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DEVELOPMENT TRENDS REPORT
FOR SOUTH AFRICA

This publication was produced for review by the United States Agency for International Development.
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FEBRUARY 2017

INTRODUCTION

More than two decades after the end of Apartheid, low economic growth, corruption and inequality constrains South Africa's development. It is a middle-income country with a well-educated and increasingly healthy labor force (having made great strides combatting AIDS and other communicable diseases). Yet the economy suffers from two interrelated sets of problems that infrequently occur simultaneously: 1) significant inequality in access to services and wealth and 2) a lack of investment in skills, governance and technology needed to push the country through the middle-income passage.

Social unrest and protest have become common occurrences in South African life. Universities in South Africa have recently been embroiled in conflict over tertiary education fees. Townships have mobilized against poor access to water and sanitation. And recent episodes of xenophobic violence have resulted in hundreds of deaths. The future of development in South Africa depends significantly on how the government can respond to these multiple threats.

South Africa is vital in the region. It has the largest population in Southern Africa and the second largest economy on the continent, with a GDP per capita among the top 10 highest in Africa. It enjoys deep and wide political and economic connections with other countries in the region and is an emerging global middle-power, member of the BRICS, and its relationship with China portends broader international ambitions.

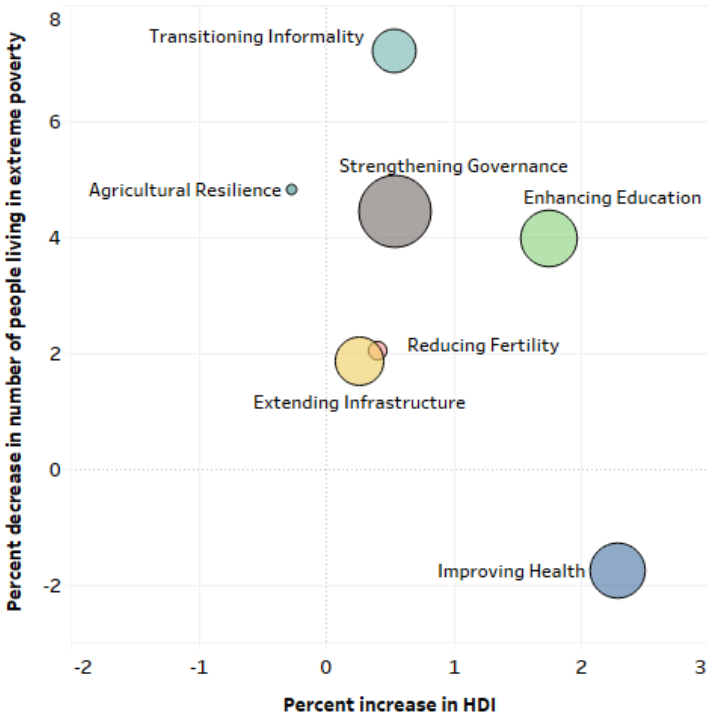
All policy choices involve tradeoffs, either explicit or implicit. Investing more money in the education sector, for example, removes resources that could have been spent on health, infrastructure or security. An investment in education can pay significant dividends by producing more highly skilled workers and more educated electors. But such investments — as with so many forms of government spending — take time to improve welfare. This report uses the International Futures (IFs) modeling platform to evaluate these tradeoffs. We explore policy interventions over a five-year period, as well as their associated impacts across a wide range of human, natural and social systems to the year 2040.

FIGURE 1: DESCRIPTIONS OF SPECIFIC INTERVENTIONS USED IN THE COMBINED SCENARIOS.

Agricultural Resilience	Increases agricultural yield, land under cultivation, domestic food demand and access to food
Enhancing Education	Removes educational bottlenecks in terms of enrollment and survival rates at various levels education (i.e. primary, lower secondary, upper secondary, and tertiary)
Improving Health	Simulates the implementation of a comprehensive and non-disease-specific health system in South Africa that targets the drivers of disease, including a reduction in obesity and child malnutrition, and an increase in WASH access, paired with additional reductions in HIV/AIDS incidence and deaths
Extending Infrastructure	Reflects improvements in access to clean water and improved sanitation, and extends access to electricity to a similar degree planned for under Power Africa
Reducing Fertility	Simulates a reduction in the fertility rates and maternal mortality in South Africa through the implementation of family planning programs
Transitioning Informality	Reduces the size of the informal sector by strengthening ties between the formal and informal sectors, simplifying the regulatory environment and increasing household transfers for pensions and welfare to unskilled labor
Strengthening Governance	Addresses structural challenges in South Africa with respect to government transparency, effectiveness, and gender empowerment.

Figure 1 presents a summary of these tradeoffs by evaluating the impact of issue-focused interventions compared with the IFs Current Path scenario in 2040 on absolute poverty reduction (the vertical axis), improvements on the Human Development Index (the horizontal axis) and per capita economic growth (the bubble size).

FIGURE 2. EXPLORING THE IMPACT OF POLICY TRADEOFFS IN 2040 IN SOUTH AFRICA. International Futures 7.27.



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040.[1] Bubble size represents percent increase in GDP (MER).[2]

More than twenty years after the end of Apartheid, low economic growth, corruption, and inequality constrains South Africa's development today.

When compared with South Africa's current development path, a push to improve governance could decrease poverty by close to 4.5 percent more by 2040, while improving HDI by about 0.5 percent. The governance intervention results in South Africa's GDP growing from nearly 450 billion in 2016 to over 850 billion by 2040. This represents an increase in GDP of nearly 60 billion relative to the Current Path in 2040. Tackling economic informality could reduce poverty by close to 7 percent. In this scenario, South Africa's GDP grows to 815 billion in 2040, an increase of over 20 billion in 2040 relative to the Current Path. An integrated education push could reduce poverty by about 4 percent and increase GDP by nearly 40 billion in 2040. Infrastructure, though important, has less direct impact on poverty and HDI, but could add 26 billion to GDP in 2040. Agriculture interventions in South Africa aimed also at extending access to food could reduce poverty by 4 percent.

Notably, while the health scenario improves HDI, it results in an increase in poverty to 2040 compared with the Current Path. This happens for two reasons. First, there has already been a sustained investment in reducing the burden of communicable disease deaths. Second, health interventions alone may not significantly to change the economic status of those whose lives they save. Interventions to reduce fertility and maternal mortality could reduce poverty levels by 2 percent. The fertility rate intervention also has a limited impact on development outcomes because the current level of South African fertility is already relatively low and falling. Today, South Africa's fertility rate is around 2.3 children per woman, compared with a regional average of 4.7.

Below is a summary of the percent change in different development indicators in the scenario compared to the Current Path in the year 2040 for South Africa. The strengths and weaknesses of each scenario, as well as the relative costs and benefits, are dependent on the definition and metrics used to define "development." We have adjusted each of the scenarios to make them comparable across issue areas.

[1] HDI is the UNDP's Human Development Index, a composite index of health, education, and standard of living.

[2] All GDP figures are in constant 2011 US Dollars.

FIGURE 3. COMPARING INTERVENTIONS ON SELECTED OUTCOMES IN 2040 FOR SOUTH AFRICA.
IFs 7.27

Scenario Name	Reduction in Absolute Poverty	Reduction in Carbon Emissions	Increase in Educational Attainment	Increase in GDP (MER)	Increase in GDP per capita (PPP)	Increase in Government Revenue	Increase in HDI	Reduction in Infant Mortality	Increase in Life Expectancy	Reduction in Malnourished people	Reduction in Poverty
Agricultural Resilience	4.8	0.0	-0.1	-0.2	0.1	1.1	-0.3	4.1	-0.3	50.2	2.9
Strengthening Governance	4.4	-2.3	0.3	7.4	4.9	8.0	0.5	3.2	0.4	2.5	3.2
Improving Health	-1.8	-2.3	0.3	4.3	1.2	4.6	2.3	14.7	4.1	-1.7	-1.9
Enhancing Education	4.0	-1.5	1.7	4.6	3.0	4.8	1.7	4.3	0.5	1.6	2.7
Reducing Fertility	2.0	0.8	1.5	-0.5	0.5	-0.3	0.4	0.6	0.3	1.6	1.8
Transitioning Informality	7.2	-0.8	0.7	2.7	1.8	7.9	0.5	2.7	0.3	1.6	4.4
Extending Infrastructure	1.8	8.4	-0.1	3.2	2.1	3.4	0.1	4.8	0.3	1.1	1.3

Each value is percent change relative to the Current Path in 2040.

PURPOSE & METHODS

All policy choices involve tradeoffs, either explicit or implicit.

Improving development outcomes requires an understanding of long-term trends and the tradeoffs implicit in policy decisions. The International Futures (IFs) platform produces reasonable expectations for how the region is evolving now and how prioritizing different types of policy interventions in South Africa over the next five years (to 2021) might impact broader, long-term country-level and regional development outcomes (to 2040).

INTERNATIONAL FUTURES (IFS)

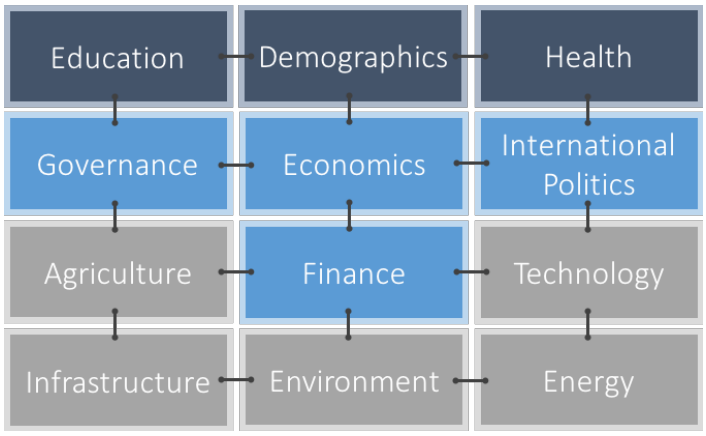
International Futures (IFs) is a free and open-source quantitative tool for thinking about long-term futures. The platform helps users to understand dynamics within and across global systems, and to think systematically about potential trends, development goals and targets. The software is not designed to predict. Instead, IFs forecasts — which are calculated using historical data and a mix of quantitative modelling approaches — offer a broad and transparent way to think about the tradeoffs in policymaking.

There are three main avenues for analysis in IFs: historical data analysis (cross-sectional and longitudinal) of more than 3,500 series, Current Path analysis (how dynamic global systems seem to be developing), and alternative scenario development (exploring if-then statements about the future). To do this, IFs integrates relationships across 186 countries and 12 core systems, including: agriculture, demographics, economics, education, energy, environment, finance, governance, health, infrastructure, international politics, and technology. The sub-models for each system are dynamically connected, so IFs can simulate how changes in one system may lead to changes across all others (see Figure 4). As a result, IFs endogenizes more variables and relationships from a wider range of key development systems than any other model in the world.

IFs is developed by The Frederick S. Pardee Center for International Futures, based at the Josef Korbel School of International Studies at the University of Denver in Colorado, USA. It was originally created by Professor Barry B. Hughes.

Learn more about IFs or download the tool for free at pardee.du.edu.

FIGURE 4.
A REPRESENTATION OF THE SYSTEMS INCLUDED IN THE INTERNATIONAL FUTURES (IFS) MODEL.



