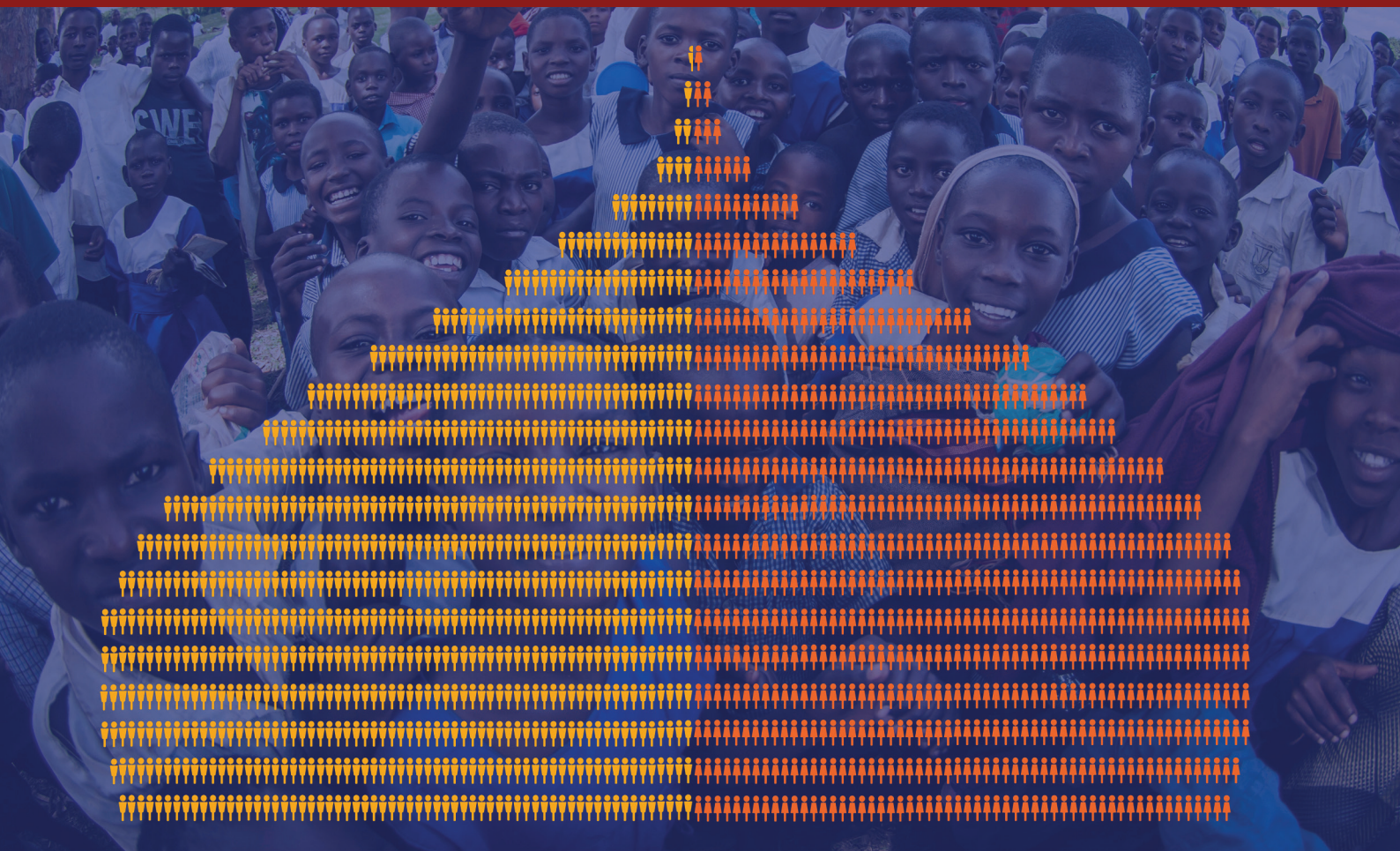


Getting to Africa's demographic dividend

Jakkie Cilliers



On their current demographic trajectory, low- and lower-middle-income African states are several decades away from achieving a demographic dividend. This report explores the timing and conditions for African states' achieving a more rapid demographic transition and looks at the impact on incomes, levels of poverty and other indicators of well-being.

Key findings

- ▶ Globally the ratio of the world's working-age population to dependents peaked in 2012 and will decline into the future, slowing economic growth.
- ▶ Yet, in Africa, the size of the working-age population as a portion of total population is still growing, to peak shortly after 2070.
- ▶ Africa's peak worker-to-dependent ratio will, however, be low, which translates into relatively modest potential for more rapid economic growth rates.
- ▶ With few exceptions, average economic growth rates in Africa are too slow and population growth rates too high to allow the continent to either rapidly reduce poverty or improve average incomes.
- ▶ Coming off a low base, labour productivity on the continent could benefit from the impact of the fourth industrial revolution that potentially could reverse the current growing gap.
- ▶ Targeted interventions on family planning; provision of clean water and improved sanitation; education; and advancing women's power, status and education relative to that of men can have an enormous impact on improving development outcomes such as more rapidly reducing poverty, improving human development and increasing incomes.
- ▶ In a scenario that advances Africa's demographic dividend modelled in this report the continent will, by 2063, have 418 million fewer people but a GDP in purchasing power terms that is US\$1.7 trillion larger than would otherwise be the case.

Recommendations

- ▶ African governments in low- and lower-middle-income countries should begin the accelerated roll-out of modern contraception. Such a programme should first soak up the pent-up demand for contraception and then aim to significantly expand contraception use beyond current planning, advancing the onset and intensity of Africa's demographic dividend.
- ▶ Africans need to get serious about eliminating gender inequality, particularly in education, and improving female enrolment and graduation rates relative to those of males at primary, secondary and tertiary levels.
- ▶ A general investment in improving education at all levels will both reduce fertility rates and improve the quality of Africa's growing labour pool.
- ▶ Investing in basic infrastructure such as the provision of clean water and improved sanitation reduces infant and female mortality and advances Africa's demographic dividend.
- ▶ Africans need to engage candidly and robustly in public discussions on and scholarly analysis of the economic and developmental implications of the continent's large youthful population. Political leadership in discussing gender inequality, fertility and family size is vital, as are public media campaigns that demonstrate the health and economic benefits of smaller families. Changed power relations between men and women are at the root of this matter.

Purpose and introduction

The purpose of this report is to explore the timing and conditions for African states' achieving a demographic dividend that can accelerate the rate of improvement in livelihoods.¹ To that end, the first part of this report presents a definition of the demographic dividend that is used for the subsequent interpretation, introduces the methodology for the associated forecasts and then examines, on a comparative basis, the nature and timing of Africa's demographic dividend. It finds that Africa's high youth dependency ratios structurally determine African states' inability to raise incomes rapidly enough to reduce poverty and provide improved livelihoods, although the inability to industrialise, corruption and governance quality all play a role as well. Current forecasts indicate that the large majority of African states will only benefit from a demographic dividend by mid-century or later. A penultimate section explores the effects of a set of interventions seeking to advance Africa's demographic dividend along with the impact on incomes, levels of poverty and other indices of well-being, and quantifies the associated benefits. The report calls for much more determined efforts to advance the continent's demographic dividend and offers a number of associated policy recommendations.

The report complements other 'big picture' reports on the future of Africa published by the African Futures & Innovation Programme at the Institute for Security Studies (ISS) on the macro-dimensions of the impact of the Fourth Industrial Revolution, conflict, democracy/governance and the prospects for progress towards the achievement of key targets that form part of the Sustainable Development Goals 2030.²

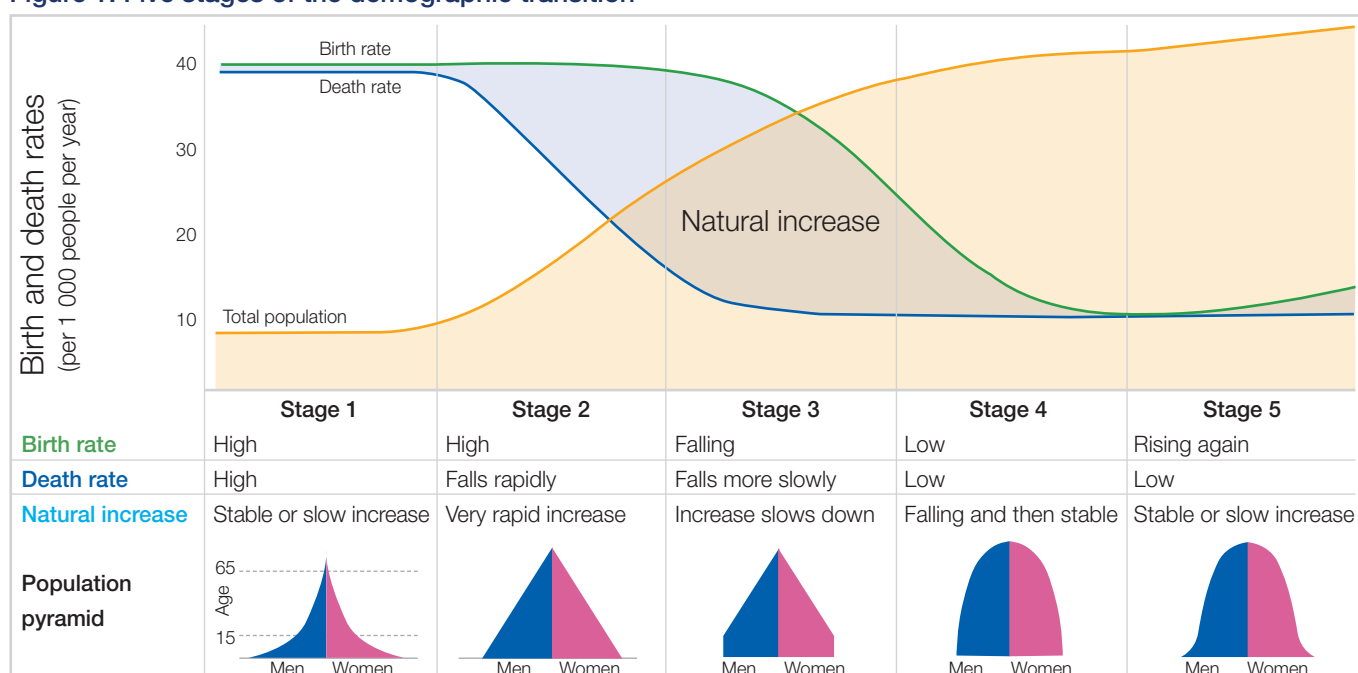
All US\$ amounts in this report are in 2017 values.

Background and definitions

In recent decades, political economists and demographers alike have explored and documented the extent to which states experience improvements in state capacity, income and political stability as a function of a favourable age structure. For example, a higher median age³ correlates strongly with an increased chance of being a liberal democracy, as well as with less turbulence and a lower chance of a violent political transition.⁴

The demographic transition, a foundational element of population studies,⁵ is the process during which mortality rates decline, leading to a population boom, followed by a decline in fertility and the subsequent end of the population boom.⁶ The five stages of the demographic transition are represented schematically in Figure 1. African states generally find themselves

Figure 1: Five stages of the demographic transition



Source: Roser, 2011.⁷

in stages one and two, with a few in stage three. The outcome in stage four is an older, more stable population structure characterised by low fertility rates, low infant mortality, long life expectancy and other improved health outcomes, typical of Japan and the European Union (EU) today.⁸ The evolution of demographics is most uncertain in stage five. Medical advances may soon be able to substantially slow the aging process, dramatically altering the size and structure of future populations. These advances could eventually also transform economic growth and average income, environmental sustainability and life patterns around work and finance.

The demographic dividend opens when the working-age population of a country is larger than the dependent population

Beyond its location in the early stages of the demographic transition, Africa is also progressing more slowly through the transition than other regions. Generally, countries (and regions) that have been unable to progress rapidly through the transition have struggled to address severe poverty and large disease burdens. This is because the demographic features characteristic

of the early stages of the demographic transition structurally constrain the ability to reduce poverty and improve livelihoods.

There are different definitions and understandings of the demographic dividend, such as a first, second and even a third dividend.⁹ The focus in this report is on the first dividend, namely the powerful contribution that the size and quality of the labour force makes to incomes. The demographic dividend therefore refers to a window of opportunity that opens when the working-age population (between 15 and 64 years of age) of a country is larger than the dependent population (below 15 and above 64 years of age).¹⁰ Statistically, the demographic dividend is represented as the ratio of this working-age population to the dependent population. It occurs because of the potential boost in economic productivity, savings and investments that occurs with an expanding labour force relative to the number of dependents (children and the elderly). However, to realise that opportunity requires that there are job opportunities for these additional workers and that worker productivity improves through increased access to education, nutrition and other key enablers.

According to Richard Cincotta, a favourable 'demographic window' exists when 0- to 14-year-olds

International Futures (IFs) is a tool for thinking about development over long-time horizons. It integrates forecasts across different sub-models, including agriculture, demography, economy, education, energy, environment, governance, health, infrastructure, international politics and technology. These sub-models are dynamically connected, so IFs simulates how changes in one system lead to changes across all other systems. As a result, IFs endogenises a large number of relationships from a wide range of key global systems. The model is an open source tool and available for free at www.pardee.du.edu.

IFs leverages over 4 000 historical data series from global data providers such as the World Bank and the Food and Agricultural Organization; identifies and measures trends; and models dynamic relationships to forecast hundreds of variables for 186 countries for every year. Where available, historical data is from 1960 and forecasts extend from 2015 (the current base year) to 2100. It provides forward-looking, policy-relevant material that frames uncertainty about the future of countries (or groups of countries) and

across development systems. It thereby allows users to think systematically about potential futures, as well as development goals and targets.

There are three main avenues for analysis in IFs: historical data analysis (cross-sectional and longitudinal), an exploration of the Current Path forecast (where systems seem to be headed), and alternative scenario development (exploring if-then statements about the future). This report uses all three types of analysis.

