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DEVELOPMENT TRENDS REPORT FOR SOUTHERN AFRICA

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EXECUTIVE SUMMARY

Over the past 15 years Southern Africa has enjoyed a period of relative peace, a contrast to the previous four decades when violent coups and long-standing civil wars confronted many countries in the region. Since 2000, regional GDP growth averaged 4 percent, enrollment in primary school increased by 10 percent, and life expectancy rose by 8 years, partly due to successful efforts to mitigate the region's HIV/AIDS crisis. Along the Current Path of development, Southern Africa is forecast to continue many of these positive trends and more than double its GDP from USD 700 billion in 2016 to more than USD 1.6 trillion in 2040.¹

Despite this steady if unspectacular progress, the region continues to experience acute development challenges. Countries in Southern Africa appear to be approaching a tipping point, where actions today — especially those that change the trajectory of government capacity and effectiveness — will determine whether the region retreats into a period of potentially violent instability or advances toward a more prosperous, sustainable future.

This tipping point is driven by various factors and trends, but is heavily influenced by the current demographic structure and growing population. At the turn of the 21st century, the 14 countries² included in this report had a population of roughly 137 million. Now, less than two decades later, the region is approaching 200 million people. By 2040, the end of this report's time horizon, we forecast that more than 300 million people will live in the region. A significant share of this population is relatively young. The people comprising this "youth bulge" require jobs, are increasingly educated and connected to the outside world, and will hold leaders accountable.

Growing populations strain all development systems, and current levels of governance capacity and quality are forecast to grow only slowly. Many countries in the region are dependent on foreign aid, which is forecast to reduce as a share of GDP. Corruption and poor governance are forecast to improve slowly. Informal economic activity, both a symptom and driver of poor development, will continue to be a barrier to growth in many countries.

Barring significant policy changes, poverty will also persist. We forecast that in 2040, more than 41 percent of the region's population will live on less than \$1.90 per day. In absolute terms, that equates to roughly 40 million more people in Southern Africa living in extreme poverty compared with today, with about 45 percent of the region's extreme poor living in only two countries: Madagascar and Malawi. Evolving global trends, like shifting trade patterns, China's rising influence, and the emerging impacts of climate change, will also have notable consequences for the region's development.

Throughout this report, we use the International Futures (IFs) Current Path (more information below) scenario to explore the long-term trends in country-level development across issue areas to 2040. Next, in response to these trends, we create new scenarios and use them to evaluate the long-term impact of potential shorter-term policy outcomes, which would be realized by 2021. We explain these scenarios briefly in Figure 1 on the following page.

¹ All money values reported here are in constant 2011 USD. If not specified, the currency conversion is at market exchange rates and not purchasing power parity.

² Angola, Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe.

FIGURE 1: DESCRIPTIONS OF 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 enrollments and survivals at various levels of the educational ladder (i.e. primary, lower secondary, upper secondary, and tertiary)
Improving Health	Simulates the implementation of a comprehensive and non-disease-specific health system in Southern 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	Increases access to clean water and improved sanitation, and extends access to electricity to a similar degree planned for in Power Africa
Reducing Fertility	Simulates a reduction in the fertility rates and maternal mortality in Southern 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 Southern Africa with respect to government transparency, effectiveness, and gender empowerment

All policy decisions involve tradeoffs, either explicit or implicit. Figure 2 shows some tradeoffs at the regional level by comparing alternative scenarios against the Current Path across three indicators: number of people living in extreme poverty, the UNDP's Human Development Index (HDI) and GDP (represented as bubble size).³

Investing in family planning and maternal health initiatives has the greatest overall impact on reducing extreme poverty. The region has average fertility rates that are lower than most of sub-Saharan Africa, largely due to lower rates in the most populous country, South Africa. However, Reducing Fertility, which includes improving maternal health, significantly lessens the future burden of extreme poverty and catalyzes a virtuous cycle of development. This scenario, however, has the smallest impact on GDP growth.

Improvements in governance have the greatest impact on overall economic growth. The Strengthening Governance scenario has the greatest direct impact on GDP growth while Transitioning Informality notably influences both HDI and GDP growth. As mentioned above, governance capacity enhancement is a key point of policy intervention that should be emphasized moving forward.

The Agricultural Resilience scenario also leads to a reduction in extreme poverty by directly enhancing the ability of the region's poorest nations to provide both sustenance and incomes. However, it does less to improve general wellbeing as measured through HDI, because it does little for education, and the health-related effects are mixed. Hunger is reduced, for example, but some countries see a rise in obesity.

The Enhancing Education scenario improves HDI by targeting bottlenecks in enrollment and graduation. Countries across the region have significantly different educational policy needs. South Africa, for example, needs to focus on education quality, vocational training, and tertiary institutions. Other countries in the region have more acute needs at lower levels of education and simply need to keep students in school for more time.

Investing more resources in health, as simulated in the Improving Health scenario, also increases GDP, reduces poverty, and grows HDI, but less than many other packaged interventions explored in this report. This is partially due to the already significant investment to reduce AIDS deaths. Health interventions without additional policy investments to enhance low-income living conditions can keep people alive and working but with poor access to basic services.

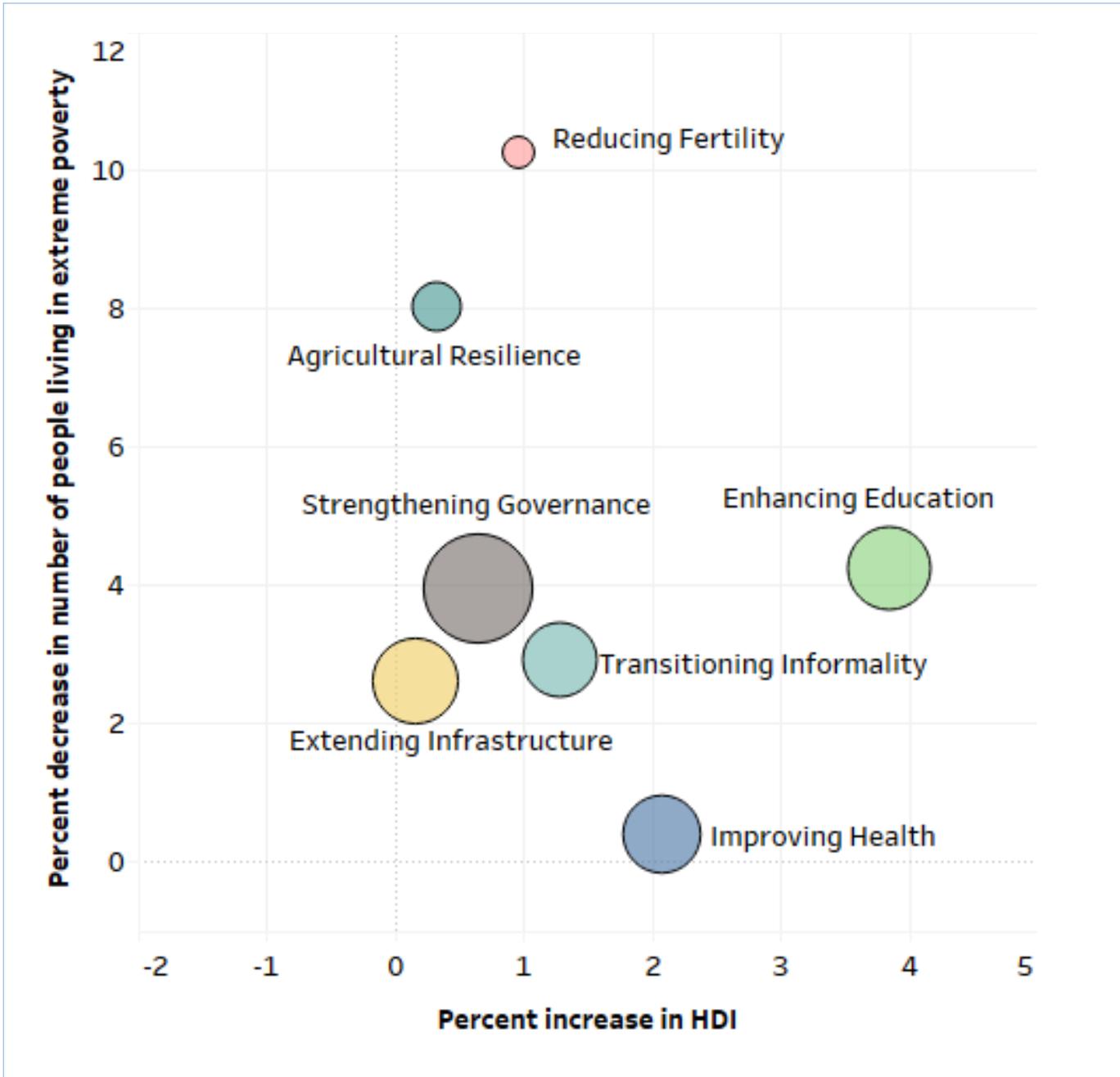
Extending Infrastructure also has positive impacts on poverty reduction, GDP growth, and HDI. However, making this policy choice in the absence of targeted investments in other areas has the most limited overall impact. This is partially due to current levels of multi-dimensional infrastructure access in the region, which are quite high relative to levels of GDP per capita. Infrastructure investments are also very costly and, if overseen by governments that lack transparency, can be used to misappropriate resources.

There is no silver bullet for improving human capabilities, and the results in this report demonstrate the need for integrated thinking to set policy. The rest of this report outlines categories of development trends and intervention points. Each section concludes with a scenario illustrating the costs and benefits of different interventions made in that developmental sector across the region. This report is accompanied by a reference report that explores relationships within and across each of these systems in more detail. The reference report also includes country profiles that summarize major trends and the effects of these scenarios at the country level.

³ HDI is a composite indicator including measures of life expectancy, education, and per capita income.

FIGURE 2: EXPLORING THE IMPACT OF POLICY TRADEOFFS TO 2040 IN SOUTHERN AFRICA.

International Futures 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040.

Bubble size represents relative increases in GDP at MER.

PURPOSE AND METHODS

Improving development outcomes requires an understanding of long-term trends and the tradeoffs implicit in policy decisions. Therefore, this report equips readers with reasonable expectations for how the region is evolving now and how prioritizing different types of policy interventions in Southern African countries over the next five years might impact broader country-level and regional development outcomes in the future.

INTERNATIONAL FUTURES (IFS)

International Futures (IFs) is a tool for thinking about trends, relationships, and the long-term impact of policy choices. IFs draws upon public data to forecast within and across the following issue areas: agriculture, demographics, education, economy, energy, environment, health, infrastructure, governance, international politics, and technology. These systems are dynamically connected, allowing IFs users to simulate how changes in one system may lead to changes in others.

IFs leverages historical data (over 3,500 historical series), identifies and measures trends, and models dynamic relationships to forecast hundreds of variables for 186 countries from 2014 to 2100. As an open source and freely available tool, IFs evaluates more relationships from a wider range of key global systems than any other model in the world.

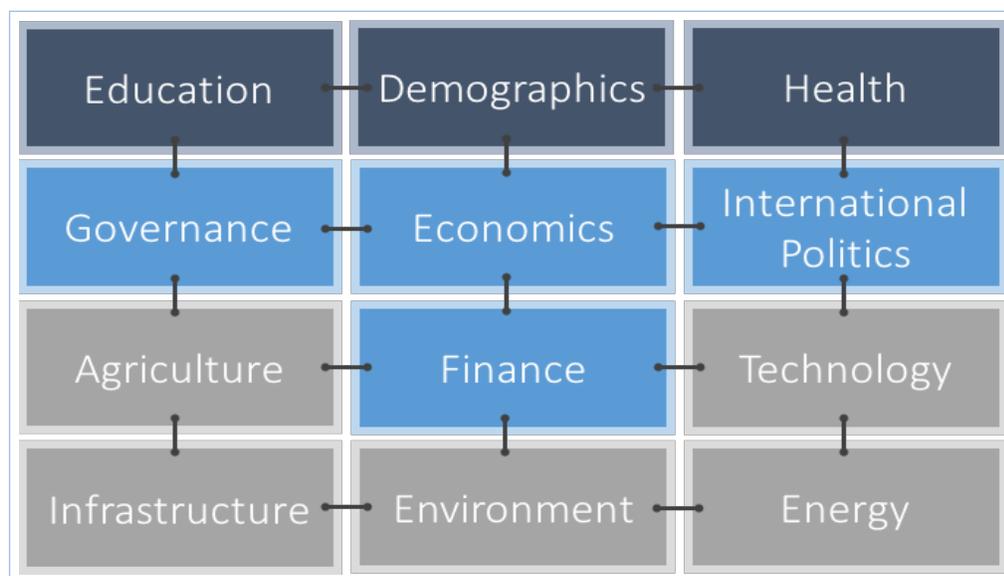
There are three main avenues for analysis in IFs: historical data analysis (cross-sectional and longitudinal), Current Path analysis (where systems seem to be developing), and alternative scenario development (exploring if-then statements about the future). It should be understood that no software can predict the future. IFs forecasts are informed extensions of current trends and dynamics built upon our current knowledge of development patterns.

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.

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 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.

FIGURE 3: DYNAMIC INTERACTIONS IN THE INTERNATIONAL FUTURES MODEL.



INTRODUCTION

As Nobel Laureate Amartya Sen argued in the 1980s, development should not be understood simply in utilitarian terms, but instead in terms of freedom and capabilities (Sen, 1979, 1988). Today, many people in Southern Africa are constrained in their freedoms and capabilities because of a heavy burden of multidimensional poverty—poverty defined not only in terms of hunger or low levels of income, but also by poor governance and low levels of education, health and access to infrastructure. This report analyzes these overlapping burdens of poverty, how they have progressed thus far, and how we expect them to unfold in the coming decades.⁴

Today, the region accounts for more than 9 percent of all extreme poverty worldwide. Macro-level drivers of poverty reduction are economic growth and reductions in inequality. People remain trapped in poverty because of poor health and security, limited rights, poor access to infrastructure, social discrimination, and poor employment opportunities (Turner, Cilliers, & Hughes, 2014). These interacting burdens leave poor people with few assets and

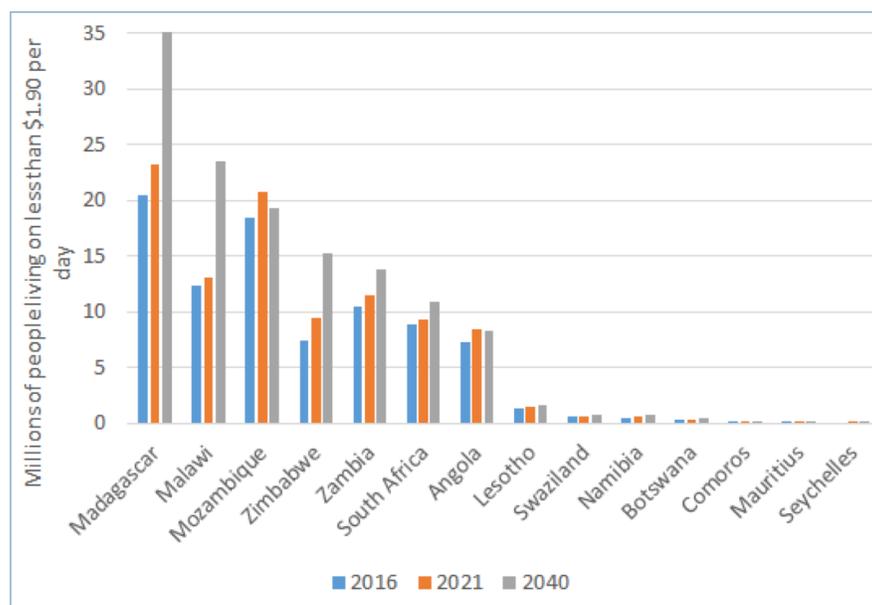
vulnerable to external shocks. Decreasing poverty requires alleviating these burdens and promoting inclusive economic growth and social protection (Shepherd, 2011). Continuing to improve governance capacity and quality, as the scenario analysis in this report shows, is a crucial step in reducing regional poverty and promoting stability.

Nearly 45 percent of the population of Southern Africa is currently living in extreme poverty.⁵ By 2040 — a full decade after the SDG deadline — this is forecast to decrease to only 41 percent. Because populations are increasing, the absolute number of people living below the poverty line grows in the Current Path from roughly 88 million in 2016 to 130 million by 2040. IFs forecasts that an additional 42 million people will live in extreme poverty by 2040; that is more than the current population of any individual country in Southern Africa except South Africa.

The countries with the highest prevalence of extreme poverty in 2016 are Madagascar (82 percent), Malawi (69 percent), Mozambique (64 percent), and Zambia (62 percent). Globally, Madagascar has the world's highest prevalence of extreme poverty, while the other three rank in the top 10 worldwide. Similarly, the countries with the most extreme poverty in the region in absolute numbers are Madagascar (20 million), Mozambique (18 million), Malawi (12 million), and Zambia (10 million). The richest and most influential country in the region, South Africa, has 8.8 million living in extreme poverty.