ABOUT THE CURRENT PATH SCENARIO

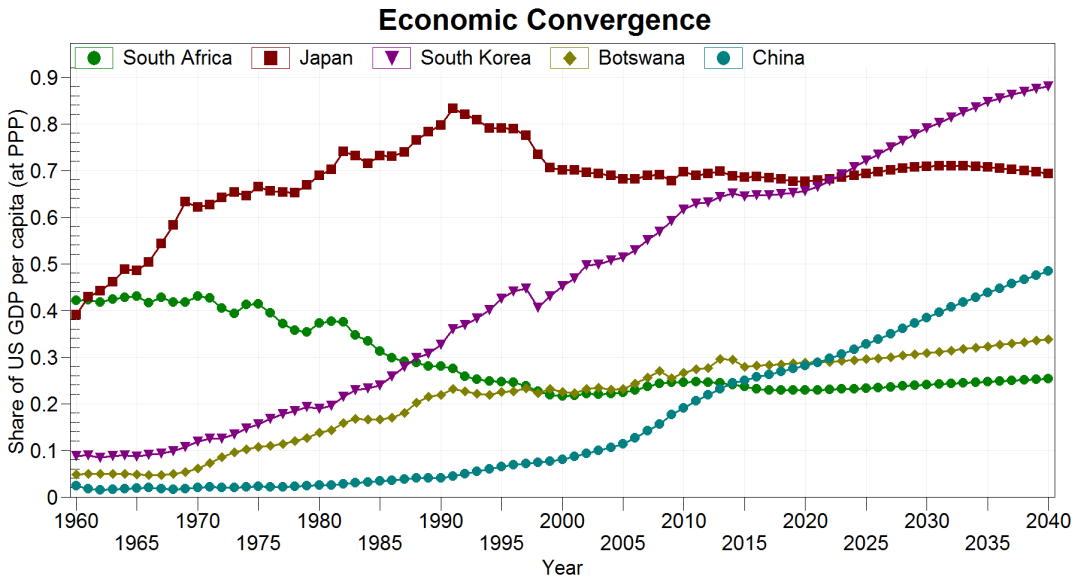
The IFs Current Path is a collection of interacting forecasts that, while dynamic, represent a continuation of current policy choices and environmental conditions. Although the Current Path generally demonstrates continuity with historical patterns, it provides a structure that generates a wide range of non-linear forecasts rather than just a simple linear extrapolation of historical trends. The Current Path assumes no major paradigm shifts, seismic policy changes or impactful low-probability events. Given that the Current Path is built from initial conditions of historical variables and is analyzed in comparison to other forecasts of particular issue areas, it can be a valuable starting point to carry out scenario analysis and construct alternative future scenarios.

ECONOMIC CHALLENGES IN SOUTH AFRICA

THE MIDDLE-INCOME TRAP AND WEALTH IN SOUTH AFRICA

Between 1960 and 1970, South Africa's GDP per capita grew from $4,764 to $6,586 (MER). Since then, South Africa has been unable to grow at the same pace as its high-income peers, and its GDP per capita has only increased to around $8,235 (MER) in 2015. South Africa is stuck in the "middle-income trap" (MIT), a term for countries struggling to move from middle-income to high-income levels of development. Since then, the country has been unable to grow at the same pace as its high-income peers, leaving it stuck in the "middle-income trap" (MIT), a term for countries struggling to move from middle-income to high-income levels of development. The graph below shows GDP per capita growth (as a share of US GDP per capita) from 1960 to 2040. South Africa's per capita GDP has declined relative to that in the United States between 1960 and 2010 from approximately 40 percent to less than 30 percent by 2016. Compare that to South Korea—a country that successfully escaped the middle-income trap—which saw its per capita GDP rise from 10 percent of the US level to close to 65 percent by 2016. Japan also saw per capita income growth from 40 percent to 70 percent of the US level.

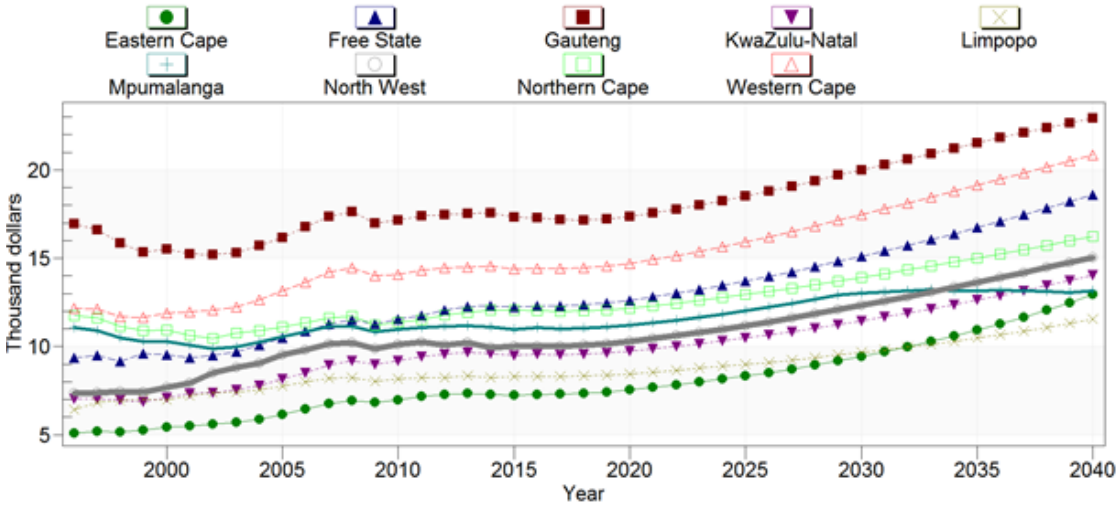
FIGURE 5. SHARE OF US GDP PER CAPITA, 1960-2040 OF SOUTH AFRICA, JAPAN, SOUTH KOREA, BOTSWANA, CHINA.
IFS Version 7.27



Countries get stuck in the MIT because they lack sufficient historical investment in human, social, and infrastructure systems to compete with higher income countries, and simultaneously have higher labor costs than other less developed economies. To successfully navigate the middle-income passage, the country must position itself to absorb and disseminate innovation from abroad—and eventually become innovators itself. This requires investment in skills and technology, and the creation of a political and economic environment conducive to business and entrepreneurial growth.

Between 1994 and 2016 South Africa's national GDP per capita grew from $4,391 to $12,310 (PPP). This progress, however, has been uneven. Per capita GDP ranges from roughly $7,300 in Eastern Cape to $17,600 in Gauteng. IFs forecasts that Gauteng's GDP per capita could be as high as $23,000 by 2040 (similar to that of Russia today), while Limpopo could have about half that amount in per capita income (still below today's national average).

FIGURE 6. GDP PER CAPITA BY PROVINCE IN SOUTH AFRICA FROM 1960-2040.
IFS Version 7.26



South Africa is one of the most unequal countries in the world and, along its Current Path, is forecast to remain so through 2040.

INCLUSIVE GROWTH AND POVERTY

South Africa's social and economic development has been characterized by two groups: those who have largely benefited from the country's economic growth and rising prosperity, and those who have been left behind. Sustaining productive economic development requires broad-based, equitable, and inclusive growth across sectors and inclusive of the majority of the population's labor force (World Bank, 2009). Along the Current Path, the benefits of growth in South Africa have largely accrued to the top income segments of the population. According to the Gini index,[3] a commonly used measure of inequality, South Africa is the most unequal country in the world and, on its Current Path, is forecast to remain so through 2040.

A legacy of structural inequality in South Africa has led to high levels of unemployment. In 2015, approximately 1 in 4 working age South Africans was unemployed, while the unemployment rate among youths might be as high as 50 percent (World Bank, 2015). High unemployment is a long-term issue in South Africa, averaging more than 20 percent of the workforce between 1994 and 2012. Moreover, South Africa's labor market is highly selective and competitive, restricting employment and earnings to the highly skilled segments of the labor force (Liebbrandt et al, 2012; Levy et al, 2015). Unemployment reduces consumption and removes the household safety net, both of which can act as a drag on economic growth (Nicols et al, 2013).

High levels of economic inequality and a long history of slow economic growth mean poverty levels in South Africa remain high. IFs estimates that in 2016 close to 9 million people lived on less than $1.90 per day (the global benchmark for extreme poverty) in South Africa, while an estimated 18 million people live on less than $3.10 per day (the global benchmark for poverty). Despite its status as one of the wealthiest countries in the region, South Africa accounts for close to 10 percent of the population living on less than $1.90 per day in the Southern Africa region, and close to 15 percent of the region's total population living on less than $3.10 per day (a function of South Africa's relatively large population that accounts for 27 percent of the regional total).

Despite wide-ranging policies from the government, poverty remains a challenge. Even as extreme poverty remains flat as a percent of the total population, the number of people living on less than $1.90 per day is expected to grow across the forecast horizon. This absolute growth in poverty is a function of population growth, inequality, and slow economic growth. Table 2 shows forecasts of the poverty headcount at two thresholds: $1.90 per day and $3.10 per day. IFs Current Path forecasts that by 2040, an estimated 10.8 million people could be living on less than $1.90 in South Africa, and close to 21 million living on less than $3.10 per day (an additional 1 and 2 million respectively from levels today).

[3] The Gini index measures inequality on an index from 0 to 1. 0 represents perfect equality, whereas 1 represents perfect inequality.

FIGURE 7. POVERTY (MILLIONS OF PEOPLE) IN SOUTH AFRICA.
IFS Version 7.27

	2016	2021	2040
Less than $1.90 per Day	8.8	9.3	10.8
Less than $3.10 per Day	18.7	19.3	21.1

Overcoming the middle-income trap requires investing in skills development (through education and training), technological adoption and dissemination, and an economic environment that includes rather than excludes broad swathes of the population. Fostering the right growth, human capital development, and poverty reduction requires inclusive and broad-based access to basic services like education, health, and infrastructure. These topics will be covered in more detail throughout this report.

GOVERNANCE

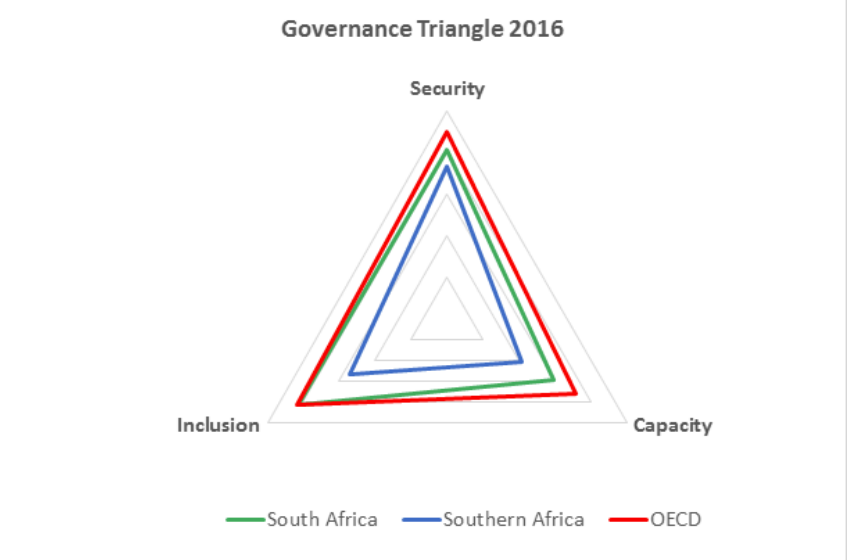
Governance in South Africa today is at a crossroads. Overcoming the country's many development challenges requires the government to maintain peace and stability while expanding service delivery and promoting equitable, inclusive growth.