The IFs Current Path is based on initial conditions of historical variables and calibrated against other forecasts. It assumes no major paradigm shifts, seismic policy changes, or transformative events (very low probability but high impact). The Current Path is therefore a dynamic scenario, representing a continuation of current policy choices and environmental conditions. Although the Current Path generally demonstrates continuity with historical patterns, it generates a range of non-linear, dynamic, and endogenous forecasts rather than simple extrapolations of historical trends.

make up less than 30% of the population and those 64 or older make up less than 15%. Alternatively, the window opens when the median age is between 25.5 and 41 years. In addition, a state should have a high portion of adults in the prime working ages of 25 to 55 years and workforce growth rates that have slowed to levels commensurate with the availability of jobs.¹¹

Typically, the fertility rate necessary for a country to achieve a demographic window of opportunity is 2.8 children per woman, or lower. Without changes in the population owing to immigration or a pandemic that skews the age structure, that fertility rate translates into a median age of 25.5 years, as identified by Cincotta.¹² Replacement fertility rates are generally considered to be 2.1 children per women. At rates below that populations start to contract.

Methodology

For the data, forecasts and scenarios that follow, the report relies on the International Futures forecasting system (IFs) hosted at the Frederick S Pardee Center for International Futures at the University of Denver.¹³ Since demographics change slowly, the forecast horizon used in this paper is to 2100, using 2030 (end of the SDGs), 2050 (mid-century) and 2063 (the target year for Agenda 2063) as useful milestones at which to examine trends and compare progress between scenarios.

Forecasts differ as to when global population numbers will peak and start to decline. According to the IFs Current Path forecast, global population should peak in around 2090 at 10.4 billion before slowly declining.¹⁴ The medium variant of the United Nations (UN) Population Division's forecast sees the world population continuing to expand beyond 11.2 billion in 2100,¹⁵ while the International Institute for Applied System Analysis (IIASA), whose forecasts are widely used in addition to those of the UN, believes that the world will achieve peak global population much earlier and at lower levels, namely 9.4 billion in 2070, before starting to decline to around 9 billion by the end of the century.¹⁶ These differences underline the extent to which the forecasts that follow serve as a broad indication of possible future trends rather than predictions.

Africa's key demographic characteristics

With few exceptions, average rates of economic growth in Africa are too slow and population growth rates too

high to allow the continent to either rapidly reduce poverty or improve average levels of income.

An economy has to grow faster in real terms than its population if it is to improve average income levels. From 1994 until 2008 (when the global recession hit) Africa experienced its most sustained period of growth since independence in the 1960s – an average of 4.6% per year. Although the average per capita income increased by 35%¹⁷ during this period, the poverty rate decreased by only about 5 percentage points, in part owing to Africa's high levels of inequality.

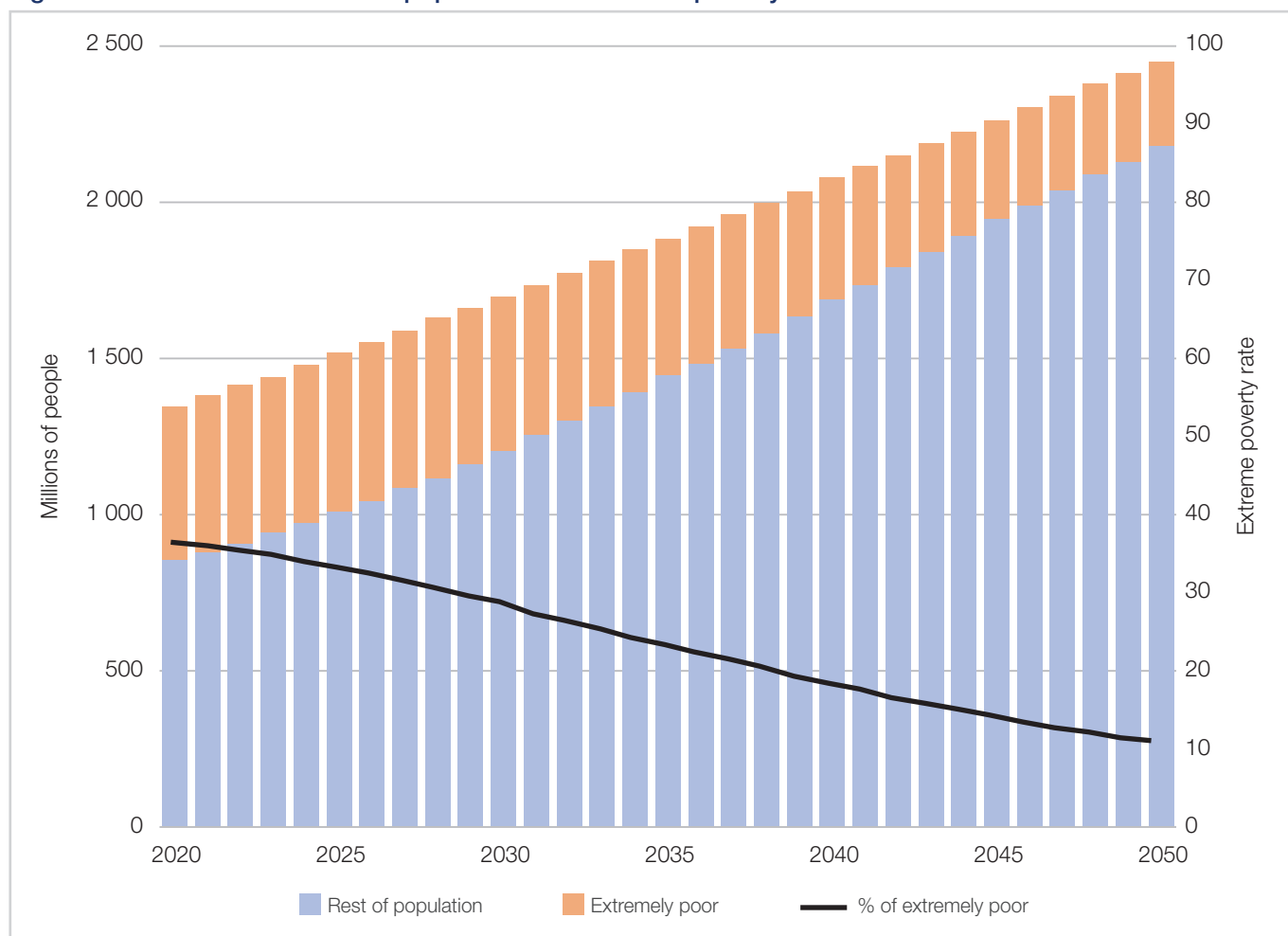
The IFs Current Path forecast is that Africa's economy is set to grow, on average, at around 4.8% per year from 2018 to 2030, at which point 487 million Africans or 29% of the continent's population will still be living below US\$1.90 per person per day – compared to 470 million or 37% in 2018.

Clearly, Africa's current economic growth trajectory is substantially below that required to eliminate extreme poverty by 2030, as set out in SDG 1.¹⁸ This is despite the fact that sub-Saharan Africa will grow slightly faster than North Africa, which is the region with the lowest poverty burden in Africa and which is on track to meet SDG 1 well ahead of 2030. Figure 2 presents the IFs Current Path forecast of Africa's population to 2050, indicating the share of the population that is forecast to live in extreme poverty in absolute numbers as well as a percentage of the population.

Africa's current economic growth is substantially below that required to eliminate extreme poverty by 2030

Economic growth is a prerequisite for improving livelihoods. However, because incomes in Africa are disparately distributed (Africa is the most unequal region globally, second only to Latin America and the Caribbean), much more is required. At current levels of inequality, Africa would have to increase its annual average GDP growth rate to 20% by 2023 and maintain that growth to 2030 to achieve the SDG goal of eliminating extreme poverty.¹⁹ Alternatively, should Africa be able to significantly reduce inequality (so that growth more effectively translates into poverty reduction), an average GDP growth rate of 12% could achieve the same

Figure 2: Current Path forecast of population and absolute poverty in Africa to 2050



Source: IFs v 7.34 initialising from 2015 World Population Prospects, the 2017 revision.

outcome. Both are extreme scenarios that fall outside the realm of realistic policy targets but illustrate the challenges ahead.

Perhaps more importantly, Africa's current demographic characteristics effectively preclude rapid improvements in livelihoods in most low- and lower-middle-income countries. While most regions are encountering the economic slowdown associated with an aging population, most African countries are at a very early stage of the demographic transition, although the picture is heterogeneous. A small number of African countries (such as South Africa) are far along in the transition, with fertility rates approaching the level at which population size first stagnates and then starts to decline without young, inward migration or changes in fertility rates. Many others (such as Mozambique) appear to be stalling in their transition, with little movement in recent years, while a third group (countries such as Ethiopia)

is achieving a rapid decline from very high fertility rates.²⁰ Fertility rates also differ within countries among income, geographical and even ethnic groups. For example, fertility rates in capital cities such as Accra and Addis Ababa are close to replacement levels while those in rural areas such as in the Democratic Republic of Congo (DRC) are close to seven children per woman.²¹

Life expectancy in many African countries is also low. Whereas life expectancy in North Africa is estimated at almost 74 years in 2018, roughly a year longer than the global average, in sub-Saharan Africa it is 61 years – more than 10 years below the global average. Twenty-nine African countries, ranging from Chad (life expectancy estimated at 52.4 years) to Djibouti (life expectancy estimated at 63.9 years) have a life expectancy below 64 years, the final year at which people are typically assumed to still be of working age.

On their current demographic trajectory (called the Current Path in this report) low- and lower-middle-income African states are several decades away from a potential demographic dividend. For the most part, Africa's transition from high to low birth and death rates trails significantly behind that in other regions globally. Africa is the youngest, least urban continent, has the lowest levels of educational attainment and is generally in poor health, although all these indicators are steadily improving over time. Agriculture is significantly larger (as a portion of GDP) than in any other region and the continent suffers from premature deindustrialisation (the value-add of manufacturing as a contribution to GDP is declining across Africa's income groups). It also has a very large informal sector and high levels of unemployment, as measured by the International Labour Organization.²²

Structurally a slow-growth world

Economic growth is determined by the contribution from labour, capital and total or multifactor productivity (MFP). The relative contribution from each of these components changes as countries develop. While the exact contribution and calculation of each is contested, labour contributes most to growth at low levels of development, then is slowly overtaken by the contribution of capital in middle-income economies. In high-income economies MFP drives improvements in productivity. Whichever way it is calculated, labour inevitably makes the largest contribution to economic growth in low-income countries, the majority of which are in Africa. Due to its low levels of education and high disease burden, Africa's large labour force is less productive than its global counterparts.

The potential for improvements in future productivity globally is large, McKinsey Analytics argues in a recent article that sets out the extent to which the ongoing digital revolution is reducing frictional transaction costs within and across sectors.²³ Artificial intelligence and automation could reverse the recent declines in global productivity. According to McKinsey, productivity growth could reach 2% annually over the next decade, with 60% of this increase from digital opportunities.²⁴ New 'digital ecosystems' are emerging, it argues, that combine goods and services in a highly customer-centric manner, shifting the border between these sectors. However, with a shrinking labour force in high-

income countries, artificial intelligence and automation will first serve to offset declining productivity in the developed world before contributing to sustaining or improving productivity generally.

Digitisation is generally considered to consist of cloud computing, e-commerce, the mobile Internet, artificial intelligence, machine learning and the Internet of Things.

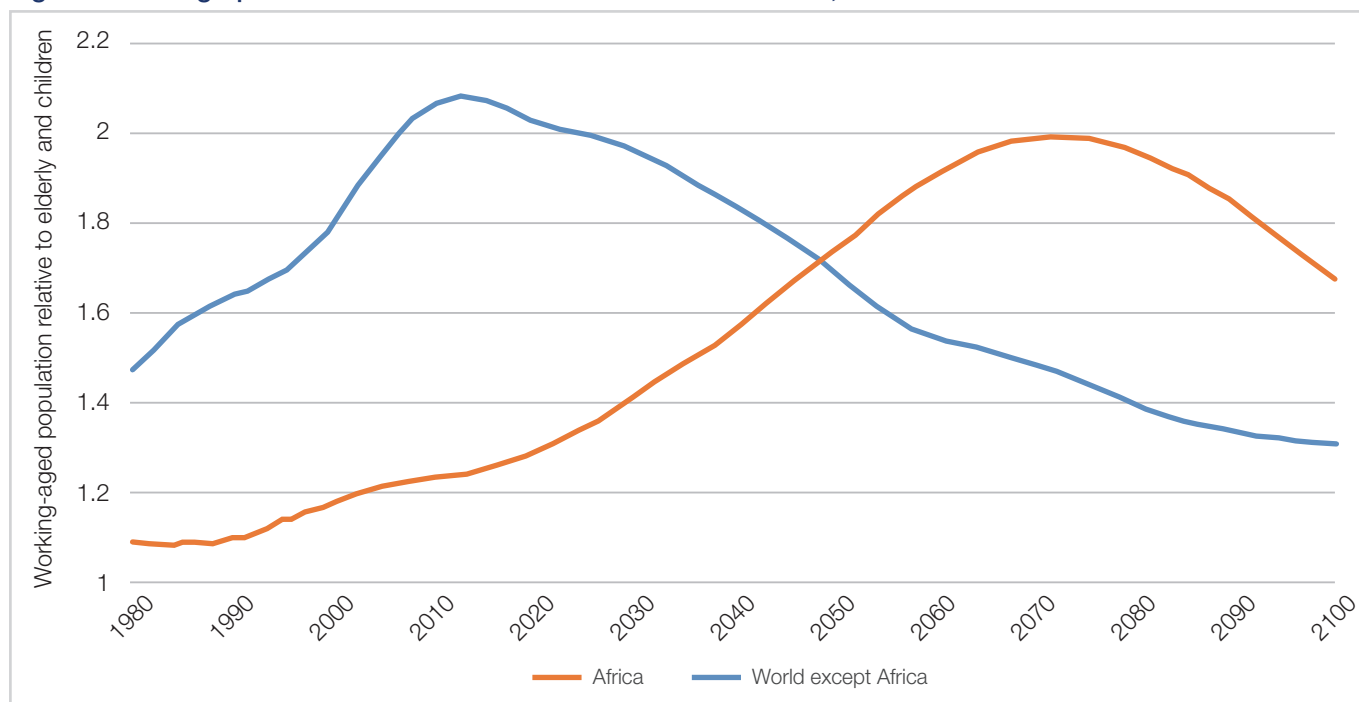
In the aftermath of the 2008 financial crisis, labour productivity growth slowed in many economies, dropping to an average of 0.5% in 2010–2014 from 2.4% a decade earlier in the United States (US) and major European economies. This can in part be attributed to changing population dynamics, as well as to a slower-than-expected improvement in productivity (even in advanced economies). By 2016 the amount of output per hour of work had actually been declining for more than a decade, argues Sharma.²⁵

Two reasons appear to explain this slower-than-expected progress. The first is that the digital economy has not yet improved productivity to the extent anticipated, and it is unclear when that will occur.²⁶ The second is that globally, the ratio of the working-age population to dependents has peaked after several decades of rapid growth and is now slowly declining.

