and a wraparound porch.

### **Policy and implementation challenges**

Shelter “should be considered a non-negotiable human right” (World Bulletin, 2016). Innovations in material and construction technologies are offering great hopes of delivering adequate shelter to those in need. However, a major obstacle to providing adequate shelter for displaced populations is related to land ownership—the identification of the ownership of the land, the legal proof for the ownership, and the use right and claims (UN-HABITAT, 2010). The failure to obtain consent from all parties can lead to political and social tensions with host communities.<sup>7</sup>

Besides land ownership, there is a tension between the objectives of lowering the cost of shelters and tailoring shelters to the specific cultural and environmental requirements of the regions. With limited funding available, cost-effectiveness is one of the major considerations for organizations on the ground commissioning shelters. As a result, non-contextual and pre-packaged solutions, such as plastic sheeting (\$12–\$14 per sheet) and tent kits, have been the first choice for decades. On average, UNHCR distributes around 2 million square metres of plastic sheeting and between 70,000 and 100,000 tents a year (worth up to \$45 million). According to an interview with a UNHCR official, however, humanitarian agencies would not consider deploying anything that costs more than \$200–\$500 per family (Wood, 2017).

Taking advantage of new technologies for meeting shelter needs will require additional resources. When UNHCR launched its “Nobody Left Outside” campaign in May 2016 to improve shelters for 2 million refugees, it aimed to raise funds from the

<sup>6</sup> For more on designing refugee communities, see <https://www.unhcr.org/innovation/redesigning-refugee-communities/>.

<sup>7</sup> See Unite for Sight (n.d.) for more on the relationships between refugees and host communities.

private sector to close the gap between the expected cost of \$728 million for its operations in 2016 and the available funding of \$158 million at the time. Funding gaps continue to impede the realization of decent and secure shelters for millions of displaced people. Even when resources are available, the social acceptance of the new types of shelters and their consistency with local building codes, materials and social needs can be an issue. For example, field testing of IKEA's "Better Shelter" is currently taking place in Ethiopia, Iraq and Lebanon to assess not only the technical viability, but also beneficiary acceptance (Tubertini, 2017). Upon completion of the field testing, the Better Shelter specifications will be revised and subsequently validated to scale up manufacturing and use.

## Combating hunger by mitigating drought risks

Ending hunger is the ultimate goal of SDG 2, particularly for the most vulnerable, with food and agriculture linked to progress across multiple SDGs (Food and Agricultural Organization, 2018b). Yet, progress in reaching these goals has been mixed. The global total of malnourished people has risen from 804 million in 2016 to 821 million in 2017 (Food and Agricultural Organization and others, 2018d). These trends hold in relative terms as well, with the proportion of people undernourished worldwide increasing from 10.6 per cent in 2015 to 11.0 per cent in 2016 (United Nations, 2018a). A number of factors drive this, with conflict, inequality and climate variability as some of the main drivers of hunger, food and water insecurity and crises.

Of the global threats and challenges outlined in the previous chapters, rapid climatic changes are affecting the ability of humanity to feed itself. In particular, droughts are increasingly the most significant natural and climatic events that threaten food production and exacerbate hunger. But new technologies offer means to predict and mitigate the potential adverse effects of drought on food production.

## Hunger projections and drought occurrence

The Food and Agricultural Organization (FAO) Global Perspective Studies presents three scenarios for agriculture and food security: (i) *business as usual*, in which current challenges in food access remain; (ii) *stratified societies*, in which inequalities worsen between groups regarding access to resources, consumption patterns and decision-making power; and (iii) *towards sustainability*, in which inequalities in access are lessened, as per the SDGs.<sup>8</sup> The projections are made to 2050, reflecting the likelihood of drought events and illustrating how these events affect crop yields, livestock and food prices, along with their consequences on malnourishment, diseases and deaths (Centers for Disease Control and Prevention, 2012). The results are separated here for high-income countries and low- and middle-income countries to highlight the different implications for these country groups.

Under all scenarios, calorie consumption remains significantly higher for high-income countries than low- and middle-income countries<sup>9</sup> (figure III.5). Efforts towards

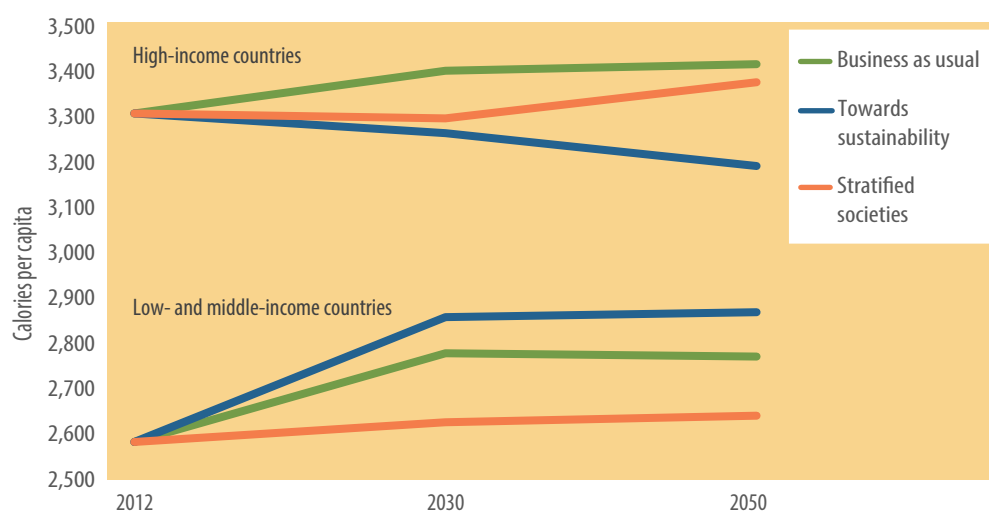
<sup>8</sup> These scenarios depend on a host of uncertainties and challenges, including numerous drivers ranging from population, incomes, technology, consumption levels and so forth. The study is based on two quantitative models: FAO Global Agricultural Perspectives System (GAPS) and Environmental Impact and Sustainability Applied General Equilibrium (ENVISAGE). For more detail, see Food and Agricultural Organization (2018c).

<sup>9</sup> Excluding China.

sustainability will curtail over-consumption in rich countries and increase consumption in low- and middle-income countries due to raised incomes. On the other hand, in business-as-usual and stratified society scenarios, overconsumption in the rich world and underconsumption elsewhere will persist. In all scenarios, South Asia and sub-Saharan Africa experience the lowest per capita consumption, dragging down the average for all low- and middle-income countries.

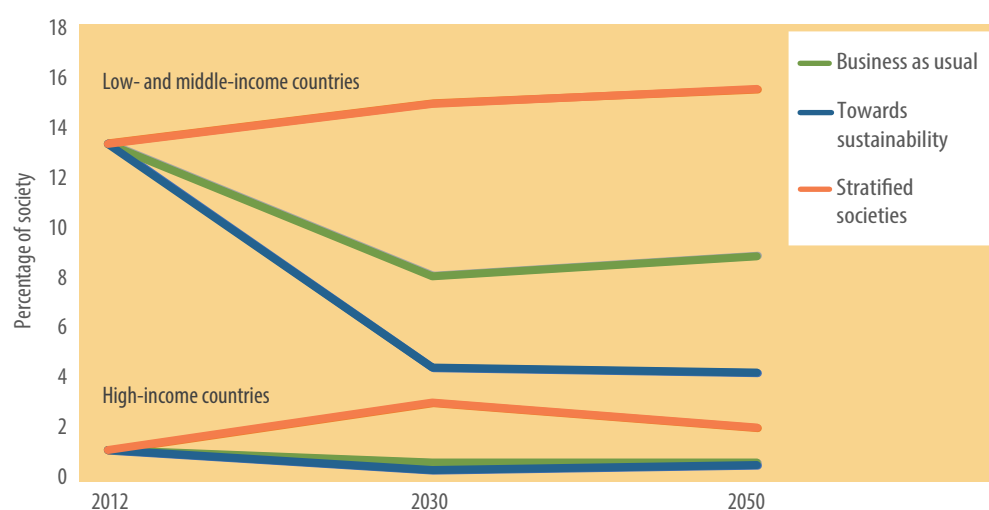
Undernourishment is projected to decline in the business-as-usual and sustainability scenarios in low- and middle-income countries, but only the latter scenario meets SDG 2 (figure III.6). Due to population increases, the absolute numbers of undernourished will rise despite a falling ratio of undernourished to nourished.

Figure III.5  
Scenarios for calorie consumption per capita, 2012, 2030 and 2050



Source: UN DESA, based on FAO (2018c).

Figure III.6  
Scenarios for prevalence of undernourishment, 2012, 2030 and 2050



Source: UN DESA, based on FAO (2018c).

Drought affects all these scenarios. The numbers of the food insecure increase drastically during and after drought events, while extreme and punctuated drought events have different negative consequences than do lengthy ones, such as the lingering effects of the 2016 El Niño. Drought events are taken into account in the FAO scenarios as they affect crop yields, livestock, food shortages and rising prices. Drought most severely affects the food security of households in impoverished or remote rural areas, particularly with subsistence farmers, thus bringing implications of regional tensions and income inequalities mentioned above. Climate change will threaten those communities already facing dire threats from drought and other conditions.

The ability to prepare for and respond to droughts varies by country and region, with a more pronounced and devastating impact of droughts in Africa. More than 363 million people were affected by droughts in sub-Saharan Africa from 1980 to 2014; between 1991 and 2013, the region lost \$31 billion in crop and livestock production due to droughts, particularly driven by East Africa (\$19 billion). Droughts in the horn of Africa from 2008–2011 increased food insecurity for 15.5 million people (Food and Agricultural Organization, 2015). In economies where agriculture is vital for rural livelihoods and the national economy, drought can be particularly harmful (figure III.7).

The Middle East and North Africa have faced more widespread, prolonged and frequent droughts over the past four decades, which has brought a shift in focus from emergency crisis management to more proactive drought resilience and risk reduction (Food and Agricultural Organization, 2018a). The true magnitude of drought impacts can be even larger in these regions as they can exacerbate inherent vulnerabilities that lead, for example, to direct and indirect nutritional effects on water-related disease, airborne and dust-related disease, vector-borne disease, mental health, and other health effects (Stanke and others, 2013).

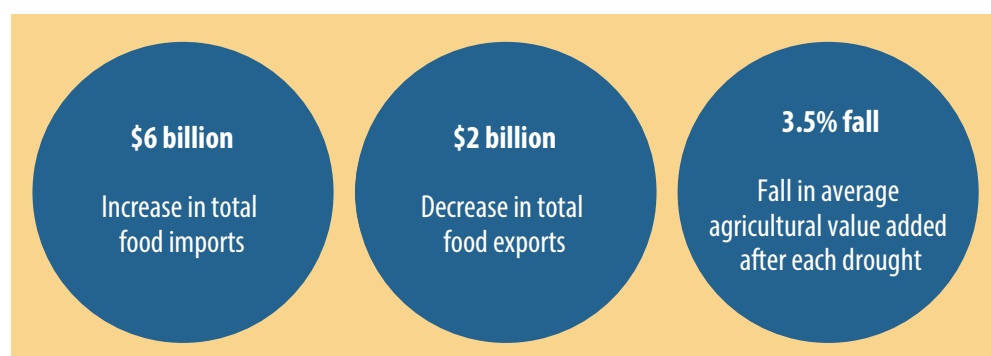
### Integrated satellite technologies and systems for drought prediction and mitigation

Early detection and mitigation of drought risks will remain critical for eradicating hunger and achieving many other SDGs, including the SDGs related to health and educational outcomes. Countries and communities are already deploying many new technologies to manage drought-related risks.

The Famine Early Warning Systems Network (FEWS NET), which makes use of satellites and other information networks, is an early-warning drought information system

Figure III.7

#### Impacts of drought in sub-Saharan Africa (SSA), 1991–2011





that covers over 30 countries across Africa, Asia and Latin America. In response to destructive famines in Africa, this network was launched in 1985 by the United States Agency for International Development (USAID) in order to assist various actors in responding to humanitarian crises. The approach pairs scientific measurement with analysis in order to make projections and build recommendations for crisis aversion and mitigation. FEWS NET brings together experts and partners from across different Governments and NGOs<sup>10</sup> to provide food insecurity early warnings through analysis of remote-sensing satellite imagery, greenness maps and other information.