Governance in South Africa today is at a crossroads. Since 1994, the ruling African National Congress (ANC) has improved both access and service delivery and instituted generous pro-poor policies. And yet, economic and social inequality remains deeply entrenched. An estimated 7 in 10 South Africans feel their government is performing "fairly badly" in important social issues such as fighting corruption, narrowing inequality, reducing crime, and managing immigration (Chingwete, 2015). The education system suffers from significant gaps in access, accountability, and a teachers' union that does not put students' interests first. Access to basic services like clean water, sanitation, and electricity remains uneven.

Addressing the many development challenges confronting the country requires the ability of the government to maintain peace and stability while expanding service delivery and promoting equitable, inclusive growth. Governance represents the nexus that can most directly cut across the crucial sectors of human development.

Below we track the forecasted development of governance in South Africa across three interacting dimensions: security, capacity, and inclusion. In IFs, governance is conceptualized as proceeding in overlapping stages: 1) states first consolidate a monopoly on the legitimate use of force (security), then 2) states build bureaucratic capacity and ability to administer their territory (capacity), and finally 3) states make a transition towards more inclusive forms of governance (inclusion) (Hughes et al., 2014).

FIGURE 8. IFS GOVERNANCE TRIANGLE IN 2016.
IFS Version 7.27



Southern Africa Region figures exclude South Africa. Security, Inclusion, and Capacity indices are measured on a scale of 0 to 1.

On each of these three IFs indices, South Africa outperforms the Southern Africa region (excluding South Africa) as a whole. Yet South Africa falls short of OECD countries, particularly with respect to capacity. IFs forecasts steady improvement along each index to 2040 (Table 3). By 2040, South Africa's scores are forecast to align closely to those of the OECD countries today.

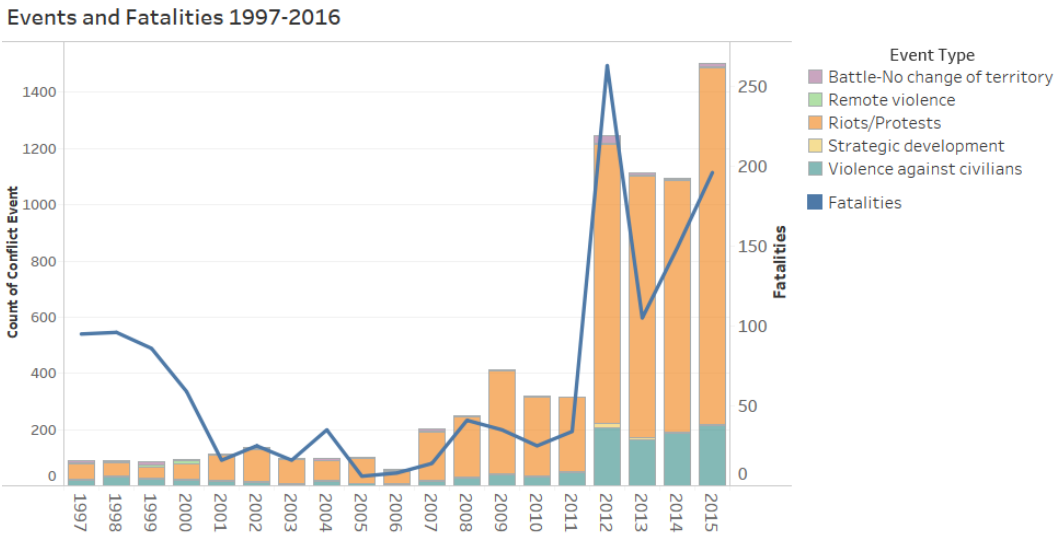
FIGURE 9. IFS GOVERNANCE INDEX IN SOUTH AFRICA, SOUTHERN AFRICA AND OECD COUNTRIES IN 2016 AND 2040.
IFS Version 7.27

	Security			Capacity			Inclusion		
	2016	2040	% Change	2016	2040	% Change	2016	2040	% Change
South Africa	0.81	0.89	10.0	0.59	0.92	21.4	0.83	0.89	7.5
Southern Africa Region	0.74	0.78	5.4	0.42	0.46	9.5	0.54	0.58	7.4
OECD	0.90	0.93	3.0	0.72	0.88	21.5	0.84	0.87	4.3

SECURITY

Along the IFs Current Path forecast, the likelihood of wide-spread violent conflict in South Africa is low. Event data on demonstrations, however, shows a spike in the number of protests and riots since 2011 (Figure 10). The South African Department of Labour reported a 608 percent increase in the number of days lost due to strikes between 2013 and 2014.

FIGURE 10. EVENTS AND FATALITIES FROM SOCIAL UNREST IN SOUTH AFRICA, 1997-2015
ACLED, 2016



Many underlying drivers of instability exist in South Africa. The young population is relatively large, and economic opportunities are limited. In addition—like Arab Spring countries—the populations are relatively well educated with access to information. Notably, South Africa enjoys much higher levels of formal governance inclusion as well as strong institutions than the rest of the region—two factors that can help mitigate destabilizing pressures. The security situation in South Africa, however, remains an acute concern.

Through inclusive policies, South Africa could leverage their demographic momentum to power economic growth, human capital, and a more powerful position in the global economy.

FIGURE 11. YOUTH AND URBANIZATION DEMOGRAPHICS OF SOUTH AFRICA ALONGSIDE UPPER-MIDDLE INCOME COUNTRIES AND THE OECD.

Egypt, Tunisia, and Libya provided as reference for Arab Spring. All population and unemployment figures are as percent of total. Youth bugle represented as portion of population between the years of 15 and 29 over the total adult population. Pop U15 represents the percent of the population under 15.

To mitigate the risks of instability, governments need to respond to the needs of their population with more effective and inclusive delivery and access. Through inclusive policies, South Africa could leverage their demographic momentum to power economic growth, human capital, and a more powerful position in the global economy.

	Unemployment Rate (most recent)	Urban Pop (2016)	Pop U15 (2016)	Youth Bulge (2011)	Youth Bulge (2016)	Average Years of Ed (2016)	Urban Pop (2040)	Pop U15 (2040)	Youth Bulge (2040)	Average Years of Ed (2040)
South Africa	25	66.5	29.1	0.43	0.40	8.9	87.6	21.7	0.30	10.6
Egypt	13	43.0	33.2	0.43	0.39	7.5	45.5	24.8	0.35	9.3
Libya	19	78.9	29.4	0.39	0.34	9.0	83.6	19.7	0.28	10.5
Tunisia	13	66.1	23.5	0.36	0.31	8.0	72.4	17.8	0.26	10.0
Upper-Middle Income	6.3	65.2	20.7	0.33	0.29	8.9	88.5	16.4	0.23	10.5
OECD	7.4	80.9	18.0	0.25	0.24	11.4	87.9	15.8	0.20	12.5

CAPACITY

Governance capacity is a function of the government's strength and quality, which determines how effectively it can respond to the population and territory within its jurisdiction. The strength of governance is measured by its ability to generate revenue. Its quality is measured by its level of effectiveness and transparency. South Africa's government capacity exceeds that of the Southern Africa region, but falls short of the levels of OECD countries. Capacity is forecast to improve in the Current Path, though slowly.

Despite the forecasted improvements across the horizon, there are multiple threats to South Africa's governance today. Corruption is one such deep, underlying threat. Pervasive government corruption reduces government effectiveness, places the needs of elites above those of the population, reduces public faith in institutions, and undercuts legitimacy. Corruption allegations have followed current South African President Jacob Zuma for much of his administration. Close to 46 percent of citizens say that "most, or all" officials in the Presidency are involved in corruption, up 11 percentage points since 2011 (Lekalake, 2015).

Globally, South Africa is ranked 65th in terms of its level of government transparency (considered here as the perceived absence of corruption). While IFs forecasts the level of transparency to improve to 2040, South Africa's global ranking is forecast to worsen, falling from 65th to 72nd.

Corruption also has direct impacts on the informal economy. The informal sector is an umbrella term for economic activity produced by "unincorporated enterprises and/or informal units that have some market production" (OECD, 2014). It increases the cost of doing business in the formal economy, makes ownership of profits and assets unreliable, and creates barriers to entry that encourages many entrepreneurs to operate informally, to avoid paying bribes or to bypass over-burdensome red tape, for instance. Corruption in social services also makes them restrictive and available only those who can afford them, leading to the creation of informal social services in the informal sector (World Bank, 2016). Greater economic informality also reduces the ability of governments to earn revenue and build strength and capacity. In 2016, IFs estimates that close to 33 percent (5.8 million people) of South Africa's non-agricultural labor force is active in the informal sector. While informal employment is forecast to decrease, in both absolute and relative terms, along South Africa's Current Path 3.5 million people could still be employed informally by 2040. Economic informality is forecast to remain a challenge for South Africa across the forecast horizon.

INCLUSION

Gender empowerment, economic freedom, and regime type—the level of institutional democracy—are inputs used to measure inclusion in IFs. According to the Gender Empowerment Index, South Africa is the 30th most inclusive country in the world. South Africa was classified as "Free" according to the Freedom Index, a global index measuring levels political and individual freedom. It also is highly institutionally democratic, with a score of 19 out of 20 points on the Polity scale in 2016.[4]

Despite the relatively high level of institutional democracy and relative openness, South Africa's government system today is operating under rising domestic pressure and disillusionment with the leadership and governance of the ruling African National Congress (ANC). Dissatisfaction stems from many of the issues identified throughout this report: persistent and deep rooted economic inequality, corruption, and uneven access to important services like education, healthcare, and basic infrastructure. In the August 2016 municipal elections, the ANC suffered its worst outcome since 1994. The Democratic Alliance (DA) now controls Cape Town, Johannesburg (in coalition government) and other cities.

These pressures underscore the acute challenges facing South Africa's governance. The increase in social protests, coupled with underlying drivers of instability, including high unemployment, a youthful population and relatively high education, mean security will remain a challenge. These security concerns, coupled with a lack of transparency, poor management of South Africa's economy and assault on her institutions may lead to a backlash that could further undermine the government's capacity and eventually compromise the security of the nation.

[4] The Polity dataset is produced by the Polity IV project. It measures country regime type on a scale of 0 to 20. 0 represents complete autocracy and 20 represents complete democracy

GOVERNANCE SCENARIOS

In this subsection, we explore a variety of scenarios aimed at improving governance in South Africa. These scenarios are grouped into two larger intervention sets: Strengthening Governance and Transitioning Informality. Strengthening Governance is comprised primarily of scenarios which address issues of government performance, including (1) Increased Transparency, (2) Greater Gender Empowerment, (3) More Effective Governments, and (4) Zero Conflict. Transitioning Informality includes (1) Strengthened Formal-Informal Linkages, (2) Improved Business Regulation, (3) Unskilled Transfers, and (4) Increased Firm Tax.

FIGURE 12. GOVERNANCE SCENARIOS

Strengthening Governance

In **Increased Transparency**, South Africa's government makes progress in the fight against corruption on par with improvements made by Namibia since 2012. This translates into a 15 percent increase in transparency by 2021 relative to the Current Path.

In **Greater Gender Empowerment,** we simulate an increase in gender empowerment in South Africa over the next five years. Gains between 2016 and 2021 under this scenario equate to an increase of 0.06 of the GEM score, bringing South Africa in line with levels of gender empowerment seen in Portugal today.

The **More Effective Governments** scenario simulates improvements in government effectiveness (capturing changes in service delivery, business regulation and tax collection) from 2.8 to 3.04 points (increase of 0.23) resulting in an overall increase of effectiveness in South Africa in 2040 from 2.31 in the Current Path to 3.14 in the scenario, which is similar to levels seen in Namibia today.

In **Zero Conflict**, we reduce the risk of internal war to zero for South Africa by 2021.