The world has entered a period of structurally slower growth

In the 45 years from 1967 to 2012, the global ratio of working-age persons to dependents increased rapidly from 1.32 workers per dependent to 1.91.²⁷ The ratio is now declining largely because of the growth in the global aged population. Figure 3 compares that broad, structural change in the ratio of working-age population to dependents in the world and in Africa, which should peak shortly after 2070. Since the number of workers as a portion of the total population necessarily has a direct impact on productivity levels, the world has entered a period of structurally slower growth. That is, unless technology can unlock significantly higher levels of productivity that will compensate for the declining

Figure 3: Demographic dividend for Africa and the rest of the world, 1980–2100



Source: Historical data from UNPD World Population Prospects, 2017 revision, forecast in IFs v 7.34.

portion of the working-age population outside Africa. The changing ratio of the working-age population to dependents was already a major contributing factor to slower global growth in the last decade and will contribute to slower growth in the future.²⁸

Africa is the second most populous continent after Asia, which has four times the population size of Africa.²⁹ Therefore, trends in Asia largely determine global trends, although the demographic momentum of a much younger Africa contributes significantly to global population increases.³⁰

Sub-Saharan Africa's high youth dependency ratios constrain its ability to rapidly raise incomes

Yet Africa has two potential advantages. First, it is the only region globally where the size of the working-age population relative to dependents will expand beyond 2030, giving it a comparative advantage. Second, coming off a base that is significantly lower than any other region, the potential for rapid improvements in labour productivity using modern technology and practices in Africa is large, underpinning the potential to catch up.³¹

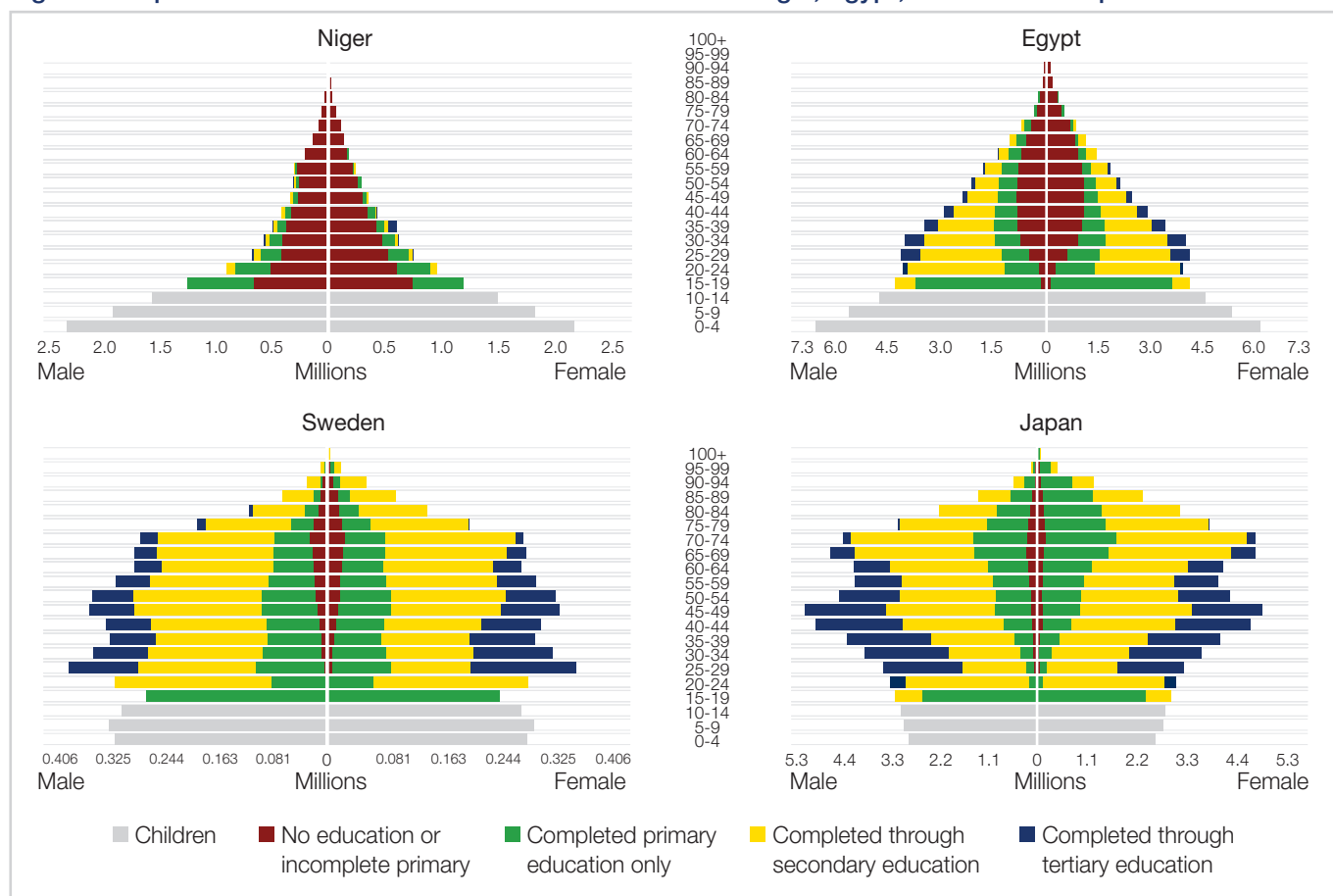
Africa and the demographic transition

Sub-Saharan Africa's high youth dependency ratios constrain the region's ability to raise incomes rapidly enough to reduce poverty and provide improved livelihoods, although the inability to industrialise, high levels of corruption and the quality of governance all play a role as well.

Figure 4 compares a population and education forecast in 2018 for four countries (Niger, Egypt, Sweden and Japan) that reflect four different stages of the demographic transition. Niger has the lowest median age in the world (15, with a life expectancy of 63). Egypt, with a median age of 25 years and life expectancy of 72 years, is on the cusp of achieving an age structure favourable for rapid economic growth. Sweden, on the other hand, is about to exit this favourable period economic growth (median age of 41 and life expectancy of 83). Japan has the highest median age in the world at 48 years (with a life expectancy of 84 years).

The colours in each pyramid in Figure 4 depict the extent to which a favourable demographic structure enables investment in educational outcomes. Most prominent is the size of the inner core (red) of people in Niger and Egypt who have not completed primary education and the outer core (blue) of people in Japan and Sweden who

Figure 4: Population structure and educational attainment for Niger, Egypt, Sweden and Japan in 2018



Source: Forecast in IFs v 7.34, initialising from UNPD World Population Prospects.

have completed tertiary education. The size of the cohort of children (at the base of the population pyramid) in a country such as Niger makes it difficult to build enough schools, train enough teachers and roll out an education system able to cope with the massive influx of pupils and simultaneously improve average levels of education for those children already within the system.

Smaller family size improves maternal and child education in a virtuous circle

In addition to the size of the working-age population, the ability to benefit from that dividend is determined by low infant mortality, female education, women's empowerment and economic policies on savings and investment. This is because as children's health and survival improve, family demand for more children declines. Smaller family size improves maternal and

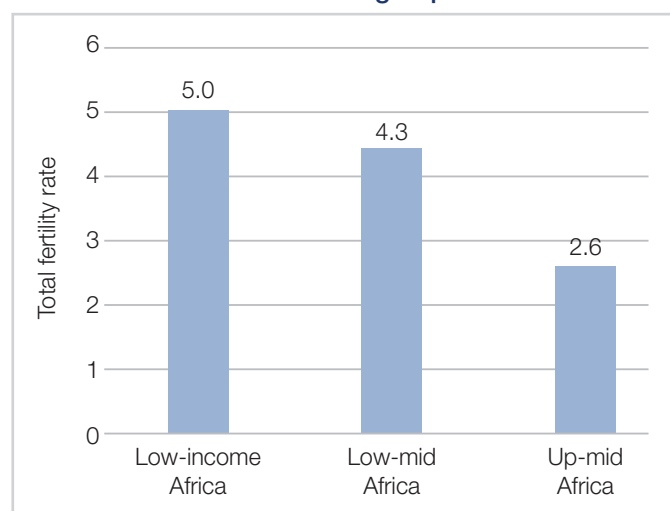
child education in a virtuous circle. As female education improves, women have fewer children, allowing for healthier, better-nourished and better-educated children. The result is that fertility rates are closely associated with income levels. Countries with high child mortality rates tend to have faster growing populations. By contrast, lower child mortality rates, higher incomes, the education of women, and the availability of contraception lead to lower fertility rates.³²

Socio-economic changes as a result of modernisation – a decline in child mortality, structural changes to the economy, and a rise in women's status and opportunities – have all contributed to a very substantial reduction in total fertility rates and hence in population growth globally. The global average is currently 2.4 children while that of Africa is 4.5, with large disparities across and within countries. Declines in fertility rates must be swift, monotonic and shared (such as rural/urban, between income and various groupings) if a country is to obtain a sizable dividend. In Ethiopia, for instance, based on 2016

data, the fertility rate was 6.4 for poor women and 2.6 for the wealthy. The corresponding numbers in Tanzania (2016) were 7.5 and 3.1.³³

Figure 5 presents the estimates for average total fertility rates for three World Bank income groups in Africa and illustrates the extent to which rates in Africa's 27 low-income countries are higher than those in its 18 lower-middle- and eight upper-middle-income countries.

Figure 5: Average fertility rate in Africa for 2018 using World Bank income groups



Source: IFs v 7.34 initialising from 2015 UNDP data.

Fertility rates across Africa vary significantly, ranging from 7.3 (in Niger) to 1.5 (in Mauritius), presented in Figure 6. With the exception of the island states of Mauritius and Seychelles, North African countries such as Tunisia, Morocco, Libya and Algeria, and South Africa and Botswana in Southern Africa, much of Africa is several decades away from a fertility rate of 2.8 that could unlock more rapid economic growth. The fertility rate for sub-Saharan Africa is currently estimated at 4.8 children per woman, likely only reaching 2.8 at around 2050 (and a median age of 25.5 years in 2052).³⁴

Mortality has also seen a dramatic decline as the health levels of Africa's population have improved. This decline reflects the expected shift from high death rates from communicable diseases in low-income countries to high death rates from non-communicable diseases in upper-middle-income countries.

There are many reasons for Africa's slower demographic transition compared to other regions. Historically, low

population density (a function of a high disease burden) translated into low levels of urbanisation and lower rates of income growth, resulting in a continent that lagged behind the development of others. In recent generations Africa has also not been able to raise education quality and levels, roll out the use of modern contraceptives rapidly enough or transition to economies where child labour is no longer required, given the dominance of the subsistence agricultural sector in many African countries.³⁵ Nor has Africa been able to produce sufficient job opportunities to provide meaningful work for its growing population.

Demographics and economic growth

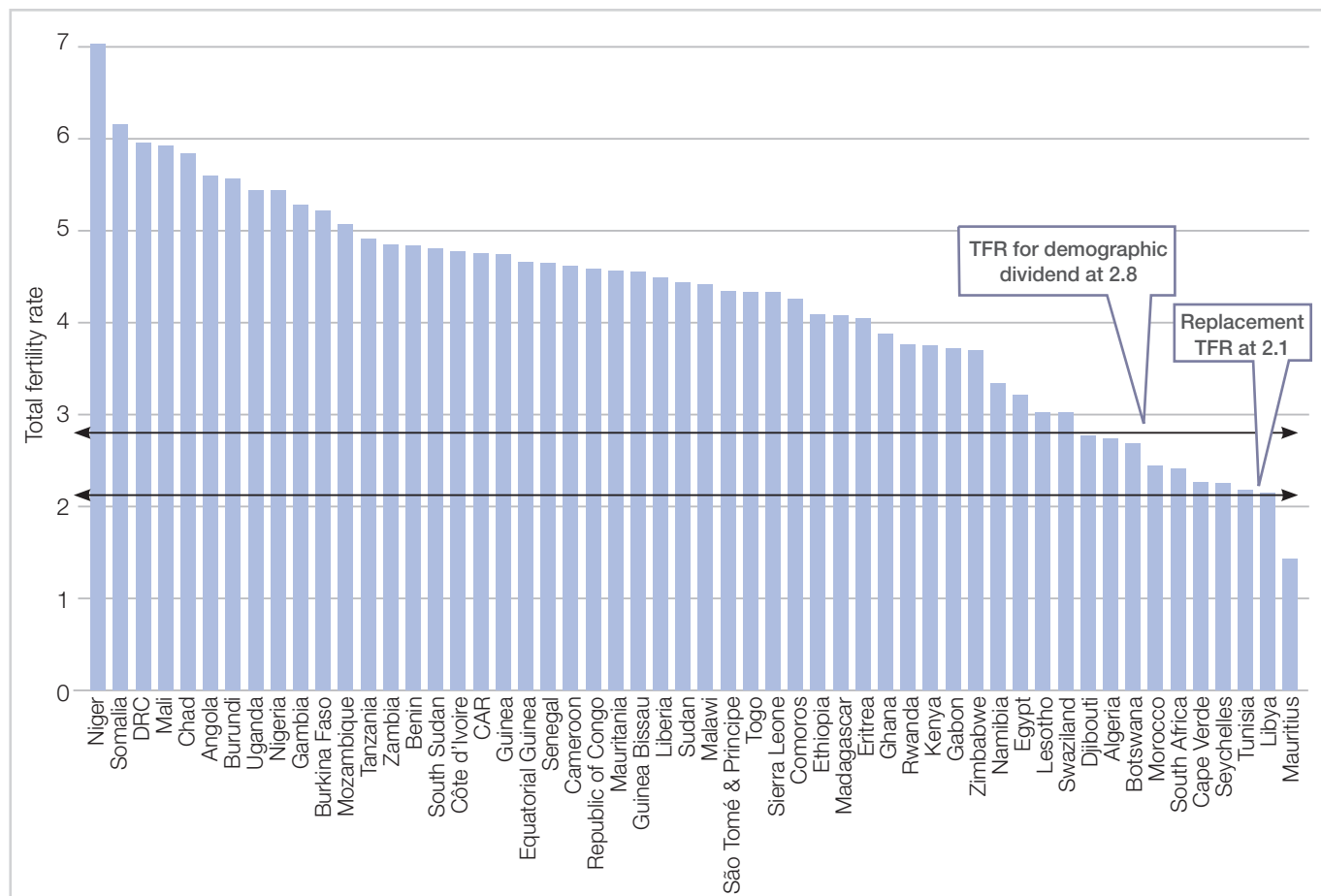
Figure 7 presents the ratio of working-aged persons to dependents for four key countries – China, India, the US and Nigeria – for the historical period from 1980 with a forecast to 2100. It should be read with the associated caveats about the inevitable speculative nature of such long-term forecasts.