Another example of emerging technology systems in the upstream drought identification system includes the Drought and Flood Mitigation Service (DFMS). This system combines satellite and ground-based measurements, weather and hydrological forecasts, and soil and vegetation information from other existing models for drought and flood early warning and mitigation (Tsarouchi, 2018).

Another case of new technologies for the drought prediction element of satellite functions is the NASA Soil Moisture Active Passive mission (SMAP), which collects local data on moisture in the top 2 inches of soil, with a 6-mile resolution, to help predict droughts. It is used by the United States Department of Agriculture for crop forecasts and analysis (Murphy, 2014).

Satellite technologies also enable farmers to respond to drought conditions. A concrete example involves satellite remote sensing to identify groundwater sources, an initiative in Ethiopia to locate groundwater sources in arid lands, including during droughts, and convey this information to local communities, farmers and pastoralists so that they may dig more accurate boreholes (box III.1).

## Policy and implementation challenges

The various satellite system technologies for drought early warning and mitigation offer significant benefits for boosting and sustaining agricultural productivity and combating hunger. But they also present significant implementation and policy challenges. Differing or overlapping coverages of satellites—whether global or regional—could be better coordinated or combined to ensure measurements at a wide variety of levels. Programmes of varying scope already exist, with different comparative advantages, and collaboration between them can bring the most relevant information needed. Meanwhile, the systems in place on the ground to process big data, produce analysed results and, most importantly, transmit this information to the relevant actors are equally crucial, and need to be scaled up and supported with resources and capabilities. There are a number of methods to get drought information to end users, such as radio, mobile phones, information centres and dissemination of printed materials (Kim and Nielson, 2017, p. 151). Satellite data can also be applied to other related and important fields of development, such as insurance (box III.2) and, more broadly, to other areas of climatic monitoring involving floods and storms.

The importance of a system of different technologies working together in any of these satellite-drought initiatives cannot be overemphasized, as illustrated in figure III.8. By addressing both acute and long-term drought conditions, such systems can also play a strong

<sup>10</sup> Key collaborating institutions in addition to the United States Agency for International Development (USAID) include the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the United States Department of Agriculture (USDA) and the United States Geological Survey (USGS).

## Box III.1

**Identifying groundwater sources by satellites**

The Afar region of Ethiopia, in which the majority of people depend on pastoralism (Godfrey and Hailemichael, 2016), suffers from low rainfall in recent years. The low level of rainfall led to an increase in the number of people needing Water and Sanitation for Health (WASH) assistance from 1.0 million in January 2015 to 8.3 million by January 2019 (Goyol and Alvarez-Sala, 2019), with four consecutive years of drought (Ryeng, 2018).

A three-phase approach has been developed to identify groundwater sources by satellite in Elidar, a district in Afar: (i) radar and optical remote sensing was employed from a variety of sources; (ii) field-based ground measurements and water sampling was undertaken; and (iii) these two sources of information were overlaid to inform borehole drilling (Godfrey and Hailemichael, 2016). These steps provide data regarding geology, hydrogeology, hydrology, hydrometeorology and geophysics in order to identify the best location for these wells, which can be pinpointed within a 250–300 metres radius (*ibid.*) and locate ground water as deep as 600 metres below sea level (Ryeng, 2018). The methodology therefore combines satellite sensing technologies with ground measurements and new data processing methods to yield high-probability outcomes. The Afar region varies greatly in hydrogeology, physiology and topography, adding to the difficulties but also indicating the potential of this method in a variety of other regions.

This is a joint initiative of the United Nations Children’s Fund (UNICEF), under the WASH cluster, and the European Union to support the Government of Ethiopia. Eleven boreholes have been drilled so far, with a 92 per cent success rate (*ibid.*). This is a more sustainable response than continuing to send water and food aid, helps identify and optimize already-existing resources, and saves resources wasted in drilling wells in suboptimal locations. Indeed, UNICEF spends over \$300,000 per month on water trucking in the Oromia region alone (Goyol, 2019). This, therefore, speaks to the oft-discussed nexus between humanitarian assistance and long-term development.

**Source:** UN DESA.

role beyond drought relief and for broader sustainable development in agriculture. Indeed, integrated technologies can provide information and address low yields and productivity that plague smallholder farmers in rural areas and prevent them from reaching agricultural transformation. They also complement other advanced technologies in agriculture such as drone use and mobile applications. If these systems are able to be scaled up, they can be harnessed to address the alarming trends and scenarios constructed by FAO above.

Being better equipped to respond to drought can help stabilize and eventually boost consumption in low- and middle-income countries and propel the upward trend of “towards sustainability” in calories per capita in figure III.5. Successes can also help bring down the proportion of society facing undernourishment. The ability to sustain such successes will depend on embedding these systems in national agriculture, economic and climate strategies.

Implementing such an approach can build on existing financing opportunities and reduce costs. First, harnessing satellites already in orbit takes advantage of excess capacity and sunk costs of satellite-operating countries, whose use of satellites for climate research already involve developmental aims. More closely linking the data generated by these satellite systems with developmental cooperation, capacity-building and other efforts can bring such methods to those communities and countries needing them the most.

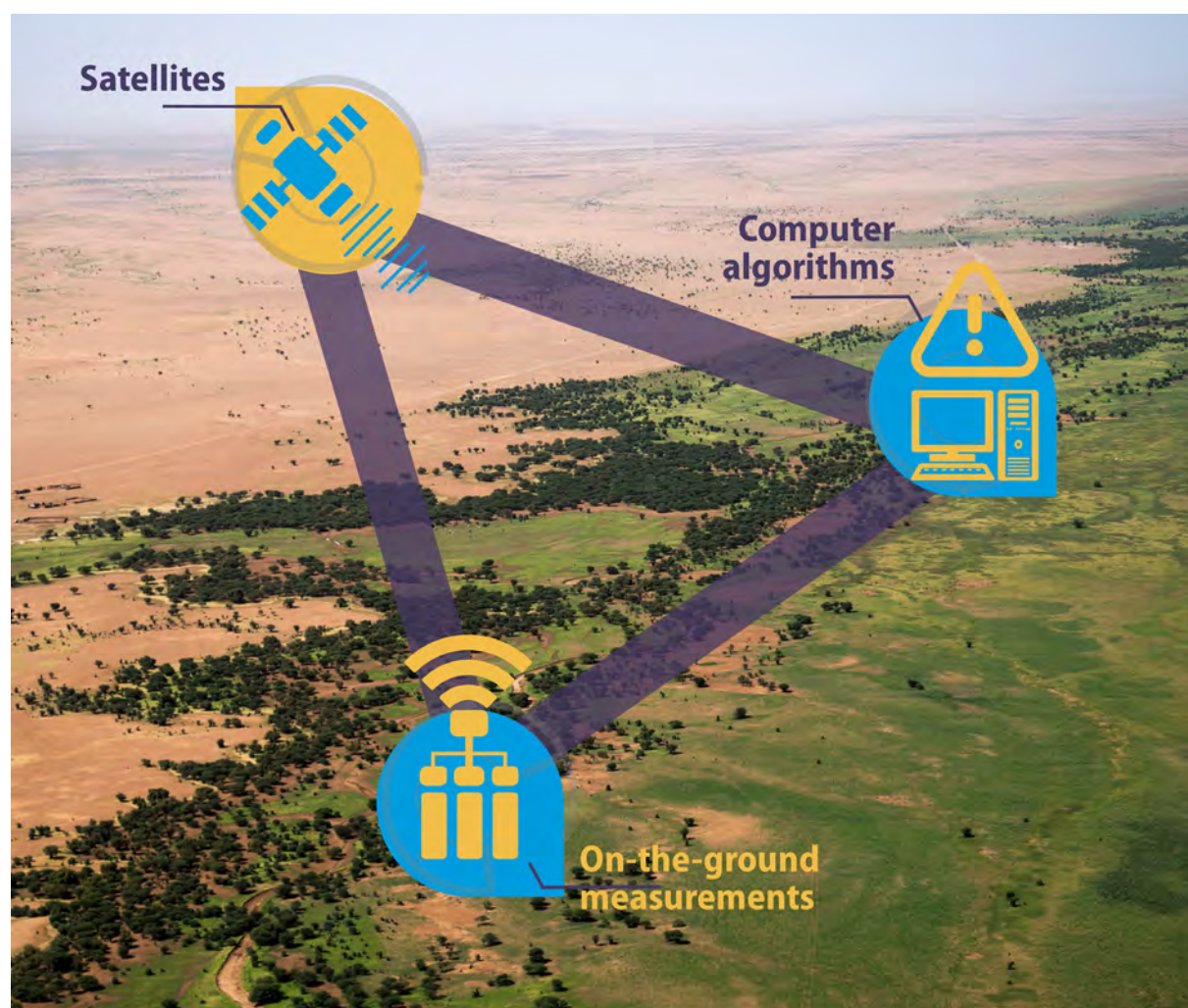
## Box III.2

**Drought prediction methods for agricultural insurance**

Insurance is an important element of protecting farmers and helping them hedge against climate events. Scaling up micro-insurance in Africa (SUM), an initiative of the Netherlands in Mali and Uganda, will use the METEOSAT satellite to provide low-cost drought insurance for small-holder farmers in these countries. SUM measures and builds indices for agricultural drought, based on daily monitoring data on relative water evaporation from soil. The data—available at 3km resolution—is compared with historical data since 1982 to assess risks and calculate insurance payouts (SUM Africa, 2018). By bringing such detailed information to out-of-network insurance markets, this initiative will harness advanced technology to support interventions that can have meaningful effects on those most vulnerable to climate events. When fully operational, it will significantly reduce the need for emergency humanitarian aid.

Source: UN DESA.

Figure III.8

**Integrated technologies for drought early warning and mitigation**

Source: UN DESA. Photo credit/UN Photo.

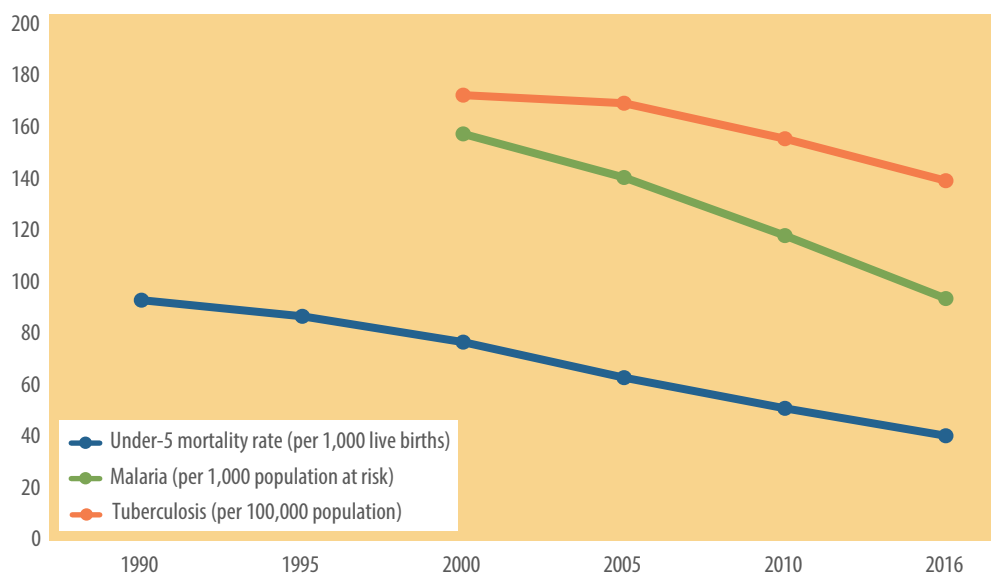
Nonetheless, there is a large demand for additional financial and human resources to implement more projects and micro-level case studies such as using satellite technology for borehole drilling. Scaling up these projects also sheds light on the needed collaboration between agriculture, technology, financing, and development in general that would allow the embedding of the system across societies facing adverse climatic events and stunted agricultural development. Indeed, agriculture is often viewed in a silo, not benefitting from best practices and new technologies from other sectors. Governments underinvest in the sector, and it receives little official development assistance.<sup>11</sup> Dealing with hunger and drought must be viewed less as an emergency humanitarian issue and rather as one of development planning, information-sharing, harnessing technologies and financing of longer-term systems that foster agricultural productivity, improve rural livelihoods and enable progress across the SDGs.