Transitioning Informality

The first scenario simulated strengthened ties between the formal and informal sectors. This allows the informal sector to become embedded within a formal production process, shifting a portion of the informal production (or informal GDP) towards the formal sector. Titled **Strengthened Formal-Informal Linkages,** informal production in South Africa is reduced by 5 percent relative to the Current Path over five years. This reduces informal GDP from 12.4 percent in 2016 to 11.2 percent in 2021—a decrease similar to regional improvements from 2000 to 2005.

Improved Business Regulation seeks to model improvements in the regulatory environment such that by 2021, South Africa's regulatory score comes within 1 percent of the global average—bringing South Africa roughly in line with today's level of business regulation found in Colombia.

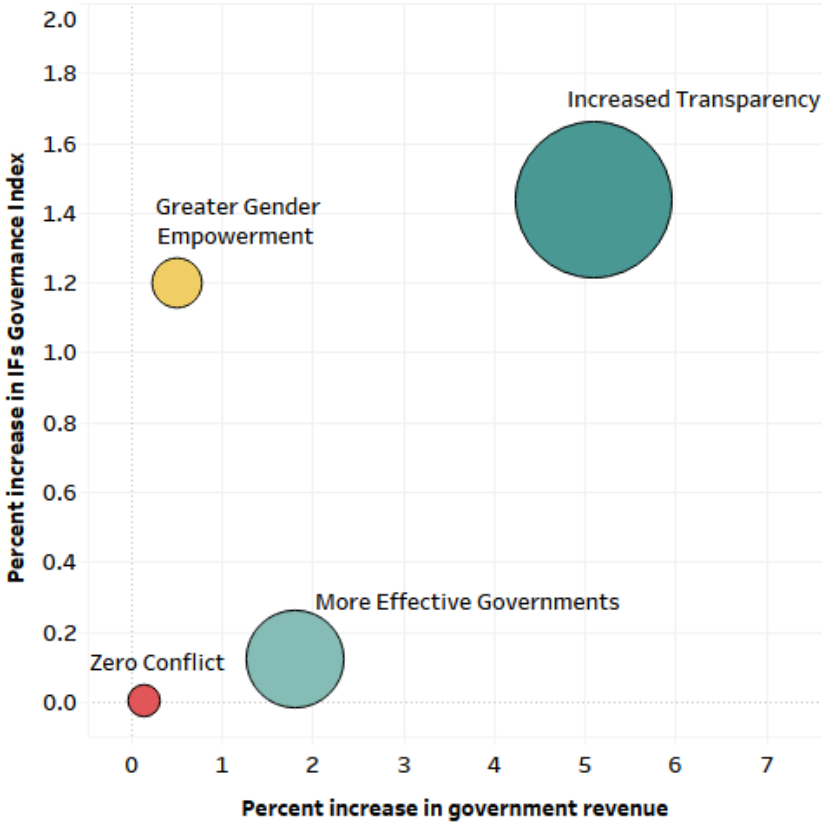
In the **Unskilled Transfers** scenario, government transfers to unskilled households for pensions and welfare increase by 10 percent (relative to the Current Path) over the next five years. This translates into an increase from $87 billion annually in 2016 to $97 billion in 2021 in South Africa.

Raising the tax rate can also push businesses into the informal sector. In the **Increased Firm Tax** scenario, we increase the tax rate by approximately 20 percent (relative to the Current Path) over 5 years, a modest but reasonable intervention given that Botswana increased taxes by 47 percent between 2005 and 2015.

STRENGTHENING GOVERNANCE AND TRANSITIONING INFORMALITY

Figure 13 evaluates the governance scenarios across three indices compared with the Current Path in 2040: the y-axis represents the percent change in the IFs Governance Index (security, capacity, and inclusion), the x-axis represents the percent increase in government revenue, and the bubble size is the change in GDP per capita.

FIGURE 13. EXPLORING THE IMPACT OF INTERVENTIONS TO IMPROVE GOVERNANCE IN 2040 IN SOUTH AFRICA.
IFS Version 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario. Size of the bubbles represent percent increase in GDP per Capita (PPP) compared to the Current Path in 2040.

Increased Transparency simulates a concerted push to reduce corruption, removing a substantial impediment to broad-based economic growth. This results in an improvement in government revenue and output. More Effective Governments improves revenue generation and generates an extra $14 billion in GDP growth relative to the Current Path in 2040 by creating a more inclusive economic environment. The broad-based female societal inclusion simulated in Greater Gender Empowerment results in a large improvement in IFs Governance Index but fewer economic returns, largely because South Africa already has a well-educated and working female population. Reducing the probability of conflict (Zero Conflict) is forecast to have minimal impact here because the IFs Current Path forecast of domestic instability is already low in South Africa.

Strengthening Formal-Informal Linkages (effectively formalizing previously informal economic activity) increased government revenue from $158 billion in 2016 to $347 billion in 2040, a 4.6 percent increase relative to the Current Path. In Unskilled Transfers, 550 thousand fewer people live in extreme poverty (less than $1.90 per day) by 2040. In Increased Firm Tax government revenue grows by a cumulative $32 billion relative to the Current Path. Improved Business Regulation boosts GDP per capita by making it easier to formalize economic activity, start a business, and make productive investments. In this scenario, formal employment increases by 8

The average South African today has only completed lower secondary school, while less than 1 percent of the population has completed tertiary education. By 2040, only 6 percent of South African adults are forecast to have completed tertiary education.

percent relative to the Current Path by 2021, resulting in a cumulative $75 billion in GDP and $40 billion in government revenue by 2040.

Figure 14 shows results of each governance intervention on select outcome indicators,

FIGURE 14. IMPACT OF INTERVENTIONS ON INFORMALITY AND GOVERNANCE IN 2040. FS 7.27

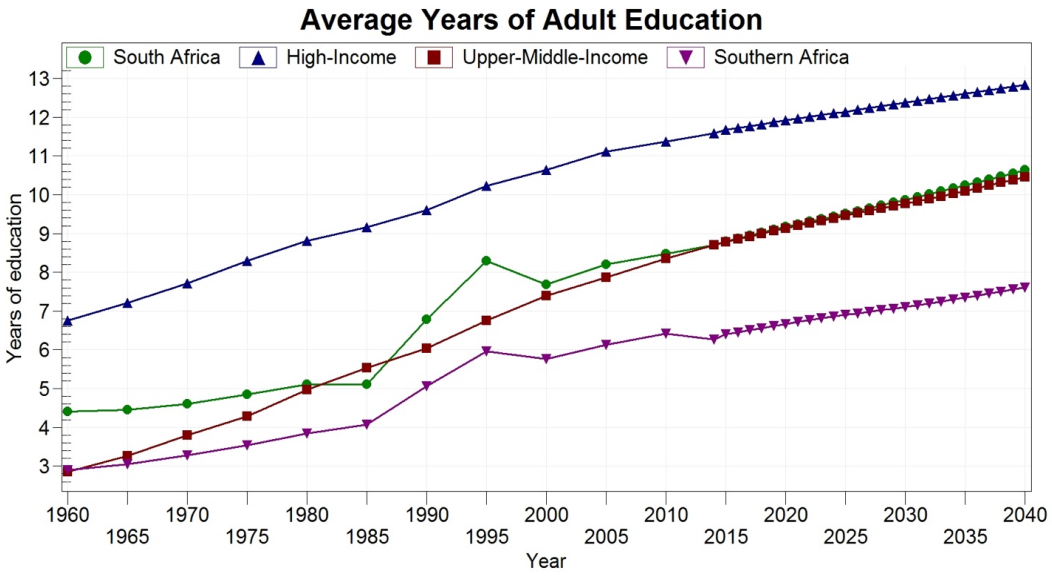
	Percent reduction in informal GDP	Percent reduction in informal labor	Percent increase in GDP at MER	Percent increase in government revenue	Percent increase in unskilled household income (% GDP)	Percent increase in household consumption
Formal-Informal Linkages	6.9	7.8	2.5	4.6	2.9	1.4
Business Regulation	7.1	18.6	0.2	0.3	0.2	0.3
Unskilled Transfers	3.4	8.5	-0.3	1.3	2.2	0.4
Firm Tax	-4.0	-10.4	0.2	0.8	0.1	0.2
Transitioning Informality (combined scenario)	12.9	23.8	2.7	7.9	6.0	2.4

Each value in the table is expressed as a percent relative to the IFs Current Path Scenario in 2040.

EDUCATION

Education is a universal human right. It is also necessary for improving economic productivity and building the skilled labor force required to push countries into higher tiers of development. Economic growth slowdowns are much less likely to occur in countries with high levels of secondary and tertiary education (Eichengreen et al, 2013). In South Africa, the average years of education among the population (aged 15+ years) was 8.8 in 2016, compared with a regional average of 6.5 years. Nevertheless, the average South African has only completed lower secondary school, and only 29 percent of the population has attained an upper secondary education by 2016. Today, less than one percent has completed tertiary education.

FIGURE 15. AVERAGE YEARS OF EDUCATION (POPULATION AGED 15+ YEARS) IN SOUTH AFRICA, SOUTHERN AFRICA REGION, HIGH INCOME, AND UPPER-MIDDLE INCOME COUNTRIES, 1960-2040.
IFS 7.27



By 2040, the average South African is forecast to have 10.6 years of education, which is in line with the average across upper-middle income countries but still below the average found in OECD countries today. By 2040, an estimated 92 percent of South Africans aged 15 or older are forecast to have completed primary education, but only 52 percent of South Africans will have completed secondary education. Only 6 percent of South African adults are forecast to have completed tertiary education, which is low when compared to an average tertiary attainment rate of 24 percent across upper-middle income countries in 2040 and 32 percent attainment in high-income countries.

While current protests focus on university access, low upper secondary survival rates mean that tertiary education access remains narrowly restricted. South Africa should prioritize interventions at lower levels of education to help ensure more students reach tertiary education.

FIGURE 16. EDUCATION COMPLETION RATES FOR SOUTH AFRICA, SOUTHERN AFRICA, UPPER-MIDDLE INCOME AND HIGH INCOME COUNTRIES IN 2016, 2021, 2040.
IFS Version 7.27

	Primary Completion			Secondary Completion			Tertiary Completion		
	2016	2021	2040	2016	2021	2040	2016	2021	2040
South Africa	82.5	84.9	91.8	28.8	33.3	52.5	0.8	1.6	6.3
Southern Africa	65.9	69.4	79.4	16.7	18.5	27.5	1.4	1.8	4.2
Upper-Middle Income	86.1	87.5	92.2	53.8	55.9	64.5	9.2	12.7	24.1
High Income	95.7	96.1	97.6	67.2	68.8	74.6	19.2	22.1	32.3

Numbers are as a percent of population 15+

While many have focused on the excessive influence of the teacher's union at lower levels of education, improving tertiary education outcomes, by both expanding access and quality, is essential to overcoming the middle-income trap for South Africa. Improving education outcomes at a national level requires the administrative capacity and necessary funding to successfully move children and students through each level of the school system, from primary to tertiary levels.

Since October 2015, protests at tertiary institutions have sprung up across the country. Despite the attention these protests have received, a small percentage of South Africa's student population reaches the tertiary level. Currently, IFs estimates only 19 percent of the age appropriate population is enrolled in tertiary education. Across high-income countries enrollment rates were closer to 72 percent in 2016.[5]

Because only a small percentage of South Africa's student population even reaches the tertiary level, policies directed at tertiary education alone will only marginally improve the situation. South Africa should look at investments at lower levels of education (including addressing the influence of the teacher's union) to help ensure more students reach tertiary education.