In 2040, while the prevalence of extreme poverty decreases overall across the region, IFs forecasts an increase in Malawi, Zimbabwe, Swaziland, and even slightly in South Africa.⁶ We forecast that the two countries in the region with the highest prevalence of extreme poverty today, Madagascar and Malawi, will remain the most poor in the region through 2040. In fact, nearly 45 percent of the people living in extreme poverty in Southern Africa in 2040 are forecast to live in these two countries.

FIGURE 4. POPULATION LIVING ON LESS THAN \$1.90 PER DAY.
International Futures 7.27



⁴ The forecast horizon for this report is 2016 to 2040.

⁵ In 2016, less than \$1.90 per day.

⁶ Seychelles and Mauritius also see slight increases in the prevalence of extreme poverty throughout this time period; however, these percentage point increases are not as significant, given the relatively small size of the population in each country.

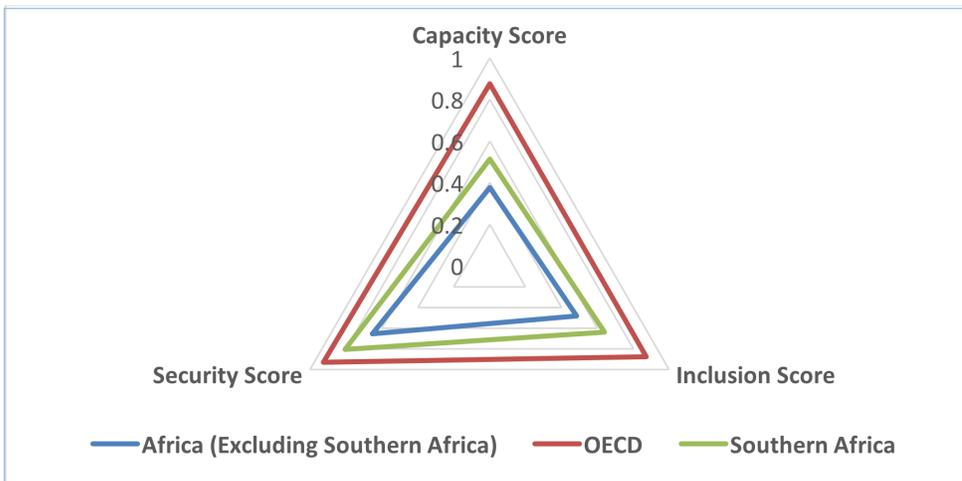
The following sections in this report analyze the key social, human and natural systems with direct impacts on poverty: governance, health, education, infrastructure, agriculture, and global and regional dynamics. Using IFs, we describe each of these sub-components of development across the region and explore trends in each along the IFs Current Path, a baseline scenario that models a world where existing policies continue unchanged. In each section, we also create alternative scenarios that attempt to explore the policy tradeoffs now facing the region.

GOVERNANCE

Perhaps more than any other issue covered in this report, governance is the linchpin for sustainable development in the region. Good governance — characterized by a government’s ability to maintain peace and ensure access to public services effectively and inclusively — could be a catalyst for Southern Africa’s development. On the other hand, poor governance — characterized instead by unpredictable levels of violent conflict, corruption, ineffectiveness and discriminatory practices — could severely restrict, and even reverse, the region’s development.

The three tables on the next page (Figures 6-8) track the forecasted development of governance in Southern Africa across three dimensions: security, capacity, and inclusion. Here, we conceptualize governance as proceeding in overlapping stages, with states first consolidating a monopoly on the legitimate use of force (security), then building bureaucratic capacity and finally institutionalizing inclusive decision-making (Hughes et al., 2014). Across all three measures, which are calculated as indices in IFs, countries in Southern Africa on average perform better than the rest of Africa, but still lag behind OECD countries through 2040.

FIGURE 5. SECURITY, CAPACITY AND INCLUSION SCORES IN 2040 IN AFRICA, SOUTHERN AFRICA AND OECD International Futures 7.27



Governance is the linchpin for sustainable development in Southern Africa.

FIGURE 6. GOVERNANCE SECURITY IN SOUTHERN AFRICAN COUNTRIES UP TO 2040. (International Futures 7.27)

Country	2016		2021			2040		
	Security Score	Global Rank	Security Score	Global Rank	Rank Change 2016-2021	Security Score	Global Rank	Rank Change 2016-2040
Angola	0.53	162	0.53	163	↓	0.65	163	↓
Botswana	0.87	69	0.87	70	↓	0.91	70	↓
Comoros	0.80	115	0.80	114	↑	0.84	123	↓
Lesotho	0.80	113	0.80	120	↓	0.84	118	↓
Madagascar	0.76	140	0.76	143	↓	0.80	144	↓
Malawi	0.79	128	0.79	128	-	0.82	134	↓
Mauritius	0.92	44	0.92	44	-	0.95	44	-
Mozambique	0.77	134	0.77	141	↓	0.81	139	↓
Namibia	0.84	100	0.84	104	↓	0.88	95	↑
Seychelles	0.93	41	0.93	42	↓	0.94	49	↓
South Africa	0.81	111	0.81	105	↑	0.89	82	↑
Swaziland	0.77	134	0.77	135	↓	0.81	137	↓
Zambia	0.79	123	0.79	130	↓	0.83	126	↓
Zimbabwe	0.80	119	0.80	127	↓	0.82	132	↓

FIGURE 7. GOVERNANCE CAPACITY IN SOUTHERN AFRICAN COUNTRIES UP TO 2040. (International Futures 7.27)

Country	2016		2021			2040		
	Capacity Score	Global Rank	Capacity Score	Global Rank	Rank Change 2016-2021	Capacity Score	Global Rank	Rank Change 2016-2040
Madagascar	0.28	167	0.29	169	↓	0.31	180	↓
Comoros	0.26	173	0.28	173	-	0.35	171	↑
Malawi	0.40	124	0.39	135	↓	0.38	154	↓
Zambia	0.36	139	0.37	144	↓	0.42	141	↓
Mozambique	0.40	124	0.40	130	↓	0.43	138	↓
Swaziland	0.48	97	0.49	106	↓	0.54	115	↓
Zimbabwe	0.45	104	0.50	103	↑	0.54	112	↓
Angola	0.54	77	0.54	92	↓	0.60	99	↓
Namibia	0.52	89	0.58	80	↑	0.64	91	↓
Mauritius	0.51	91	0.54	88	↑	0.66	84	↑
Lesotho	0.68	42	0.68	48	↓	0.70	70	↓
South Africa	0.59	63	0.64	60	↑	0.72	63	-
Seychelles	0.77	20	0.78	29	↓	0.84	38	↓
Botswana	0.72	35	0.76	34	↑	0.84	38	↓

FIGURE 8. GOVERNANCE INCLUSION IN SOUTHERN AFRICAN COUNTRIES UP TO 2040. (International Futures 7.27)

Country	2016		2021			2040		
	Inclusion score	Global Rank	Inclusion score	Global Rank	Rank Change 2016-2021	Inclusion score	Global Rank	Rank Change 2016-2040
Angola	0.34	159	0.34	162	↓	0.4	168	↓
Swaziland	0.28	174	0.31	170	↑	0.4	165	↑
Malawi	0.53	121	0.54	120	↑	0.6	125	↓
Mozambique	0.55	118	0.54	119	↓	0.6	117	↑
Zimbabwe	0.56	115	0.59	110	↑	0.6	107	↑
Comoros	0.62	95	0.63	96	↓	0.6	102	↓
Madagascar	0.60	98	0.60	101	↓	0.7	96	↑
Zambia	0.64	87	0.65	91	↓	0.7	91	↓
Seychelles	0.74	56	0.76	58	↓	0.8	66	↓
Mauritius	0.77	48	0.77	53	↓	0.8	60	↓
Botswana	0.73	60	0.76	56	↑	0.8	55	↑
Namibia	0.72	70	0.74	66	↑	0.8	46	↑
Lesotho	0.75	55	0.78	50	↑	0.8	43	↑
South Africa	0.83	28	0.85	26	↑	0.9	25	↑

SECURITY

Large-scale civil wars and abrupt regime change are largely a thing of the past, and since the early 2000s, the region, with the exception of Madagascar in 2009, has had governments free of existential crises.⁷

While few states failed, low-level violence is still a persistent problem. Civil unrest, including protests and violent government responses to dissatisfied populations, reflects underlying demographic tensions and poor governance. Figure 10 displays Armed Conflict and Event Data (ACLED), which tracks lower level violent conflict. Each circle represents an instance of conflict and is color-coded by type.

Much of this conflict is shaped by a relatively large share of young people—or “youth bulge”—that is unsatisfied with economic opportunities and governance. To put this in context, all Southern African countries, except for South Africa, Mauritius, and Seychelles, have a larger youth bulge today than Egypt did at the peak of its revolution (Egypt’s youth bulge was 42.5 in 2011).

FIGURE 9. HISTORICAL ABRUPT REGIME CHANGE AND CIVIL WARS FOR SOUTHERN AFRICA .

IFs 7.27 from the Political Instability Task Force (PITF, 2015)

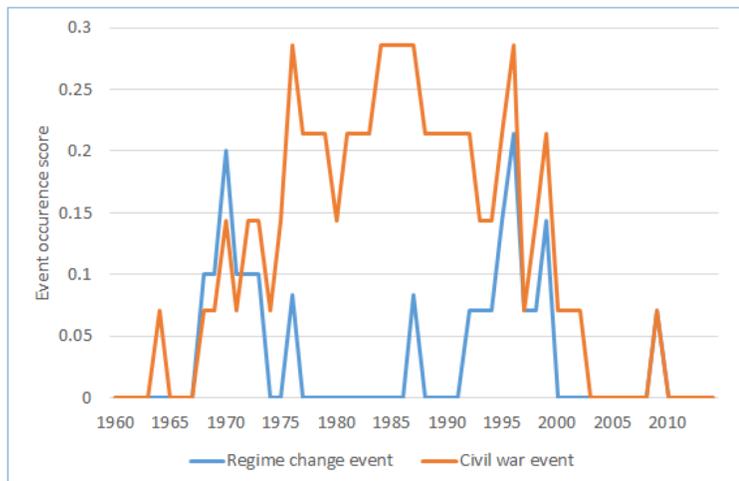
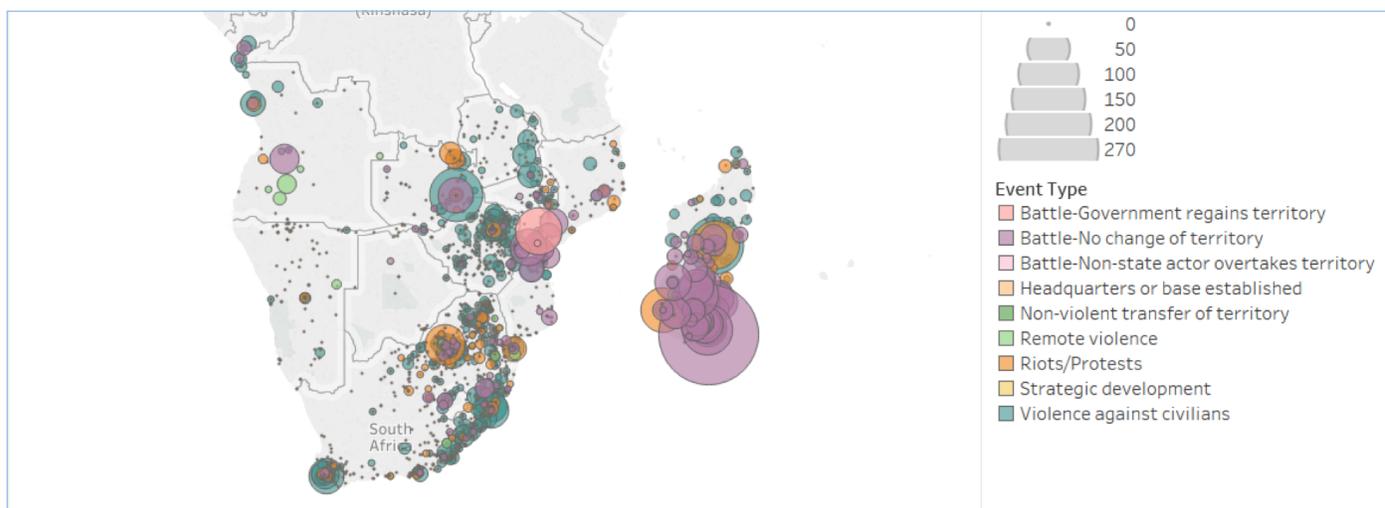


FIGURE 10. DATA ON GEOGRAPHICAL EVENTS AND FATALITIES FOR SUB-NATIONAL VIOLENCE BY TYPE.

Armed Conflict Location and Event Data (ACLED)



⁷ The Reference Report provides more information on the history of conflict and instability in the region.

Using a multidimensional approach to modeling political instability, Figure 11 highlights acute vulnerabilities for domestic instability now. Angola, Malawi, Mozambique, and Zimbabwe are multidimensionally fragile and experience a range of conditions that could lead to state failure. Other countries have more particular but deep issues related to political stability (structural imbalances in Lesotho and economic issues in Madagascar, for example). As a whole, the region is also generally vulnerable to political instability from demographic, economic, and structural imbalances in development (see the Southern Africa Development Trends Reference Report for more detailed explanation of model assumptions).

FIGURE 11. YOUTH BULGE IN SOUTHERN AFRICA WITH GLOBAL RANKS AND PROBABILITY OF CONFLICT.
International Futures 7.27

Country	Unemployment rate (most recent)	Informal labor share (2016)	2016		2021			2040		
			Youth bulge	Global Rank	Youth Bulge	Global Rank	Change in Youth Bulge from 2016-2021	Youth Bulge	Global Rank	Change in Youth Bulge from 2016-2040
Angola	6.8	48.5	50.9	9	51	6	↑	46.8	6	↑
Mozambique	22.6	64.9	50	15	50.5	8	↑	45	11	↑
Zambia	13.3	67.2	51.3	6	50.2	10	↓	44.8	13	↓
Malawi	7.5	68.7	52	4	50.3	9	↓	43.5	16	↓
Zimbabwe	5.4	82.1	51	8	47.1	30	↓	41.7	23	↓
Madagascar	3.6	72.1	48.4	27	47.4	23	↑	41.1	27	-
Swaziland	22.3	44.5	52.7	3	48.4	15	↓	40.3	32	↓
Comoros	6.5	64.4	46.8	41	45	43	↓	40.2	34	↑
Lesotho	26.2	33.3	50.8	10	47.4	24	↓	39.3	39	↓
Namibia	18.6	42.2	46.6	42	43.9	47	↓	36.8	50	↓
Botswana	18.2	26.4	42.2	63	38.3	71	↓	32.3	64	↓
South Africa	25.1	31.2	40.4	74	37.4	73	↑	30.4	72	↑
Seychelles	N/A	13.7	28.4	127	26	123	↑	25.1	106	↑
Mauritius	7.7	12.3	28.7	125	27.1	119	↑	19	157	↓

Youth bulge is a measure of the population aged between 15-29 years relative to the population aged over 29.