China's previous one-child policy partly explains its remarkable growth rates since the 1980s. China reached its peak demographic dividend in 2010 at 2.8 working-age persons relative to the elderly and children (with 74% of its total population aged between 15 to 64), and is experiencing such a rapid decline that the potential contribution of its working-age population to growth will be overtaken by that of India in 2029. From 2046 the US is projected to regain a more positive working age/dependent ratio compared to China. The ratio of working-age persons to dependents in India will likely only peak at 2.18 in 2035, before also starting a slow decline.

China's previous one-child policies largely explains its remarkable growth rates since the 1980s

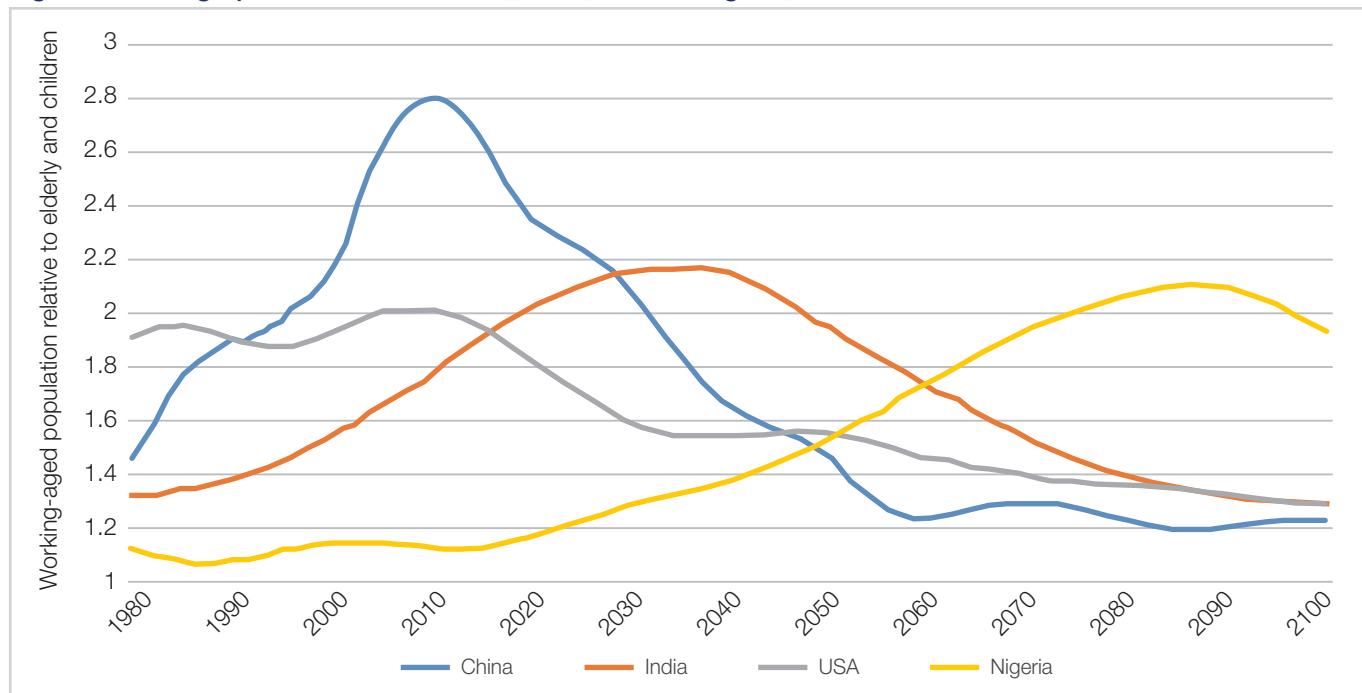
Assuming that productivity levels in these four economies are similar, China's economic growth rate will continue to fall over time, with India steadily growing more rapidly until its growth rate also starts to decline after 2035. The US should again grow more rapidly than China from 2046.³⁶ From the mid-century Nigeria should grow more rapidly than any of the others.

Figure 6: Fertility rates in Africa 2018



Source: IFs 7.34, initialising from 2015 data in World Development Indicators, World Bank.

Figure 7: Demographic dividend in China, India, US and Nigeria, 1980–2100



Source: Historical data from UNPD World Population Prospects, 2017 revision, forecast in IFs v 7.34.

Nigeria currently has a population estimated at 195 million people and will, by 2087 – when it achieves its peak demographic dividend – already have 629 million people, with its population continuing to grow well into the 22nd century.

It is also important to recognise that the level at which countries achieve their peak demographic dividend will have an impact on growth. A peak of 2.8 (China in 2010) obviously delivers much more rapid economic growth than a peak of 2.2 (India in 2035) or a peak of 2.1 (Nigeria in 2087), because the number of workers relative to dependents is higher. That peak of 2.8 contributed significantly to China's achieved almost 11% growth in 2010. Growth forecasts using IFs is for India to grow at 8.5% in 2035 and Nigeria at less than half that by 2087.³⁷

At the end of the century, the ratio of working-age persons to dependents is set to contract in all regions except Africa

Also, the longer a country can benefit from the demographic dividend the better. An important explanation for the dynamism and growth of the US economy over an extended period of time is that it entered its demographic dividend shortly before 1930 (when the median age of its population passed the 25.5-year mark) and will only exit it around 2036 (when the median age of its population is over 41), having loitered in this sweet spot for more than a century. China, on the other hand, will only spend some 35 years in this fortunate window. This explains the likely inability of China to graduate to high-income status, reflected in the oft-repeated mantra that China will grow old before it gets rich. Development takes time. Eventually India will spend almost 50 years in the demographic sweet spot (from 2011 to 2059) and by that metric experience a degree of catch-up with China. Nigeria's median age only passes 25.5 years in 2062 in the Current Path forecast. It will only achieve a median age of 41 sometime in the next century.

There is, of course, more to economic growth rates than the size of the working-age population compared to dependents, but this basic relationship is so important that Ruchir Sharma argues that labour force growth (more people working more hours) explains about half of economic growth.³⁸ The World Bank is more cautious and argues that, in East Asia, about one-third of the increased growth during its economic miracle can be attributed to the demographic dividend, with a substantial portion of the remainder achieved by the determined pursuit of export-oriented policies that provided productive employment for its rapidly expanding population.³⁹

Much of the rest comes from improved productivity, i.e. improvements in education, application of technology and the health of the workforce.⁴⁰

Looking to the end of the century, the ratio of working-age persons to dependents is set to contract in all regions except Africa, where it will only

629 million

THE ESTIMATED
POPULATION OF NIGERIA
BY 2087

peak in around 2072 (see Figure 3). At that point Africa will have a population of 3.1 billion people, of whom 67% will be of working age compared to 60% in the rest of the world. That translates into a working age/dependent ratio of 2.0 in Africa and 1.5 in the rest of the world.

Because Africa will achieve a relatively low worker/dependent ratio (2.0 compared to the 2.8 peak achieved by China in 2010 and the expected peak of 2.2 forecast for India in 2035), it will grow at more modest rates at its peak demographic dividend compared to countries such as the Asian Tigers, Japan and China at their peak.

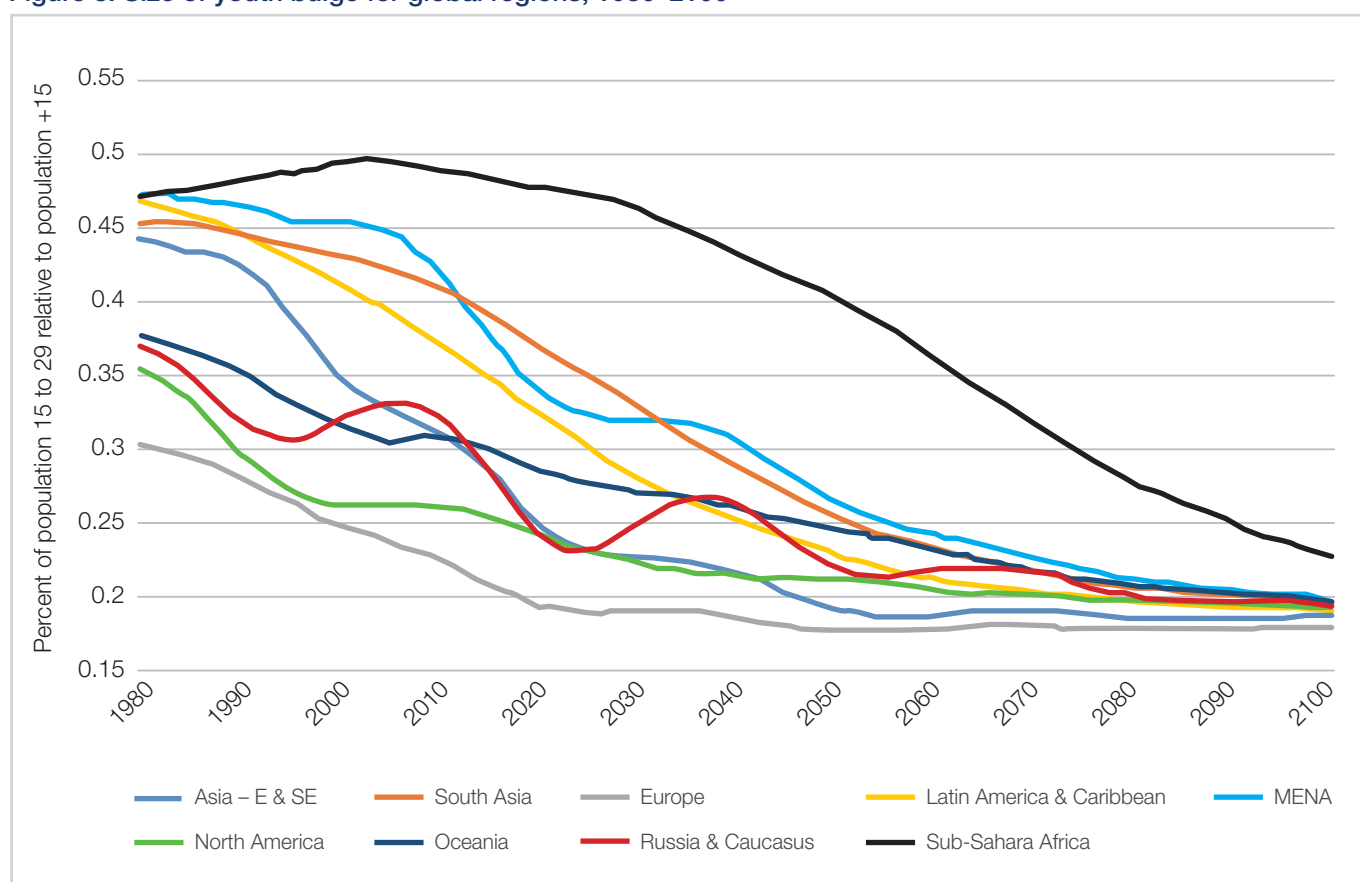
In summary, sub-Saharan Africa has a very young population (median age estimated at 18 years in 2018), and the continent's population will remain significantly younger than that of any other region to the end of the century. As a result the region has fewer people of working age and too large a population under 15 years to sufficiently invest in improvements in health, education and job creation to rapidly increase incomes.⁴¹ The

slow pace of the demographic transition has delayed improvements in income and reductions in poverty from this generation to the next.

Because Africa will achieve a relatively low worker/dependent ratio, it will grow at more modest rates

Figure 8 presents the history and forecast for the size of the youth bulge (people between 15 and 29) as a portion of the total population aged above 15. A large youth bulge relative to the total adult population, which is characteristic of many poor countries, is robustly associated with increased risk of conflict and high rates of criminal violence, particularly when young people lack opportunities in terms of education, training and employment and have no sense of voice or participation, as explored in a recent ISS forecast on the prospects for Africa's stability to 2023.⁴²

Figure 8: Size of youth bulge for global regions, 1980–2100



Note: MENA is the Middle East and North Africa.

Source: IFs v 7.34 initialising from 2015 UNPD World Population Prospects, 2017 revision.

Whereas Europe and Japan are experiencing slow economic growth partly because of their large elderly population, sub-Saharan Africa is the only region where income levels grow slowly largely because of its high youth dependency burden. It only gets to a 25.5-year average median age (the start of the high growth sweet spot identified by Cincotta) around 2055. In Africa only the North African countries of Tunisia, Morocco, Libya and Algeria, the small island states Mauritius and Seychelles, and South Africa currently have a median age above 25.5 years.