[5] These figures include students that have returned for higher education, but may be older than the tertiary age cohort.

EDUCATION SCENARIOS

Drawing from the above discussion, these scenarios simulate a future in which South Africa successfully facilitates advancement through its formal education system. These scenarios include 1) increasing primary education survival rates, (2) improving enrollment in lower secondary education, (3) increasing lower secondary education survival rates, (4) improving enrollment in upper secondary education (5) increasing upper secondary education survival rates, and (6) improving enrollment in tertiary education.

FIGURE 17. ENHANCING EDUCATION

The **Primary Survival** scenario increases the primary survival rate in South Africa from 91.6 to 99 percent over five years, a similar rate of increase as Botswana achieved from 1989 to 1994.

The **Lower Secondary Enrollment** scenario increases the transition rate from primary to lower secondary from its current level of 95 percent to 99 percent by 2021. Lesotho, Madagascar, and Zambia have all achieved similar increases in lower secondary enrollment historically.

The **Lower Secondary Survival** scenario increases the lower secondary survival rate (the portion of students that enter lower secondary who make it to the final grade) from 93.3 percent to 99.6 percent by 2021, similar to what Madagascar achieved from 2000 to 2005.

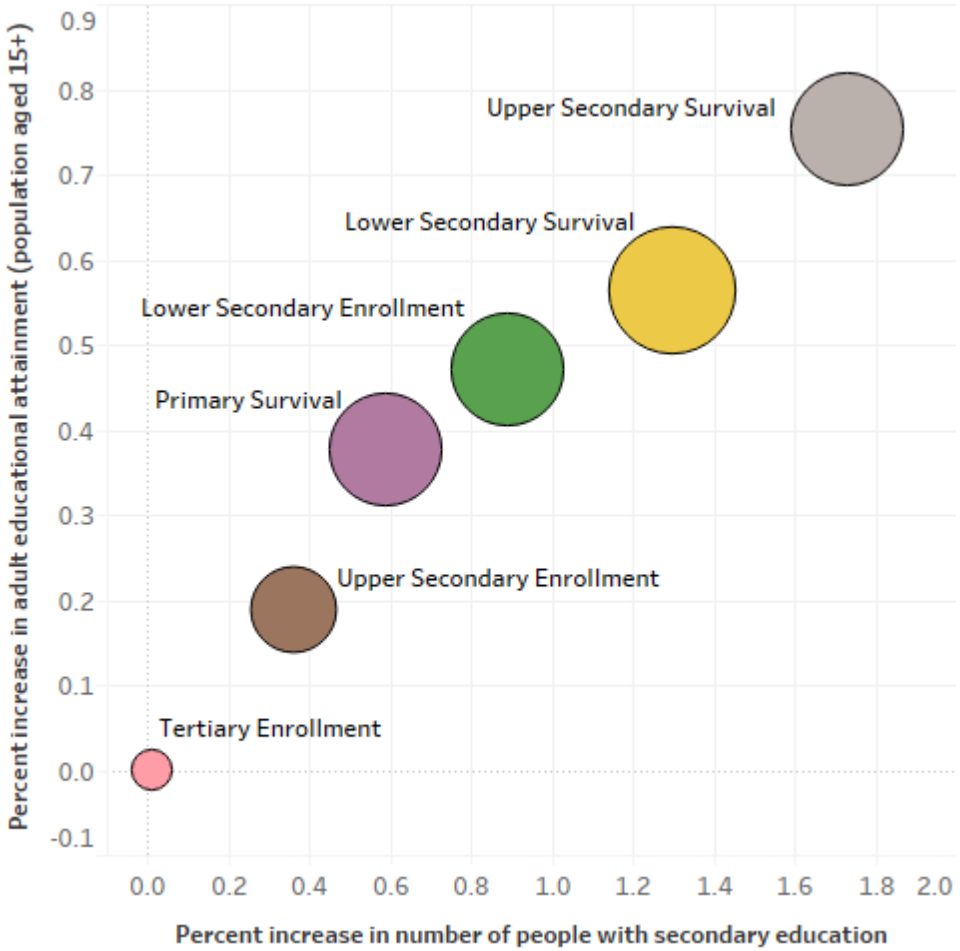
The **Upper Secondary Enrollment** scenario increases the upper secondary transition rate (the portion of graduates of lower secondary that enroll in upper secondary) from 92.9 to 94.7 percent by 2021, paralleling Botswana's achievements from 2000 to 2005.

The **Upper Secondary Survival** scenario increases the upper secondary survival rate (the portion of students who enter upper secondary school who make it to the last grade) from 93.5 to 100 percent by 2021.

The **Tertiary Enrollment** scenario increases the tertiary intake rate from 19.4 to 21.1 percent by 2021.

The Tertiary Enrollment scenario alone has little impact on increasing overall educational attainment or the number of tertiary graduates because so few students make it through secondary. Thus, while current protests focus on university access, low upper secondary survival rates mean that tertiary education access remains narrowly restricted. Instead, programs aimed at boosting upper secondary education survival and completion could increase national education levels by 20 percent and significantly increase the percent of the population with a secondary education degree. Policies aimed at increasing enrollment in upper secondary school also have strong impact on education outcomes.

FIGURE 18. EXPLORING THE IMPACT OF INTERVENTIONS TO IMPROVE EDUCATION OUTCOMES IN 2040 IN SOUTH AFRICA.
IFS Version 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Size of the bubbles represent percent increase in number of people with tertiary education relative to current path in 2040.

A scenario that only increases tertiary enrollment does not produce significant improvements to human development because it ignores low throughput at earlier stages of the education system. Compared with interventions in other educational levels, the Lower Secondary Survival scenario, by contrast, has the most relative impact in South Africa. It has the greatest percent increase in educational attainment, as well as the number of people with secondary and tertiary education. Improving enrollment rates across all levels provides the necessary flow of students to increase tertiary enrollment in the long term.

South Africa has among the largest double burdens of disease in Southern Africa.

FIGURE 19. NUMBER OF TERTIARY STUDENTS IN CURRENT PATH AND EDUCATION SCENARIO INTERVENTIONS 2016-2040.
IFS 7.27

	Tertiary Students (millions)		
	2016	2021	2040
Current Path	1.03	1.06	2.17
Primary Survival	1.03	1.06	2.21
Lower Secondary Enrollment	1.03	1.06	2.22
Lower Secondary Survival	1.03	1.07	2.24
Upper Secondary Enrollment	1.03	1.07	2.18
Upper Secondary Survival	1.03	1.14	2.19
Tertiary Enrollment	1.03	1.06	2.17
Combined	1.03	1.16	2.41

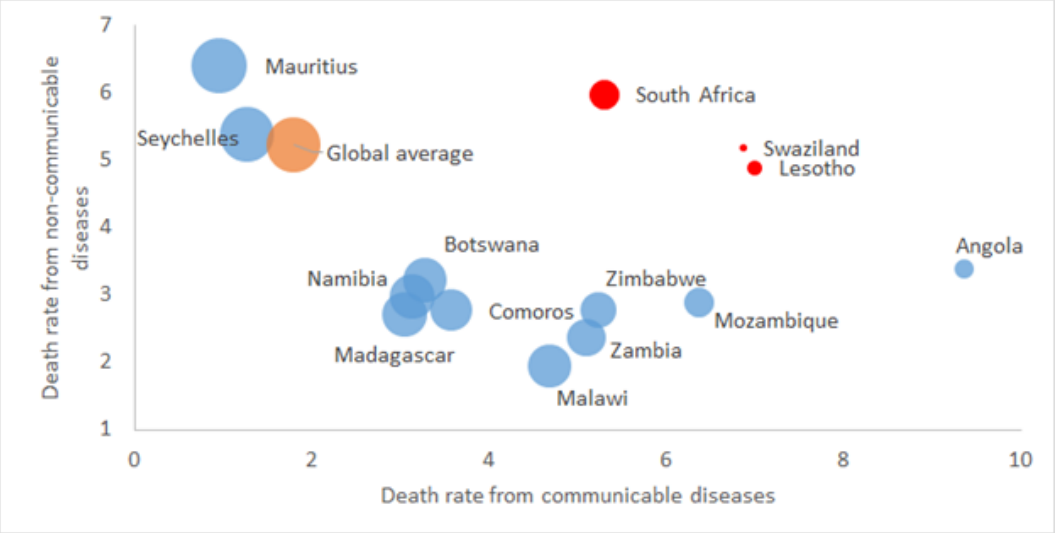
Note: color indicates the most (green) and least (red) effective scenarios for increasing the number of tertiary students.

HEALTH

Due to the AIDS epidemic, life expectancy in South Africa fell from 62 years in 1995 to a 35-year low of 52 years in 2010. Life expectancy has since rebounded to 58 years in 2016. Despite significant reductions in the HIV/AIDS burden since the early 2000s, South Africa today suffers from multiple health burdens that result in a current population life expectancy significantly lower than the expected level of life expectancy based on GDP per capita (at PPP) data.

As shown in Figure 20, South Africa has a large double burden of disease (with both high levels of communicable and noncommunicable diseases). In 2016 the death rate from communicable diseases in South Africa was 4.9 deaths per thousand, the fifth highest communicable disease death rate in Southern Africa. The death rate from noncommunicable diseases was 5.9 deaths per thousand, behind only Mauritius in the region. Moreover, there are high levels of deaths from injuries. South Africa has the third highest intentional injury death rate in the region (next to Swaziland and Lesotho).

FIGURE 20. DEATH RATES FROM COMMUNICABLE AND NONCOMMUNICABLE DISEASES IN SOUTHERN AFRICA IN 2016.
IFS Version 7.27



Bubble Size is Average Life Expectancy at Birth.

Table 8 shows the forecasted number of DALYs from major communicable and noncommunicable diseases in South Africa.6 In 2016, HIV/AIDS represents the largest disease burden across both categories, contributing to an estimated 7.1 million DALYs. Cardiovascular disease contributes to an estimated 3.4 million DALYs. DALYs from noncommunicable diseases are forecast to grow from 18 million in 2016 to 20 million by 2040, while DALYS from communicable disease are forecast to shrink from 16 million in 8.9 million in 2040. The contribution of HIV/AIDS to total DALYs is forecast to fall from 18 percent in 2016 to 12 percent by 2040.

6 Disability Adjusted Life Years (DALYS) are calculated as the sum of Years of Life Lost (YLL) to premature mortality and the sum of Years of Life lost to disability (YLD). The sum of DALYs across the population represents the disease burden and can be thought of as the gap between a perfectly health population and the current status.

FIGURE 21. DALYS FROM MAJOR DISEASE TYPES IN SOUTH AFRICA 2016-2040
IFS Version 7.27

		Total DALYS (Thousands of Years)		
		2016	2021	2040
Communicable Diseases	**HIV/AIDS**	7,111	6,453	4,037
	Diarrhea	881	761	439
	Malaria	7	6	3
	Respiratory Infections	1,500	1,319	840
	Other Communicable Diseases	6,587	5,859	3,614
	Total	16,086	14,398	8,933
Non-Communicable Diseases	**Cancer**	1,544	1,630	1,907
	Cardiovascular Disease	3,371	3,480	3,868
	Diabetes	1,148	1,263	1,765
	Digestive Disease	720	751	877
	Respiratory Disease	857	927	1,280
	Mental Health	1,344	1,406	1,583
	Other Non-Communicable Diseases	8,557	8,513	8,375
	Total	17,541	17,970	19,655
Injuries	**Intentional Injuries**	1,787	1,969	2,477
	Unintentional Injuries	2,588	2,593	2,398
	Total	4,375	4,562	4,875

In 2016 South Africa still had the third highest death rate from HIV/AIDS (0.25 per thousand) in the world, though that is down from a peak of 0.67 per thousand in 2006. Treatment programs can mitigate the health impacts of HIV and prolong the lives of those affected. This keeps the HIV prevalence rate high. Prevalence is forecast to increase from its current rate of approximately 13 percent to 15 percent in South Africa between 2016 and 2040. In fact, peak prevalence in South Africa is not forecast until 2056 (UN Spectrum, 2016).