FIGURE 12. DRIVERS OF CONFLICT ALONG WITH GLOBAL RANKS.
Based on current Pardee Center research for the Minerva Initiative

	Goldstone		Demographic		Economic		Governance		Horizontal Inequality		Structural Imbalances		SUM OF POSSIBILITIES
	PROBABILITY	RANK	PROBABILITY	RANK	PROBABILITY	RANK	PROBABILITY	RANK	PROBABILITY	RANK	PROBABILITY	RANK	
Angola	0.078	93	0.061	97	0.014	64	0.050	89	0.037	91	0.037	91	0.277
Botswana	0.015	49	0.014	49	0.010	42	0.015	37	0.010	21	0.046	97	0.111
Comoros	0.026	65	0.018	55	0.029	94	0.013	24	0.008	10	0.031	85	0.124
Lesotho	0.026	63	0.025	68	0.023	84	0.015	37	0.010	19	0.086	100	0.185
Madagascar	0.024	58	0.033	76	0.029	95	0.041	82	0.016	57	0.021	69	0.164
Malawi	0.090	97	0.052	92	0.038	99	0.023	62	0.017	59	0.036	89	0.256
Mauritius	0.004	18	0.006	23	0.010	38	0.010	1	0.010	19	0.013	48	0.054
Mozambique	0.027	67	0.052	91	0.032	97	0.028	70	0.018	66	0.038	92	0.196
Namibia	0.018	54	0.017	53	0.013	57	0.023	62			0.033	86	0.104
Seychelles			0.002	2	0.009	29			0.005	1			0.015
South Africa	0.023	58	0.047	87	0.011	47	0.013	24	0.019	68	0.040	94	0.153
Swaziland	0.015	44	0.024	66	0.016	69	0.013	24	0.009	15	0.036	89	0.112
Zambia	0.029	73	0.050	90	0.019	75	0.019	50	0.015	48	0.048	98	0.180
Zimbabwe	0.111	98	0.037	80	0.026	90	0.060	94	0.034	87			0.268

CAPACITY

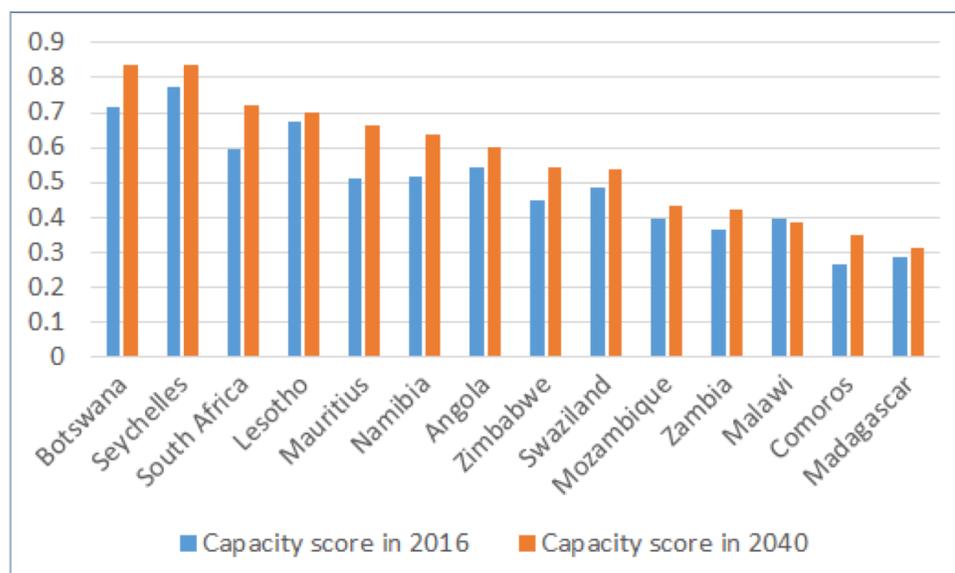
The development of government capacity — the quality of service provision and the strength to solve collective action problems — is crucial for the long-term promotion of human development and needs to be a policy priority for the region. Governments in the region are currently about as capable as you would expect (based on their level of economic development benchmarked globally using GDP per capita at PPP). However, growth in capacity is forecast to

be slow. Given relatively high levels of informal employment along with declining foreign aid as a share of GDP, it will be a challenge for governments to address the growing complexity of collective action problems in the region (driven by both increasing economies and populations).

Government capacity is a crucial factor in the development of security in the region and, if not significantly improved, will continue to fuel dissatisfaction among young populations. Indeed, as our scenario analysis in this report suggests, advancing the quality of governance does more for per capita economic growth than any other single intervention.

Figure 13 shows little change in Governance Capacity over time in the region.

FIGURE 13. CAPACITY SCORES IN SOUTHERN AFRICA IN 2016 AND CURRENT PATH OF DEVELOPMENT TO 2040. International Futures 7.27



Most countries in the region are collecting more non-aid revenues than expected when benchmarked globally by per capita GDP. Government revenue as a percentage of GDP is forecast to increase in 11 of the region's 14 countries between 2016 and 2040. In Mozambique, Malawi and Lesotho, the share of government revenue declines to 2040, a drop which is partially driven by a forecasted decline in foreign aid as a share of GDP across the region. In Lesotho, in particular, estimates of government revenues as a share of GDP are especially high today, likely due to revenues from the Southern African Customs Union (SACU). Regionally, foreign aid comprises just

less than 5 percent of all government revenues today. But in countries with greater levels of poverty like Comoros, Malawi, Mozambique, Madagascar, Zimbabwe and Zambia, foreign aid accounts for more than a fifth (and in the case of Comoros, as much as half) of all government revenues. In 2040, IFs forecasts that foreign aid will make up less than 2.5 percent of all government revenues regionally, declining to half its current share. Such government revenue shortfalls are also tied to high levels of informality in the region, as countries are unable to collect taxes from significant segments of the economy. More than half of all labor in the

region is now informal, a share that is forecast to decline to roughly 44 percent by 2040.

Governance quality (transparency and effectiveness, for example) increases the efficacy of these government resources. As might be expected, more prosperous countries (Seychelles, Botswana, and Mauritius) will continue to perform well both on transparency and effectiveness over the next few decades. Other governments, particularly those in Angola, Zimbabwe, Comoros and Madagascar, score poorly on both transparency and effectiveness and do not improve significantly over time.

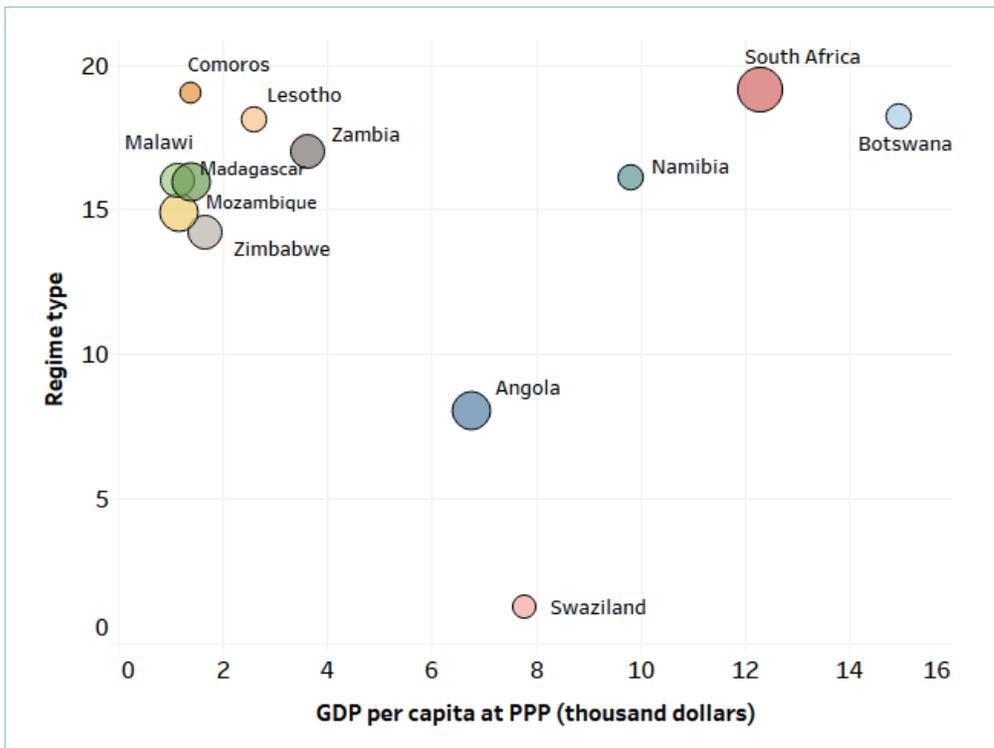
INCLUSION

The inclusion dimension of the IFs Governance Index represents democracy (as a regime type) and gender empowerment, the former an institutional measure of inclusion and the latter a proxy for broader identity group inclusion. Historically, the transition toward broader and deeper inclusion comes later than the transition toward greater security and improved government capacity. In present-day Southern Africa, however, the average citizen lives in a country susceptible to conflict and lower levels of government capacity but still characterized by a relatively democratic regime.

Inclusivity in governance, which includes the empowerment of minorities, should be a development goal in itself, and in that sense, the region as a whole is in relatively good shape given its per capita GDP. However, it's

also useful to consider the degree to which inclusion, and formal democratic practices within a country in particular, could affect other areas of governance and overall development. Countries in the region that are more anocratic — that is, their governments have some institutions that are simultaneously responsive to democratic and autocratic processes— are more likely to encounter greater security risks and capacity challenges ahead. Today, Angola and Zimbabwe are more anocratic than their Southern African neighbors; yet moving forward, and especially given their relatively young (and underemployed) populations, other countries also risk backsliding away from their current democratic status into more anocratic territory by 2040.

FIGURE 14. REGIME TYPE SCORE AND GDP PER CAPITA AT PPP IN SOUTHERN AFRICA IN 2016.
International Futures 7.27



The average Southern African citizen lives in a country characterized by a relatively democratic regime.

Bubble size represents population size in millions. A regime type score of 20 represents a fully democratic regime, whereas a score of 0 represents a fully autocratic regime.

GOVERNANCE SCENARIOS

In this subsection, we explore a variety of scenarios aimed at improving governance in Southern 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.

Strengthening Governance

Increased Transparency

In this scenario, Southern African governments make similar progress in the fight against corruption to what Namibia accomplished since 2012. In terms of regional gains in transparency, this translates to roughly a 14 percent increase in transparency by 2021 relative to the Current Path. By 2021, Southern Africa has largely closed the gap with the global average and put the region ahead of Latin America.

Greater Gender Empowerment

Here, we simulate an increase in gender empowerment across the region over the next five years. Gains between 2016 and 2021 under this scenario range from absolute increases of 0.06 in countries that have higher levels of gender empowerment in the region (Lesotho, Namibia, South Africa), to around 0.02 in countries that have lower levels such as Angola, Mozambique, Malawi, and Comoros.⁸ As discussed above, gender empowerment is an important component of deeper government inclusion and drives changes in democracy.

More Effective Governments

This scenario simulates improvements in government effectiveness between 0.05 and 0.2 points, resulting in an overall increase of effectiveness in the region in 2040 from 2.51 in the Current Path to 2.64 in the scenario, which is similar to Namibia today.

Zero Conflict

This intervention reduces the risk of internal war to zero for all countries by 2021 and has the greatest impact on Angola, since it is the country with the highest probability of conflict (according to the internal war probability measure forecast by IFs) and the only country in the region to remain at risk through 2040.

Transitioning Informality

Strengthened Formal-Informal Linkages

The first scenario aimed at transitioning the region away from informality simulates the strengthening of ties between the formal and informal sectors. This allows the informal sector to become increasingly embedded within formal production process, shifting a portion of the informal production (or informal GDP) towards formal ends. In this scenario, informal production in all countries is reduced by 5 percent more than is forecast in the Current Path. This reduces informal GDP from 18.6 percent in 2016 to 17.3 percent in 2021—a decrease similar to that which was seen in the region from the 1960s to 1980s, and from 2000 to 2005.

Improved Business Regulation

In this scenario, the regulatory environment is simplified to the point that by 2021, it comes within 1 percent of the global average—bringing the region in line with today's level of business regulation found in Swaziland, Namibia, and Zambia.

Unskilled Transfers

This scenario raises government transfers to unskilled households for pensions and welfare by 10 percent (relative to the Current Path) over the next five years. This intervention translates into an increase from \$112 billion annually in 2016 to \$132 billion in 2021.

Increased Firm Tax

Raising the tax rate can also push businesses into the informal sector. In this scenario, we increase the tax rate by approximately 20 percent (relative to the Current Path) over 5 years, a moderately optimistic intervention given Botswana's nearly 47 percent increase in taxes between 2005 and 2015.

⁸ A 0.06 increase is like closing the gap between South Africa and Portugal, for example, while a 0.02 jump is like closing the gap between Saudi Arabia and Morocco today.

Each of these scenarios improves either the security, capacity, or inclusion dimensions within the region. Implementing the full suite of interventions has additional benefits beyond the sum of their individual components (the combined intervention bubble is not shown below). For example, the additional revenue collected in the Governance Combined scenario, which joins the Strengthening Governance and Transitioning Informality scenarios, is greater than the sum of the increased revenue from all the component scenarios. One explanation can come from the movement of informal labor and production to the formal sector. Reducing corruption, increasing household transfers, and simplifying the regulatory environment all tend to drive a decrease in the level of informality. This shift enables a larger tax base and higher levels of productivity and creates a virtuous cycle of formalization and growth.

Figure 15 shows the percent increase in labor productivity relative to the Current Path for each scenario, the two larger intervention sets, as well as the combination of all scenarios.

By 2040 the Transitioning Informality scenario increases government revenue by 10.5 percent and labor productivity by 4 percent relative to the Current Path, though this is less than the labor productivity gains seen in the Increased Transparency scenario.

FIGURE 15. PERCENT INCREASE IN GOVERNMENT REVENUE AND LABOR PRODUCTIVITY RELATIVE TO CURRENT PATH.
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	Government Revenue (Percent Increase Compared to the Current Path)		Labor Productivity (Percent Increase Compared to the Current Path)	
	Percent Increase in 2021	Percent Increase in 2040	Percent Increase in 2021	Percent Increase in 2040
All Scenarios Combined	6.7	23.2	2.9	13.3
Strengthened Governance	2.01	9.5	1.5	8.5
Increased Transparency	1.3	5.2	0.9	4.5
Greater Gender Empowerment	0.2	0.3	0.1	0.3
More Effective Governments	0.1	1.6	0.1	1.6
Zero Conflict	0.3	1.9	0.4	1.7
Transitioning Informality	4.7	10.5	1.4	4.0
Strengthened Formal-Informal Linkages	1.6	6.7	1.0	3.2
Improved Business Regulation	0.9	1.0	0.5	0.7
Unskilled Transfers	0.7	0.9	0.2	-0.2
Increased Firm Tax	1.3	0.9	-0.3	0.1

Figure 16 evaluates the Strengthening Governance scenarios across three dimensions. The y-axis represents changes in overall governance security, capacity and inclusion using the percent increase in the IFs Governance Index. The x-axis represents the percent increase in government revenue, and the bubble size is the percent increase in GDP. The Increased Transparency scenario has by far the largest impact of any governance intervention (increasing government revenues by over twice that of any other scenario). After the Increased Transparency scenario,

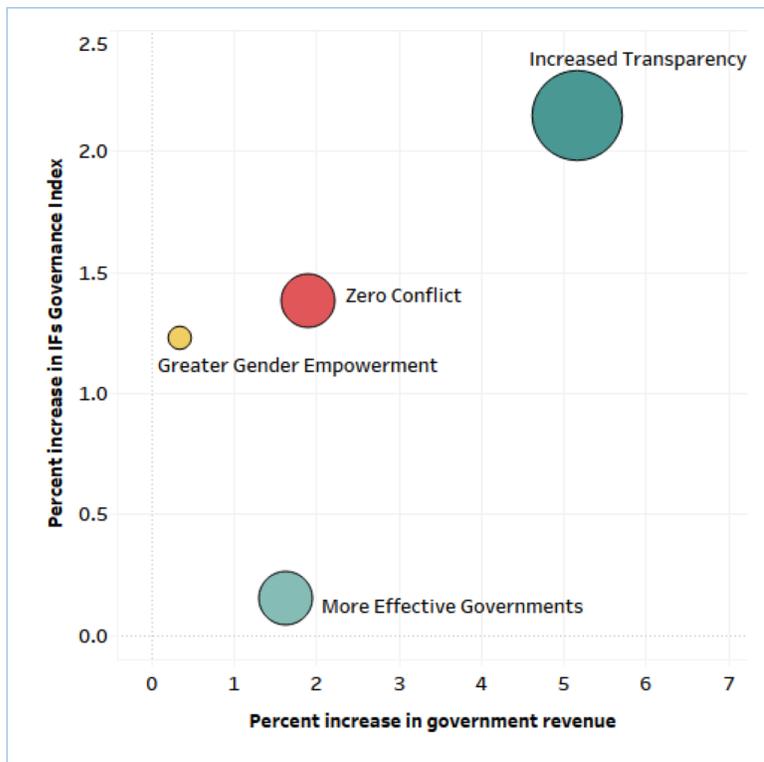
Zero Conflict and Greater Gender Empowerment increase the IFs Governance Index by the greatest amount.

The impact of these scenarios varies from country to country. For example, in Angola, a significant exogenous reduction in the threat of security increases economic growth by 5 percent by 2040. However, in countries that have a much lower risk of instability, this intervention does little to strengthen governance (beyond what is already forecast in the Current Path).

The Increased Transparency scenario reduces corruption and, as a knock-on effect, also formalizes some informal economic activity. Corruption is like a tax on businesses whose revenue isn't re-invested to improve society and human development. Reducing this inefficient allocation of resources has broader virtuous impacts across the economy and broader society.

FIGURE 16. ASSESSING TRADEOFFS ACROSS THE STRENGTHENING GOVERNANCE SUB-COMPONENTS FOR THE SOUTHERN AFRICA REGION.

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Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents percent increase in GDP per capita at PPP.

In countries with large informal sectors but relatively low government revenue (as a share of GDP) the Strengthened Formal-Informal Linkages scenario generates higher government revenue. Figure 17 evaluates the Transitioning Informality scenarios across three dimensions. In this figure, the x-axis displays relative increases in GDP at MER and bubble size represents the percent increase in the IFs Government Index over the Current Path.