## Achieving universal health coverage

SDG 3 calls for all countries to “ensure healthy lives and promote well-being for all at all ages”. Progress towards this goal has been encouraging. Many more people today are living healthier lives than in the past decade and there has been significant improvement in reproductive, maternal, newborn and child health, as well as in combating infectious and non-communicable diseases (figure III.9).

Technology has been an important contributor to this progress, enabling rapid progress in the medical therapies and interventions and in how health care is delivered. Technology has helped develop new medicines and vaccines, saving countless lives. Basic technologies that provide clean water and improved sanitation have helped societies to grow and prosper without succumbing to the ravages of disease. More recently, digital

Figure III.9  
Under-five mortality rate, incidence of malaria, and incidence of tuberculosis, 1990–2016



Source: World Health Organization. Global Health Observatory Data Repository. Available from <http://apps.who.int/gho/data/node.home>.

<sup>11</sup> Agriculture only received 4.2 per cent of official development assistance from 2003–2012 (Food and Agricultural Organization, 2015, p. 51)

technology is enabling less costly and better research, improved training of health providers and patients, better monitoring of the impact of interventions, and inexpensive medical devices.

At the same time, there are still too many people vulnerable to preventable and treatable maladies, contributing to severe and disproportionate insecurities felt across certain populations. Africa is particularly exposed to various health risks (figure III.10). Compared to other regions and the world average, the continent suffers from greater incidence of disease and child mortality. More is needed to eradicate a wide range of diseases and address many different persistent and emerging health issues.

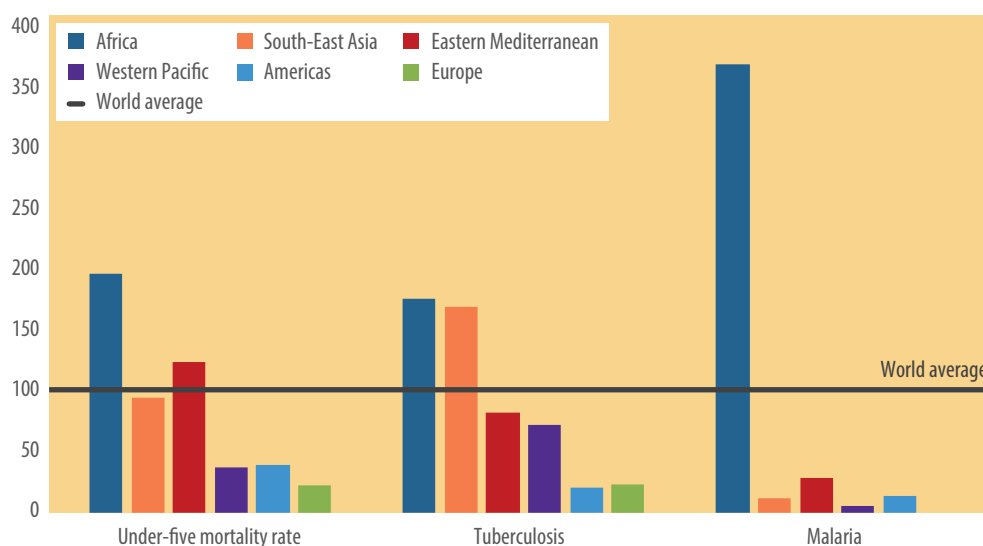
At least half of the world's population still does not have full coverage of essential health services, even as many countries have expanded access to health services and financial protection over the last two decades.<sup>12</sup> The poor and marginalized remain underserved and every year 100 million people fall into poverty due to health-related spending.

The world has been trying to address this and there has been significant but variable progress towards universal health coverage (UHC), both across and within countries. All States Members of the United Nations have agreed to try to achieve UHC by 2030, as part of the SDGs. UHC is a powerful target in the road to achieving better health and well-being, and general human development.

As defined by the World Health Organization (WHO), UHC means that all individuals and communities receive the health services that they need without suffering financial hardship. It includes the full spectrum of essential, quality health services, from

Figure III.10

### Under-five mortality rate, incidence of malaria, and incidence of tuberculosis relative to world average, 2017



**Source:** World Health Organization. Global Health Observatory Data Repository. Available from <http://apps.who.int/gho/data/node.home>.

**Note:** Under-five mortality rate is the probability of dying by age 5 per 1,000 live births. The incidence of malaria is measured per 1,000 persons at risk. The incidence of tuberculosis is measured per 100,000 persons per year.

<sup>12</sup> Health coverage is measured by the proportion of a population that can access essential quality health services and by the proportion of the population that spends a large amount of household income on health. The level and equity of coverage is tracked using 16 health services in four categories: reproductive, maternal, newborn and child health; infectious diseases; noncommunicable diseases; service capacity and access. For more detail, see World Health Organization (2019).



health promotion to prevention, treatment, rehabilitation, and palliative care. UHC enables everyone to access the services that address the most significant causes of disease and death, and ensures that the quality of those services is good enough to improve the health of the people who receive them.

The WHO has published estimates for the cost and the benefits associated with reaching 16 SDG health targets for three quarters of the world's population in 67 countries by 2030. Achieving all the health targets in the SDGs by 2030 would mean hiring an additional 23 million health workers and building 415,000 new health facilities. Together with other investments, the total annual cost of achieving the SDG health targets will start at \$134 billion and increase to \$371 billion by 2030.<sup>13</sup>

The estimated benefits would be significant. More than 50 million infants and children who could die before their fifth birthday would be saved. In total, 97 million premature deaths would be prevented, including 20 million deaths from cardiovascular disease, diabetes and cancer. Life expectancy would increase by between 3.1 and 8.4 years, depending on country conditions.

Looking forward, the rapid pace of technological progress lets us imagine a future where everyone has access to basic health services. Digital technologies have an important role in improving access to health and health outcomes for all. This section argues that digital technologies can help make health services available to all by providing access to preventative, diagnostic and treatment services, provide health education, and expand knowledge and research.

### Available digital technologies and strategies to improve access to health services

Health systems are complex, with many important and interdependent functions. Figure III.11 provides a conceptual model of the “stack” of functions that are required to address the health needs of a target population. Achieving UHC and providing quality, timely and adequate care to the underlying population requires improving the performance of health services across multiple layers of accountability, supply, demand, quality and cost.

There is also a clear role for digital technologies to improve the performance of various health functions and to expand health coverage to a target population.<sup>14</sup> Digital technologies make it possible for health services to benefit from the revolution in mobile technologies (mHealth), new platforms for telepresence and eLearning (telehealth), new standards for electronic health records, communication using social media, and advanced analytics using big data.

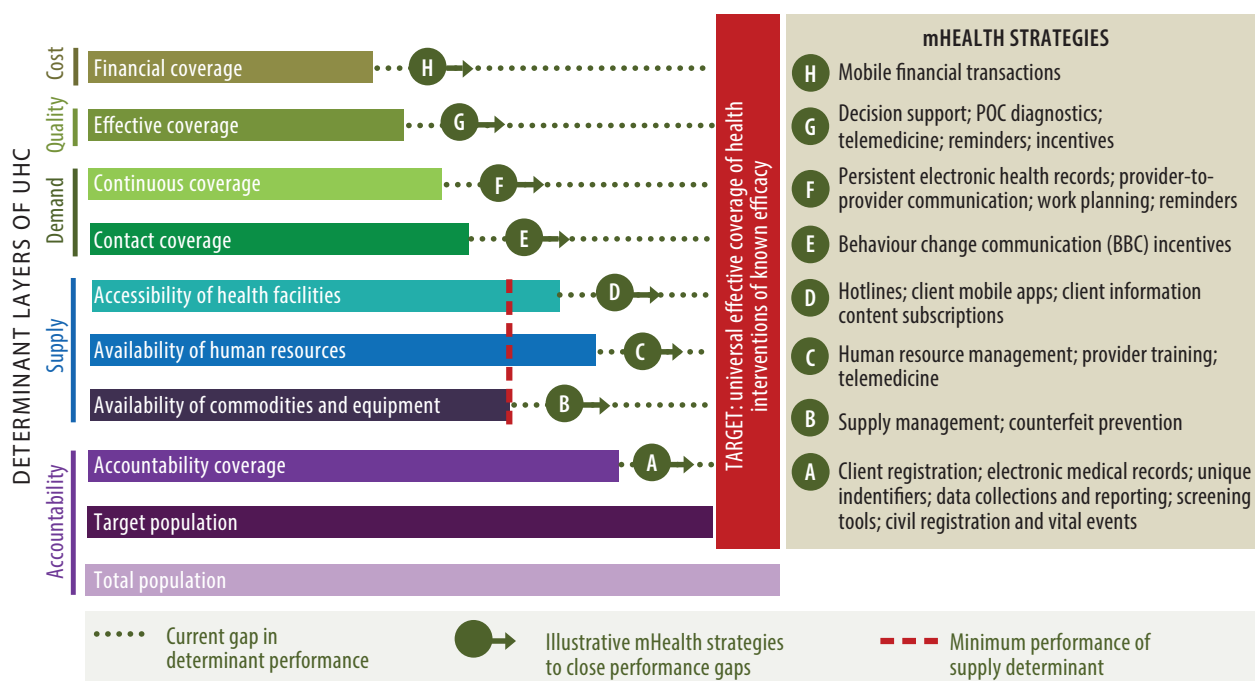
Mobile technologies, telehealth and analytics will become even more important with the recent emergence of intelligent connectivity—the fusion of high speed 5G networks, artificial intelligence (AI) and Internet of Things (IoT) supported by big data. While 5G networks will be very expensive to build and are likely to entrench the digital divide in some countries, and in some cases between countries, they would likely make it possible to expand health services and information in far greater volume and velocity than what is possible with current technology.

<sup>13</sup> Estimates consider the cost of scaling up health services deliveries in multiple categories to meet performance targets, health service coverage, and overall health outcomes. Investments are modelled to increase over time following a progressive expansion of service coverage (Stenberg and others, 2017).

<sup>14</sup> The cost-effective and secure use of information communications technology (ICT) in support of health and health-education, knowledge and research are known as “eHealth”.

Figure III.11

## A cascading model of the determinants of UHC and the impact of digital technologies



Source: Reproduced from Mehl and Labrique (2014).

### Mobile health: using mobile technology for health care

A better health system requires that people make use of available services, and mobile technology can be an enabler of many other technologies because of the growing ubiquity of mobile devices (table III.1).<sup>15</sup> Mobile technologies and connectivity can be leveraged to better disseminate health information using social media and to facilitate access to medical personnel. They can also help to reduce the cost of medical devices by tapping into the power of sensors that exist in smartphones and tablets.

Mobile health (mHealth) helps increase the demand for health services through better information dissemination, particularly for those in remote areas. Information campaigns and tools can boost the demand for health services by providing health education regarding when to seek screening, examinations and treatment. They can also help inform the population of risk vectors and health campaigns. Short message services (SMS) can provide text-based health education and treatment compliance, medical appointment reminders, and health surveys and surveillance. The existing advertisement network can also be leveraged to target information campaigns to population groups at risk.

Break Dengue, for example, uses digital channels and social media to target and connect patients, doctors, the pharmaceutical industry, research and development orga-

<sup>15</sup> Mobile technologies are quickly becoming ubiquitous and have great potential for helping achieve universal health coverage. The global use of mobile devices has increased exponentially, from 2.2 billion global mobile phone subscriptions (82 per 100 inhabitants) in 2005 to more than 7 billion (>120/100) by the end of 2015. The increase has been greatest in the developing world, with mobile phone subscriptions increasing from 1.2 billion to over 5.5 billion. However, there remain important differences in the quality of the mobile technologies available in developing countries.