A double burden of disease like the one in South Africa requires a horizontal health management strategy. Vertical strategies have often been the norm in Africa: they focus on completely eradicating one disease (malaria, for instance). Horizontal health systems seek to improve health outcomes across disease types by improving the quality of health infrastructure.

HEALTH SCENARIOS

To evaluate different health impacts, we constructed the following scenarios that can be grouped into two major categories: 1) improving health and 2) reducing fertility. Each of the scenarios is described in greater detail in the box below.

FIGURE 22. HEALTH SCENARIOS

Improving Health

The **HIV/AIDS Reduction** scenario decreases deaths from HIV/AIDS from 0.24 percent of the population in 2016 to 0.18 percent by 2021. In the Current Path, it is only reduced to 0.20 percent by 2021. A parameter to decrease the rate of infection is also used in this scenario.

The **HIV/AIDS Resurgence** scenario models the consequences if pressure on the HIV/AIDS epidemic is not maintained and the rates of both prevalence and death from the disease increase over the next five years compared to the Current Path. Here, the death rate from HIV/AIDS increases from 0.24 percent of the population in 2016 to 0.35 percent in 2021.

The **Increased Water and Sanitation** (WASH) scenario increases access to an improved water sources from 73 to 75 percent by 2021, and access to improved sanitation increases from 66.4 percent to 71.4 percent.

The **Malnourished Children** scenario is a future where the proportion of underweight children is reduced from its current level of 8.4 percent of the total child population to 7.1 percent by 2021.

The **BMI (Body Mass Index) Reduction** scenario simulates a reduction in the average body mass index of South Africa from 27.6 to 26.4 by 2021.

Reducing Fertility

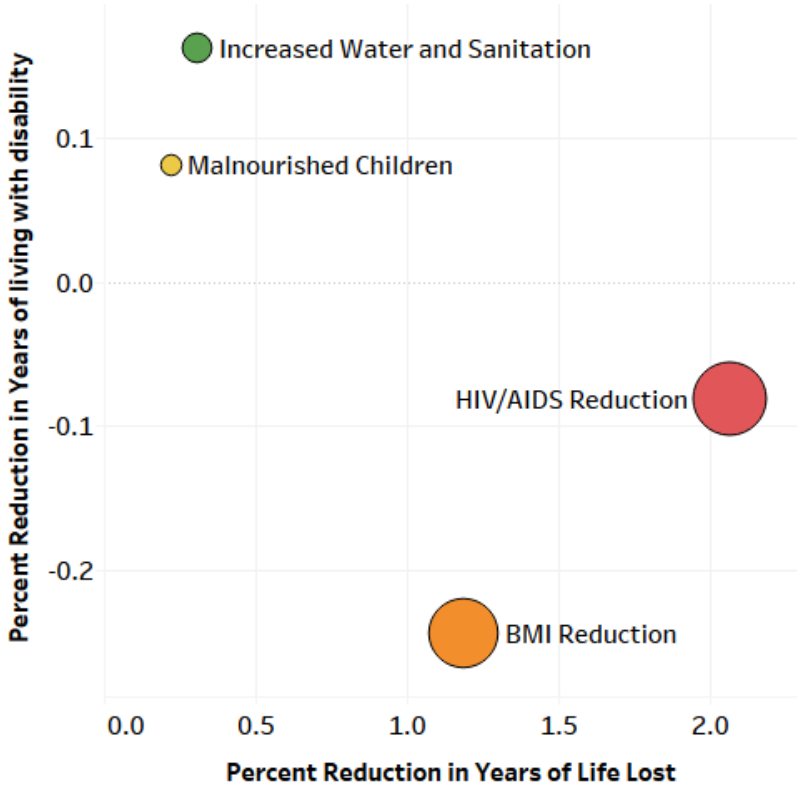
In the **Contraception Access** scenario we have simulated a 20 percent increase in contraceptive use (relative to the Current Path) over 5 years, resulting in a 9 percent increase in the use of modern contraceptives between 2016 and 2021.

We also explore an extended **Fertility Reduction** scenario in which South Africa further reduces fertility through other family planning interventions. In this scenario, South Africa reaches 1.9 births per woman by 2021.

The **Maternal Mortality** scenario simulates a reduction in communicable disease for women aged 15 to 49 by 10 percent over five years, translating to a roughly 30 percent decrease in maternal mortality over five years. This intervention is consistent with previous historical periods in South Africa (WHO; 2015).

Even though death rates from HIV/AIDS have declined since their peak in the early 2000s, peak HIV prevalence is not forecast to occur until 2056 in South Africa.

FIGURE 23. EXPLORING THE IMPACT OF INTERVENTIONS TO IMPROVE HEALTH OUTCOMES TO 2040 IN SOUTH AFRICA.
IFS Version 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Size of the bubbles represent percent increase in life expectancy compared to the Current Path in 2040.

An additional investment in HIV/AIDS reduction has a positive impact on GDP and years of life lost, but does not decrease the number of years people live with disability because more people live with HIV/AIDS for longer. The largest overall impact on improving years of life living with disabilities is an additional intervention in water and sanitation access (see the next section), which reduces the burden of communicable disease. In addition, spending to adequately feed undernourished children reduces both years of life lost and years living with a disability. BMI Reduction also shows a significant improvement in GDP by reducing health costs, and improves years of life lost. Yet because in this scenario those with high BMI remain alive for longer, the total population of years living with disabilities rises.

HIV/AIDS Resurgence

HIV/AIDS Reduction scenario increases access to ARVs and reduces YLLs by approximately 470,000 years in 2040 relative to the Current Path. However, due to the rising prevalence of the disease, YLDs increase by 10,000 years in 2040 relative to the Current Path. While the benefits of the HIV/AIDS Reduction scenario and indeed the combined Improving Health scenario (Figure 23) do not have the greatest impact on every development outcome, the consequences of an HIV/AIDS resurgence could be catastrophic.

HIV/AIDS Resurgence scenario simulates an increase in AIDS-related deaths in the country, a scenario that could happen if current interventions/programs to combat HIV/AIDS were reduced or relaxed. The result is an increase in YLLs by 2 million years, a 3 percent increase in infant mortality, and 375 million more deaths relative to the Current Path by 2040. Furthermore, a resurgence of the HIV/AIDS epidemic could translate to a cumulative loss of $54 billion relative to the Current Path by 2040. Since along the Current Path prevalence is not forecast to peak until the mid-2050s, the health community must remain vigilant against such an outcome.

Rapid progress has been made to expand access to infrastructure since the end of Apartheid. Despite this, access rates today remain uneven.

The Contraception Access scenario results in a cumulative 820,000 fewer births by 2040. Fertility Reduction generally leads to an increase in GDP per capita from $12,300 in 2016 to $16,900 in 2040. The Maternal Mortality scenario reduces the death rate from communicable diseases in women aged 15 to 49 drives a five month increase in life expectancy by 2021 and a cumulative 90,000 fewer deaths by 2040. (The fertility scenarios are not shown graphically.)

The combined Reducing Fertility scenario simulates an integrated health push aimed at reproductive health and reductions in maternal mortality. However, due to South Africa's already low fertility rates, the impact of this integrated push on other economic or social outcomes is far less than what would be seen in countries, like Angola, with rapidly growing populations. South Africa's population ages more rapidly, experiences less of a youth bulge and a larger demographic dividend, but only marginally so. Nevertheless, this still translates to an annual 30,000 fewer people going hungry, 26,000 fewer household with unimproved sanitation access, and 120,000 fewer people without access to electricity.

INFRASTRUCTURE

WATER, SANITATION, ROADS, AND ELECTRICITY

Access to clean water, sanitation, roads and electricity is essential for building an inclusive society, enhancing wellbeing and improving productivity. Studies have found that increasing the stock of infrastructure has significant impacts on growth and reduces inequality (Calderon & Serven, 2004; Ascher & Krupp, 2010; Calderon, 2009). In South Africa rapid progress has been made to expand access to infrastructure since the end of Apartheid. Between 1994 and 2016, access to piped water increased from 83 percent of the population to 95 percent, the size of the road network grew from 330,000 km to close to 370,000 km, and the number of mobile phone subscriptions grew from just over 1 subscription per hundred people to an estimated 151 subscriptions (per hundred people) in 2016.

Despite much of this progress, current access levels remain uneven. In 2016 an estimated 16 million individuals lacked access to modern sanitation facilities. Moreover, while an estimated 99 percent of the urban population has electricity access, access rates in rural South Africa are only around 70 percent. The IFs Current Path is optimistic about improvements in access in both urban and rural segments across the horizon, but universal modern sanitation and universal electricity access is not forecast in South Africa by 2040. The table below depicts the forecast of basic infrastructure access over the horizon along the Current Path.

FIGURE 24. BASIC INFRASTRUCTURE ACCESS IN SOUTH AFRICA 1995-2040
IFS Version 7.27

	1995	2016	2021	2040
Electricity Access (% of Population)	65.1	87.9	90.0	97.2
Improved Sanitation (% of Population)	53.7	66.5	68.5	76.8
Piped Water (% of Population)	83.9	93.1	93.4	95.3
Road Network (Total KM)	331,265	369,478	376,277	400,000
Paved Roads (% of Total)	19.6	18.1	24.3	57.4

ENERGY

South Africa has the highest electricity production capacity in Africa and yet the country has suffered from recent energy crises, characterized by frequent rolling brownouts and blackouts that hamper economic growth (Economist, 2015). This crisis has largely been overcome, but strains remain. In November 2016, South Africa's Department of Energy released the 2016 Integrated Energy Plan (IEP) which includes a controversial increase of 9.6 Gw of nuclear capacity. It also plans for an increase in coal, gas, and renewable capacity to meet growing demand.[7]

Regardless of the source and size of future generation capacity, South Africa faces a transmission and distribution challenge. Historically, the electricity sector has been centralized under Eskom, South Africa's state-owned electricity utility company that is responsible for providing more than 90 percent of the country's electricity (IEP, 2016). That monopoly is dissipating rapidly as electricity production becomes more decentralized and intermittent. Independent power producers, small scale energy generators and municipalities produce 7.2 percent of South Africa's electricity. As production diversifies, both in terms of the number of producers and the type of production, the grid must adapt or the potential for renewable energy will be lost (Hedden, 2016).

Close to 90 percent of electricity comes from coal-fired power plants. Renewable energy accounts for close to 4 to 5 percent of South Africa's generation capacity (McGroarty, 2015), and the government's 2010 Integrated

[7] Based on electricity demand, the 2013 IEP update advised against pursuing nuclear capacity.

Resource Plan set a target of 17,800 MW (approximately 42 percent) of new generation to come from renewable sources (Department of Energy, 2015).