However, the y-axis represents the percent increase in GDP (relative to the Current Path). While Angola and South Africa (the two largest economies in the region) see the largest absolute increase in government revenue across these scenarios, a significant portion of Southern African revenue generation also comes from the gains seen in Mozambique and Zambia (the third and fourth largest economies, and the two countries

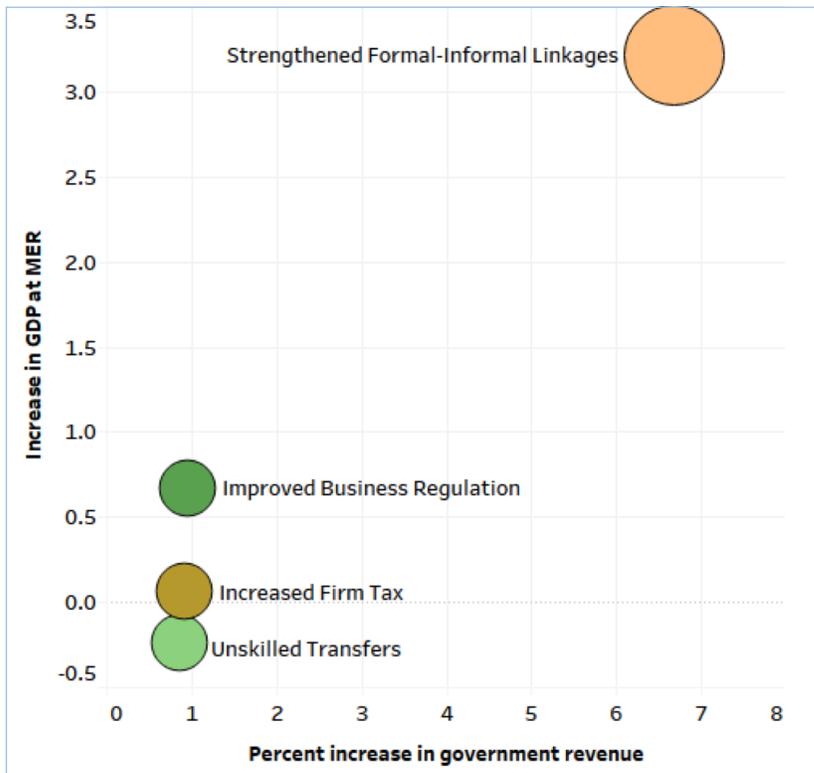
which benefit the most from formalization in terms of percent increase in GDP).

As a greater share of informal production is absorbed into the formal sector, the pool of taxable activity also expands. For example, in the Strengthened Formal-Informal Linkages scenario, Madagascar enjoys an increase in labor productivity by around 5.3 percent (relative to the Current Path) by 2040, and an expansion of government revenue by nearly 6.5 percent over the same period.

Though the countries with the highest levels of regulation in the region (Angola, Zimbabwe, and Comoros) may be positioned to gain the most in terms of formalization in this scenario, lower levels of human capital (in terms of educational attainment) make it difficult to take full advantage of the improving business environment. Furthermore, in Increased Firm Tax scenario, the 20 percent increase in the firm tax rate results in an additional 2 million people seeking employment in the informal sector across the region. With increasing tax rates, firms that are less productive, and in turn less competitive, may face the decision of moving into the informal sector or going under. Therefore, while an increase in the tax rate would theoretically mobilize greater revenue, it can also simultaneously reduce the number of firms that choose to participate in the taxable formal sector.

FIGURE 17. ASSESSING TRADEOFFS ACROSS THE TRANSITIONING INFORMALITY SUB-COMPONENTS FOR THE SOUTHERN AFRICA REGION.

International Futures 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents percent increase in total governance index.

Lower levels of human capital make it difficult to take full advantage of the improving business environment.

HEALTH

With an average life expectancy of 59.6 years in 2016, Southern Africa has the third lowest life expectancy among all other developing regions in the world (after Western and Central Africa).

AIDS accounted for the highest death rate in 2016 at 1.5 deaths per thousand people. The second biggest killer in the region is cardiovascular disease, which accounted for 1.4 deaths per thousand people in 2016.⁹

Communicable diseases accounted for 55 percent of deaths in the region in 2016, more than three times the global average. The premature death rate from noncommunicable diseases in Southern Africa is also higher than the global average.¹⁰

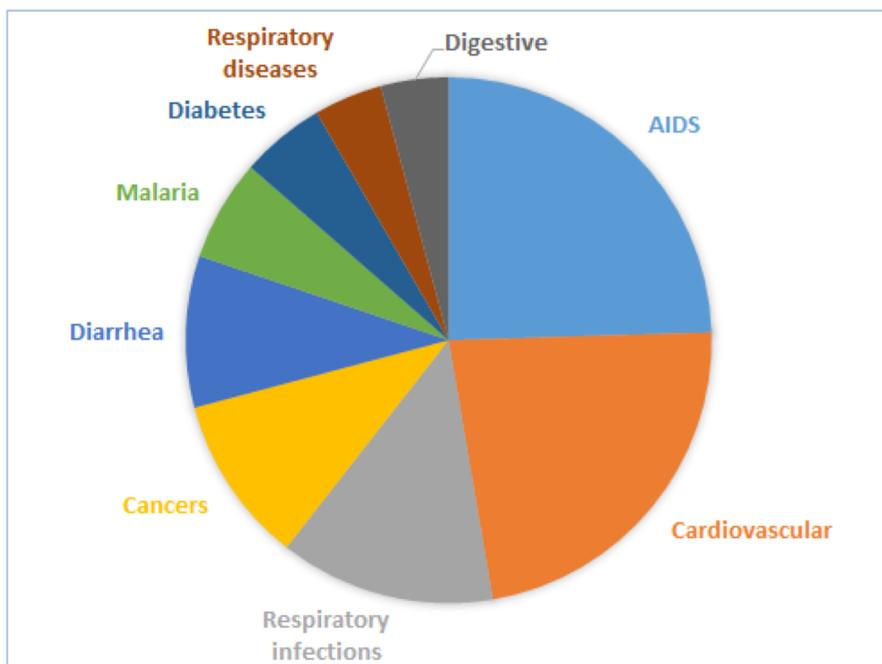
Infant mortality has declined dramatically from 141 deaths per thousand infants in 1960 to 50 deaths per thousand infants in 2016 in Southern Africa. However, Southern Africa continues to have the third highest rate of infant mortality among other developing regions 2016 (again, after Western and Central Africa). Respiratory infections, malaria, diarrhea and other communicable diseases were the biggest contributors to infant mortality in the region in 2016.

By 2030, noncommunicable diseases are expected to surpass communicable diseases as the primary cause of mortality in Southern Africa. High levels of both communicable and noncommunicable diseases is referred to as

the “double-burden” of disease. These two disease categories are very different in terms of their causes and the way they are treated. Thus, a challenge for Southern Africa will be to maintain a healthcare system that can effectively cater to these two very different types of mortality simultaneously.¹¹ As the scenario analysis later in this report shows, infrastructure, especially improved access to water, sanitation, and hygiene (WASH), is a key component of any “horizontal” health system that focuses on prevention, treatment and management of all diseases. The World Health Organization, for instance, has highlighted the causal relationship between low levels of access to improved WASH and the spread of communicable diseases (Fewtrell et al, 2007).

FIGURE 18. DISTRIBUTION OF DEATH RATES BY CAUSE IN 2016.

International Futures 7.27



⁹“Other communicable diseases,” an aggregated category accounting for various different causes of death, actually account for the most deaths in Southern Africa.

¹⁰ Forecasts from IFs 7.27 show that death rates from communicable and noncommunicable diseases are higher for every age group.

¹¹ Vertical programs are health programs that target specific diseases, where interventions are provided through delivery systems that typically have separate administration and budgets, with varied structural, funding, and operational integration with the wider health system (Atun, 2008). However, considering the transitioning disease burden and the inter-relationship of the diseases, what is required is the implementation of a horizontal health system that emphasizes prevention as well as treatment of all diseases (Narayan and Donnenfeld, 2016).

FIGURE 19: LIFE EXPECTANCIES IN SOUTHERN AFRICA IN 2016, 2021 AND 2040 ALONG WITH CHANGE IN GLOBAL RANKS.

Country	2016		2021			2040		
	Average life expectancy at birth	Global Rank	Average life expectancy at birth	Global Rank	Change in Global Rank from 2016-2021	Average life expectancy at birth	Global Rank	Change in Global Rank from 2016-2040
Angola	52.8	182	54.1	183	↓	64.3	180	↑
Botswana	65.4	144	67.5	145	↓	73.2	136	↑
Comoros	64.6	148	66.8	146	↑	71.3	152	↓
Lesotho	51.1	185	53.2	185	-	59.8	184	↑
Madagascar	66.3	139	67.9	141	↓	71.6	151	↓
Malawi	64.9	146	67.9	139	↑	74.5	121	↑
Mauritius	75.1	77	76.0	76	↑	78.9	75	↑
Mozambique	57.3	173	60.9	172	↑	69.4	163	↑
Namibia	66.0	141	68.2	137	↑	73.9	124	↑
Seychelles	74.1	89	75.0	89	-	77.7	88	↑
South Africa	58.1	172	59.7	173	↓	65.3	175	↓
Swaziland	49.6	186	51.0	186	-	57.1	186	-
Zambia	61.6	162	64.1	160	↑	70.8	155	↑
Zimbabwe	59.8	169	61.8	169	-	67.7	168	↑

Ranks have been computed on the basis of life expectancy data and forecasts of 186 countries.

FIGURE 20: TOP CONTRIBUTORS TO DALYs IN SOUTHERN AFRICA IN 2016, 2021 AND 2040.

Country	TOP CONTRIBUTORS TO DALYs		
	2016	2021	2040
Angola	Diarrhea	Diarrhea	Tuberculosis and respiratory infections
Botswana	AIDS	AIDS	Cardiovascular disease
Comoros	Tuberculosis and respiratory infections	Cardiovascular disease	Cardiovascular disease
Lesotho	AIDS	AIDS	AIDS
Madagascar	Tuberculosis and respiratory infections	Cardiovascular disease	Cardiovascular disease
Malawi	AIDS	AIDS	AIDS
Mauritius	Diabetes	Diabetes	Diabetes
Mozambique	AIDS	AIDS	Cardiovascular disease
Namibia	AIDS	AIDS	Cardiovascular disease
Seychelles	Cardiovascular disease	Cardiovascular disease	Cardiovascular disease
South Africa	AIDS	AIDS	AIDS
Swaziland	AIDS	AIDS	AIDS
Zambia	Malaria	Malaria	Cardiovascular disease
Zimbabwe	AIDS	AIDS	Cancers
Southern Africa	AIDS	AIDS	Cardiovascular disease

HIV/AIDS

Southern Africa has the highest prevalence of HIV in the world. Recent advances in investing in antiretroviral treatments (ARTs) have significantly reduced the burden of death from AIDS and many people are living long healthy lives with the disease. But, the decreasing AIDS death rate has the counter effect of slowing the decrease of prevalence of HIV within a population — as fewer people die from AIDS there are more HIV-positive people alive, increasing the number of people who can spread the disease. While there are more people alive with HIV/AIDS today, consistent use of ARTs reduces their ability to spread the disease as well.

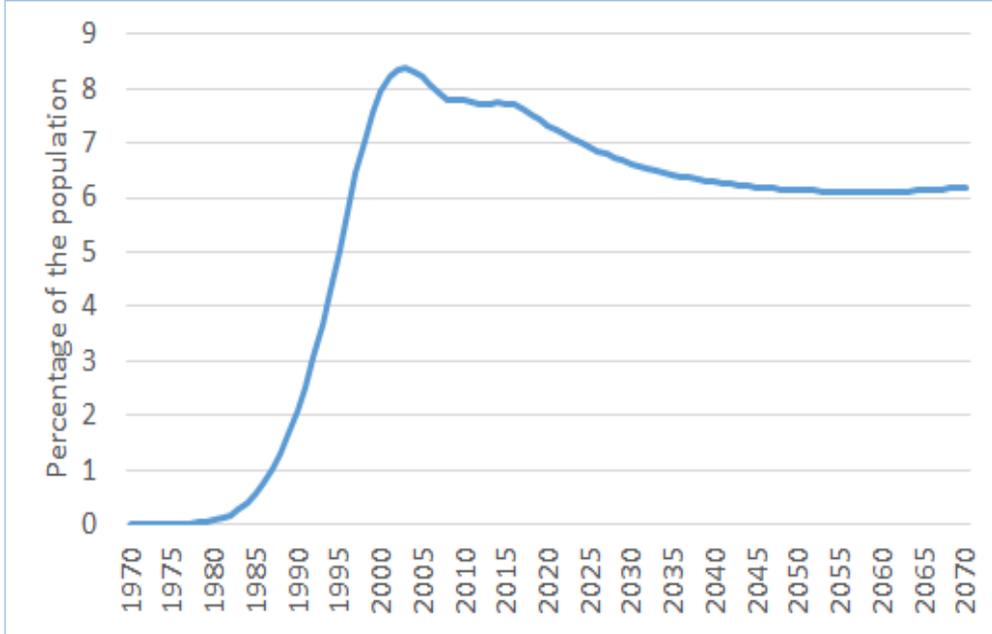
The prevalence of HIV is forecast to remain high for decades. Thus, the disability impact of the disease will continue to be a burden and is forecast to exceed the mortality impact of the

disease from the mid-2020s onwards. In addition, the continued prevalence of HIV makes individuals vulnerable to incidence of other diseases, mainly tuberculosis: the risk of developing this respiratory infection is estimated to be between 26 and 31 times greater in people living with HIV than among those without (WHO, 2016).

So while we are likely past the peak death rate and peak prevalence of HIV/AIDS in Southern Africa as a whole, many individual countries have not yet reached peak prevalence. For instance, prevalence is expected to peak in South Africa in the year 2055, and in Lesotho, Madagascar and Swaziland by 2070.¹² To prevent resurgence, more effort must be made to avoid infection from HIV. Only reducing incidence can increase the rate at which the prevalence declines.

FIGURE 21. PREVALENCE RATE DATA FROM THE UNAIDS SPECTRUM MODEL.

Spectrum v. 5.46



¹² Forecasts extracted from Spectrum model of UNAIDS v 5.46.

FERTILITY

Declining fertility rates have shaped demographic trends around the world.¹³ In 1960, fertility rates in Southern Africa ranged from 5.5 births per woman in Seychelles to 7.3 births per woman in Angola. Today, fertility rates range from 1.5 births per woman in Mauritius to 5.8 births per woman in Angola, with a regional average of around 4.1 (for reference, the global average is 2.4). By 2040, the Current Path forecasts that the regional average total fertility rate (TFR) will still be greater than the global average was in 1990, which is similar to the level of Lesotho today. In 2040—at a rate similar to that in Zimbabwe today—the average Angolan woman is forecast to give birth to around four children.¹⁴

Many Southern African countries have made significant strides in reducing maternal mortality, a driver of fertility and broader wellbeing, since the 1990s. However, today, the region still suffers from a relatively high burden of maternal mortality. Malawi, Mozambique, Lesotho, Angola, and Zimbabwe all have levels of maternal mortality higher than the average of the UN's least developed country group. Gorman (2013) suggests that a successful program targeting maternal and child health should be better integrated with HIV treatments, such as lifelong ARTs, to reduce the risk of complications during or after birth and to mitigate mother-to-child transmission.

With a population growth rate of more than 3 percent per year, Angola is the seventh fastest growing population in the world. South Africa, on the other hand, has a population growth

rate (0.7 percent in 2016) more in line with the OECD average (0.5 percent in 2016). Nearly all other countries in the region are at a stage of their demographic transition (from youthful and rapidly growing to mature with slow or negative growth) found somewhere between that of Angola and South Africa.

Rapid population growth poses a major obstacle for maintaining and improving the overall health of Southern Africans. Each year 6.3 million people are born (a figure forecast to reach 7.5 million by 2040) in the region. Most of these children are born to parents who make less than \$3.10 per day and who live without access to electricity, piped water or improved sanitation. Therefore, despite reductions in poverty rates within countries, the absolute number of people that live in poverty or lack access to these basic services is on the rise in the region.

**By 2040,
the Current Path
forecasts that the
regional average total
fertility rate will still be
greater than the global
average was in 1990.**

¹³ However, among some developed and more demographically mature populations, migration can have very noticeable impacts on the age-sex structure of a country. In some episodes of large migration, this noticeable impact is also seen in Southern African countries such as Mozambique and Zimbabwe.

¹⁴ Contraceptive use in Southern Africa is significantly higher than the continental average, with roughly 58 percent of women using modern forms of contraception (compared with 27 percent for all of Africa). Country-level prevalence ranges from around 12 percent in Mozambique to 75 percent in Mauritius. Fertility rates are, however, much higher in some countries than would be expected given the level of contraceptive use as well as the level of GDP per capita and female education.