Table III.1

**Examples of using mobile technologies in health care**

<b>Communication between individuals and health services</b>	
Health call centres/health-care telephone helplines	Health-care advice and triage provided by trained personnel and pre-recorded messages; accessible on mobile phones or fixed lines
Emergency toll-free telephone services	Free telephone hotlines for health emergencies provided by trained personnel and pre-recorded messages, and linked to response systems; accessible on mobile phones or fixed lines
<b>Communication between health services and individuals</b>	
Treatment adherence	Reminder messages provided by health services to patients aimed at achieving medication adherence using mobile ICT; messages can be text, voice or multimedia
Reminder to attend appointments	Reminder messages provided by health services to patients to make or attend an appointment using mobile ICT; message can be text, voice or multimedia
Community mobilization/health promotion campaigns	Health promotion campaigns conducted using mobile ICT to raise the awareness of target groups. Messages conveying information can be text, voice or multimedia
<b>Consultation between health-care professionals</b>	
Mobile telehealth	Consultation between health-care practitioners or between practitioners and patients using mobile ICT
<b>Intersectoral communication in emergencies</b>	
Emergency management systems	Response to and management of emergency and disaster situations using mobile ICT
<b>Health monitoring and surveillance</b>	
Health surveys	Data collection, management and reporting of health surveys using mobile ICT; may involve any combination of networked mobile devices
Surveillance	Routine, emergency and targeted data collection, management, and reporting for public health surveillance using mobile ICT; may involve any combination of networked mobile devices
Patient monitoring	Data capture and transmission for monitoring a variety of conditions in a range of settings using mobile ICT
<b>Access to information and education for health-care professionals</b>	
Access to information, resources, databases and tools	Access to health sciences literature, resources and databases using mobile ICT
Clinical decision support systems	Access to decision support systems using mobile ICT
Electronic patient information	Access to electronic patient information (such as EHR/EMR, laboratory results, X-rays, etc.) using mobile ICT
mLearning	Access to online educational resources using mobile ICT

Source: World Health Organization (2017).

nizations, NGOs and associations at both global and local levels. Using social media to drive digital engagement, they empower their audiences with information on dengue prevention, the latest news on dengue fever, and real stories from patients and clinicians who have encountered dengue. This helps to “put a face” to the disease and has promoted a different narrative that did not exist previously.

According to the latest eHealth survey from WHO, nearly 80 per cent of countries reported that health-care organizations promote health messages using social media (WHO, 2017). However, the potential of social media to support UHC has not yet been fully explored. The same technologies that created social media networks and that allow for personalized messaging and targeted advertisements can be used to improve health promotion and public health awareness efforts. Social media can be used to improve, for example, health knowledge on women’s health and contraception, vaccination and immunization campaigns, hygiene and sanitation campaigns, and for pandemic and epidemic response.

Health services are also benefiting from using commodity devices, such as smartphones, tablets, and cameras, to drastically reduce the cost of medical devices such as portable ultrasounds. Commodity devices benefit from Moore’s Law—the observation that the number of transistors in an integrated circuit doubles approximately every two years—and have become more powerful and cheaper. Specialized medical equipment is, by contrast, increasing in cost.

One example of using technology to improve access to services involves the Portable Eye Examination Kit (Peek) in Kenya. Peek is a unique, smartphone-based system that can be used for comprehensive eye testing anywhere in the world. Peek Acuity, the smartphone application used to test eyesight easily and affordably, is as accurate as the traditional and familiar eye-test charts (Snellen charts). As of the end of 2017, the Peek Acuity app has been downloaded over 40,000 times in over 100 countries (The Peek Vision Foundation, 2017).

### *Telehealth and eLearning*

Health-care systems face a severe workforce shortage of about 10.3 million health workers globally, which is expected to rise to 12.9 million in 2035. Digital health technologies have the potential to make health services available remotely to underserved communities and also to increase the supply of health workers through eLearning platforms.

Telehealth using mobile health can significantly alleviate the lack of trained personnel due to physical distance for remote populations. Using mobile devices, it is possible for trained personnel to remotely review radiological images (teleradiology), diagnose or consult skin conditions (teledermatology), review and diagnose pathological results (telepathology), provide mental health services (telepsychiatry), and remotely monitor patients. For mental health, computerized cognitive behavioral therapy (CBT) can rapidly augment the supply of effective health treatments. Such systems are being deployed and scaled up, notably in the United Kingdom of Great Britain and Northern Ireland, following the demonstrated efficacy using randomized clinical trials.

eLearning (i.e., the use of ICT for education) is increasingly recognized as one of the key strategies for health workforce training. eLearning is used to educate medical professionals in over 84 per cent of countries and has the potential to play a significant part in addressing the skills gap among countries. In 2010, the Aga Khan Development Network (AKDN) set up an eLearning programme in Afghanistan, which has since expanded to the Kyrgyz Republic, Pakistan, Tajikistan and the United Republic of Tanzania. Overall,

the programme delivered over 5,500 teleconsultations and has trained 1,569 health-care providers who live and work in remote regions (Aga Khan Development Network, 2016).

### *Electronic health records, big data and better analytics*

The collection and digitization of information using electronic health records (EHR) and other medical sources can be used to vastly improve the accuracy and availability of health information available to health professionals and patients. They can also improve the operational and financial efficiency of health-care systems.

EHR can provide doctors and health professionals with more complete, accurate, and accessible information about their patients, improving the quality of medical care and reducing errors. Artificial intelligence can provide expert assistance in diagnosis, especially in repetitive tasks such as analysis of images and large bodies of research information.

For health system administrators, analytical tools that rely on ever increasing digital health data can shed light on individual, group and national level health outcomes to improve health coverage in support of UHC. They also improve the performance of the health system by providing better data on effectiveness and coverage of interventions and helping to identify and implement outcome-based treatment options. One example of the use of data analytics to directly influence health outcomes came during the 2015 typhoid outbreak in Uganda. The Uganda Ministry of Health's district offices collected data at the health centres where typhoid cases were treated. In order to use this information effectively for a disease response, Pulse Lab Kampala was invited to utilize interactive data visualization tools to help present dynamic information about case data and risk factors in support of managing the outbreak.

The 2016 eHealth survey found that 47 per cent of responding countries have national electronic health record systems despite the complexity and cost associated with implementing EHR programmes. International standards are being discussed and implemented for interoperability and to facilitate the diffusion of these systems to more countries.

### **Policy and implementation challenges**

The WHO has recognized the importance of digital technologies and has made eHealth a priority since 2005 during the fifty-eighth World Health Assembly (WHO, 2005a), which also adopted a resolution promoting UHC (WHO, 2005b). Since then, the progress in both UHC and eHealth has been accelerating.

The combination of widely available connected devices and the growing recognition of the role of digital technologies to achieve health goals is changing how Governments manage their health systems. According to WHO, 58 per cent of the 125 countries that participated in their latest health survey report have national strategies to use digital technology for health (eHealth). Fifty six per cent of countries either have a national policy for telehealth or one that refers to telehealth. The trend has also been positive, with the number of countries adopting eHealth, health information and telehealth policies increasing substantially over the past decade (figure III.12).

New technologies should be embraced, and continued progress should be promoted. For policymakers, leveraging ICTs for health care in a way that promotes UHC will require investments in innovation and management of health systems to support the long-term development and diffusion of technologies. Modernization of health systems can address

bottlenecks in accessing and deploying technologies not only in health facilities, but also in the management of national health systems.

Policies can encourage the innovative health application of existing commercial technologies to lower the cost and increase the accessibility of services. This is especially important in developing countries which have larger underserved populations and relatively fewer health-care resources. Investing in Internet infrastructure can expand the reach of mHealth and the services that it enables. Expanding telehealth services to give more rapid access to appropriate specialist expertise or to prevent long and costly travel on the part of the patient or health-care provider are often major benefits in the delivery of health care to rural populations.

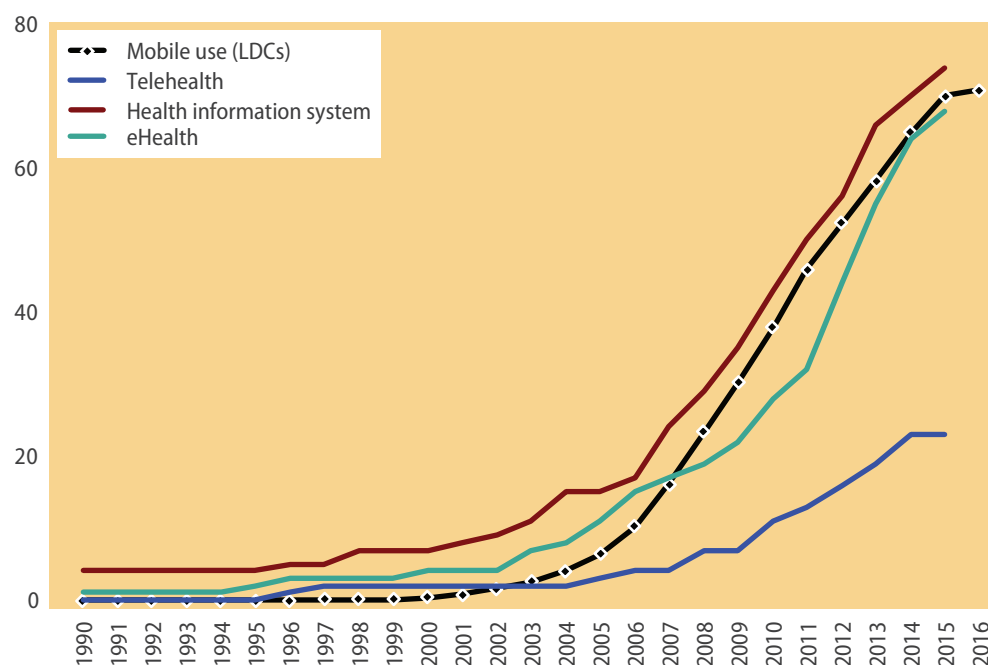
Many people, particularly in low-income countries, do not have access to 4G or even 3G networks and will likely remain excluded initially from the benefits from 5G. The new form of inequality in access to and use of new technologies is often called the digital divide or digital inequality. The timely engagement with new technologies and technological capacities of the users will critically determine how health-care services are delivered in the future.

As medical data and services become more digitized and globalized, national institutions must support rules-based regimes for data to promote national and collective interests. One example would be establishing the boundaries of acceptable use of data for medical research (Cheng, LaFleur and Rashid, 2019). With the appropriate ethical safeguards, transparency and privacy norms, individuals and societies can benefit from personalized health campaigns that leverage technologies like artificial intelligence to guide and tailor the most effective messages to inform and influence health behavior (Wei, 2017).

Policies can also facilitate the creation and use of data systems to support research into effective clinical interventions. In Sweden, for example, the Government created

Figure III.12

### Mobile use per 100 people and number of countries with policies regarding Telehealth, Health Information system and eHealth, 1990–2016



Sources: UN DESA, based on data from World Development Indicators database and WHO (2017).

SWEDEHEART as the national registry of diagnosis and treatment of cardiovascular disease, the leading cause of death in men and women in the country. The registry combines data from other registries under a single database to support clinical research to reduce mortality and morbidity of patients, and to increase cost-effectiveness in health care. The data is continuously shared among clinical doctors and researchers to find and standardize the most effective examinations, diagnosis and treatment procedures, strengthening the effectiveness and efficiency of the entire national health system. This data is now an important foundation for research on heart disease and has resulted in numerous scientific articles, influencing the treatment of heart disease throughout the world.