INFORMATION COMMUNICATION TECHNOLOGY (ICT)

South Africa is a regional leader in ICT and boasts the largest market for mobile broadband on the continent. Rapid ICT adoption has begun to lower the cost of access to many health and financial services that were previously unavailable to most. By 2040, fixed broadband access is forecast to reach close to 30 subscriptions per 100 people. However, at 100 subscriptions per 100 people, mobile broadband today has already surpassed fixed broadband and is forecast to reach close to 160 subscriptions per 100 by 2040. This rapid uptake has facilitated access to many innovative services and strategies that would otherwise been unavailable. Fast and reliable access to fixed broadband internet is increasingly necessary for regional business to be competitive in the global market, but requires significant time and resources to retrofit existing telecommunications infrastructure (Margolese-Malin et al., 2014).

The South African government is responsible for nearly a quarter of ICT spending in the country—on par with countries like Finland and the Netherlands—to support e-government, e-health, and online education initiatives. This has put the country on a path in which mobile broadband subscriptions have more than tripled between 2010 and 2015, and are forecast to triple again by 2025.

INFRASTRUCTURE SCENARIOS

To explore investment in infrastructure as a driver of South African development we have developed scenarios that include improvements in the country's 1) Rural Electricity Access and Renewable Generation, 2) Roads, 4) Mobile Broadband, 5) Safe Water and 6) Improved Sanitation.

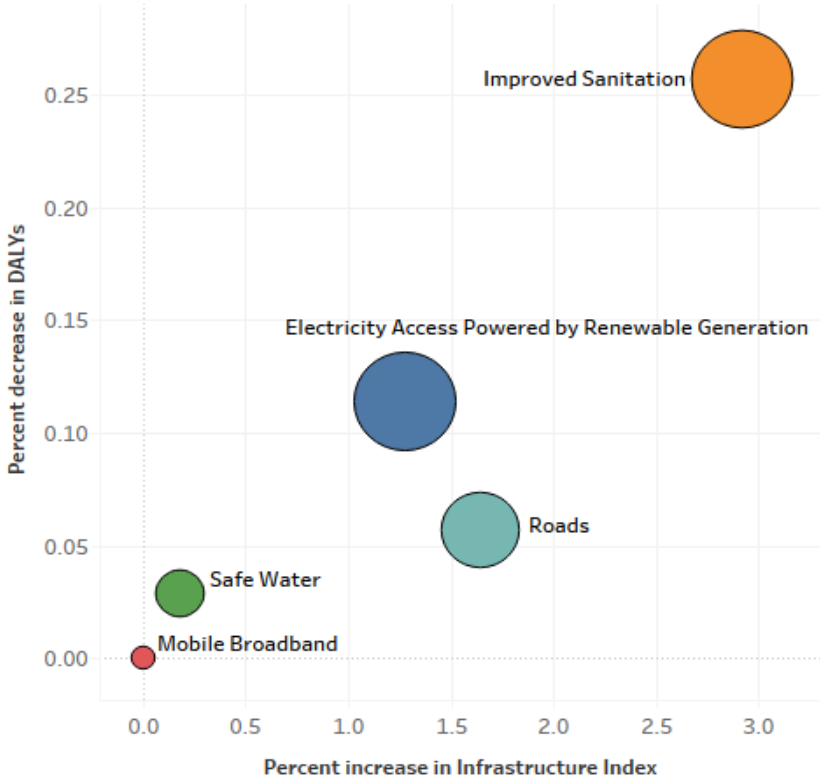
FIGURE 25. EXTENDING INFRASTRUCTURE

In a combined **Electricity Access Powered by Renewable Generation** scenario (inspired by the Power Africa targets for South Africa), the country reaches near universal rural electricity access by 2040, up from 69 percent in 2016. Also under this scenario, generation capacity grows by approximately 10 percent by 2040 compared to the Current Path.

The **Roads** and **Mobile Broadband** scenarios extend transportation and communication networks across the region. In these scenarios, the road density (total road network relative to land area) increases by 5 percent relative to the Current Path by 2021. Under the mobile broadband scenario, broadband access is increased by 5 percent between 2016 and 2021.

In the **Safe Water** scenario, access to improved sources of water is increased from current levels of about 73 percent in South Africa to 75 percent by 2021. In the Improved Sanitation scenario, access to improved sanitation is increased from its current level of 66 percent of the population to 72 percent by 2021.

FIGURE 26. EXPLORING THE IMPACT OF INTERVENTIONS TO ADVANCE INFRASTRUCTURE IN 2040 IN SOUTH AFRICA.
IFS Version 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Size of the bubbles represent percent increase in GDP (MER) compared to the Current Path in 2040.

Figure 26 presents the results of several scenarios that expand access to different infrastructure assets by 2040. The y-axis represents the percent decrease in total DALYs, the x-axis shows the percent increase in total infrastructure assets, and bubble size represents the percent increase in GDP (MER), all relative to the Current Path.

Improved Sanitation has the most significant impact on improving GDP, reducing DALYs—thus creating a more productive labor force—and by adding to the country's stock of infrastructure more generally (as measured by the IFs Infrastructure Index) compared with the Current Path. Extending access to renewable energy also has significant and positive impacts on Extending access to renewable energy also has significant and positive impacts on development indicators reflecting poor energy management (both in terms of diversification of production and grid quality). Investing in roads improves overall access to infrastructure and does enhance GDP relative to the Current Path, but does less to reduce DALYs. The Safe Water scenario does increase GDP, but has little other impacts (largely because access is already quite high), and an additional push increasing access to mobile broadband has very small positive impacts.

AGRICULTURE

To decrease hunger and food insecurity, South Africa will need a more resilient agricultural sector that supports increased production and more effective demand.

Southern Africa experienced one of the strongest El Niño events ever recorded during the 2016 rainy season causing the worst drought in parts of the region for 35 years (RIASCO, 2016). The drought decimated rain-fed crops, leading most of the provinces in South Africa to declare states of emergency to mobilize resources to deliver aid to vulnerable populations (OCHA, 2016). This drought is just the most recent example of how climate change is affecting water resources and food security in South Africa and across the region.

South Africa is the largest agricultural producer in the Southern Africa region, and third largest on the continent behind Nigeria and Egypt. While the country is a net exporter of agricultural products (both in terms of value and volume), the exports tend to be concentrated in the primary sectors (FAOSTAT 2017). South Africa is a net importer of processed agricultural products (South Africa Yearbook 2015/16: 35). While agricultural production is expected to rise, largely because of increases in yield, it is not forecast to keep pace with rising demand.

In the Current Path, South Africa will increasingly rely on imports to meet its food and agricultural needs. Further, over 13 percent of South Africans went hungry in 2015, and over 26 percent had limited access to food (Statistics South Africa, 2015: 65). To decrease hunger and food insecurity, South Africa will need a more resilient agricultural sector that supports increased production and more effective demand.

A resilient agriculture sector requires a balanced water sector (AQUASTAT, 2017). Increased access to water, urbanization, irrigation, and electricity generation (through coal-fired generation plants) are leading to increased water demand.[8] South Africa is one of the driest countries in the world and is already overexploiting its water resources at the national level (Hedden, 2016). While the next stage of the Lesotho Highlands Water Project will significantly add to the country's water supply, it will not be enough to meet growing demand.[9] Overall water demand is expected to reach 18.9 km^3 by 2035, and the current plans for increasing water supply, if all are successfully completed on time, will only increase South African water supply to 17.8 km^3.

[8] Industrial water demand is driven in part by thermo-electric power generation.

9 The Lesotho Highlands Water Project is an ongoing cooperative infrastructure project between Lesotho and South Africa. It will divert water from the Lesotho highlands to South Africa and provide electricity for Lesotho

AGRICULTURE SCENARIOS

The scenarios in this section simulate agriculture-related interventions including 1) a Yield Increase and 2) Increased Effective Demand.

FIGURE 27. AGRICULTURAL RESILIENCE

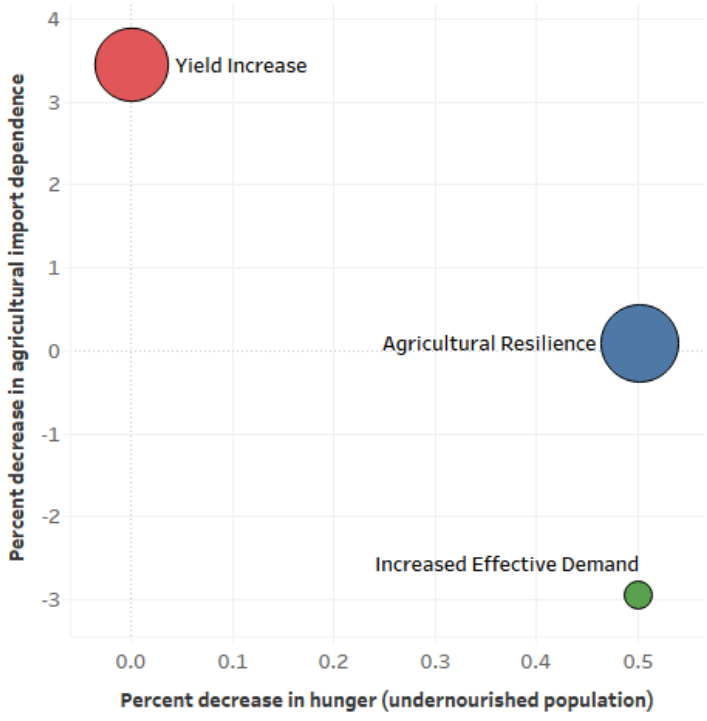
The **Yield Increase** scenario increases yield in South Africa from 4.6 tons/hectare in 2016 to 5.4 by 2021, compared to 4.9 in in 2021 the Current Path.

In the **Increased Effective Demand** scenario, agricultural demand is increased from 58 million metric tons in 2016 to 71 in 2021, compared to 62 in 2021 the Current Path. Effective demand is defined here as the ability to access food. Increased effective demand could result from better physical access to markets in terms of transportation, higher average incomes so that South Africans can afford more food, or more equal distribution of income and food. Poverty reduction, especially in rural areas and for women, is essential for reducing hunger (Hedden et al, 2016).

The **Agricultural Resilience** scenario is the combination of the above scenarios. Nigeria and Rwanda are two African countries that have significantly reduced hunger by implementing similar interventions as modeled in the Resilience scenario. They boosted production through significant investments to improve yields alongside commensurate interventions aimed at improving effective demand.

The figure below shows the effects of these interventions on hunger and food insecurity in the region. The positive horizontal axis represents decreases in hunger, the vertical positive axis represents decreases in net import dependence as a percent of demand, and the bubbles are weighted by the increase in GDP compared with the Current Path to 2040.

FIGURE 28. IMPACT OF AGRICULTURAL INTERVENTIONS FOR SOUTH AFRICA.



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents the percent change in value-added from Agricultural sector to the Current Path in 2040.

South Africa's regional influence has dramatically increased since 1994, the result of growing economic, social, and political interaction between South Africa and the rest of the region.