HEALTH SCENARIOS

The combined Improving Health scenario includes 1) HIV/AIDS Reduction 2) Increased Water and Sanitation 3) Malnourished Children and 4) BMI Reduction. To draw a contrast, we also created a scenario that simulates an HIV/AIDS Resurgence. Because of its impact on the future demographics, we've also created a separate set of health scenarios that focus on Reducing Fertility, including 1) Contraception Access 2) Family Planning and 3) Maternal Mortality.

Strengthening Governance

HIV/AIDS Reduction

This scenario decreases deaths from HIV/AIDS from 0.15 percent of the population in 2016 to 0.1 percent by 2021. In the Current Path, it is only reduced to 0.12 by 2021. A parameter to decrease the rate of infection is also used in this scenario.

HIV/AIDS Resurgence

This 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 5 years compared to the Current Path. Here, the death rate from HIV/AIDS increases from its current level of 0.15 to 0.19 percent of the population by 2021.

Increased Water and Sanitation (WASH)

The WASH scenario increases access to an improved water sources from 72 to 76 percent by 2021, and access to improved sanitation increases from 44 to 49 percent.

Malnourished Children

This scenario reduces the portion of underweight children from 16 percent in 2016 to 13 percent by 2021.

BMI (Body Mass Index) Reduction

In this scenario, the body mass index of certain countries with higher levels of obesity (Botswana, Mauritius, South Africa, and Swaziland) is reduced from 27.5 currently to 26.3 percent by 2021.

Reducing Fertility

Contraception Access

Data from the World Development Indicators suggest that most countries in the region have seen a 20 percent increase (or an average of 9.3 percentage points) in contraception use over 5 years (World Bank, 2016). In this scenario, therefore, we have simulated a 20 percent increase in contraceptive use (relative to the Current Path) over 5 years, resulting in an 18 percent increase in the use of modern contraceptives between 2016 and 2021.

Family Planning

Since the region still maintains higher than expected fertility rates given contraceptive prevalence, female education, and per capita GDP, we also explore an extended scenario in which countries can reduce fertility through other family planning interventions. Examples of such efforts can be seen in Mauritius, Botswana, and Zimbabwe, which have put forth strategies to improve sex education, modern contraception access, and women's health services (Mauritius Family Planning & Welfare Association, 2012; Botswana Ministry of Health, n.d.; ZNFPC, 2016).

Maternal Mortality

This scenario simulates a reduction in communicable disease for women aged 15 to 49 by 10 percent over 5 years, translating to a roughly 30 percent decrease in maternal mortality over five years. Historically, this has been accomplished in Botswana, Mauritius, South Africa, Zambia and Zimbabwe (WHO; 2015).

In the HIV/AIDS Reduction scenario, overall HIV prevalence actually increases compared to the Current Path, because fewer people are dying from the disease. This intervention causes the largest decrease in years of life lost (YLL), the largest boost in life expectancy, and a significant reduction in years living with a disability (YLD) of all these health scenarios.¹⁵ The HIV/AIDS Resurgence scenario increases the region's YLL significantly as more people contract HIV and life expectancy decreases, yet YLD actually decreases since there are less people alive that are HIV positive.

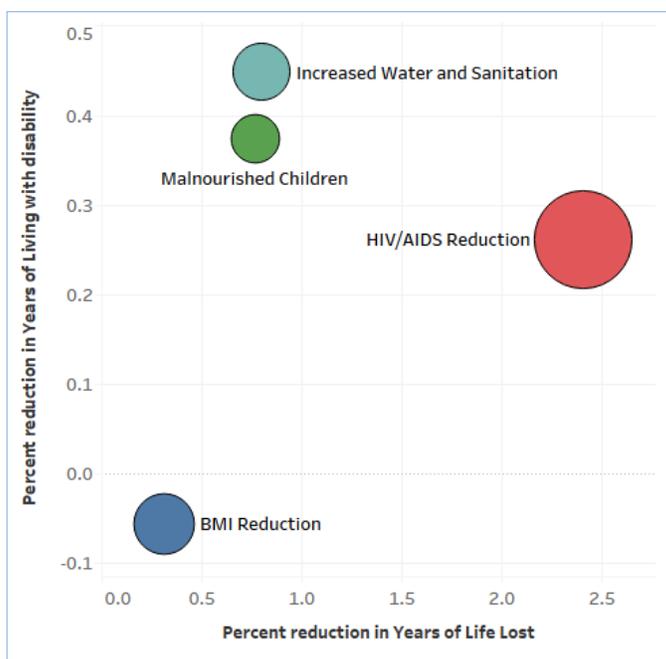
Of all health scenarios, the Increased Water and Sanitation (WASH) scenario shows the largest decrease in YLD. Increased WASH access (along with reductions in malnourishment) reduces the prevalence of communicable diseases,

which significantly reduces the number of years living with disability. Since communicable diseases disproportionately affect the younger population, reductions in the prevalence of these diseases can then eliminate more years of disability across a population.

The Malnourished Children scenario leads to a significant reduction in stunting, which affects a person for their entire life and contributes to YLDs. The BMI Reduction scenario decreases both YLL and YLD from some diseases, most significantly cardiovascular diseases. However, this scenario actually increases the overall YLD because more people are living longer lives, often with some form of disability. Still, this scenario sees the largest increase in average regional life expectancy after the HIV/AIDS scenario.

The Improving Health scenario brings all of these interventions together (except HIV/AIDS Resurgence). This scenario is the best in terms of YLDs, YLLs, and overall life expectancy. YLLs are reduced by over 6 million years, YLDs are decreased by 1.7 million years, and life expectancy is extended by over one year to 2040. As this demonstrates, focusing on one type of disease or one driver of disease can increase the health of a population in certain ways, but a horizontal, integrated approach that focuses on the drivers of mortality and morbidity leads to the greatest gains in overall health and life expectancy. The graph below shows the decrease in YLL and YLD compared to the Current Path on the horizontal and vertical axes respectively. The size of the bubbles is weighted by the increase in life expectancy compared to the Current Path.

FIGURE 22. IMPACT OF HEALTH INTERVENTIONS FOR SOUTHERN AFRICA COMPARED TO THE CURRENT PATH IN 2040.
International Futures 7.27



Size of bubbles represents increase in life expectancy.

¹⁵ Years of life lost (YLL) measures the years of life that a person would have lived if he or she had not died prematurely. Years lived with disability (YLD) measures the number of years that a person lives with a disability, including stunting and other diseases.

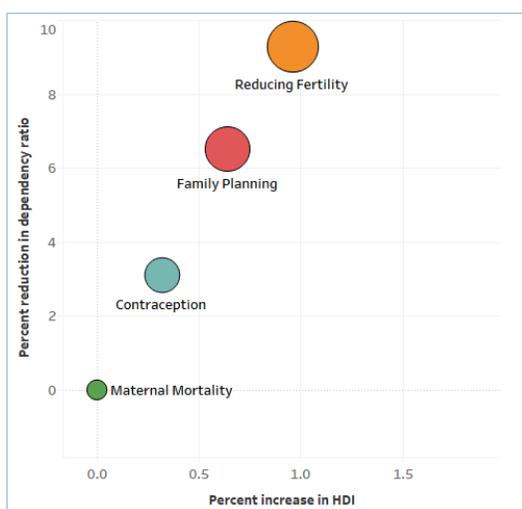
As discussed above, the high fertility rates found in several countries in the region drive rapid population growth, sustain a high youth bulge and undermine future demographic dividends.¹⁶ Any comprehensive development agenda would be incomplete without a strong focus on female and family health. For each of these fertility-related scenarios, we focus on impacts on GDP per capita, relative dependency ratios (with a higher score indicating a greater reduction in the ratio between economically active and inactive people by 2040) and the HDI.

By 2040, fertility rates in the Family Planning scenario are forecast to remain above replacement rate at 2.7 births per woman (compared with the 2040 Current Path value of 3). With this intervention, some countries with very high fertility rates, such as Angola, Zimbabwe, Mozambique, and Malawi, see a reduction in fertility like that of Mauritius during the 1960s.

Figure 23 assesses the impact of these scenarios across three broad dimensions relative to the Current Path: the HDI (x-axis), the dependency ratio (y-axis) and GDP per capita at PPP (bubble size).

FIGURE 23. IMPACT OF FEMALE AND FAMILY HEALTH INTERVENTIONS FOR SOUTHERN AFRICA COMPARED TO THE CURRENT PATH IN 2040.

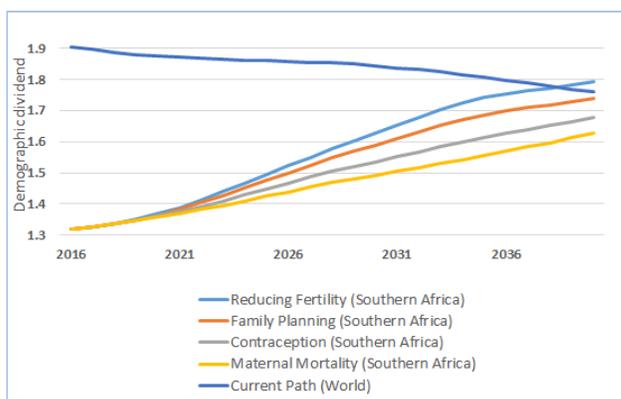
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Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents change in GDP per capita at PPP.

FIGURE 24. DEMOGRAPHIC DIVIDEND FOR SOUTHERN AFRICA AND THE WORLD UNDER THE CURRENT PATH AND THE FOUR REDUCING FERTILITY SCENARIOS.

International Futures 7.27



By 2040, the combined Reducing Fertility intervention results in a reduction in the size of the regional population of over 17.3 million people, or 5.6 percent, relative to the Current Path by 2040 (Figure 23). Most of this reduction comes from countries with large populations and high fertility rates, like Angola, Mozambique, Madagascar, Malawi, Zambia and Zimbabwe.

By significantly reducing the size of their younger generations, many Southern African countries would age more rapidly. By 2040, countries like Zimbabwe, Malawi, Swaziland, and Zambia could see an increase in the median age of over two years relative to the Current Path. However, since demographic change moves very slowly, the immediate impacts of fertility reduction on the youth bulge are generally not seen for 15 years.

These interventions are forecast to also increase the region's modest demographic dividend. In the Current Path, the demographic dividend in Southern Africa is expected to increase at a moderate rate. However, by reducing fertility now, the relative share of the working age population will increase relative to the Current Path of development with a significant time lag. If fertility rate programs are significantly reduced today, some countries in the region could see demographic dividends similar to those that drove Chinese growth in the early 2000s by 2040.

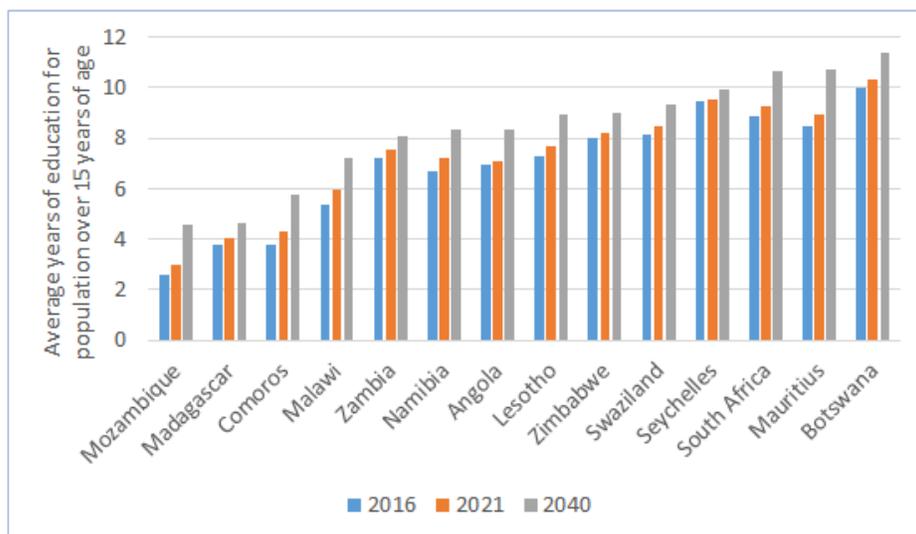
¹⁶ "Demographic dividend" refers to a period during which a country or region's dependent population (children and retired people) is smaller than the working-age population.

EDUCATION

Education has been a priority development objective for many countries in Southern Africa, and all countries have increased levels of attainment since 1960. The overall level of education in Southern Africa has increased quite dramatically over the past several decades, from an average of 2.9 years per adult in 1960 to 6.5 today. This means the average person in Southern Africa has completed a little more than primary school. While this is below the global average of 7.9, it is higher than the African average (5.7) and the highest of all sub-Saharan African regions.¹⁷ Progress differs among countries, however, with Botswana at the top (10 years of education per person) to Mozambique at the bottom (2.6 years of education per person).

While levels of education have increased in all countries in Southern Africa, none of these countries managed to achieve Millennium Development Goal 2: “Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling,” (UN, 2008). As of 2016, only 66 percent of the population of Southern Africa has completed primary school. This is not due to low levels of primary enrollment; gross primary enrollment is above 100 percent for nearly every country in Southern Africa.¹⁸ Achieving higher levels of attainment requires investments not only in expanding access, but also in programs that encourage students to stay in school and move on to the next level. This relates to educational quality, which is also a notable challenge across the region.

FIGURE 25. AVERAGE YEARS OF EDUCATION FOR POPULATION 15 AND OVER.
International Futures 7.27



¹⁷ All figures taken from IFs v 7.24 using 2016 as the “current” year. Average years of education for adults defined using population 15 and older.

¹⁸ The gross enrollment rate is the total number of people enrolled in a level of education over the age appropriate population for that level. This can exceed 100 because non-age appropriate students can attend school.

Figure 26 shows flow rates into and out of each level of education in the countries of Southern Africa, and the region as a whole (in the last row). The first column represents the gross enrollment rate for primary education, which is about 114 percent for the region. Still, only 73 percent of students who enter primary school survive to the final year, and only 64 percent of age-appropriate children are enrolled in lower secondary school. Of the students that enter lower secondary school, 75 percent survive to the final year. Gross enrollment in upper secondary school in Southern Africa is only 43 percent, but of those students that enter upper secondary school, 85 percent survive to the final year. Because of high dropout rates and the failure to transition to the next grade level, only 17 percent of the population in Southern Africa has completed upper secondary school, and only 1.4 percent of the adult population holds a tertiary degree.

Constraints to attaining higher levels of education can occur at various points along the progression, and vary from country to country. In Mozambique, for instance, only 38 percent of those enrolled in primary education survive to graduation. Since this bottleneck occurs early in the education system, it poses a particularly significant challenge to higher levels of attainment. Of those students that are enrolled in lower- and upper-secondary classrooms, the majority survive until the final year, further demonstrating the importance of primary survival in Mozambique. Similarly, Angola and Madagascar experience significant setbacks from the primary level onward, as only around 60 percent of enrolled students make it to their last year of primary education. While primary survival represents the most significant bottleneck to attaining higher levels of education in the region, countries such as Comoros, Mauritius, Seychelles, and South Africa experience a more significant bottleneck in upper secondary survival, with Botswana and Zimbabwe seeing the most significant bottleneck in upper secondary enrollment.

FIGURE 26. EDUCATION ENROLLMENT, SURVIVAL, AND GRADUATION RATES BY COUNTRY IN 2016.
International Futures 7.27

	PRIMARY ENROLLMENT	PRIMARY SURVIVAL	LOWER SECONDARY (GROSS) ENROLLMENT	LOWER SECONDARY SURVIVAL	UPPER SECONDARY (GROSS) ENROLLMENT	UPPER SECONDARY SURVIVAL	TERTIARY ENROLLMENT	TERTIARY GRADUATION
Angola	123	60	39	67	22	95	10	9
Botswana	109	100	98	100	76	85	28	9
Comoros	108	99	71	83	55	77	9	6
Lesotho	107	84	64	65	38	84	10	3
Madagascar	142	61	53	65	22	84	4	3
Malawi	138	80	54	37	24	97	1	1
Mauritius	103	99	113	68	87	65	40	14
Mozambique	106	38	33	70	14	80	6	1
Namibia	110	92	94	79	38	96	10	7
Seychelles	103	91	109	89	50	47	8	1
South Africa	100	92	95	93	93	82	19	8
Swaziland	113	86	75	64	50	74	6	4
Zambia	103	71	64	89	6	72	3	2
Zimbabwe	103	86	71	73	39	90	5	1
Southern Africa	114	73	64	75	43	85	10	5

All enrollment figures are gross enrollment.