Identifying policy interventions

Africa must reduce the average number of children per woman if it is to advance the timing and impact of its demographic dividend.

Although many factors impact on fertility rates, female educational attainment is generally considered the deep driver. In addition, women's increased participation in the labour force, which is closely linked to their rising education and a steady improvement in gender parity, also reduces total fertility rates.⁴³

Women who are better educated have more employment opportunities and are therefore likely to want fewer children. Educated women are also more likely to be better informed about modern contraceptives and the benefits that lower fertility offers in allowing for better education for their more limited number of children. Thus improved levels of female education reduce fertility rates, allowing better education in turn. Alternatively, where women have a lower social status and fewer opportunities outside the household, fertility rates tend to be higher.

In sub-Saharan Africa, the average adult woman has received 5.1 years of education – the lowest number globally. The global average is 7.8 years – a goal that sub-Saharan Africa will only achieve in 2055 on the Current Path, at which point the global average will likely have increased to 10.4 years. Improving levels of educational attainment is therefore a slow process. For example, it took sub-Saharan Africa 14 years, from 2001 to 2015, to increase the average number of years of education achieved by women aged 25 years and older by one year (to 4.4 years). Along the Current Path forecast, Africa will only reach a 78% lower secondary school completion rate (the current global mean) around 2060.

Changing gender parity in education – the number of female students participating in a given level of education relative to the number of male students at the same level – is an important milestone on the road to improved female education. In sub-Saharan Africa, gender parity in education has improved over time but trails behind even regions such as the Middle East and North Africa (MENA). In 2015, 95 girls attended primary school for every 100 boys in sub-Saharan Africa, a ratio that worsens significantly at secondary school level (only 90 girls for every 100 boys) and decreases to 73 women for every 100 men that enrol in tertiary education.

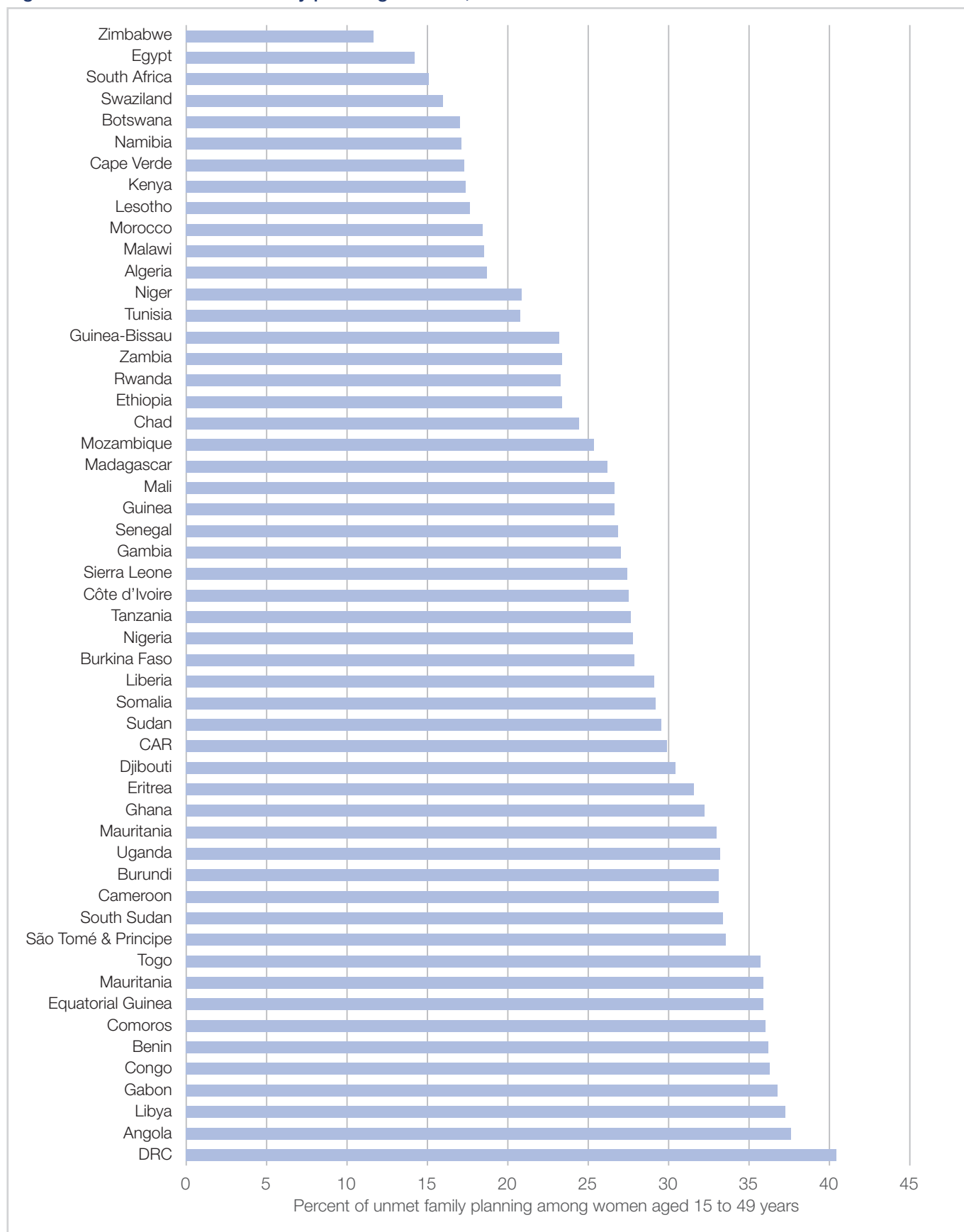
While MENA is not typically thought of as a particularly progressive region in terms of gender, in 2015 girls in MENA countries were about 5% more likely to enrol in primary school than girls in sub-Saharan Africa. The investment in female education in North Africa is, however, largely wasted, with the female share of the total labour force roughly half that of sub-Saharan Africa (24% vs 43%). Whereas the labour force participation rate for females is only 23% in North Africa, it is 64% in sub-Saharan Africa.

Africa must reduce the average number of children per woman to advance the timing and impact of its demographic dividend

Use of modern contraceptives is a more immediate driver of total fertility rates, although poor access to education among women constrains uptake. Research suggests that the average gap between actual and desired fertility could be as high as two children per woman in sub-Saharan Africa,⁴⁴ pointing to a large pent-up demand for the provision of modern contraceptives. Data from the UN Population Division forecasts that the unmet demand for modern contraceptives in low-income Africa will be 28% in 2018 and 25% in lower-middle-income African countries, with large country-to-country variations.⁴⁵ Figure 9 presents estimates from the UN Population Division for the unmet need for family planning in Africa for women of reproductive age (15 to 49 years) who are married or in-union for 2018, ranked by percentage.

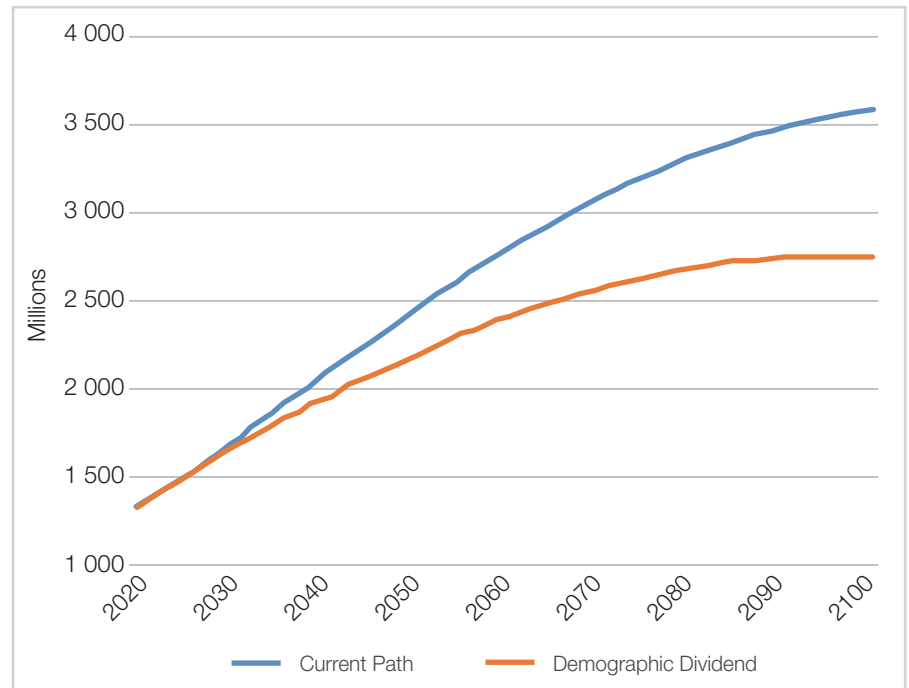
The potential for rapid update and a large impact is therefore large. For example, three low-income countries (Rwanda, Ethiopia and Malawi) achieved a 13–19%

Figure 9: Unmet demand for family planning in Africa, estimates for 2018



Source: UN Population Division, estimates and projections of family planning indicators 2018.

Figure 10: Population forecast for Africa under different scenarios



Source: IFs v 7.34 initialising from 2015 data in UNDP World Population Prospects, 2017 revision.

increase in contraceptive use over 15 years (2000–2015) and 22–27% over 30 years (1985–2015). Three lower-middle-income countries (Swaziland, Lesotho and Zambia) achieved an 11–12% increase in contraceptive use over 15 years (2000–2015) and 22–23% over 30 years (1985–2015).

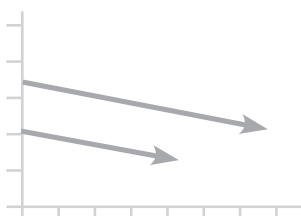
Generally, a decline in fertility follows a decline in child mortality with a time lag of several years.⁴⁶ The provision of safe water, improved sanitation, etc., which reduces infant mortality, therefore eventually translates into reductions in fertility.

Advancing Africa’s demographic dividend⁴⁷

This section presents a combined Demographic Dividend scenario that emulates the aggressive roll-out of modern contraceptive use, modestly reduces infant and female mortality rates from communicable diseases,⁴⁸ steadily improves education outcomes, eliminates the gender gap in education by 2030, and improves the provision of safe water, sanitation and electricity. The result is to advance the timing and intensity of Africa’s demographic dividend. The interventions in the IFs system are detailed in an appendix and benchmarked against the expected progress in South America and South Asia as two comparable regions.

The Demographic Dividend scenario results in the following changes in Africa’s population when compared to the Current Path:

- By 2030, 26 million fewer people (total fertility rate is 3.2 instead of 3.8, with life expectancy having increased to 68 instead of 67 years)
- By 2050, 250 million fewer people (total fertility rate is 2 instead of 2.7, with life expectancy having increased to 74 years)



A DECLINE IN FERTILITY
GENERALLY FOLLOWS
A DECLINE IN CHILD
MORTALITY WITH A TIME
LAG OF SEVERAL YEARS

- By 2063, 418 million fewer people (total fertility rate is 1.9 instead of 2.2, with life expectancy having increased to 77 years)
- By 2100, 837 million fewer people (total fertility rate is 1.9, with life expectancy having increased to 82 years)

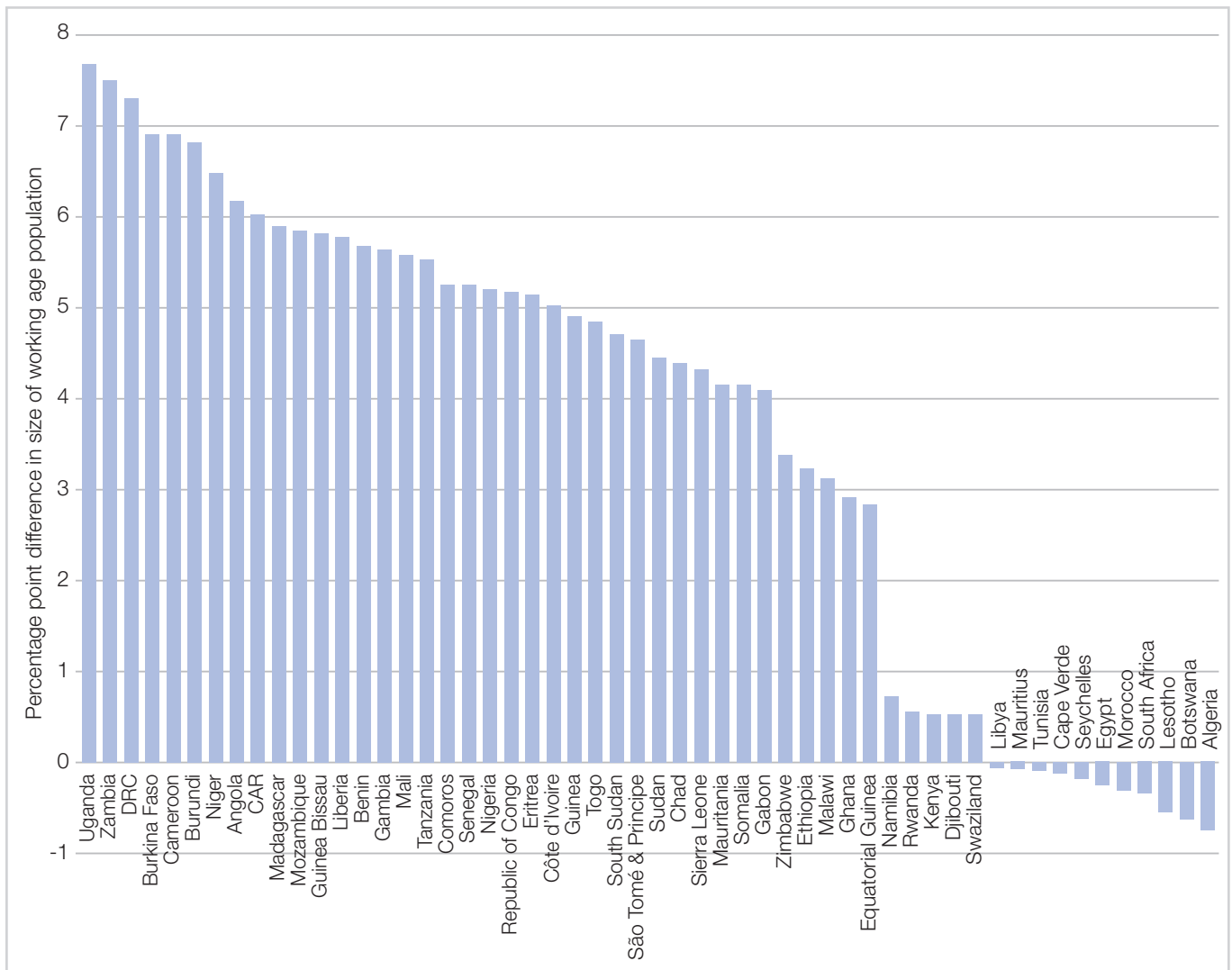
Given the momentum behind Africa's youthful population, the impact of this scenario on the world would be substantial. Instead of a global population peaking at an estimated 10.4 billion people shortly before 2090, global population would peak at 9.7 billion in around 2075, more than a decade earlier, with enormous implications for global sustainability. Average levels of income in Africa would increase significantly, with an initial increase in global GDP (which would be US\$1.8 trillion more in 2050), but then decrease compared to the Current Path

forecast as the impact of a significantly smaller African population reduces the size of the global economy in the very long term.⁴⁹

Instead of a global population peaking at 10.4 billion shortly before 2090, it will peak at 9.7 billion around 2075

Figure 11 presents the percentage point difference in the size of the working-age population in the Current Path and Demographic Dividend scenarios in 2050. Uganda, Zambia and the DRC gain the most (almost 8 percentage points), countries such as Namibia and Rwanda gain little and Botswana and Algeria are negatively affected.