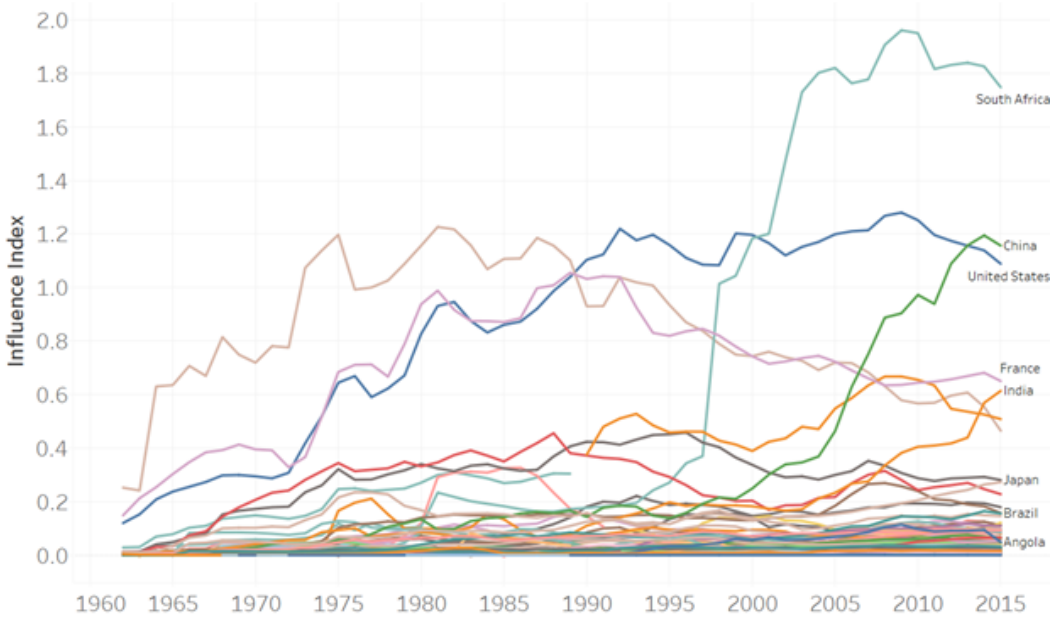
The Yield Increase scenario has the greatest effects on import dependence. Increased production reduces imports and raises exports relative to the Current Path. This scenario does little to decrease hunger, since increased production does not necessarily translate into food for the hungry. Increased Effective Demand, or increased food consumption, decreases hunger dramatically (by nearly 50 percent). However, increasing access without increasing production leads to a rise in food imports and net import dependence actually increases in this scenario. Agricultural Resilience, which combines the above scenarios, is the only case that reduces both hunger and import dependence significantly. In other words, to decrease food insecurity and hunger, South Africa needs to focus on increasing both food production and effective demand.

Expanding irrigation systems in South Africa could increase yield and build resilience against periodic droughts, but this has associated costs and tradeoffs. Increasing the demand of water for agricultural use will constrain the amount of water available for municipalities, which are under increasing demands for water due to trends in income, urbanization, and access to safe drinking water.

SOUTH AFRICA'S REGIONAL ROLE

South Africa is the second largest economy on the continent, with a GDP per capita among the top 10 in Africa. It enjoys deep and wide political and economic connections with countries in the region. The graph below shows external influence on the Southern Africa region between 1960 and 2015 using the Pardee Center's Influence Index.10 By this measure, South Africa's regional influence has dramatically increased since 1994 such that today South Africa has surpassed that of the United States, France, or China. Most of the increase in influence has come as a result of a growing volume of economic, social, and political interaction between South Africa and the rest of the region.

FIGURE 29. INFLUENCE IN SOUTHERN AFRICA REGION FROM AUTHOR'S OWN DATA AND CALCULATIONS
Pardee Center, 2016



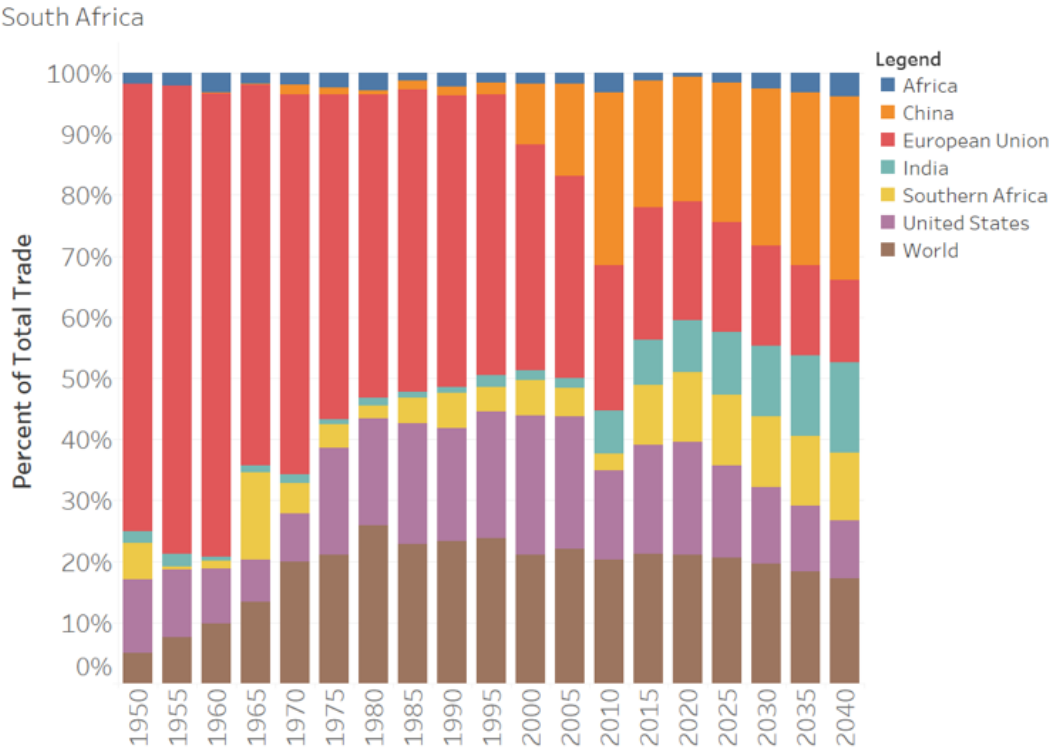
As of 2015, South Africa is a member of 44 global and regional inter-governmental organizations. It is an active participant in the Southern African Development Community (SADC), Southern Africa's largest regional organization, and the African Union. South Africa led the way on negotiating the terms of the SADC Free Trade Agreement, signed in 2008, shaping the structure of the FTA and providing incentives for weaker regional states to participate in a liberal trading regime (Krapohl et al, 2013). In addition to its leadership role in SADC, South Africa is also a member of the Common Monetary Area and the Southern African Customs Union (SACU). The CMA is a monetary union between South Africa, Lesotho, and Swaziland and Namibia, and its goal is to provide a framework for exchange rate and monetary policy that supports economic development of its member countries (IMF, 2007). SACU includes the countries in the CMA and Botswana.

[10] The Influence Index measures influence capacity or potential influence across dyadic economic, security and political interactions. The composite index is comprised of time-series measurements of shared political connections, alliances, and levels of diplomatic representation; shared economic connections including trade, aid, and arms, as well as relative measures of power between countries in the international system. For a more complete description of the Influence Index, see the Southern Africa Reference Report.

TRADE

The graph below shows the distribution of South Africa trade (as a percent of total) from 1960 to 2015, with forecasts out to 2040. In 2000, only 6 percent of the total trade to South Africa came from trade with other countries in Southern Africa. Trade to the European Union made up the largest proportion of South Africa's total trade (37 percent) in that same year. By 2015, Southern Africa's share of South African trade had fallen to approximately 4 percent. The percentage of total South African trade associated with the European Union fell even more sharply to 25 percent of total trade. IFs Current Path forecasts the European Union will continue to play a smaller role in South Africa's trade profile (only 14 percent by 2040), while trade with Southern African neighbors will increase to 11 percent of total trade by 2040. In 2000, China accounted for 10 percent of South Africa's total trade, and by 2015, China's share of total South African trade had reached 15 percent. By 2040, IFs forecasts that trade with China will account for over a quarter of South African trade.

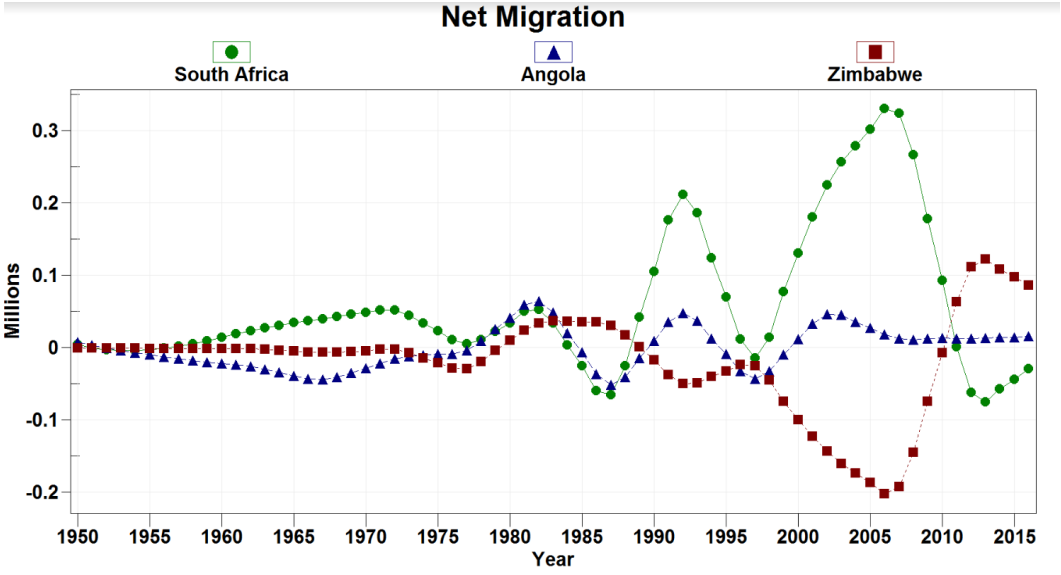
FIGURE 30. TRADE WITH SOUTHERN AFRICA (% OF TOTAL) 1998 TO 2015. DATA FROM: IMF DIRECTION OF TRADE STATISTICS.



MIGRATION

Recent migration patterns to and from South Africa have been driven by violent conflict and economic crises in neighboring countries. South Africa is a popular destination for regional immigration because it stands as a beacon of relative opportunity and stability in the region. The graph below shows net migration to South Africa from 1960 onwards. The end of Apartheid catalyzed a return of South Africans to the country. Another large influx of migrants took place in the early 2000s with the expansion of the South African gold mining industry, which coincided with a large migration of Zimbabweans to South Africa, many of them seeking economic opportunity or escaping political and economic crises.

FIGURE 31. NET MIGRATION FOR SOUTH AFRICA, ANGOLA, AND ZIMBABWE, 1950-2020.



CONCLUSION

South Africa is a country beset by problems that stem from the legacies of Apartheid (poor access to services and poverty), ineffective governance and planning (the middle-income trap) and a governance situation that is itself at a cross-roads and facing rising levels of dissatisfaction among the population. While at low-risk for widespread civil conflict, the current state of South African development is precariously positioned between large, youthful populations demanding good governance and jobs and corrupt leadership.

The next two decades of development in South Africa will be shaped by the choices made today. The current development context requires strategic investments in all areas of human development, physical infrastructure, and social systems. This report has highlighted areas for investment that are most likely to produce significant gains in improving human capabilities.

ACKNOWLEDGEMENTS

The authors thank USAID for sponsoring this report. In particular, we thank Paul Pleva and Tracy Hercowitz for their feedback and direction throughout the process. To our partners at the Institute for Security Studies (ISS), we would also like to acknowledge Ciara Aucoin, Jakkie Cilliers, Zach Donnenfeld, and Alex Porter for their intellectual support and feedback.

This project has benefited immensely from the work of many researchers at the Frederick S. Pardee Center for International Futures, including Drew Bowlsby, Althea Ditter, Alaina Ferguson, Emory Ferguson, Lisa Filholm, Nikki Frick, Taylor Hanna, Hamda Hirisi, Stellah Kwasi, Damola Ladipo, Alanna Markle, Joel Maweni, John McPhee, Meredith Moon, Alisa Nelson, Caleb Petry, Mickey Rafa, and Ann Rogers.

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