## Securing modern energy for all

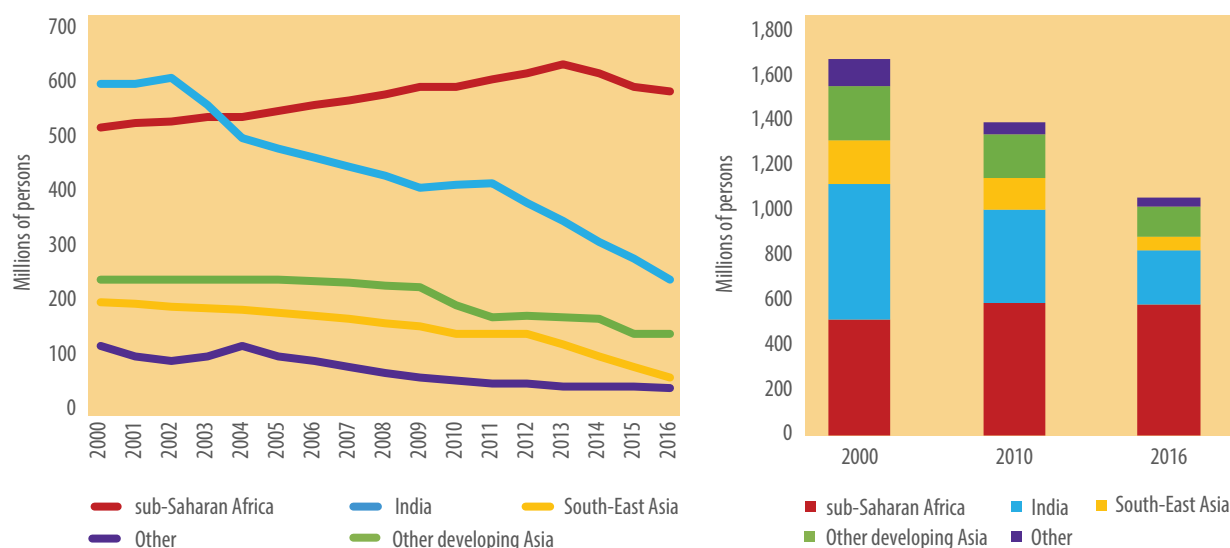
Modern energy, particularly electricity, powers and supports the basic needs and makes life easier for all. Electricity provides additional comfort for displaced people living in shelters on refugee campgrounds, the twenty-first-century convenience for populations in mega cities and everyone else living between these two extreme areas. People cannot live without electricity in the modern world. Without electricity, digital information cannot be produced, stored, transmitted or consumed. Access to affordable modern energy is a precondition for eliminating poverty (SDG 1) and reducing inequalities (SDG 10).

Access to reliable and affordable energy is also an enabling factor for achieving SDGs. Sustainable Energy for All—a global coalition of Governments, private sector, civil society and international organizations launched in 2011—recognizes the centrality of access to sustainable, modern energy to ending poverty and ensuring sustainability. Electricity is positively correlated with improved education and health, gender equality and economic growth (United Nations, 2018a, chap. III). Furthermore, with decentralized, renewable energy, combined with the conventional expansion of grid connections with renewable sources, achieving universal energy access (SDG 7) directly relates to climate actions (SDG 13) and the reduction in the impacts of air pollution (SDG 3.9). Energy-related carbon dioxide (CO<sub>2</sub>) emissions started increasing again in 2017 after only three years of flat growth, owing to economic growth recovery. Energy-related outdoor air pollution leads to about 2.9 million premature deaths at the global level; indoor air pollution is considered to be linked to more than 2.6 million premature deaths, mostly due to smoke from cooking.

The rate of new connections to electricity has been accelerating in recent years; the number of people without access to electricity declined from 1.7 billion in 2000 to 1.1 billion in 2016 (figure III.13). The acceleration has been largely driven by the expansion of the grid system and renewables—particularly solar PV—by source. In 2016, two-thirds of new power capacity around the world (almost 165 gigawatts (GW)) were generated by renewables, to which solar PV contributed over 74 GW. The International Energy Agency (IEA) predicts that some countries are already on track to reach the goal of ensuring access to modern energy for all by 2030 (International Energy Agency, 2017a). The progress, however, has been uneven among countries; the same IEA report claims that “the world is far from being on track to meeting the SDG 7 of energy for all by 2030” (ibid., p. 103) (box III.3).

There are now technological solutions to deal with these sustainable development challenges. New technologies have reduced the cost of renewables and made decentralized

Figure III.13  
Population without access to electricity by region, 2000–2016



Source: IEA (2017a), figure 2.1.

solutions—mini- and micro-grid and stand-alone systems<sup>16</sup>—viable options, along with the conventional expansion of grid connections. At the same time, advances in these technologies have made energy-related products and services more affordable, inducing further demand for electricity. The lower prices of decentralized solutions have also encouraged the emergence of new entrepreneurs and financing schemes. With prospects for cost recovery and reasonable profits, decentralized electricity systems will be built and sustained. Mobile networks make it possible to incentivize private companies to enter the electricity market even in rural areas, where the cost recovery of investment and illegal usage of electricity have traditionally been an issue. The networks allow the user of decentralized systems to remotely pay bills via a smartphone, and the electricity producer to collect usage data and disable a device if the customer misses a payment and turn the device back on when the payment is made. In fact, providers of mini- and off-grid systems have entered the market in many parts of Africa where mobile networks are available (see International Energy Agency, 2017a, pp. 84–85).<sup>17</sup>

<sup>16</sup> The so-called pico solar is not included in the decentralized system. It comprises a solar panel, battery and one or more LED lamps and, in many cases, mobile-phone charging port. The pico solar generates less than the International Energy Agency's minimum threshold of electricity of 250kWh per year in a rural household and 500kWh per year in an urban household. In 2000, the global average electricity consumption per household was about 3,500kWh per year while the typical household in Canada and the United States of America, two of the highest levels of household electricity consumption in the world, consumed about 12,000kWh.

<sup>17</sup> The most popular combination of mobile payments and decentralized systems is the pay-as-you-go system with a solar module with a battery and small appliances. See Runyon (2016) and Wogan (2013).

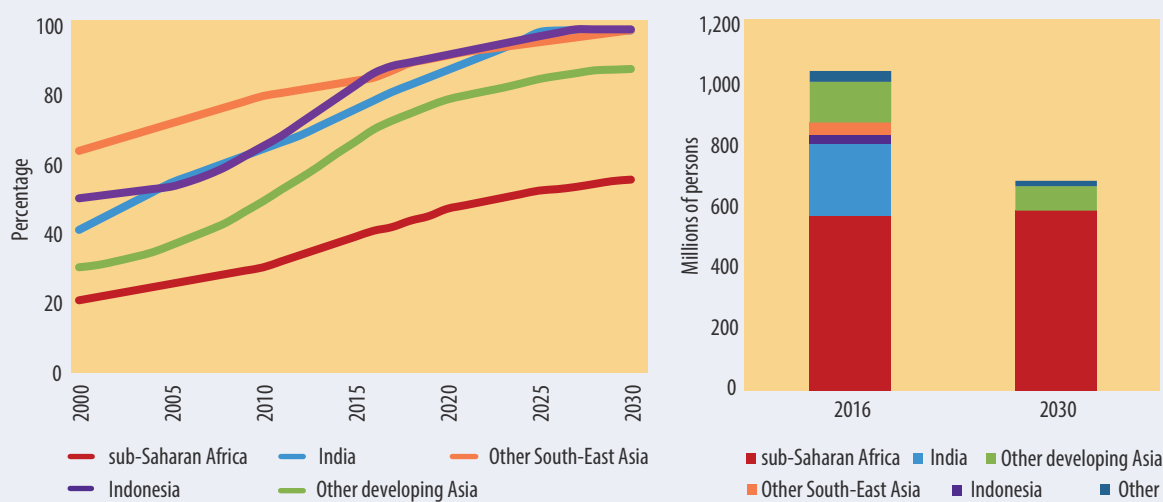


## Box III.3

**Electrification efforts in sub-Saharan Africa**

Despite the recent efforts, electrification rates do not keep pace with population growth in sub-Saharan Africa. According to the International Energy Agency, people without access to modern energy are forecast to concentrate in the region; 602 million out of the 674 million people (about 89 per cent) in the world without access to modern energy will be found in sub-Saharan Africa, particularly in its rural areas, in 2030 (figure III.3.1) This prediction is based on the policies and measures that national Governments around the world have already put in place, *plus* the likely impacts of announced policies, including, most importantly, the National Determined Contributions made for the Paris Agreement.

Figure III.3.1

**Electricity access rate and population without electricity by region in the New Policies Scenario, 2000–2030**

Source: IEA (2017a), figure 2.4.

Note: The New Policies Scenario (NPS), developed by IEA, is a scenario that is based on the policies and measures that national Governments around the world have already put in place, plus the likely impacts of announced policies, including, most importantly, the National Determined Contributions made for the Paris Agreement.

## Technologies at hand

Since 2000, many countries have made large strides in improving access to electricity. Among them, India stands out as one of the most remarkable successes. The country now reaches 82 per cent of the population, almost doubled from a mere 43 per cent in 2000 (figure III.3.1). Between 2000 and 2012, the number of people gaining access was 28 million per year, but it increased to 41 million a year in 2016. The IEA predicts that, if this pace is kept, the country will achieve universal access in the early 2020s. Almost all people who have gained access since 2000 have done so via grid extension, with about 75 per cent of the new access fueled by coal and around 20 per cent by renewable sources. The share of coal in the power mix, however, is forecast to drop by less than half in 2040 (International Energy Agency, 2017b, p.24). The Government of India is now aiming at developing ten

thousand mini- and micro-grids with combined capacity of 500 megawatts. Indonesia and other Southeast Asian countries are also forecast to achieve near universal access by 2030. China achieved universal access to electricity in 2015. Grid extension has also been the main means for these countries with increasing shares of renewables in the power mix.

The centralized power grid is still considered to be the primary means for electrification because it is the least costly option per unit of electricity in many cases. However, as greater concentrations of people without access are found in the rural areas in developing countries and particularly in Africa, the required investment in building transmission and distribution networks reduce the cost effectiveness of centralized grids. Decentralized technologies that support decentralized solutions come to fore. Among these, mini-grids are an option in areas that are not cost effectively served by the grids. They are localized power networks, typically relying on modular generation technologies, such as solar PV, wind turbines, mini-scale hydropower generator and biomass. Mini-grids employ either a small diesel generator or battery systems as backup for maintaining a stable flow of power. They require certain levels of demand threshold to justify the initial investment. As demand for electricity rises, the grids can be connected to a main centralized power grid.

When local demand is not sufficient to justify the installation of a grid, off-grid systems can provide access to electricity. These stand-alone systems are not connected to a grid and typically power single households. Solar PV systems and batteries can be built at any scale to match the end-user demand. The costs of generating per-unit electricity from the off-grid systems are the highest among several alternatives, but are currently declining due to rapid falling prices of solar PV, batteries and LED lighting. The initial investment costs on both on- and off-grid systems can be a significant obstacle for rapid expansions of the systems (The Economist, 2019), while digital and communication technologies can lower the cost barrier by collecting payment and monitoring performance of the off-grid systems through mobile phones.