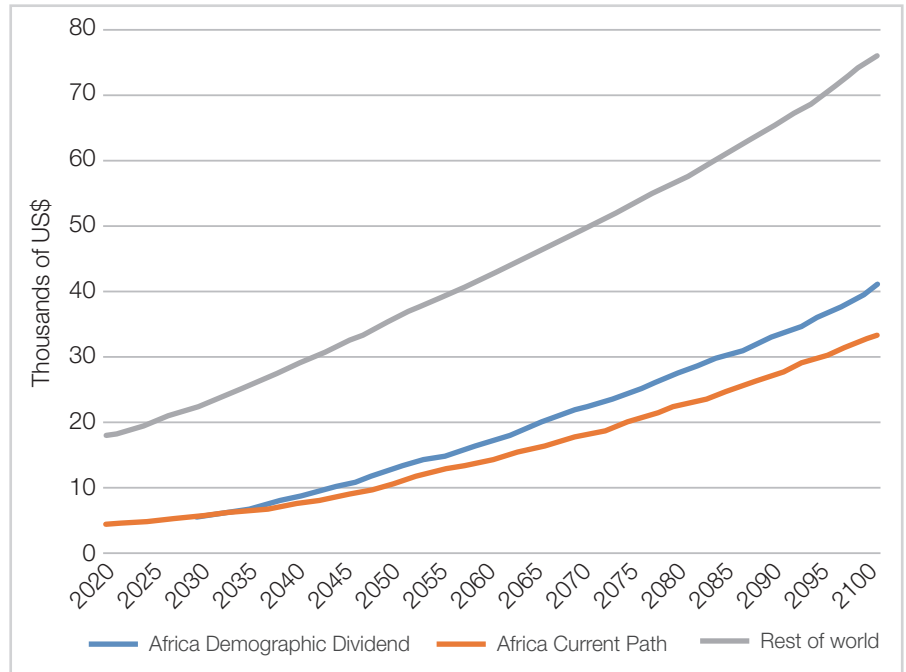
Figure 11: Difference in working-age people in Africa 2050: Current Path vs Demographic Dividend scenario



Source: IFs v 7.34, initialising from 2015 UNDP population forecast.

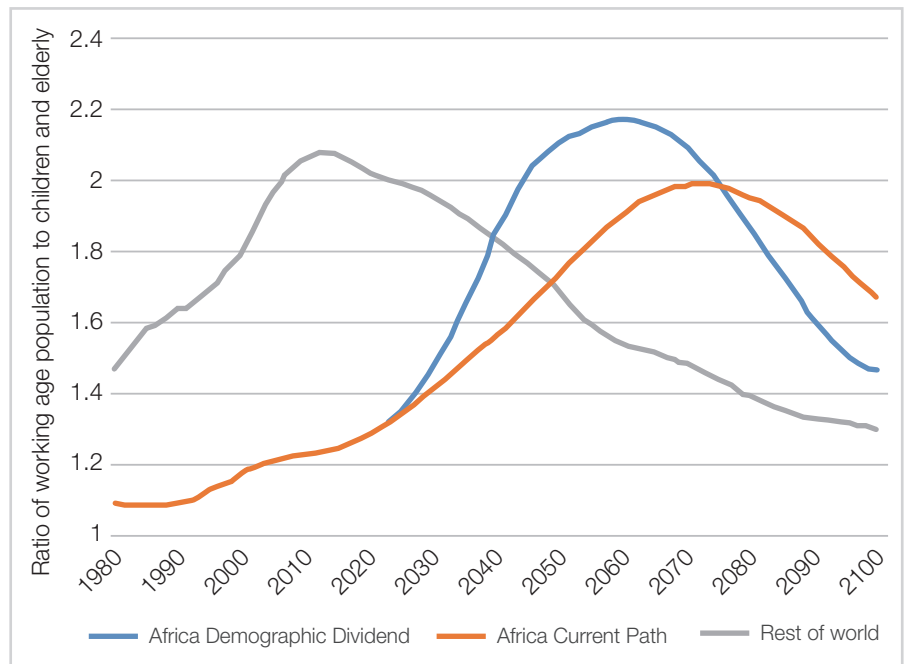
With more people entering their productive working age and fewer dependents (mostly children), Africa's economy would grow more rapidly. Since Africa will eventually also have a smaller population the transition propels substantive increases in average income levels.

Figure 12: Income forecast: Africa vs rest of the world – Current Path vs Demographic Dividend



Source: IFs 7.34, initialising from WDI 2015 data.

Figure 13: Difference in ratio of working age to dependents: Africa vs rest of the world



Source: Historical data from UNPD World Population Prospects, the 2017 revision. Forecast in IFs v 7.34 initialising from 2015.



THE DEMOGRAPHIC DIVIDEND SCENARIO SIGNIFICANTLY REDUCES THE GROWING GAP BETWEEN AVERAGE INCOME LEVELS IN AFRICA COMPARED TO THE REST OF THE WORLD

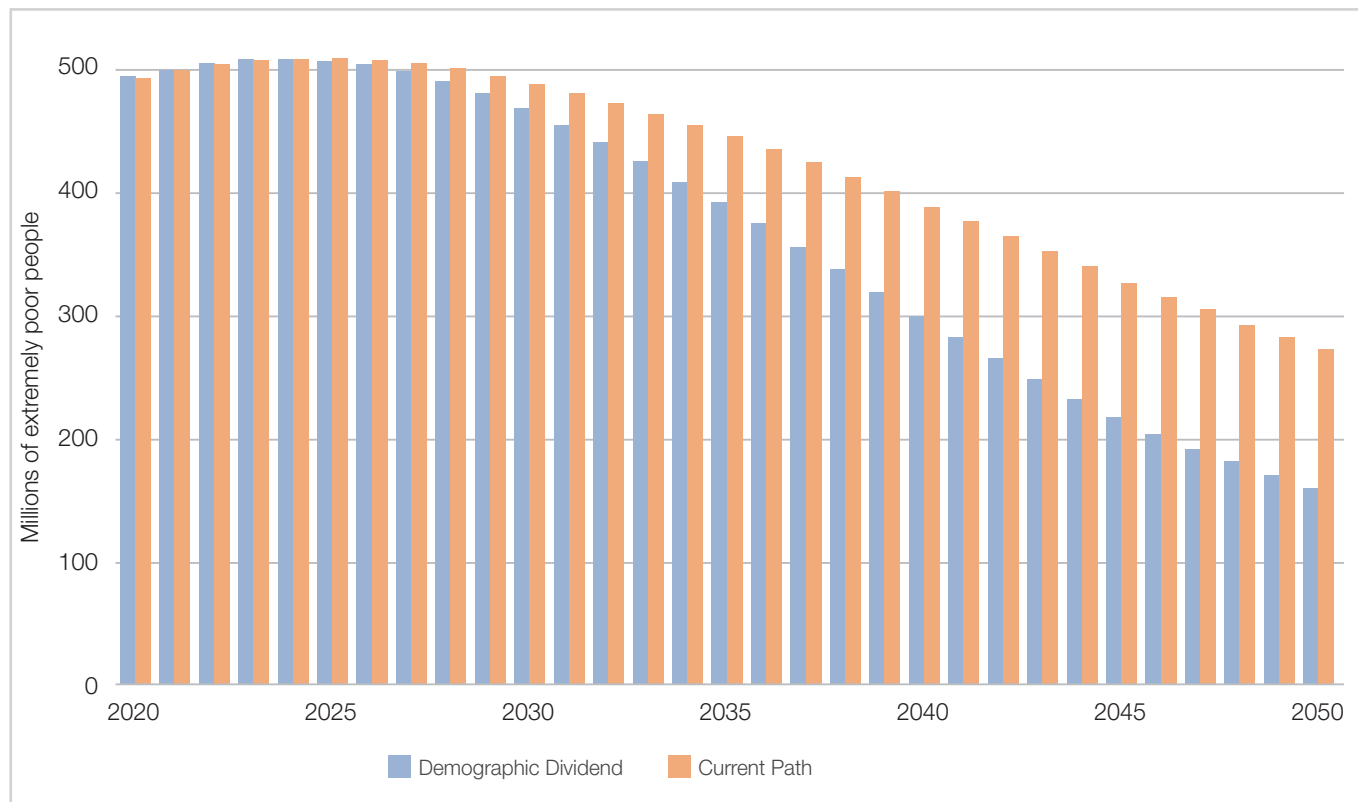
The Demographic Dividend scenario significantly reduces the growing gap between average income levels in Africa compared to the rest of the world. In the Demographic Dividend scenario, the African GDP per capita in purchasing power parity by 2050 is 36% of the average for the rest of the world (44% by 2063), compared to 30% (2050) in the Current Path scenario and 35% by 2063 (see Figure 12).

These changes are a function of the extent to which Africa is able to advance the onset of its peak demographic dividend (by 13 years) as well as increase the ratio of working-age persons to dependents, resulting in a larger portion of working-age persons to dependents than would otherwise be the case. Instead of the number of working-aged people relative to elderly and dependents peaking at 2 in 2072, it would peak at 2.2 in 2059, as reflected in Figure 13.

With more persons of working age and fewer children to educate, the improvements cascade across various indices of human well-being. For example, poverty rates come down significantly, with 19 million less people living in extreme poverty by 2030, 112 million less in 2050 and 95 million less by 2063. With its large and poor population, Nigeria is likely to experience a reduction of 37 million less extremely poor people in 2050 (2 million less in 2030) out of a total population that, by 2050, will likely count 367 million people (instead of 405 million in the Current Path).

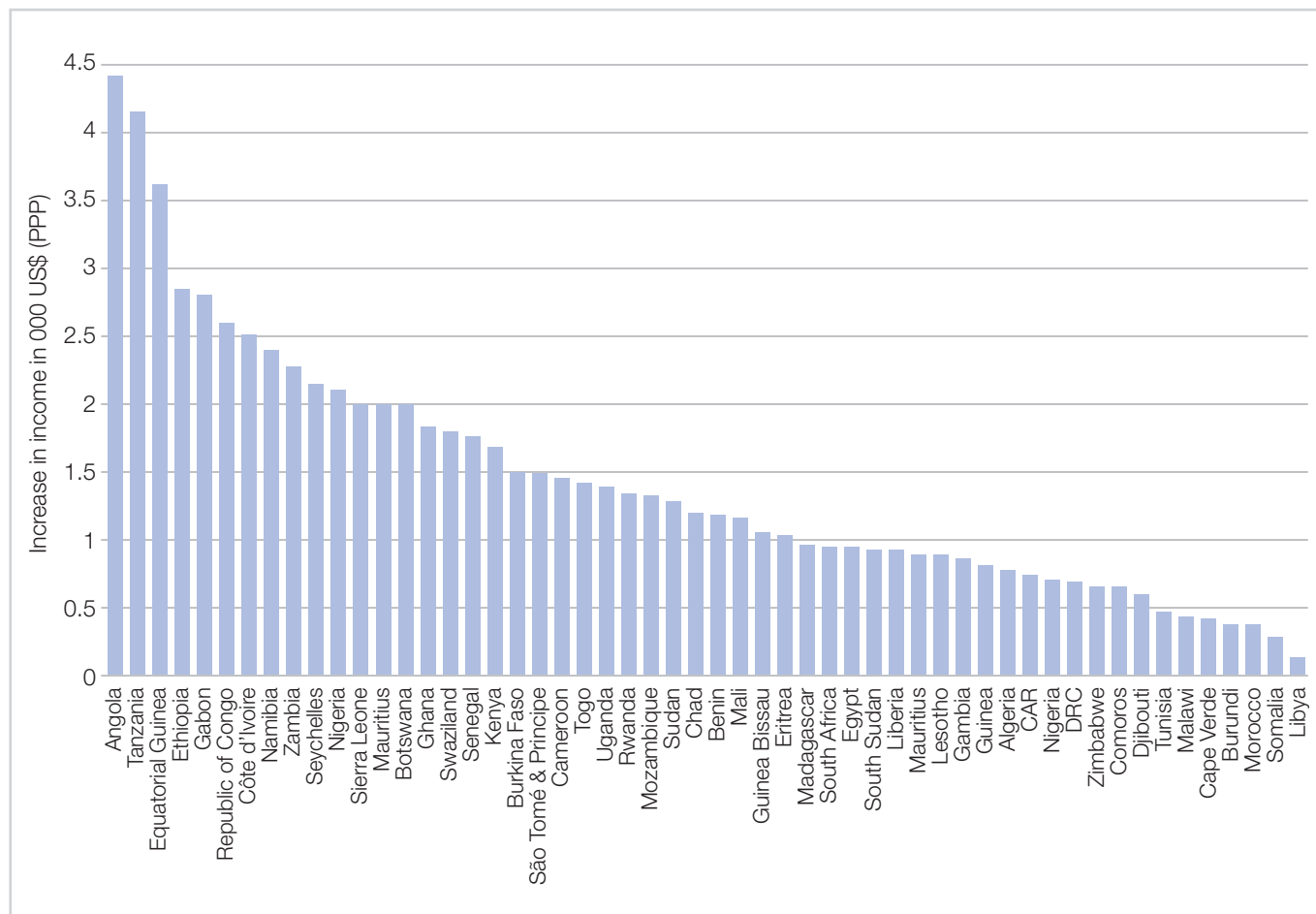
The number of extremely poor Africans in the Current Path and Demographic Dividend scenarios is compared in Figure 14.