FIGURE 27: FEMALE LOWER SECONDARY ENROLLMENTS IN SOUTHERN AFRICA IN 2016, 2021 AND 2040 ALONG WITH GLOBAL RANKS FOR THE SAME MEASURE.

Country	2016		2021			2040		
	Percent Lower secondary enrollments for females	Global Rank	Percent Lower secondary enrollments for females	Global Rank	Change in rank from 2016 -2021	Percent Lower secondary enrollments for females	Global Rank	Change in rank from 2016 -2040
Angola	86.6	113	89.0	106	↑	92.5	114	↓
Botswana	100.0	1	100.0	1	-	100.0	1	-
Comoros	80.7	131	77.8	142	↓	80.3	158	↓
Lesotho	67.8	166	68.4	169	↓	85.4	146	↑
Madagascar	64.8	171	66.9	172	↓	71.0	176	↓
Malawi	34.9	185	43.1	185	-	61.0	184	↑
Mauritius	88.0	109	94.7	66	-	100.0	1	↑
Mozambique	72.3	157	72.5	157	-	77.2	164	↓
Namibia	80.4	132	80.9	135	↓	92.0	117	↑
Seychelles	90.9	93	90.4	97	↓	91.5	119	↓
South Africa	94.3	63	94.3	71	↓	100.0	1	↑
Swaziland	63.0	172	64.8	174	↓	76.7	165	↑
Zambia	88.7	105	87.7	110	↓	89.8	129	↓
Zimbabwe	73.8	154	72.8	156	↓	77.3	163	↓

Ranks have been computed on the basis of data and forecasts of 186 countries.

FIGURE 28: AVERAGE YEARS OF EDUCATION FOR AGES 25 AND OVER ALONG WITH GLOBAL RANKS OF THE SAME MEASURE.

Country	2016		2021			2040		
	Average years of education for ages 25+	Global Rank	Average years of education for ages 25+	Global Rank	Change from 2016-2021	Average years of education for ages 25+	Global Rank	Change from 2016-2040
Mozambique	1.9	186	2.3	184	↑	3.6	185	↑
Madagascar	3.4	178	3.8	178	-	4.6	179	↓
Comoros	3.5	177	4.1	175	↑	5.9	169	↑
Angola	6.7	125	6.7	136	↓	7.7	145	↓
Malawi	5.5	147	6.2	143	↑	8.2	134	↑
Zambia	7.2	118	7.6	117	↑	8.6	127	↑
Lesotho	6.7	124	7.2	124	-	8.6	126	↓
Zimbabwe	8.0	99	8.3	101	↓	9.2	110	↓
Namibia	6.9	122	7.6	119	↑	9.2	109	↑
Swaziland	8.0	102	8.4	100	↑	9.4	103	↑
Seychelles	9.5	70	9.5	73	↓	9.9	98	↓
Mauritius	8.2	96	8.7	92	↑	10.6	80	↑
South Africa	9.0	80	9.5	77	↑	11.0	69	↑
Botswana	9.8	60	10.2	60	-	11.4	56	↑

Ranks have been computed on the basis of data and forecasts of 186 countries.

EDUCATION SCENARIOS

In this section we explore scenarios aimed at improving levels of educational attainment in Southern Africa. Drawing from the above discussion, these scenarios simulate a future in which each country in the region successfully facilitates advancement through its formal education system. To do this, we identified several key bottlenecks in access (see Figure 26 above) and modeled the long-term impact of interventions to address each one. 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, (6) improving enrollment in tertiary education, and (7) increasing government spending in education.

Enhancing Education

Primary Survival

This scenario increases the primary survival rate in Southern Africa from 78 to 87 percent over 5 years, a similar rate of increase as Botswana achieved from 1989 to 1994.

Lower Secondary Enrollment

This scenario increases the transition rate from primary to lower secondary from its current level of 77 percent to 84 percent by 2021. Lesotho, Madagascar, and Zambia have all achieved similar increases in lower secondary enrollment historically.

Lower Secondary Survival

This scenario increases the lower secondary survival rate (the portion of students that enter lower secondary who make it to the final grade) from 75 percent to 82 percent by 2021, similar to what Madagascar achieved from 2000 to 2005.

Upper Secondary Enrollment

This scenario increases the upper secondary transition rate (the portion of graduates of lower secondary that enroll in upper secondary) from 71 to 80 percent by 2021, a similar increase to what Botswana achieved from 2000 to 2005.

Upper Secondary Survival

This scenario increases the upper secondary survival rate (the portion of students who enter upper secondary school who make it to the last grade) from 84 to 93 percent by 2021.

Tertiary Enrollment

This scenario increases the tertiary intake rate from 13 to 18 percent by 2021.

Each of these scenarios changes the flow of students within each national education system. The graph below compares each scenario described above along two axes and presents change in 2040 relative to the Current Path. The y-axis measures percentage increases in educational attainment, or the average number of years of school that people over the age of 15 have completed. The x-axis, meanwhile, represents the percent increase of people who have completed their secondary education. Keep in mind that Goal 4 of the Sustainable Development Goals is universal primary and secondary education; therefore, improvements in this area work towards that goal. Bubble size measures the percent increase in people with tertiary degrees.

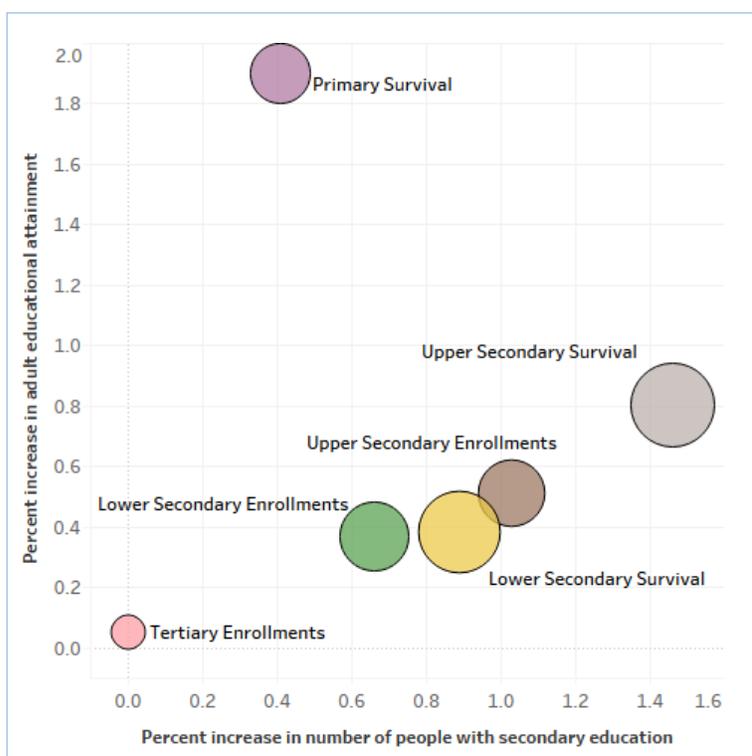
The Primary Survival scenario shows the biggest increase in overall educational attainment across the region. This is largely due to the reduction in current limitations on primary school survival rates in Mozambique, Madagascar, Malawi, and Angola, which are now and will continue to be relatively large, young countries.

Upper Secondary Survival leads to the highest increases in the percentage of people in the region with (upper) secondary and tertiary degrees. It also significantly increases the overall level of educational attainment in the region, though less than the primary survival scenario. Upper Secondary Enrollment, which increases flows at the stage where we see the most significant bottleneck in the region as a whole, also leads to greater advances in secondary education completion, though not as high as the primary and upper secondary survival scenarios.

The Lower Secondary Enrollment and Lower Secondary Survival scenarios both increase overall levels of education and the portion of the population with a secondary and tertiary degree, but not as much as most of the other scenarios. Interestingly, the Tertiary Enrollment scenario does less for increasing levels of tertiary attainment than any of the other scenarios. This is because the constraints in the system at lower levels of education prevent so many students from tertiary eligibility. Increasing primary and secondary enrollment and survival rates will do more to increase the number of tertiary graduates than an increase in the tertiary enrollment rate.

Of course, the educational constraints are different in each country (see Figure 26 above) so the effects of these scenarios vary. Countries with low levels of primary survival like Mozambique, Madagascar, and Malawi see much greater gains in overall education levels from the Primary Survival scenario than other countries. Botswana, Comoros, and Zimbabwe see the largest gains in adult attainment from the Upper Secondary Enrollment scenario. Angola, Mauritius, Seychelles and South Africa see the largest gains from Upper Secondary Survival. Lesotho, Namibia, Swaziland, and Zambia all see the greatest increases in adult education from increases in Primary Survival, but they all face serious constraints in upper secondary education as well.

FIGURE 29. IMPACT OF EDUCATION INTERVENTIONS FOR SOUTHERN AFRICA COMPARED TO THE CURRENT PATH.
International Futures 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents percent increase in people with tertiary education.

Regionally, attainment increases most dramatically in the Enhancing Education scenario, which combines all components.¹⁹ In fact, attainment increases more in this scenario than all of the other education scenarios combined. Removing one constraint in the educational pipeline increases education levels for an age group, but those students quickly run into another bottleneck. Targeting constraints based on where flows of students slow leads to more positive outcomes overall.

Increasing primary and secondary enrollment and survival rates will do more to increase the number of tertiary graduates than an increase in the tertiary enrollment rate.

¹⁹ Because its impact is so much greater; it is not included in Figure 29 above; however, this combined scenario is used in comparisons with combined interventions in other systems elsewhere in the report.

INFRASTRUCTURE

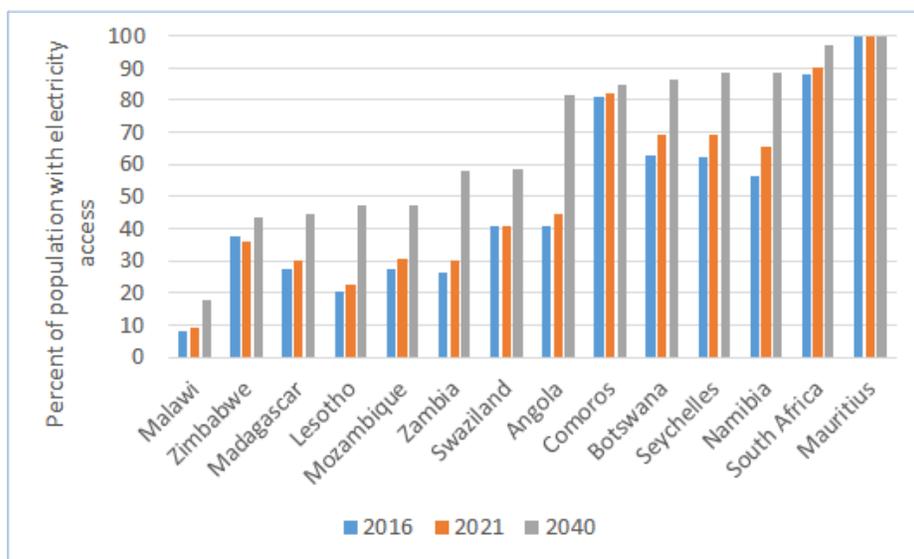
In 2016 less than half of the population of Southern Africa had access to electricity. We forecast that the number of people with access to electricity will grow by 27 million to 2040 in the Current Path, representing an increase of coverage from 47 percent in 2016 to only 61 percent by 2040, leaving a significant portion of its population without electricity. Rates of access to electricity tend to

be even lower in rural areas—only 27 percent of the region’s rural population has access compared to 75 percent of the urban population. This suggests that governments are only just keeping up with the needs of a growing population whose lifestyles are increasingly reliant on electricity.

Figure 30 shows electricity access today and across time for each country. Angola, which is expected to see more economic growth due to its oil sector, makes notable progress over the time horizon. Also, in Mozambique, Zambia and Lesotho, the percentage of people with access doubles by 2040 yet still remains relatively low (54 percent, 60 percent and 49 percent, respectively).

FIGURE 30. PERCENTAGE OF POPULATION WITH ACCESS TO ELECTRICITY BY COUNTRY.

International Futures 7.27



Due to population growth, urbanization, and rising incomes, demand for electricity will increase in every country in Southern Africa. Even as the region is forecast to double its current generation capacity from 57 GW today to 119 GW in 2040, the Current Path scenario estimates that roughly 40 percent of the population will still live without electricity access in 2040. The bulk of the increase will be from fossil fuel and nuclear energy production; however, a substantial portion of this new generation capacity is likely to come from renewable resources. Renewable electricity

generation made up 13.1 percent of total electricity generation in 2010. This has been rising since 1996 when it was 5.9 percent of all electricity in the region. The Power Africa Road Map also includes cross-border strategies to help the region meet additional demand at the country level. This includes projects that will expand utility-scale solar in Zambia, Botswana, Namibia and South Africa, as well as hydropower in Mozambique (Power Africa Roadmap, 2016).

In Southern Africa, Information Communication Technologies (ICT) have begun to lower the cost of access to a number of services that were previously unavailable to most, as health advice, banking systems, weather alerts, and education opportunities are delivered straight to mobile devices. ICT adoption in the region is set to grow at one of the fastest rates in the world. By 2040, fixed broadband access is forecast to reach close to 30 subscriptions per 100 people. However, at 41 subscriptions per 100 people, mobile broadband today has already surpassed fixed

broadband, and is forecast to reach close to 140 subscriptions per 100 by 2040. 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 (Margoese-Malin et al., 2014).

Mobile broadband uptake in Southern Africa today is slightly below that of upper-middle-income countries. IFs forecasts that it will also progress at a slower rate, so that by 2040 the

region would have a mobile broadband penetration level between that of lower-middle- and low-income countries, as shown in Figure 31.

Nevertheless, there is significant variation between countries in the region, with Botswana and South Africa forecast to reach around 150 subscriptions per 100 within the next decade, while other countries are not forecast to reach this level before 2040, as shown in Figure 32.

FIGURE 31. MOBILE BROADBAND SUBSCRIPTIONS PER 100 PEOPLE, FORECAST BY INCOME
International Futures 7.27

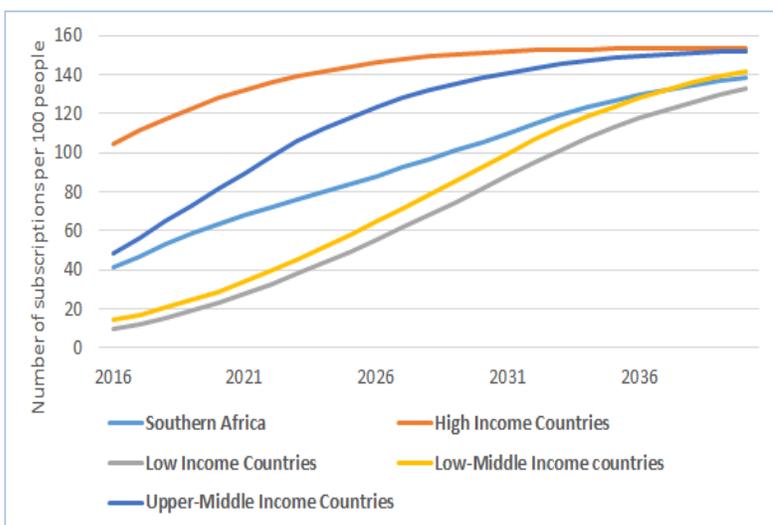
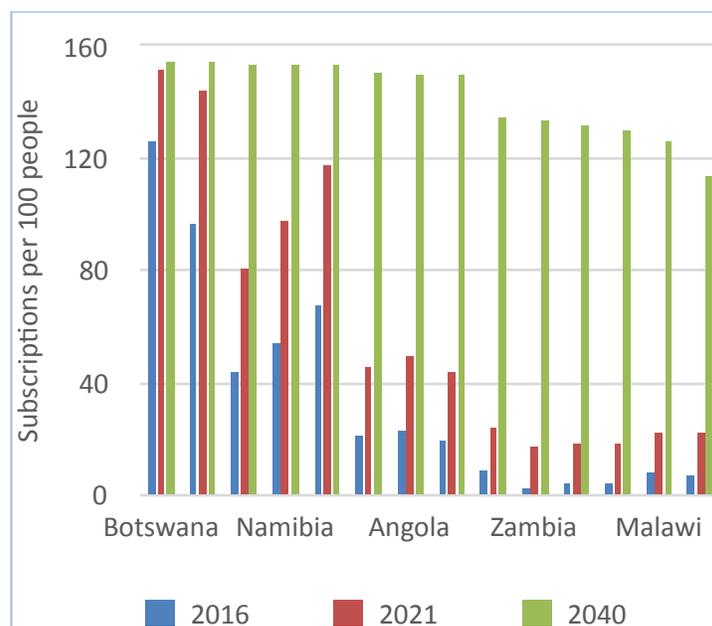


FIGURE 32. MOBILE BROADBAND SUBSCRIPTIONS PER 100 PEOPLE, HISTORY AND FORECAST BY COUNTRY.
International Futures 7.27



Fixed broadband access levels now lag further behind in the region and are only slightly higher than the average of low-income countries globally, with an average of two subscriptions per 100 people. Within the region, access rates are all fairly similar (except for Mauritius and Seychelles). IFs forecasts that countries like Angola will reach over 40 subscriptions by 100 people by 2040, while others like Mozambique remain at less than 20.