### Pathways to modern energy for all: sustainable development scenario

A pathway to modern energy for all people in developing countries should incorporate four aspects of sustainable development: (i) universal access to modern energy for all by 2030 (SDG 7); (ii) clean air for all (SDG target 3.9); (iii) taking urgent action to combat climate change (SDG 13); and (iv) the Paris agreement to hold the increase in the global average temperature to well below 2°C above the pre-industrial levels (Intergovernmental Panel on Climate Change, 2018). Tracking SDG 7, the Energy Progress Report monitors progress towards the Goals and their targets on a country-by-country basis and provides a snapshot of how far the global community is from achieving the SDGs.<sup>18</sup>

Scenarios developed by IEA are used to identify obstacles to these Goals. IEA has provided medium- and long-term energy scenarios. One of these is explained in box III.3, the *New Policies Scenario* (NPS), which depicts the world of energy if the business-as-usual approach prevails. Against the NPS, the IEA introduced the *Sustainable Development Scenario* (SDS) in 2018, whose objective is to assess the gap between where the existing policies (i.e., NPS) are leading and where we want to be (i.e., achieving the SDGs). The SDS

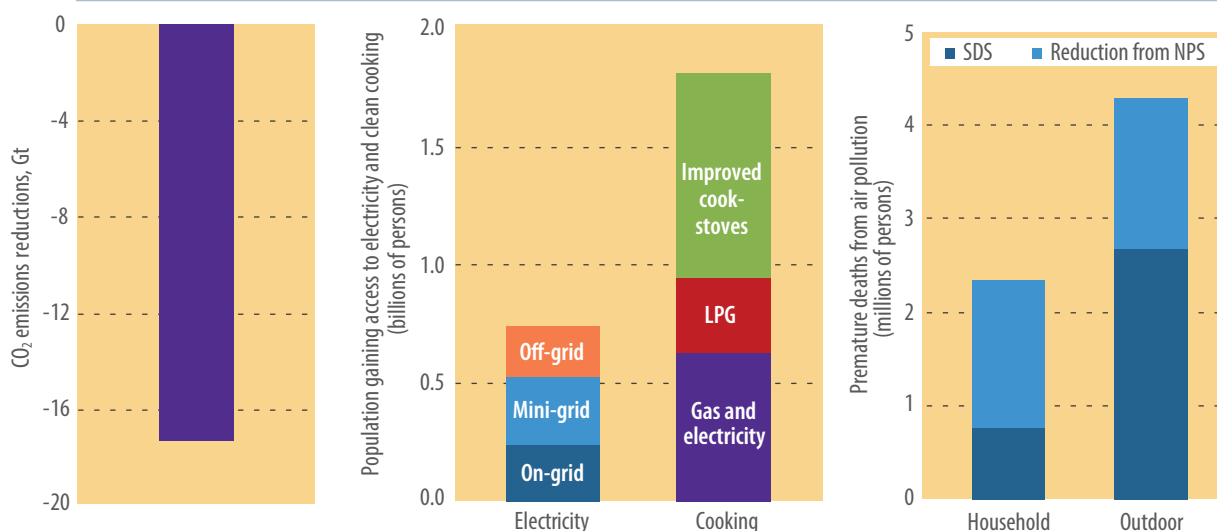
<sup>18</sup> The report is jointly published by the International Energy Agency, International Renewable Energy Agency, United Nations Statistical Division, World Bank and World Health Organization. Available from <https://trackingsdg7.esmap.org/>.

incorporates multiple policy objectives in the social, economic and environmental areas, including SDG 7 and target 3.9, and pursues energy security while accompanying social and environmental considerations. In particular, it is aligned with the goal of the Paris Agreement to hold the increase in the global average temperature to well below 2°C above pre-industrial levels.<sup>19</sup> It should be noted that the energy-related technologies employed in the SDS are all currently available.

The SDS scenario starts from the three interlinked energy-related SDGs—Goals 3, 7 and 13—and then works backwards to the present to show what it takes to achieve these Goals simultaneously, aiming to find a strategy to achieve them in the least costly manner. A cumulative investment of \$353 billion for 2017–2030 is required to reduce the number of people without access to electricity from 993 million in 2017 to 649 million in 2030 and the number of people without access to clean cooking from 2.7 billion to 2.2 billion for the same period in the NPS. This investment is equivalent to 1.6 per cent of total energy investment. The SDS would, on the other hand, require \$786 billion in cumulative investment for the same period to provide modern energy and clean cooking for all. This is equal to 3.4 per cent of total energy investment for 2017–2030. (International Energy Agency, 2017a, chap. 5). Achieving universal access calls for more than doubling the investment required in the NPS, about 82 per cent of which would be invested in sub-Saharan Africa.

With the reduction of indoor pollution and the achievement of the Paris Agreement in its objectives, the SDS assumes renewable resources more than envisaged in the NPS. The SDS also uses energy efficient technologies to contribute to modern energy for all through lower fossil-fuel use, emphasizing the importance of decentralized low-carbon

Figure III.14  
Impacts of the SDS relative to the NPS, 2040\*



Source: IEA (2017b), figure 3.13.

\* NPS=New Policies Scenario and SDS=Sustainable Development Scenario.

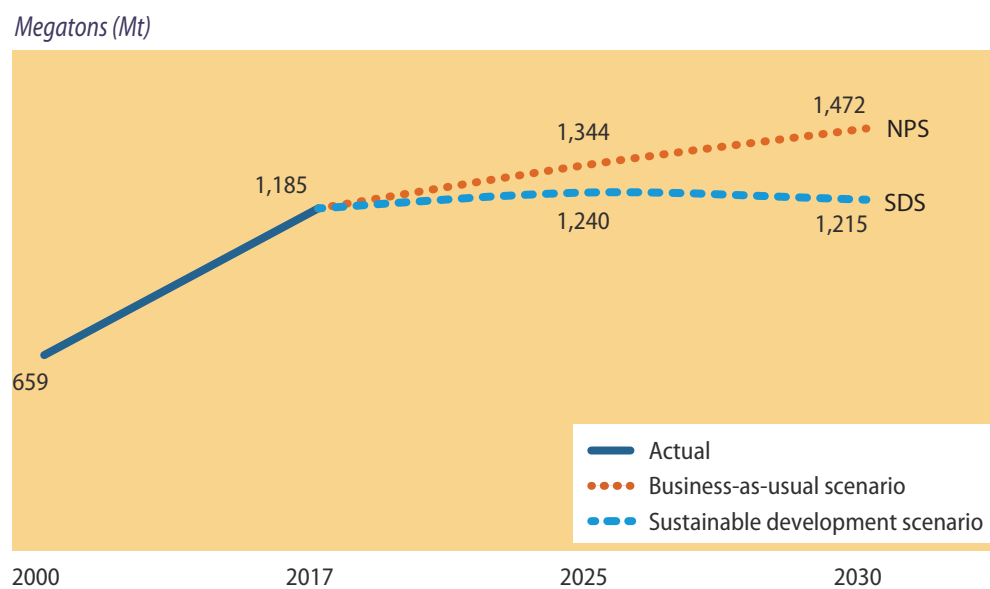
<sup>19</sup> For the assumptions made to build the SDS, see chapter 3 of International Energy Agency (2017a) and Annex B of International Energy Agency (2018).

technologies. The SDS highlights the changes that are required to reach the pathway to deliver the three SDGs (figure III.14).

In the SDS, 1.3 billion people are set to gain access to electricity by 2030 to achieve the universal access, which are around twice as many as in the NPS, and 2.9 billion will get access to clean cooking, 2 billion more than in the NPS. In addition, efforts to use low-carbon technologies will lead to CO<sub>2</sub> emissions reduction, putting the global community on track to address climate change and outdoor pollution. In the scenario, coal use peaks before 2020 and oil use soon after. Natural gas will be the main fossil fuel.<sup>20</sup>

Figure III.15 shows CO<sub>2</sub> emissions from the two scenarios for Africa, while keeping annual economic growth rate around 4 per cent. The SDS manages to reduce CO<sub>2</sub> emissions by 17.5 per cent by 2030, thanks to the significant uptake of renewable energy sources and the cut back of fossil fuels. New renewable energy technology is paving the way for the decoupling of economic growth and carbon emissions, making it possible to maintain the same growth rates with much lower CO<sub>2</sub> emissions. Although the SDS serves electricity to a greater number of people than the NPS, the total level of electricity generated is less because IEA predicts that light bulbs and appliances will be much more efficient (services per unit of energy) in the future, as compared with the current levels, which is reflected in the SDS.<sup>21</sup>

Figure III.15  
CO<sub>2</sub> emissions in Africa, 2000–2030



Source: UN DESA, based on International Energy Agency.

<sup>20</sup> While it is beyond the time horizon of this report, power generation will be decarbonized by 2040, relying on renewables (60 per cent), nuclear power (15 per cent) and carbon capture and storage (6 per cent).

<sup>21</sup> A household that uses 4 lightbulbs, a TV set, a fan, a mobile phone charger and a refrigerator consumes 1,250 kWh per year with standard efficient appliances. Highly efficient appliances can deliver the same services for one third of the electricity consumption. See International Energy Agency (2017a), pp. 54–55.

## Policy and implementation challenges

The Sustainable Development Scenario is designed to show that the goal of affordable and clean energy for all is interrelated with many other SDGs. The scenario further shows that providing clean and safe energy for all is a key to achieve other SDGs addressing clean air and climate change, whose improvements, in turn, contribute to other SDGs, such as health, education, water and sanitation, resilient infrastructure, and income-related goals of poverty and inequality.

The political commitments supporting and enabling the investment are a prerequisite for achieving modern energy for all in many parts of the developing world. But strategies and tactics to deliver universal access would be country specific and need to take into account local conditions and practices. There are, however, a few common challenges that the SDS suggests for policymakers.<sup>22</sup>

Governments need to take a holistic approach and include productive uses in energy access policies and targets. For example, providing energy for productive uses in agriculture and local community service can be included when planning universal access to energy. Energy for productive use will foster food security and economic opportunities, but the amount of energy required is not much above what is required for universal access to energy.

To create suitable conditions for mini- or off-grid investment and, subsequently, to make provisions for grid connection of the decentralized solutions, decentralized off-grid systems are effective methods for providing access to areas that are too expensive to have grid systems as argued above. But moving beyond a basic level of electricity consumption would require more energy than off-grid systems can handle and, thus, connections to mini-grids and grid systems, will be required in the later stage. Policymakers need to understand the dynamic and integrated nature of energy access development and have coordinated planning to upgrade existing systems and integrate decentralized systems into the grid.

Energy efficiency considerations should be an integral part of energy access policies. Energy needs to be affordable and reliable, but this requirement can be very challenging in sparsely populated areas away from an existing grid. Efficient appliances can improve not only energy efficiency but also the reliability and performance of a system as a whole, by improving the affordability of energy access. Policymakers also need to regulate the import or use of less efficient appliances.

Finally, energy policies should encourage a wide range of business models and avoid building new barriers. There are now new sources of financing, which can be seen as complementary solutions to the established approach, and which Governments should encourage. There is no unique set or mix of fuel, technology and sources of financing, but it is important for policymakers to engage with a wide array of stakeholders to find the best mix for the country or local areas. A well-designed regulatory framework for the energy sector is a must to fund \$56.1 billion a year, the amount necessary to achieve universal access to modern energy by 2030. Such a framework is important to provide proper incentives: the elimination of value-added tax on solar panels can increase demand for renewable energy sources, and the establishment of better clarity and transparency of regulations can facilitate private investment and market competition, and help often-fragmented energy markets open up new avenues for financing. The framework can help small local businesses pair with national enterprises to increase access to potential markets and funding, and to improve consumer needs.

<sup>22</sup> This section is largely based on International Energy Agency (2017a).

## Conclusion

This chapter highlights the actual and likely role of technology in strengthening shelter, food, health and energy securities for a sustainable future, focusing on technologies for meeting the urgent and basic needs for shelter, food, health and modern energy. These technologies, if harnessed and distributed equitably, can also address the global risk factors, insecurities and inequalities identified in this report and enable progress towards the SDGs. The chapter highlights recent advances in technologies that have made new products and services more accessible and affordable for those who are in insecure or vulnerable situations and have large potential to realize the principle of leaving no one behind.

It also argues that technology-induced cost reductions will not necessarily mean that more people will automatically gain access to affordable housing, health care or clean, renewable energy. Stronger political will and more robust financial means will be needed to realize the potential reach that products and services could have. Indeed, financing opportunities abound for new technology whether through growing public revenues, entrepreneurs and investors looking for new areas of high returns, and aid that can be channeled to new technologies, and so forth. Where political will does strongly exist for innovative approaches to meeting basic needs, these require greater and more efficient coordinated efforts to deal with persistent problems and gaps.

Technology is addressing the urgent needs of displaced populations and could even offer solutions to addressing the wider challenge of affordable housing. For emergency tent and temporary shelters, material technology has improved the ease of transportation and the speed of installation. While swift and cost-effective responses are essential in the first stage of displacement, quality of shelters and their ability to adapt to local conditions become primary concerns as the displacement situations are increasingly protracted worldwide. Innovative construction technologies have been applied to transitional and progressive shelters that not only protect families from outside dangers but also create inside spaces to protect their privacy and bring back feelings of security. When shelters become permanent, multiple technologies such as renewable energy and 3D printing have brought a new realm of possibility to initiate localized manufacturing and encourage self-sufficiency even in disaster-stricken areas.