Figure 14: Number of people living in extreme poverty in Africa: Current Path vs Demographic Dividend



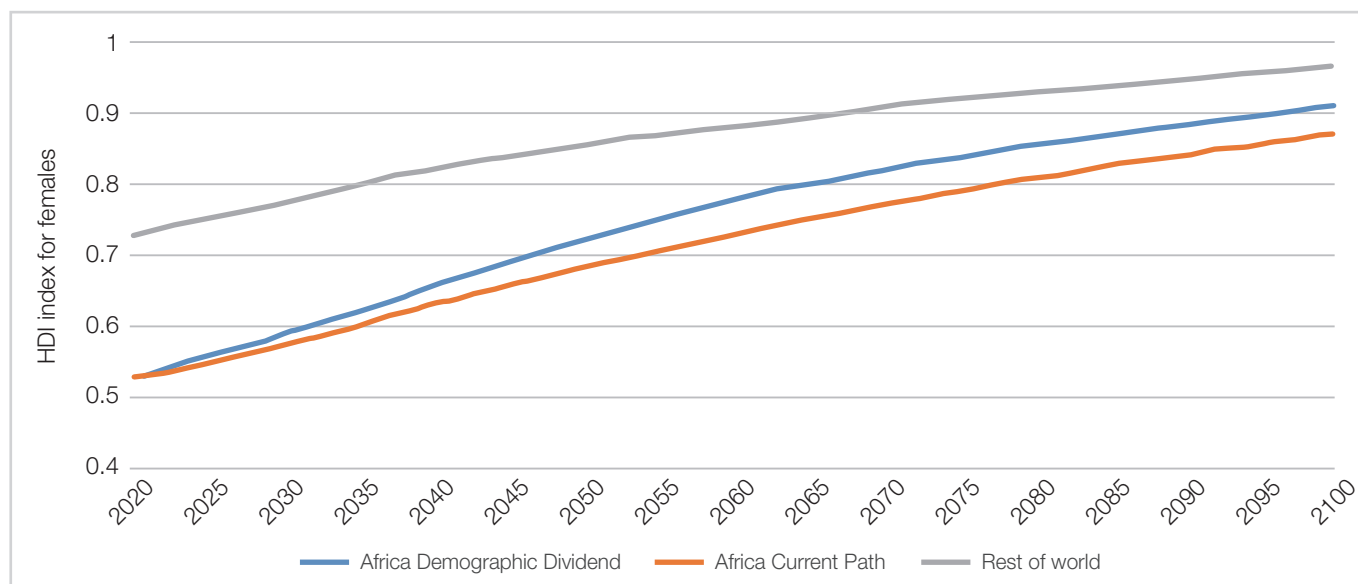
Source: IFs 7.34 initialising from 2015 World Population Prospects, the 2017 revision.

Figure 15: Difference in average income levels by 2050 between Current Path and Demographic Dividend scenarios



Source: IFs v 7.34 forecast initialising from 2015 WDI data.

Figure 16: Forecast of female HDI to 2100: Africa (Current Path vs Demographic Dividend) and the rest of the world



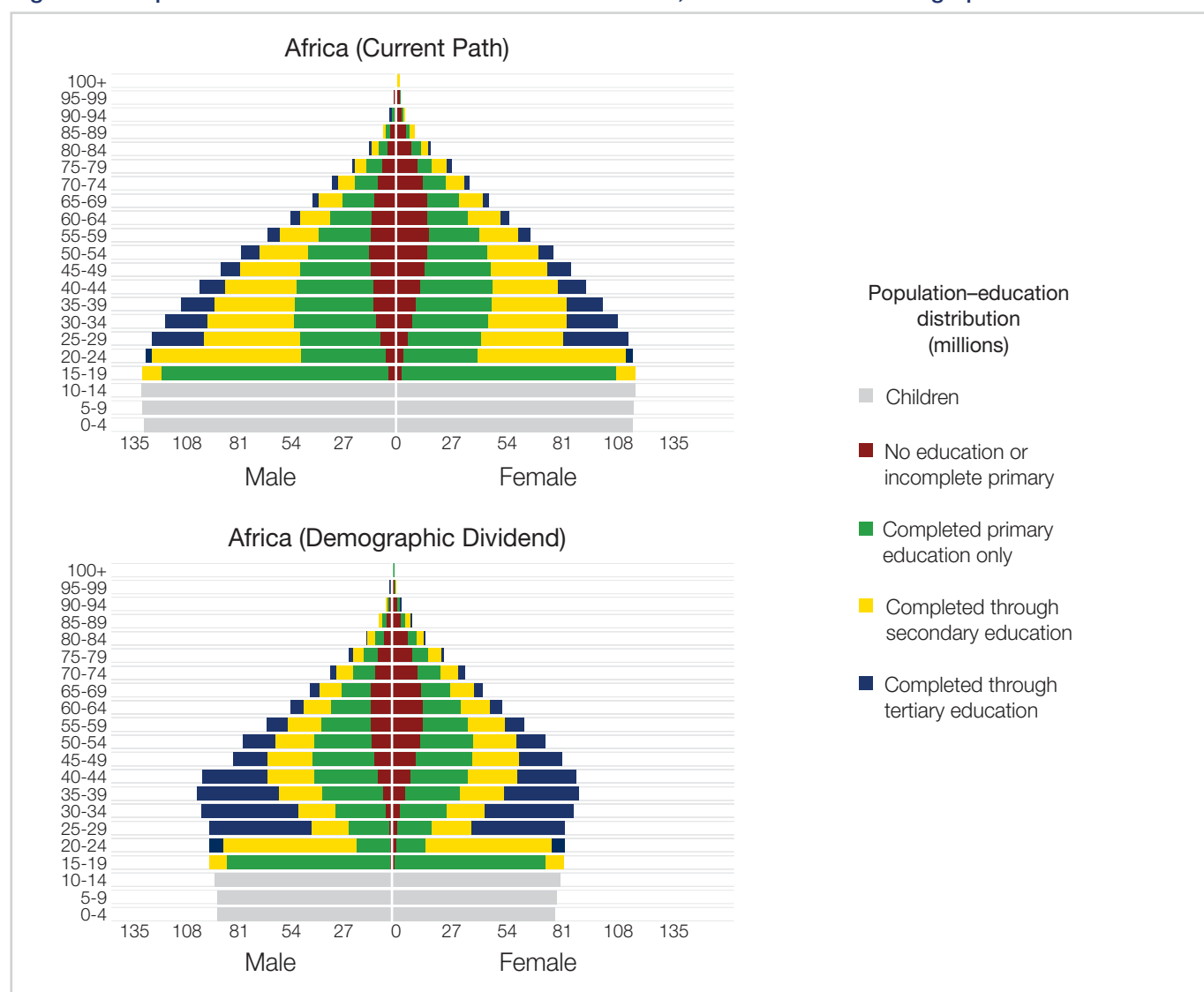
Source: IFs v 7.4 initialising from UNDP 2015 historical data.

All countries benefit from the improvements in average income that follow from a smaller population with a larger portion of working-age people. The difference between the Current Path and the Demographic Dividend scenario is presented in Figure 15. In Angola, average income levels increase by US\$4 800 per person in 2050, and in Tanzania US\$4 500. In Ghana, the difference is US\$2 000 and US\$4 300 and in Egypt US\$1 000. Libya benefits the least, with average incomes increasing by only US\$140 per person.

Since individual indicators of human development all improve, Africa generally narrows the gap with the rest of the world on composite indicators such as the Human Development Index (HDI). For example, Figure 16 presents a forecast of female HDI for Africans and the rest of the world, comparing the Current Path with the Demographic Dividend scenario.

The difference between the two scenarios by 2063 is presented in Figure 17. In the Demographic Dividend scenario, Africa has a much more mature

Figure 17: Population education distribution for Africa in 2063, Current Path vs Demographic Dividend scenario



Source: IFs 7.34 initialising from Barro-Lee.

population structure with a distinctive bulge along the midriff, compared to the more youthful structure of its population that is evident in the Current Path forecast. Similar to Figure 4, the red grouping at the heart of each population pyramid indicates no education or incomplete primary education. The blue ribs on the outer edge of the pyramid indicate completed tertiary education. Instead of median adult education of 8.8 years, Africa would have almost 10 years, with a concomitant impact on labour productivity.

In the Demographic Dividend scenario, Africa reduces the gap in average education levels for adults between itself and the rest of the world. The current gap is 2.8 years, which would, by 2050, have increased to 3.2 years along the Current Path forecast. In the Demographic Dividend scenario that gap narrows to 2.4 years.

In the Demographic Dividend scenario the population of Africa's 27 low-income countries would be 196 million less in 2054

The improvements in education flow from two directions. On the one hand, lower fertility rates translate into a smaller infrastructure requirement and allow governments to spend more money on improving education quality. On the other, the Demographic Dividend scenario includes interventions that grow educational intakes and progression from primary, secondary through to tertiary level at an annual rate of 1.4% from 2020 to 2030, providing an additional boost to the already improved outcomes in the scenario.

Africa's 27 low-income countries are home to an estimated 622 million Africans and have a median age below 18 years. The Current Path forecast is that these countries will only achieve a median age of 25.5 years in 2054, i.e. in 36 years' time. During that period the population of this grouping will increase to 1.4 billion. With concerted action, such as that modelled in the Demographic Dividend scenario, the population of this large group of countries could be 190 million less than currently forecast, with average incomes that are US\$2 900 higher than would otherwise be the case along the Current Path.

Africa's 18 lower-middle-income countries currently have a population of 547 million people, with a median age of below 21 years. These countries are slightly closer to entering the demographic window of opportunity and should do so in 2045, i.e. in 27 years' time, when their population will have increased to 917 million people. The Demographic Dividend interventions would see a population that, by 2045, is 67 million smaller with average incomes that are US\$1 700 higher.

The eight African upper-middle-income countries that have a median age above the 25.5 year threshold are home to only 115 million Africans, representing roughly 9% of the continent's total population. These countries would also benefit from the policies set out in this report. By 2040 this

THE GAP IN AVERAGE EDUCATION LEVELS FOR ADULTS BETWEEN AFRICA AND THE REST OF THE WORLD IN THE DEMOGRAPHIC DIVIDEND SCENARIO NARROWS TO

2.4 years

COMPARED TO

3.2 years

IN THE CURRENT PATH SCENARIO

group of countries would have average incomes that are US\$1 340 higher than currently forecast for that year, although their population would have increased by only 4 million people since fertility rates in these countries are already approaching replacement levels.

Conclusion

This report illustrates the impact of a more rapid demographic transition in Africa on levels of poverty, income and other indices of human well-being, although the situation differs across and within countries.

Changes in technology and society will have a huge impact on society in the decades ahead and there are considerable uncertainties associated with long-term forecasts. In high-income countries many women will be having children much later in life (as their reproductive age advances), the working life of men and women is likely to have extended significantly beyond the 64-year-old threshold used in this study, and people will generally be much more productive into older age, working for more years and probably having successive careers in different sectors.

Artificial intelligence and the coming age of robotics will also impact labour productivity, although most likely initially in the developed world, where they will first offset the decline in the size of the labour force before adding to rates of growth.

Population trends will fundamentally shape Africa's future development prospects

Caveats aside, it is clear that population trends will fundamentally shape Africa's future development prospects and impact on global sustainability. Since the number of workers as a portion of the total population globally is declining, the world has entered a period of structurally slower growth that will inevitably also constrain Africa's long-term growth prospects. That is unless technology can unlock significantly higher levels of productivity able to compensate for the declining portion of the working-age population outside Africa. In the long term Africa should, however, be able to benefit from a growing labour force and improvements in technology, both of which will have an impact on productivity.

It is evident that Africa is experiencing a broad-based improvement in human well-being across various dimensions. That transition is, however, slow. While things are getting better, Africa will fall further behind global averages on metrics such as health, education and income. By 2030 poverty will largely have been eliminated elsewhere, but not in Africa, where it will remain a substantial burden to improved human and economic development outcomes globally.

Speeding up Africa's demographic transition requires concerted action in three broad areas, tailored to country specificities. The first and most impactful intervention in the short to medium term is the accelerated roll-out



AFRICA SHOULD BE ABLE
TO BENEFIT FROM A
GROWING LABOUR FORCE
AND IMPROVEMENTS IN
TECHNOLOGY IN THE
LONG TERM

of modern contraception use that soaks up and then goes beyond the pent-up demand. Early gains through this intervention will have a disproportionate positive effect further down the line. The second is female empowerment and, in particular, eliminating gender inequality in education and boosting female enrolment and graduation rates to those of males at primary, secondary and tertiary levels. A final group of interventions should target the improved health of women and children by investing in basic infrastructure such as the provision of clean water and improved sanitation.

Above all else, African leadership in low- and lower-middle-income countries (particularly in those countries that currently have high fertility rates) needs to step up to the plate. Most prominent among these are Niger, Somalia, the DRC, Mali, Chad, Angola, Burundi, Uganda, Nigeria, The Gambia, Burkina Faso and Mozambique; all countries where the total fertility rate currently exceeds five children per woman. In an additional 23 countries the average fertility rate exceeds four children per woman. This is complicated by the fact that rural fertility rates are significantly higher than those in urban areas, and that fertility rates differ according to income.