On average, Southern African countries have roughly 820 kilometers of roads per person and .25 kilometers of roads per hectare. In comparison, high-income economies on average boast roughly 8,800 kilometers of paved roads per person and roughly 2.3 kilometers of paved roads per hectare—approximately 10 times the road density in the region. At the country level, Seychelles and Botswana have the highest road density in terms of population, while Seychelles and

Mauritius, because they are both geographically very small, have more roads per hectare than most high-income countries. The rest of the road access story across the region is more challenging, with some of the poorest (per capita) countries such as Mozambique, Madagascar, and Malawi having less than 15 percent of the world average (3,065 km per person) in paved roads per capita.

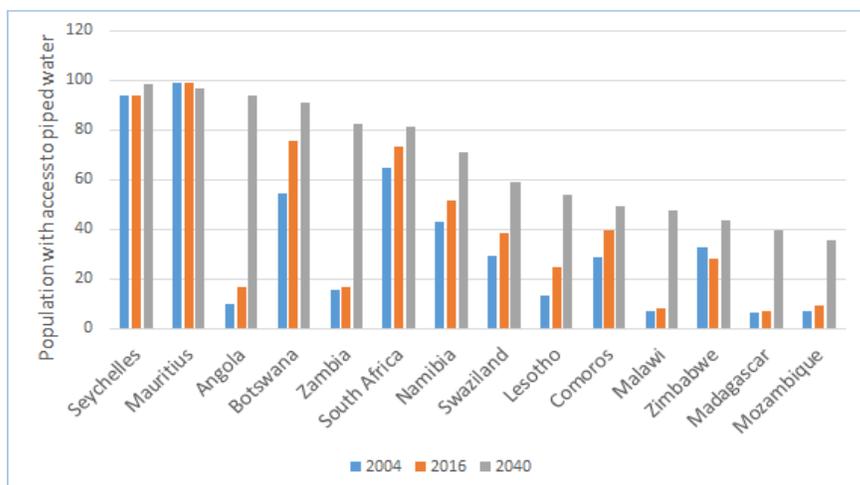
WATER AND SANITATION

As described earlier in the Health section, access to clean water and sanitation is crucial to human development. In 2016, approximately 28 percent of the population of Southern Africa relied on unimproved drinking water, such as unprotected wells, springs and surface water. Another 39 percent gets their water from safe, yet still not ideal sources, which includes “public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, rainwater collection” (WHO, 2015: 50).

This leaves less than a third of the total population (32 percent) with access to piped drinking water. The IFs Current Path forecasts access to piped water to more than double, to over 63 percent by 2040. Nevertheless, nearly a third of the region’s people will likely continue to live without piped water access, with populations in the poorest countries at the greatest risk of increased communicable disease and decreased productivity.²⁰

Less than half of the population of the region (44 percent) today has access to improved sanitation. By 2040, IFs forecasts that 71 percent of the region’s population will access improved sanitation, which includes, “flush toilets to piped sewer system, septic tanks, pit latrines, ventilated improved pit (VIP) latrines, pit latrines with slab or composting toilets” (WHO, 2015: 50).

FIGURE 33. PERCENTAGE OF POPULATION WITH ACCESS TO PIPED WATER BY COUNTRY, HISTORY (WITH LINEAR INTERPOLATION) AND FORECAST.
International Futures 7.27



²⁰ Keep in mind that these water access figures are most closely related to human development and do not account for the water scarcity issues in other areas of these countries’ economies, such as industrial or agricultural demand. This will be covered more extensively in the Natural Systems section of this report.

FIGURE 34: INFRASTRUCTURE INDEX VALUES FOR SOUTHERN AFRICAN COUNTRIES ALONG WITH GLOBAL RANKS OF THE SAME MEASURE.

Country	2016		2021			2040		
	IFs Infrastructure Index score	Global Rank	IFs Infrastructure Index score	Global Rank	Change in Global Rank from 2016-2021	IFs Infrastructure Index score	Global Rank	Change in Global Rank from 2016-2040
Angola	-0.8	152	-0.6	154	↓	0.1	139	↑
Botswana	-0.1	124	0.1	123	↑	0.3	119	↑
Comoros	-0.4	139	-0.4	140	↓	-0.3	152	↓
Lesotho	-0.8	155	-0.7	156	↓	-0.2	149	↑
Madagascar	-1.4	175	-1.3	176	↓	-0.6	172	↑
Malawi	-1.2	167	-1.1	169	↓	-0.7	174	↓
Mauritius	0.5	60	0.5	62	↓	0.7	64	↓
Mozambique	-1.1	163	-0.9	162	↑	-0.5	163	-
Namibia	-0.2	131	-0.1	131	-	0.2	133	↓
Seychelles	0.6	47	0.7	46	↑	0.8	43	↑
South Africa	0.3	85	0.4	85	-	0.5	88	↓
Swaziland	-0.3	132	-0.2	134	↓	0.0	144	↓
Zambia	-0.5	140	-0.4	139	↑	0.2	132	↑
Zimbabwe	-0.5	143	-0.5	147	↓	-0.3	154	↓

Ranks have been computed on the basis of data and forecasts of 186 countries.

Due to population growth, urbanization, and rising incomes, demand for electricity will increase in every country in Southern Africa.

By 2040, the bulk of new capacity will be from fossil fuel and nuclear energy production but a substantial portion is likely to come from renewable resources.

INFRASTRUCTURE SCENARIOS

The combined Improving Health scenario includes 1) HIV/AIDS Reduction 2) Increased Water and Sanitation 3) Malnourished Children and 4) BMI Reduction. To draw a contrast, we also created a scenario that simulates an HIV/AIDS Resurgence. Because of its impact on the future demographics, we've also created a separate set of health scenarios that focus on Reducing Fertility, including 1) Contraception Access 2) Family Planning and 3) Maternal Mortality.

Extending Infrastructure

Electricity Access

In this very ambitious scenario, an additional 7.5 million connections are installed across Southern Africa over the next five years. Under this scenario (modeled after the Power Africa targets for Southern Africa), the region reaches over 66.2 percent electricity access by 2021. This is roughly the coverage seen in Botswana today (63.1 percent)..

Renewable Generation

This scenario increases generation capacity by approximately 7 gigawatt hours by 2040 compared to the Current Path, particularly from new renewable and hydro sources in Botswana, Mozambique, Namibia, South Africa, and Zambia..

Roads and Mobile Broadband

These scenarios extend transportation and communication networks across the region, with an additional 54 thousand kilometers of road built between 2017 and 2021, and a 10 percent higher annual uptake rate relative to the Current Path, respectively.

Safe Water

Here, access to improved sources of water is increased from current levels of about 72 percent in the region to 76.4 percent by 2021 (compared to the Current Path of 73.2 percent in 2021).

Improved Sanitation

In this scenario, access to improved sanitation is increased from its current level of 16.8 percent of the population to 21.6 percent by 2021, compared to the Current Path of 20.3 percent by 2021.

**IFs forecasts
that by 2040
the region will have
a mobile broadband
penetration level
between that of
lower-middle-
and low-income
countries.**

Figure 35 explores how these interventions are forecast to impact health and economic development in 2040. The y-axis measures the percent change in overall morbidity and mortality using a measure of disability adjusted life years (DALYs).²¹ The x-axis indicates the increase in the IFs Traditional Infrastructure Index, a composite measure of the level and quality of physical infrastructure (water and sanitation, transportation, and electricity).²² Bubble size in this graphic represents the percent change in GDP in 2040 relative to the Current Path.

The Safe Water scenario increases access to piped water as well as other improved sources, which includes “public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, rainwater collection” (WHO, 2015). This scenario significantly reduces the burden of DALYs and moderately improves the traditional infrastructure index.

The Electricity Access scenario closes the gap between Southern Africa and the world by the late-2020s, significantly reducing the economic drag of the underperforming grid. In this scenario the region sees as many as 8 million new connections by 2022, and 10 million before 2030.²³ Most of these new connections are in South Africa, Madagascar, Mozambique, Angola, and Zimbabwe.

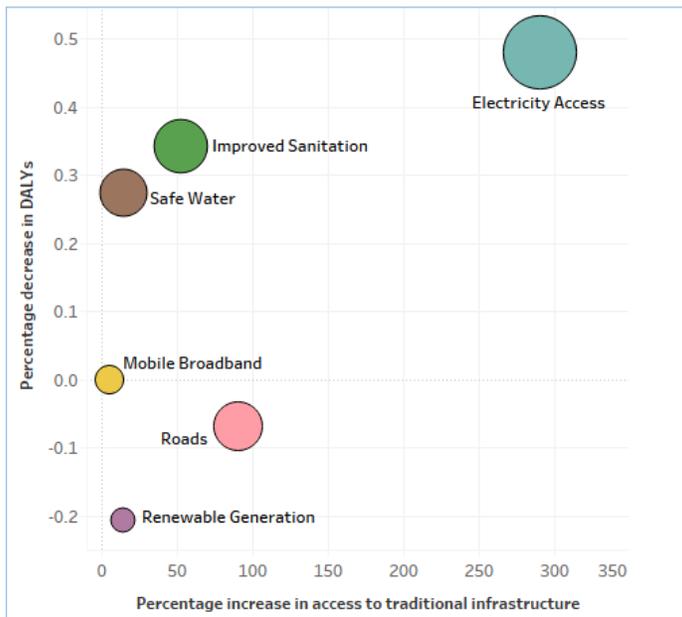
The less aggressive (but perhaps more attainable) Safe Water, Improved Sanitation, and Roads scenarios do not achieve global parity until the late-2030s, leading to slower gains in productivity, and less overall economic output (compared with the Electricity Access scenario) by 2040.

Each of these interventions has direct impact on overall health in the region, which is covered more extensively earlier in the report. For instance, electricity connections help to offset the use of traditional cook stoves, reducing the health burden associated with

indoor air pollution. Improving access to safe water and sanitation reduces the death rate from communicable disease. Access to safe water and improved sanitation have the two largest single positive impacts on reducing DALYs, though this varies by country according to a number of factors including (but not limited to) the relative burdens of disease related to indoor air pollution, the relative burden of communicable diseases associated with poor water and sanitation, and tradeoffs in infrastructure investment across sectors.

The economic gains from all interventions in the combined Extending Infrastructure scenario translate to a cumulative increase in GDP of \$623 billion or an annual increase of \$44 billion in GDP by 2040. Under this combined scenario, Southern Africa also experiences 1.5 million fewer DALYs annually relative to the Current Path by the mid-2020s.

FIGURE 35. IMPACT OF INFRASTRUCTURE INTERVENTIONS FOR SOUTHERN AFRICA AS A WHOLE COMPARED TO THE CURRENT PATH.
International Futures 7.27



Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents percent increase in GDP at MER.

²¹ Disability-adjusted life years or DALYs are calculated as the sum of years of life lost (YLL) and years living with a disability (YLD). It represents the time lost due to premature death or a chronic disease or disability.

²² For more information see the IFs Help System webpage on “Estimating the Social, Economic, and Environmental Impacts of the Attainable Infrastructure” at <http://www.du.edu/ifs/help/understand/infrastructure/flowcharts/impacts.html>.

²³ The intervention is applied from 2016 to 2021. Additional connections (relative to the Current Path) continue to increase due to endogenous factors, such as the higher levels of GDP per capita achieved in this scenario.

AGRICULTURE

Many people, especially those in rural areas, depend directly on the environment for their survival. Climate change poses substantial challenges to an already environmentally vulnerable region, and human-driven pressures, such as population growth, urbanization, and an increasing demand for food, energy and water, could compound these scarcity issues. A thriving and resilient agriculture sector is not just good for the region's economic development, it could be the difference between a dry season and a famine. Despite possessing large tracts of land that could be cultivated, Southern Africa is a net importer of food and suffers from high levels of undernourishment.

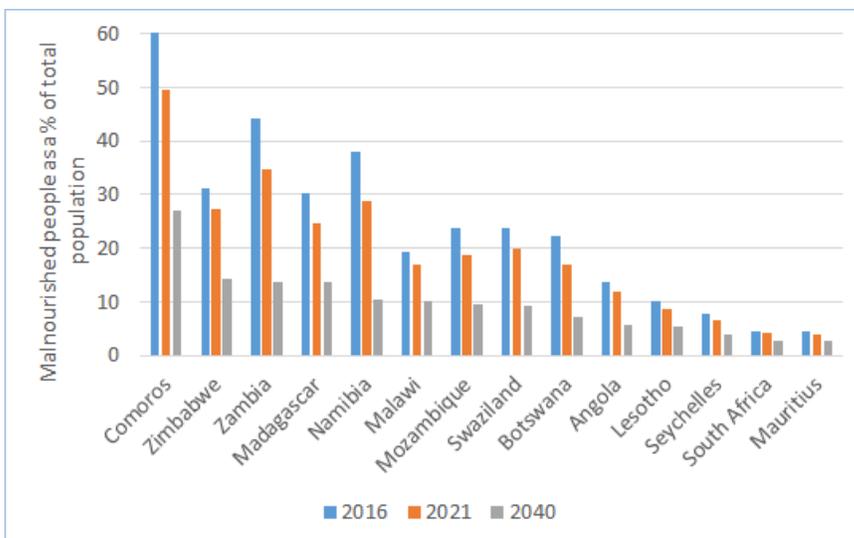
As previous sections have already explained, population in Southern Africa is set to grow by more than 60 percent in the Current Path scenario between today and 2040. Combined with increased calorie consumption from rising incomes, this population growth could lead to an increase in agricultural demand of more than 80 percent by 2040. If agricultural production does not increase, either hunger

will persist or this demand must be met through food imports. Increased production alone, however, is not enough to reduce hunger and food import dependence; domestic agricultural demand must also increase to ensure that food is not exported.

Prevalence of hunger has decreased in Southern Africa from over 30 percent in 1991 to 20 percent in 2016. However, due to population growth, hunger in absolute terms has increased from over 33 million in 1991 to over 39 million in 2016. While some countries (Angola, Malawi, Mauritius, and Mozambique) have made significant progress in reducing hunger, prevalence has actually increased since 1991 in Comoros, Madagascar, Namibia, Swaziland, and Zambia. In Madagascar, Mozambique, and Zambia, IFs estimates that nearly 23 million people were undernourished in 2016; these three countries alone account for 56 percent of the undernourished population in the entire region. The figure below shows the prevalence of undernourished people (hungry) for all countries in Southern Africa.

In addition to high levels of hunger, Southern Africa faces a food security challenge: the region is already a net importer of food and import dependence is forecast to increase considerably. Food demand in every country is likely to rise, leading overall regional demand to increase from 177 million metric tons (mmt) in 2016 to 322 by 2040. Over two-thirds of the increase in food demand will come from Angola, Mozambique, Malawi, and Madagascar. Angolan food demand is expected to more than double from 2016 to 2040, from 28 mmt in 2016 to 63 mmt in 2040.

FIGURE 36. PERCENTAGE OF POPULATION UNDERNOURISHED BY COUNTRY, HISTORY AND FORECAST.
International Futures 7.27



The potential for agricultural production in Southern Africa is not being realized. Agricultural yields in Southern Africa are only 4.2 tons per hectare, compared to the global average of 6.1. Substantially raising yields in Southern Africa will require greater investments in quality inputs such as seeds, fertilizer, and pesticides, as well as better soil and water management practices.

In addition to extra yields, increasing the amount of land under cultivation could also address shortfalls in regional food production. In Southern Africa, some 327 million hectares are considered arable land. Angola (~27%), Mozambique (~20%), and Zambia (~18%) contain the majority of the region's arable land. Of that land, only 12.5 percent of it is actually cultivated. Specifically, of the countries mentioned above, none uses more than 10 percent of their arable land.

The primary issue with expanding the amount of land under cultivation is that it will most likely encroach on forest land. For example, in the case of countries like Zambia, where

forests represent 84 percent of the potentially arable land, cultivating more land would introduce a new set of challenges, such as land degradation, loss of biodiversity, and the release of carbon that had previously been sequestered in soils and trees. Thus, the preference should be on increasing the intensity of production, not the land area.

Governments can improve food access among their populations through transfers to the poor, so that they can afford to eat, or through better transportation to markets. Measures aimed at assisting subsistence farmers will likely improve food access as well. Subsistence farmers face hard constraints on their ability to increase yield, such as poor soil quality, low rainfall, and remote location but also "soft" constraints such as access to markets and information, financial resources, and insurance (Fan et al., 2013). Removing these soft constraints from subsistence farmers could help alleviate poverty, hunger, and increase yields and productivity. In addition, hunger falls disproportionately on women and rural communities. In Southern Africa, women are

less likely to own and control land, making them less likely to invest in production. Studies have shown that increasing women's access to income and land reduces hunger among both women and children (Giovarelli, Wamalwa & Hannay, 2013).