Droughts are the most devastating climate event for agriculture and food security. Preventing their effects is a matter of life or death for vulnerable populations. Technology is already playing a crucial role in changing their devastating consequences. Drought early warning systems that integrate remote sensing satellite imagery, ground measurement techniques and advanced data amalgamation algorithms can address both acute drought and the implications of long-term drought-like conditions. Such technologies also assist communities in mitigating against current droughts. Finally, they can be an invaluable engine to end hunger at all levels as they can provide information and address low agricultural yields and low productivity. Investment and coordination are required to ensure data is acted upon and to scale up successful practices.

At least half of the world's population still do not have full coverage of essential health services. eHealth technologies can make health services equitably available to remote and underserved communities. Digital technologies such as mobile technology, telepresence, augmented reality, eLearning, electronic health records, social media, and big data can be leveraged to reduce bottlenecks and to drive improvements in the quality, cost and coverage of health services. It can provide a crucial push towards reaching the target of 23 million additional health workers between now and 2030 and build 415,000 new health facilities.



Together with other investments, the total annual cost of achieving the SDG health targets will start at \$134 billion and increase to \$371 billion by 2030.

Electricity is a fundamental requirement for economic and social development. Mini-grids and stand-alone systems with renewable resources can allow 1.3 billion people in developing countries to access electricity. With these technologies at hand, 2.9 billion will get access to clean cooking, which will eliminate the premature deaths attributable to the resulting household air pollution, and CO<sub>2</sub> emissions will be consistent with holding the increase in the global average temperature to well below 2°C—still above the pre-industrial levels. To make this a reality, the international community, Governments and the private sector can join forces to raise the needed \$786 billion in cumulative investment, or \$56.1 billion a year until 2030, about 82 per cent of which would be invested solely in sub-Saharan Africa.

## Chapter IV

# The way forward

*Sustainable Development Outlook 2019: Gathering storms and silver linings* underscores the imperative of urgent action to address the intertwined challenges of climate change and inequality. The scientific evidence is clear that the world must act now to prevent irreversible and catastrophic impacts of climate change. Unfortunately, it is hard, if not impossible, to implement bold climate action without broad-based support at national and local levels that is missing in many countries. Impoverished and marginalized communities in both rich and poor countries are often less concerned about climate change, not because they do not believe it is real, but because they are caught up in meeting the more basic needs for survival. Poor households can ill afford to shoulder the additional cost of climate action, especially when their basic needs often remain unmet.

Chapter III of the *Outlook* demonstrates the immense potential for leveraging new technologies to meet the basic needs of the poor. Reducing the cost of basic needs and making them affordable and accessible can attenuate many aspects of the livelihood challenges that millions of poor households face worldwide. Technological advances can help improve the economic conditions of poor households and enhance their ability to support bold climate change adaptation and mitigation efforts. While technological innovation is rapid, however, the adoption and use of new technologies often face considerable economic, sociological and cultural barriers. For example, even when renewable technologies are cost effective, households do not always adopt them because of high switching costs and a lack of understanding of their risks and uncertainties, as highlighted in the *World Economic and Social Survey 2018* (United Nations, 2018c). Well-targeted policies and appropriate financial incentives can ensure rapid and widespread adoption of new technologies that are most needed for sustainable development.

Adoption and use of new technologies will be necessary but not sufficient for addressing climate change, unless they foster fundamental shifts in production and consumption patterns. But behavioural changes are often slow and incremental. It takes decades or generations to achieve significant shifts in production and consumption patterns. Producers care about their immediate bottom lines and profitability, often ignoring social and environmental costs. Consumers are often constrained to buying goods and services available at the lowest prices, even when they know those prices do not include the true social and environmental costs. The current system of production and consumption is driven by narrowly defined cost structures that do not, for example, account for the cost of pollution. Mass awareness campaigns and greater corporate social responsibilities are slowly changing behavioural patterns, but these changes are inadequate for the scale and urgency needed to combat climate change. Unfortunately, the world cannot wait decades for these changes to take place.

There is no silver bullet for transforming human behaviour, nor is there a one-size-fits-all solution. The discussions in this section present few policy options for addressing climate change and inequality. Some of these policies have already been tried and tested, while many countries are contemplating these and other options. As the discussion below demonstrates, the success of these policies depends on specific country contexts, particularly on the level of public support for these policies. Good communication strategies and

stakeholder engagements play a critically important role in generating broad-based public support.

## Carbon tax for combating climate change

Human behaviour responds to financial incentives. Taxes are effective financial incentives as well as disincentives. They often determine the final cost of goods and services produced and consumed. A tax on CO<sub>2</sub> emissions—popularly known as carbon tax—is generally viewed as an important tool for changing production and consumption patterns. Carbon tax puts a price on carbon emissions, requiring individuals and firms to internalize the cost of pollution. While widely considered an efficient and administrable market-based instrument for tackling climate change, the world is yet to see widespread application of carbon taxes. As of the first quarter of 2019, 29 carbon tax initiatives have been implemented or are scheduled for implementation around the world (World Bank, 2019). Along with 28 emission trading schemes (another carbon-pricing instrument), these 57 carbon initiatives cover only about 20 per cent of global CO<sub>2</sub> emissions.

There are considerable cross-country variations in the level of carbon taxes and their impact. Sweden—with the highest carbon tax, about \$125 per ton (t) of CO<sub>2</sub>—is a success story.<sup>1</sup> Carbon emissions have declined by 25 per cent since 1991, when the country introduced the carbon tax (at \$27/t CO<sub>2</sub>), while the economy grew by 60 per cent during the same time period. The success of Sweden can partly be attributed to strong efforts to create public dialogue, which strengthened political trust in the fiscal reform that introduced carbon tax (Funke and Mattauch, 2018). Cross-country studies show that ambitious carbon pricing is typically correlated with high levels of political trust and low corruption levels.<sup>2</sup> Finland, Norway and Switzerland—the few countries with carbon prices above \$40/t CO<sub>2</sub>—also demonstrate that political trust matters for successful implementation of carbon taxes. As discussed in chapter I, trust in government is strongly and negatively correlated to levels of economic insecurity and income inequality. Countries and societies with low levels of inequality and economic insecurity tend to have greater trust in institutions and consequently are better able to secure broader social support for bold climate action.

The high carbon prices in these countries stand in contrast to many other carbon tax schemes around the world that see their carbon tax levels remain lower than \$10/t CO<sub>2</sub>. In some cases, carbon tax initiatives have a price tag of as little as \$1/t CO<sub>2</sub>. With a few exceptions, carbon tax levels in 2019 remained unchanged compared to 2018 for most initiatives. The current levels of carbon prices in most countries are far below the \$40–\$80/t CO<sub>2</sub> needed by 2020, and the \$50–\$100/t CO<sub>2</sub> by 2030 to meet the targets of the Paris Agreement (World Bank, 2019). The effectiveness of carbon tax initiatives is clearly undermined by the fact that most countries are pricing the cost of carbon emissions too low.

The success of a carbon tax initiative clearly depends on the political economy. Leading thinkers in climate change policy have argued that traditional economic lessons on efficiency and equity of carbon-pricing instruments are “subsidiary to the primary challenge of garnering greater political acceptability” (Klenert and others, 2018). Acceptability of carbon tax initiatives depends on their distributional fairness; how the tax revenue is being

<sup>1</sup> Available from <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>.

<sup>2</sup> See, for example, Rafaty (2018).

used; how salient the revenue recycling mechanism is; and the degree of political trust and policy stability amid partisan changes in government.

Strong political trust, as seen in the case of Sweden, is a key determinant for maintaining a relatively high carbon tax (*ibid.*). There is a clear need to ensure that revenue generated by carbon tax initiatives is, in terms of distribution, neutral or even progressive. This issue is of high importance, given that carbon tax is typically regressive as low-income households consume a more energy-intensive basket of goods (as a percentage of their total consumption) than wealthier households do (Kolstad, 2014; Marron, Toder and Austin, 2015). Uniform lump-sum transfers, targeted transfers to groups who are disproportionately affected, spending on green investment, and appropriate fiscal incentives are options for mitigating the regressive effects of—and generating broader support for—carbon tax. For example, a fair tax revenue mechanism that makes direct transfers to groups that are disproportionately affected can foster trust. Public acceptability of a carbon tax is also lower if carbon revenues go towards the general government budget, rather than being earmarked for a specific purpose, such as transfers to particularly affected groups or targeted green investments (*ibid.*).

The setbacks of carbon tax initiatives in Australia and France illustrate the importance of effective political communication on carbon-pricing initiatives and quelling the public's fear of regressive outcomes. A clear political communication strategy that explains the carbon price (i.e., striking the right balance between efficiency and equity that sufficiently reflects the social cost of carbon emission and economic cost of mitigation) is critically important for garnering political support for introducing and implementing the right level of carbon tax.

The success of a carbon tax will also critically depend on greater international cooperation to address concerns related to a country's competitiveness in the global market and the potential free-rider problems that arise when countries implement a carbon tax and bear the cost of that implementation. The case of Australia's failed carbon tax initiative illustrates the general concerns that the public has about the economic effect of introducing carbon tax ahead of other countries. A reciprocal, common commitment to a consensus carbon price that is set at a sufficiently high level will remain critical for preventing a prisoner's dilemma problem with carbon taxes. Cramton and others (2015) proposed to set a globally binding carbon price, following a super majority voting rule to form a coalition of the willing.

## Revisiting income and wealth taxes to address inequality

Carbon taxes, while effective in mitigating CO<sub>2</sub> emissions, do not resolve the broader and more pervasive within-country income and wealth inequality. During most of the twentieth century, countries largely relied on progressive taxation—that is, levying higher taxes on higher individual incomes—to ensure more equitable redistribution of income and finance the provision of public good. Against the backdrop of economic arguments that lower taxes encourage more private investment and generate larger multiplier effects than public investments, and the political economy reality that high-income earners can exert greater political influence on tax rates, tax progressivity has generally declined in most developed economies for the past four decades. This has been largely driven by falling top personal income tax rates. Inefficiency of the public sector and perception of corruption have also contributed to reducing tax progressivity. In contrast, many developing countries are increasingly relying more on indirect value added taxes (VAT) than progressive or

flat income taxes. A largely informal economy, poor tax administration capabilities, and political power of the wealthy are preventing the successful adoption of progressive income taxes in many cases.

Political economy challenges that diminish the progressivity of tax structures are encouraging policymakers to look for new and innovative sources of revenue to finance the provision of public goods and reduce inequality, especially inequalities in consumption and access to opportunities. Effective social protection and transfer policies can reduce inequality in consumption, access and opportunities, and ensure access to predictable levels of income, even when inequality is high. In the United States, where tax progressivity declined sharply in recent decades, consumption inequality did not experience a sharp increase, largely because of the efficacy of social transfer programmes. Non-cash consumption (mostly payments for health care) now account for as much as 30 per cent of household consumption in the United States (Mason, 2018).

There is renewed interest in wealth taxes as an effective means for redistribution. Some forms of basic wealth tax, namely property taxes, exist in most countries. Recurrent property taxes levied annually or semi-annually by local authorities have been an important source of government revenue in many developed countries. While property taxes do not directly mitigate income and wealth inequality, they can play an important role in improving access to public goods at the local level. In the United States, recurrent property taxes, which account for 15.4 per cent of government revenue, are the main revenue source for funding for education and law enforcement activities. In China, Japan and the Republic of Korea, property taxes are important sources of government revenue, relative to other countries at similar levels of development. In contrast, in most sub-Saharan countries, property taxes account for less than 1 per cent of total government revenue. Property taxes represent an untapped opportunity for many developing countries to increase government revenue and use the revenue to provide for the public good, including climate change adaptation and mitigation measures.