Africa needs to ensure that there is sufficient demand for jobs, as well as the political, social and economic opportunity to improve livelihoods

Upper-middle-income countries with an expanding labour force need to facilitate employment growth through investment in agriculture and manufacturing, although much of the current growth in African economies is currently in low-end services. Efforts to improve the savings and investment of aging populations need to be encouraged in those countries where the large working-age population bulge is moving through the system.

Africans need to engage candidly and robustly in public discussions and scholarly analysis on the economic and developmental implications of the continent's large youthful population. Changes in fertility reflect shifts in social and cultural norms that may take time, but while the fertility transition is slow getting started it can rapidly pick up momentum. Political leadership in discussing gender inequality, fertility and family size is vital, as are public media campaigns that demonstrate the health and economic benefits of smaller families. Changed power relations between men and women are at the root of this matter. As the World Bank noted in an extensive study on African demographics, 'the number of children that a couple have depends directly on a woman's position in the household and her bargaining power relative to that of her husband'.⁵⁰

In addition to an improved supply of healthy, educated workers, Africa needs to ensure that there is sufficient demand for jobs, as well as the political, social and economic opportunity to improve livelihoods, or face an escalated risk of social unrest. Ultimately, countries need to ensure both high levels of job creation and access to basic services to realise the dividend that comes with the expansion of a productive labour force.



AFRICANS NEED TO HAVE MORE ROBUST PUBLIC DISCUSSIONS ON THE DEVELOPMENTAL EFFECTS OF THE CONTINENT'S LARGE YOUTHFUL POPULATION

A challenge not explored in this report is unplanned urban growth. Africa is experiencing rapid and largely unplanned urbanisation that contributes to reduced fertility but also reflects an alarming trend of urban poverty growth, since Africa's urban areas do not provide significantly improved job opportunities.⁵¹ Conflict and instability, although generally lower, is also urbanising, as reflected in a recent report by the ISS.⁵²

This report has also not explored the additional benefits of advancing Africa's demographic dividend, such as the increased chance of being a liberal democracy, the prospects for less turbulence, and the lower chance of experiencing a violent political transition, all of which are strongly associated with a higher median age. Nor has it dealt with the second and third dividends that flow from fertility rates below 2.8.

The impact of the policy interventions modelled in this report on various indices of human development is large, but insufficient to completely reverse the Current Path forecast of growing divergence in average incomes between Africa and the rest of the world. Eventually Africa requires a consort of structural transitions, including agriculture and industrialisation, aspects of which have been examined in the ongoing series of publications by the ISS. None will be possible without a fundamental change in the way in which Africa is governed.

Annex

Interventions in IFs

The forecasts for this report are done using IFs version 7.34 and are benchmarked to present reasonable future progress when measured against the expected progress in two developing regions, namely:

- **South Asia** (Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka)
- **South America** (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela)

All in 2015 values	Africa	South Asia	South America
GDP (MER)	2 689 BN	3 772 BN	5 023 BN
GDP (PPP)	5 998 BN	11 428 BN	6 620 BN
Population	1 193 mil (med age 19.5)	1 823 mil (med age 26.1)	416 mil (med age 30.1)
GDP PC (PPP)	US\$5 030	US\$6 270	US\$15 900
Gini	0.413	0.3439	0.4946
Years of adult education (+15)	5.64	6.84	8.17
GEM	0.33	0.255	0.547
Average HDI score	0.528	0.6188	0.7571

All interventions commence in 2020, interpolated to 2030 (unless otherwise indicated), and are then maintained to 2100.

- Gender
 - Education primary, gender parity time for intake - years [edprindreqintn]. Interpolated from 0 to 6
 - Education primary, gender parity time for survival - years [edpringndreqsur] interpolated from 0 to 8
 - Education lower secondary, gender parity time goal for graduation - years [edseclowrgndreqgrad] interpolated from 0 to 10
 - Education lower secondary, gender parity time for transition - years [edseclowrgndreqtran] interpolated from 0 to 10
 - Education upper secondary, gender parity time for transition - years [edsecupprgndreqtran] interpolated from 0 to 10
 - Education, upper sec, gender parity time goal for graduation - years [edsecupprgndreqgrad] interpolated from 0 to 10
 - Education tertiary, gender parity time for intake - years [edtergndreqint] interpolated from 0 to 10
 - Education tertiary, gender parity time goal for graduation - years [edtergndreqgrad] interpolated from 0 to 10 by 2032

- Gender empowerment measure multiplier [gemm] interpolated from 1 to 1.4
- Contraceptive use multiplier [contrusm] interpolated from 1 to 1.6 by 2035
- Education:
 - Education, lower secondary, general, graduation rate, annual growth rate [edseclowrgragr] interpolated to 1.4
 - Education, primary survival rate, annual growth rate, per cent [edprisurgr], interpolated from 1 to 1.4
 - Education, primary, net intake rate, annual growth rate, per cent [edpriintngr] interpolated from 1 to 1.4
 - Education, tertiary, graduation rate, annual growth rate, per cent [edtergradgr], interpolated from 1 to 1.4
 - Education, tertiary intake rate, multiplier [edterintm] interpolated from 1 to 1.4
 - Education, upper secondary, general graduation rate, annual growth – per cent [edsecupprgradgr] interpolated from 1 to 1.4
 - Education, lower secondary, general, transition rate, annual growth – per cent [edseclowrtrangr] interpolated from 1 to 1.4
 - Education, upper secondary, general transition rate, annual growth – per cent [edsecupprtrangr] interpolated from 1 to 1.4
- WATSAN and electricity
 - Electricity access multiplier [infraelecaccm] interpolated to 1.3
 - Water source safe, percentage of people with access to, multiplier, unimproved [watsafem] interpolated from 1 to 0.7
 - Sanitation, improved, per cent of population with access to, multiplier, other unimproved [sanitationm] interpolated from 1 to 0.7
- Communicable disease mortality multiplier for children under 5 [hlmortcdchldm] interpolated from 1 to 0.8
- Communicable disease mortality multiplier for female adults [hlmortcdadlrm] interpolated from 1 to 0.8

Notes

Special thanks to Parfait M Eloundou-Enyegue, Zachary Donnenfeld, Lily Welborn, Julia Bello-Schünemann and Marius Oosthuizen for helpful comments and input on previous versions of this report.

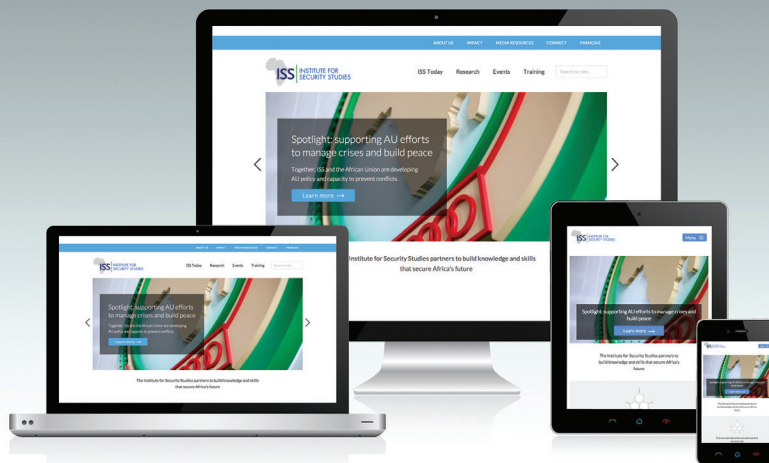
- 1 D Canning, S Raja and AS Yazbeck (eds.), Africa's demographic transition: dividend or disaster?, World Bank, African Development Forum series, 2015, 1, <https://openknowledge.worldbank.org/bitstream/handle/10986/22036/9781464804892.pdf?sequence=3&isAllowed=y>. A second dividend potentially follows much later when the large, healthy population that lives longer and earns more starts saving and investing for retirement. Other gains result from a deepening of investments in early childhood and education.
- 2 Previous reports include forecasts on fragility, violence/instability, democracy, urbanisation, development aid and the potential for Africa to achieve key Sustainable Development Goals (SDGs) in poverty, health and basic infrastructure. In addition, the Institute has completed and published a number of detailed country-level reports on the long-term developmental prospects of Ethiopia, Mozambique, Namibia, South Africa, Nigeria and Kenya, generally with a time horizon of 2030 or 2040.
- 3 Median age of 35.5 and higher. See R Cincotta, Age-structure and intra-state conflict: more or less than we imagined?, Conference Paper, 19 April 2018, https://www.researchgate.net/profile/Richard_Cincotta/publication/324653656_Age-structure_and_Intra-state_Conflict_More_or_Less_Than_We_Imagined/.
- 4 Median age 25.5 and below. Alternatively, the younger a population is, the less likely it is to be a liberal democracy and the more likely it is to lose its status as a liberal democracy were it to be one. Earlier work by the ISS using Polity IV data noted the extent to which democracy in many African states is fragile and that levels of democracy are, in fact, higher than would otherwise be expected given average levels of income and education. See J Cilliers, The future of democracy in Africa, Institute for Security Studies (ISS), African Futures Paper 19, 20 October 2016, <https://issafrica.org/research/papers/the-future-of-democracy-in-africa>.
- 5 The origins of the demographic transition are debated. Early mentions of the demographic transition include F Notestein, Population: the long view, in T Schultz (ed.), Food for the worm, Chicago: University of Chicago Press, 1945, 36–57; WS Thompson, Population, *American Journal of Sociology*, 34, 1929, 959–975.
- 6 Having many children is not only because of the expectation that some could die before reaching adulthood, but also because in economies dominated by employment in the agricultural sector (characteristic of many poor and developing countries), families need children as labour. Child labour was widespread in most agrarian societies, even during industrialisation. As these demands change, fertility rates decline.
- 7 M Roser and E Ortiz-Ospina, World population growth, Our World In Data, April 2017, <https://ourworldindata.org/world-population-growth/>
- 8 BB Hughes et al., Opportunities and challenges of a world with negligible senescence, Frederick S Pardee Center for International Futures, December 2014, 59, <http://pardee.du.edu/opportunities-and-challenges-world-negligible-senescence-0>
- 9 A first dividend might enhance labour; the second dividend might enhance capital (via savings and investments); the third dividend could enhance total factor productivity through human capital investments in the next generation (and the digital revolution). In a recent presentation at the Woodrow Wilson Center, Prof. Parfait M Eloundou-Enyegue of Cornell University (who reviewed this report) pointed to the historical sequence of these different dividends as populations proceed through the demographic transition.
- 10 R Cincotta, response to questions at Hom Nath Chalise, What is demographic dividend and how long is the demographic window of opportunity of different country?, Research Gate, https://www.researchgate.net/post/What_is_demographic_dividend_and_how_long_is_the_demographic_window_of_opportunity_of_different_country.
- 11 R Cincotta, Demography: a development perspective, in J Spear and PD Williams (eds.), *Security and development in global politics: a critical comparison*, Washington DC: Georgetown University Press, 2012, 291–310.
- 12 R Cincotta, Opening the demographic window: age structure in sub-Saharan Africa, New Security Beat, blog, 26 October 2017, <https://www.newsecuritybeat.org/2017/10/opening-demographic-window-age-structure-sub-saharan-africa/>
- 13 The model is an open-source tool and available for free at www.pardee.du.edu. It leverages historical data, identifies and measures trends, and models dynamic relationships to forecast hundreds of variables for 186 countries for every year from 2015 to 2100.
- 14 M Roser and E Ortiz-Ospina, World population growth, Our World in Data, April 2017, <https://ourworldindata.org/world-population-growth>.
- 15 UN Population Division, Population indicators, <https://esa.un.org/unpd/wpp/Download/Standard/Population/>
- 16 International Institute for Applied Systems Analysis (IIASA), The approach to human capital projections, http://www.iiasa.ac.at/web/home/research/researchPrograms/WorldPopulation/Projections_2014.html
- 17 From US\$3 482 to US\$4 685 in constant 2017 US\$ at PPP.
- 18 J Bello-Schünemann et al., African futures: key trends, ISS, 26 June 2017, <https://issafrica.org/research/books-and-other-publications/african-futures-key-trends>
- 19 For the first scenario *gdpadjsw* was set to 0 and *gdprext* interpolated to 20 from 2018 for five years and maintained at that level to 2030. For the second scenario *gdpadjsw* was set to 0, *gdprext* interpolated to 12 from 2018 for five years and maintained at that level to 2030, and *ginidomm* interpolated from 1 in 2018 to 0.5 by 2023 and maintained at

- that level to 2030. Scenarios done in IFs 7.33P. For the historical period 2000 to 2015 (using data from the WDI) only Equatorial Guinea, Ethiopia and Rwanda improved net GDP by an annual average of more than 5%. A forecast for economic growth for the period 2016 to 2030 using IFs indicates that only Ethiopia and Libya will meet the 5% annual benchmark. The country group where average net growth is more than 5% for 2031 to 2045 consists of a healthy 13 countries (Angola, Republic of Congo, Côte d'Ivoire, Ethiopia, Kenya, Lesotho, Liberia, Libya, Mozambique, Rwanda, Tanzania, Togo and Uganda). But that more positive prognosis only comes about after the 2030 target year.
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 - 28 See, for example, R Sharma, *The rise and fall of nations: ten rules of change in the post-crisis world*, London: Penguin Random House, 2016, 28–29. The annual rate at which the world population increases peaked at 2.2% in 1962/3. It has since fallen to roughly half of that (currently the rate at which the global population expands annually is roughly 1% per year), ending the period of rapidly accelerated population growth experienced after the Second World War.
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- 41** The median age of the various regions is as follows (for 2018): Europe – 43 years; North America – 38; East and Southeast Asia – 36; Russia and the Caucasus – 35; Oceania – 34; Latin America and the Caribbean – 30; Middle East and North Africa – 28; South Asia – 27; and sub-Saharan Africa – 19.
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