Wealth taxes, which tax both real and financial assets, have been growing in popularity as a means to more directly address intergenerational inequality that prevents socioeconomic mobility. As opposed to taxing dynamic activities such as incomes or consumption, a wealth tax is assessed on the static net worth of the individual. A wealth tax also targets funds which are being saved rather than invested, thus minimizing its effect on productive economic activities.

Several countries implement wealth taxes. France, for example, has employed different wealth tax schemes over the years. The current wealth tax kicks in at €800,000, not to exceed 75 per cent of the total income of the wealthy individual. While the tax previously included all assets and investments, President Macron scaled it down to only cover property to encourage productive use of wealth, stem tax evasion and address the cumulative tax burden which has grown to the highest in the Organisation for Economic Cooperation and Development (OECD) (as a share of gross domestic product (GDP)). However, given the pressures from the Yellow Vests and other movements stressing the punishing cost-of-living and tax burdens on lower-income groups, there has been speculation the wealth tax will be revised again to include all physical and financial assets (Agnew, 2018).

The success of a wealth tax depends on the actual revenue it generates, how it incentivizes more productive use of wealth and how it affects wealth inequality. Innovative taxes which seek to address wealth but not stymie investment include, for example, land value taxes (see box IV.I). Critics of wealth taxes point to their limited revenue gains vis-à-vis their administrative costs. The wealthy can easily find deductions, hide funds or move

## Box IV.1

**Land value tax**

All taxes are distortionary. If income is taxed too high, it discourages efforts to earn additional income. High taxes—and inefficient use of tax revenue, whether perceived or real—also tend to encourage tax avoidance and evasion. Economists have long searched for taxes that would have the least distortionary effects on income, consumption or investment. A land value tax (LVT), first proposed by Henry George in 1879, is considered the least distortionary and most efficient among all taxes. Policymakers and economists from the right, including Sir Winston Churchill and Milton Friedman, and from the left, including Joseph Stiglitz and others, join a rare consensus on LVT as the most effective form of taxation. There is now renewed interest in LVT as the ultimate method for addressing inequality in societies.

The concept of LVT is simple. A significant amount of wealth is captured in the value of land in urban centres. The value of land increases mostly because of public investments—designation of a political and administrative centre, transportation system, public services, civic facilities, schools, etc.—in the area (neighbourhood, town or city) where the land is located. Individual actions of the landowner do not increase the land value. The value of land also increases because of the relatively inelastic supply of land. Only a government authority can change the supply of land with changes in land-use permits or zoning rules. The LVT taxes the “unearned” increases in land value (the value not earned by landowners) that is due to public investments.

The LVT incentivizes land improvement and construction of buildings on the land as these improvements are not taxed, encouraging productive activities to offset the cost of LVT. In many instances, it is easier to enforce than a general wealth tax as it does not involve easily concealable assets in bank accounts. LVT can also discourage land speculation and prevent booms and busts in land prices.

Despite its immense economic and social potentials, LVT remains a novelty in most countries. In Singapore, the Government taxes 50 per cent of the increased land value surrounding public transit expansions.<sup>a</sup> Kenya applies a land value tax incorporating the value of the land itself and its access to, and benefits from, public services ranging, in many cases, from less than 10 per cent up to 30 per cent. It does not levy property taxes. Small lands are often exempt from this. Gaborone, Botswana, has implemented land tax rates four times higher on unused plots than on used plots in order to discourage speculation and encourage development.<sup>b</sup> Many municipalities in the U.S. State of Pennsylvania have also experimented with LVTs.

Despite the purported benefits, LVTs are yet to see widespread application. It is often difficult to precisely measure the appreciation in land value absent the market value of various government interventions that add value, necessitating costly land valuation exercises more frequently than in the case of property taxes.<sup>c</sup> Notwithstanding some practical difficulties, the land value tax presents a viable alternative for reducing wealth inequality. It can also enable Governments to promote sustainable land use to facilitate adaptation to climate change. There is a clear need for further research on how LVT can be used to bolster mitigation and adaptation efforts.

Source: UN DESA.

<sup>a</sup> Siba and Sow (2017).

<sup>b</sup> International Growth Centre (2018).

<sup>c</sup> The Economist (2018).



them abroad, and minimize their taxable wealth through a variety of other means. These concerns have led to the elimination of wealth taxes in many contexts. The number of OECD countries implementing wealth taxes fell from 12 in 1990 to four in 2017.<sup>3</sup> Notwithstanding these challenges, there is now a rallying cry in a number of countries for introducing a progressive wealth tax on the ultra-rich. Several presidential candidates in the United States have unveiled plans to introduce wealth taxes.

## Universal basic income to address inequality and support climate action

Universal basic income (UBI)—an idea that has been around since at least the late eighteenth century (Paine, 1797)—has experienced a twenty-first century “renaissance”. In its most idealized form, a UBI programme pays every individual—regardless of income, age, disability status or willingness to work—cash amount that is large enough to meet a person’s basic needs, without requiring them to earn income from other sources. Policy discussions about UBI typically center on variations that are less generous in payment and more restricting in coverage.

Proponents trumpet the potential of UBI in addressing a host of challenges that the global community faces: persistent poverty; rising income inequality; job loss and slow wage growth associated with technological advances; and flawed social safety nets. UBI can give people a greater sense of agency, granting them the freedom to pursue meaningful work without being constrained by financial needs. The option embedded in UBI for individuals to leave unrewarding work can help to improve the bargaining power of workers in negotiations with employers (Wright, 2017). Arguably, UBI, in enabling poor households to meet their basic livelihood needs, could foster wider support for bold climate action, including implementing sufficiently high carbon tax. The revenue generated by carbon tax could be used to finance UBI.

On the other hand, opponents warn about the negative incentives (i.e., discouraging people from working and increasing social alienation). Others point out that the effectiveness of UBI in addressing inequality depends critically on how the programme fits into the broader social welfare system. Whereas a UBI complementary to existing welfare programmes can have an equalizing effect, a UBI that replaces some or all social transfer programmes can lead to significant upward redistribution of income (Hoynes and Rothstein, 2019).

A major challenge for implementing UBI is the massive amount of financial resources that it needs. For example, it is estimated that a UBI of \$12,000 per year for each adult resident in the United States over age 18 would cost about \$3 trillion per year, which is equivalent to about 75 per cent of total federal expenditures in 2017 (ibid.). The actual net fiscal cost will depend on what other transfer programmes UBI might replace and the economic multiplier effect. There are estimates that UBI would increase U.S. GDP by \$2.5 trillion over eight years (Galeon, 2017), subsequently raising tax revenues that would finance the UBI itself. These are estimates, and empirical evidence on the actual impacts of UBI remain scant. The Finnish Government piloted a UBI scheme during 2017–2018 that gave €560 in tax-exempt basic income each month to 2,000 randomly selected unemployed persons regardless of whether they had or were seeking employment. Preliminary results

<sup>3</sup> Available from <https://www.oecd.org/tax/tax-policy/role-and-design-of-net-wealth-taxes-in-the-OECD-summary.pdf>.

of the experiment show that while UBI had no noticeable effect on employment levels, it improved people's physical and mental well-being as well as trust in institutions and other people (Kangas and others, 2019). Governments will need to explore innovative options and cost-effective solutions, such as UBI and other transfer programmes, to ensure that every human being is able to fulfil their basic livelihood needs of food, shelter, health and energy. This will go a long way in rebuilding trust in government and generating broad-based support for bold and urgent climate action.

## A global green new deal to meet sustainable development challenges

There is a growing realization among policymakers, academics and civil society participants that piecemeal approaches to fighting inequality and climate change will fall short in delivering sustainable development outcomes. Introducing a carbon tax, wealth tax or land value tax, or implementing UBI schemes, in and of themselves, will not be enough for addressing the enormity of the rapidly unfolding risks of climate change. There must be complementary investments in building resilient and sustainable infrastructure and also human capital. There is a clear need for a more ambitious and more comprehensive framework—a global political compact—to deliver on the commitments of the 2030 Agenda for Sustainable Development, the Paris Agreement and the Addis Ababa Action Agenda.

There are calls for a Green New Deal in the United States. Similar proposals, including from think tanks, the US Green Party, and *The New York Times* journalist Thomas Friedman, who is commonly attributed as the first to use the term “Green New Deal,” date back to at least 2007.<sup>4</sup> In March 2009, a report of the United Nations Environment Programme called for a Global Green New Deal (United Nations Environment Programme, 2009). In the *World Economic and Social Survey 2009*, the United Nations Department of Economic and Social Affairs had put forward a strategy called the Global Green New Deal (GGND).<sup>5</sup> The GGND focused on mobilizing large-scale public and private financing for investment in renewable energy. By pushing down the price of renewable energy as rapidly as possible, the GGND expected to improve the prospects of people everywhere, both environmentally and economically. Other large-scale initiatives in various forms present new opportunities for addressing the challenges confronting the humanity. The Belt and Road Initiative implemented by China is an important global effort for building resilient infrastructure, which can also contribute to reducing inequality and addressing climate change.

The scale and magnitude of the climate change risks will clearly require a bold, ambitious and comprehensive strategy. Whatever name the strategy takes, it must reflect a common and universal commitment of all countries and all people. The strategy must address both inequality and climate change in tandem to ensure broad-based support for bold climate action. This is a must for saving the people and the planet and for achieving shared prosperity for all. A comprehensive strategy that accompanies financial commitment to promote equality and social justice is a must for meeting the multiple challenges humanity is facing now and in the foreseeable future. The success of the 2030 Agenda and the future

<sup>4</sup> See, for example, Data for Progress (<https://www.dataforprogress.org/green-new-deal>); Green Party US ([https://www.gp.org/green\\_new\\_deal](https://www.gp.org/green_new_deal)); and Friedman (2007).

<sup>5</sup> Available from <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=46&menu=1515>.

of sustainable development will critically hinge on how governments and societies are best able to mitigate the risks of rising inequality and aggravating climate change.

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## Databases

EM-DAT International Disaster Database

Centre for Research on the Epidemiology of Disasters (CRED)

<https://www.emdat.be/>

Eurostat: Statistics Explained, Asylum Statistics

[https://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics)

Famine Early Warning Systems Network (FEWS NET)

<http://fewns.net/>

ILOStat

<https://ilostat.ilo.org/>

International Labour Organization World Social Protection Database

International Monetary Fund (IMF)

World Economic and Financial Surveys

World Economic Outlook Database

<https://www.imf.org/external/pubs/ft/weo/2017/01/weodata/index.aspx>

Organisation for Economic Cooperation and Development (OECD)

Wealth Distribution Database

<https://stats.oecd.org/Index.aspx?DataSetCode=WEALTH>

Palmer Drought Severity Index

<https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/>

UNCTADStat International Trade in Goods and Services

<https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>

United Nations Development Programme Human Development Data Bank

<http://hdr.undp.org/en/data>

Uppsala Conflict Data Program Database (UCDP)

<https://ucdp.uu.se/>

World Bank World Development Indicators

<https://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>

World Health Organization Global Health Observatory data repository

<http://apps.who.int/gho/data/node.home>

World Values Survey: All Rounds - Country-Pooled Datafile Version [Data set]

<http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp>





*Sustainable Development Outlook 2019: Gathering Storms and Silver Linings* presents candid analyses of the risks and challenges confronting the Sustainable Development Goals. It highlights the gathering storm of persistently high—and rising—inequality within countries as one of the most critical stumbling blocks, impeding bold and urgent climate action. Inequality depresses growth, chokes economic and social mobility, entrenches people’s sense of insecurity, and undermines trust in institutions and government. This, in turn, increases social discord and can trigger violence, conflicts and disorderly migration. Analysing the interactions among uncertainties, insecurity and inequality, the report calls for restoring trust in institutions and strengthening multilateralism for accelerating progress on the 2030 Agenda for Sustainable Development. It features the immense potential for leveraging technological advances and breakthroughs to enhance food, shelter, health and energy security of the most vulnerable.

The *Outlook* underscores the imperatives of new and innovative approaches and policies for promoting sustainable economic growth, leveraging new technologies, and reducing inequality in access and opportunity to ensure that no one is left behind.

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