**A stable water sector
could mean
the difference between
a dry season
and a famine.**

WATER

Overall water demand is expected to increase in all countries in Southern Africa. While an expansion of irrigation is necessary for increasing agricultural yields as well as increasing the resilience of crops in Southern Africa, it will lead to an increase in agricultural water demand. Meanwhile, growth in regional thermoelectric power generation, as well as additional activity in Southern Africa's manufacturing sectors, will add to industrial water demand. And, increasing access to safe water in cities and income growth will lead to an increase in municipal water demand.

Droughts and extreme weather events cannot be predicted over any considerable time horizon, and water shortages can occur for reasons completely unrelated to the water sector (poor infrastructure and conflict for example). But the drivers of water demand are foreseeable and interventions made now can impact the overall resilience of the water sector. A stable water supply that is not overexploited will ensure that when droughts occur in the future, they do not lead to water shortages.

Figure 37: MALNOURISHMENT IN SOUTHERN AFRICAN COUNTRIES IN 2016, 2021 AND 2040.

Country	2016		2021			2040		
	Malnourished people as a percent of total population	Global Rank	Malnourished people as a percent of total population	Global Rank	Change in Rank from 2016-2021	Malnourished people as a percent of total population	Global Rank	Change in Rank from 2016-2040
Angola	13.8	47	12.0	45	↓	5.8	47	-
Botswana	22.2	26	17.0	28	↑	7.3	35	↑
Comoros	61.7	2	49.4	3	↑	26.9	1	↓
Lesotho	10.2	61	8.5	61	-	5.2	30	↓
Madagascar	30.4	13	24.6	12	↓	13.5	4	↓
Malawi	19.3	32	17.0	27	↓	10.1	10	↓
Mauritius	4.6	125	4.0	143	↑	2.6	67	↓
Mozambique	23.8	22	18.8	24	↑	9.5	12	↓
Namibia	37.8	8	28.8	9	↑	10.4	9	↑
Seychelles	7.7	75	6.6	75	-	3.9	20	↓
South Africa	4.5	127	4.1	115	↓	2.8	29	↓
Swaziland	23.8	23	20.0	21	↓	9.3	7	↓
Zambia	44.1	5	34.6	5	-	13.6	2	↓
Zimbabwe	31.0	11	27.2	10	↓	14.2	1	↓

Figure 38: AGRICULTURAL IMPORT DEPENDENCE IN SOUTHERN AFRICA.

Country	2016		2021		2040	
	Agricultural import dependence		Agricultural import dependence	Change in dependence from 2016-2021	Agricultural import dependence	Change in dependence from 2016-2040
Zimbabwe	18.99		27.2	↑	42.85	↑
Zambia	-6.272		8.082	↑	38.22	↑
Seychelles	72.09		71.15	↓	78.24	↑
Lesotho	58.12		60.37	↑	63.75	↑
Botswana	55.47		58.94	↑	63.09	↑
Swaziland	-0.177		3.748	↑	23.03	↑
South Africa	-2.056		-0.675	↑	3.537	↑
Mozambique	4.809		9.735	↑	31.45	↑
Madagascar	6.198		15.24	↑	35.63	↑
Mauritius	4.597		7.38	↑	10.74	↑
Namibia	0.382		11.19	↑	33.06	↑
Malawi	-2.633		6.457	↑	32.01	↑
Angola	12.15		20.95	↑	44.01	↑
Comoros	0.098		0.733	↑	30.16	↑

Import dependence is calculated as net imports of food divided by demand for food.

AGRICULTURE SCENARIOS

The scenarios in this section simulate agriculture-related interventions including 1) Yield Increase 2) Land Increase 3) Loss Reduction and 4) Increased Effective Demand.

Agricultural Resilience

Yield Increase

This scenario simulates a 12 percent increase in yields over the Current Path scenario by 2021. This intervention translates to an average increase across the region during this period of 0.9 tons/hectare and an 11.4 percent increase in agricultural production.

Land Increase

In this scenario, Southern Africa increases land under cultivation from 43 million hectares in 2016 to 44.2 million hectares in 2021, an increase of 1.2 million hectares. For comparison, Swaziland is about 1.7 million hectares.

The Loss Reduction

This scenario models a decrease in the loss of crop from producer to consumer by 2.1 percentage points across the region over five years. Rather than losing 21 percent of agricultural production, in this scenario only 18.7 percent is lost along the way.

In the Increased Effective Demand scenario, agricultural demand is increased by 14 percent (or 28 million metric tons) compared to the Current Path in 2021.

Agricultural Resilience

This scenario is the combination of all of the above

FIGURE 39. PERCENTAGE OF POPULATION UNDERNOURISHED BY COUNTRY, HISTORY AND FORECAST. International Futures 7.27

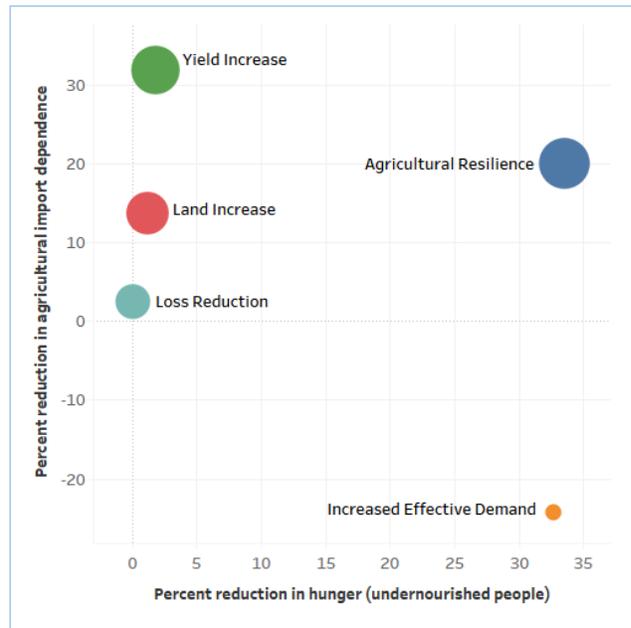


Figure 39 shows the effects of these interventions on hunger and food insecurity in the region. The positive horizontal axis represents decreases in hunger; the vertical positive axis represents decreases in net import dependence as a percent of demand, and the bubbles are weighted by the increase in GDP.

Each value in the graph above is expressed relative to the IFs Current Path scenario in 2040. Bubble size represents percent increase in GDP at MER.

The Yield Increase scenario has the greatest effects on import dependence as it increases agricultural production allowing for fewer imports and more exports. Land Increase and Loss Reduction also decrease import dependence, though not as dramatically as the yield scenario. None of these scenarios do much 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 over 30 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, countries in Southern Africa need to focus both on increasing food production and access within the region.

Improving agricultural yields in Southern Africa will require investments in quality inputs such as seeds, fertilizer, and pesticides, as well as better soil and water management practices. Expanding irrigation systems in the region could build resilience against periodic droughts, but this action 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.

To decrease food insecurity and hunger, countries in Southern Africa need to focus on increasing both domestic food production and access.

GLOBAL AND REGIONAL DYNAMICS

Continental and regional integration is a major pillar of the African Union and an increasing priority for countries in Southern Africa. Successful integration has the potential to improve and harmonize infrastructure, foster private investment and engagement, and ultimately alleviate poverty. The past several decades have seen a proliferation of Regional Economic Communities (RECs) on the African continent. Many of these RECs have overlapping membership. While the Southern Africa Development Community (SADC) is the primary REC for Southern Africa, countries are also members of the EAC, COMESA, SACU, and IOC. A central goal of SADC is to increase integration and prosperity across the region through boosting intraregional trade and promoting the free flow of labor between Southern African countries. However, like many RECS, SADC has faced implementation challenges, especially with incorporating regional integration agreements into national development plans.

TRADE

Southern African countries tend to trade more with countries outside the region. Historically, trade was overwhelmingly with European partners. However, due to the growing prominence of other trade partners, Europe's share of Southern African trade has declined significantly over the past few decades.

Trade with the United States increased steadily post-independence, bolstered by (AGOA) in 2000. AGOA provides for duty-

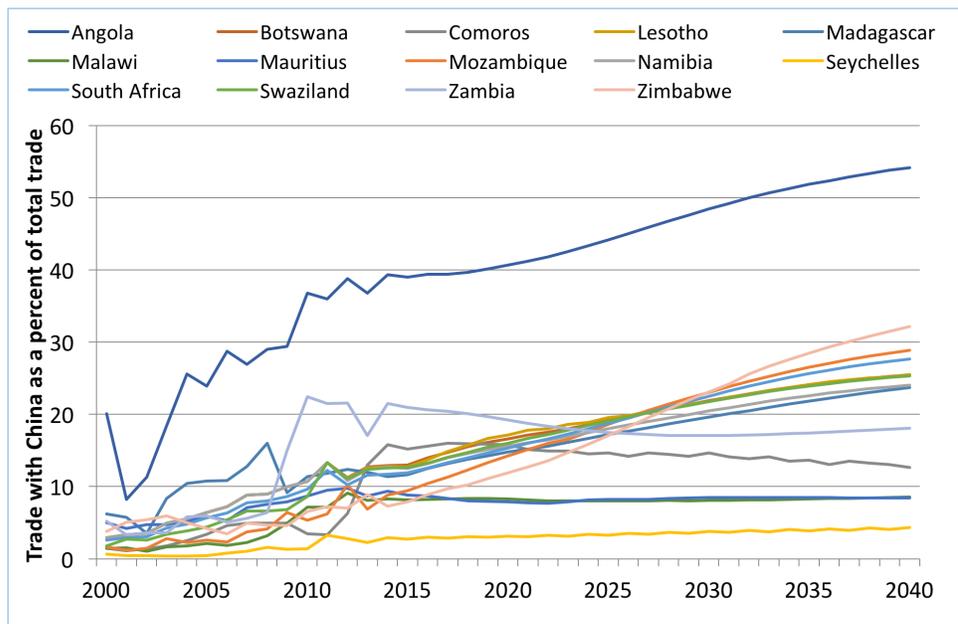
free entry to the United States for products from eligible African countries, four of which are in Southern Africa. Since the recession, however, trade with the United States has been on the decline.

Trade with China, on the other hand, has been growing significantly as it has become the main trading partner with the region. This trend is forecast to grow to over 20 percent of total trade for all but five countries in Southern Africa (Zambia, Comoros, Mauritius, Malawi,

and Seychelles) by 2040. By the early 2030s the Current Path forecasts that over half of Angolan trade will be with China. While China depends on Angola for less than 1 percent of its total trade, Angola is one of the largest energy exporters to China, having sold \$26.25 billion in oil to China in 2014. The only country China relies more on for energy trade is Saudi Arabia (though trade between Angola and China has declined recently, partially driven by low oil prices).

FIGURE 40. SOUTHERN AFRICA TRADE WITH CHINA.

Historical Data from CEPII (2017) and UNSTATS (2015)
Forecasts from International Futures 7.27



Despite the notable growth in intraregional trade since the 1980s (see Figure 41 below), intraregional trade still represents a relatively small portion of total regional trade. While intraregional trade is forecast to grow from around \$55 billion in 2016 to over \$140 billion by 2040, it is forecast to remain at around 10 percent of total trade throughout the horizon.

Many of the economies in the region produce similar patterns of goods (and thus lack economic complementarity) and face poor interregional transportation infrastructure and high at-the-border costs. Poor policy coordination and lack of strategic support from regional organizations has also hampered progress. Within the region, the Southern African Development Community (SADC) has prioritized trade as a catalyst for improved intraregional cooperation. In line with the group's Protocol on Trade signed in 1996, the organization has since defined five key Integration Milestones: a free trade area

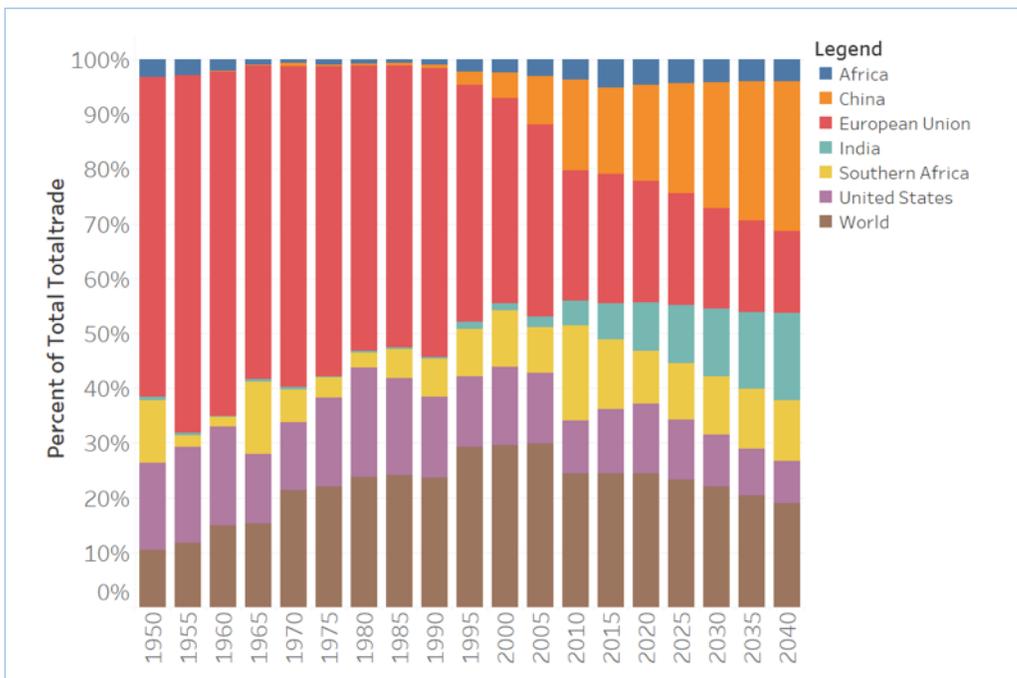
by 2008, a customs union by 2010, a common market by 2015, a monetary union by 2016 and a single currency by 2018 ("Integration Milestones," 2012). To date, only the free trade area has been successfully implemented, with 12 of 15 SADC member countries, excluding Angola, the Democratic Republic of Congo and Seychelles, signing on.

Moving forward, SADC has ambitions of further boosting levels of intraregional trade through initiatives that promote greater access to growing markets, reduced transportation costs, and scalability through the strengthening of regional value chains. Many of these have followed the Spatial Development Initiative (SDI) model, which identifies transport corridors as areas of potential growth and seeks to foster private investment, public-private partnerships, and enhanced regional integration. The Maputo Development Corridor, SADC's flagship SDI, restored a historic trade route from the Mpumalanga, Gauteng, and Limpopo

Provinces in South Africa to Mozambique's port of Maputo. It drew extensive investment to rehabilitate roads and port infrastructure and has drawn secondary investment in infrastructure, agriculture, mining, tourism, and manufacturing. Recently, the Trans-Kalahari Railway Project, sponsored by the governments of Botswana and Namibia, has been refocused to include SDI projects. The railway, proposed to run from the coal mines of eastern Botswana to the port of Walvis Bay, Namibia, was originally envisioned as a transport route for coal. But as coal prices fell, it has been reimagined as a regional development corridor, targeting diverse sectors such as agriculture, manufacturing, and real estate.

FIGURE 41. SOUTHERN AFRICA TRADE DISTRIBUTION OVERTIME.

Historical Data from International Monetary Fund (2016)
Forecasts from International Futures 7.27



MIGRATION

Though the region's trade tends to extend beyond the region itself, migration in Southern Africa most often occurs within the region. Individuals that do emigrate out of the region tend to move to countries with strong colonial ties. However, only Zimbabwe and South Africa send a significant number of migrants out of the region (in both cases most go to the United Kingdom). And South Africa is the only country that attracts a significant number of immigrants from the United Kingdom.

Individuals leaving their country of origin in Southern Africa overwhelmingly end up in other Southern African countries, typically driven by some combination of economic opportunity (i.e. higher wages), security, geographic proximity, and, in some cases, legal restrictions (i.e. visas). Intra-regional migration has been on the rise since the 1990s, with

South Africa being the most popular destination. Political instability, rather than economic motivations, has driven most of this migration to date. Flows associated with periods of instability or war are typically short in duration when compared to those associated with economic phenomena, indicating that individuals that migrate to avoid conflict often return to their country of origin after the conflict has ended. Figure 42 shows the spike of migration out of Mozambique and into neighboring Malawi during its civil war, and the longer migration out of Zimbabwe into South Africa, driven both by economic opportunity as well as political oppression.

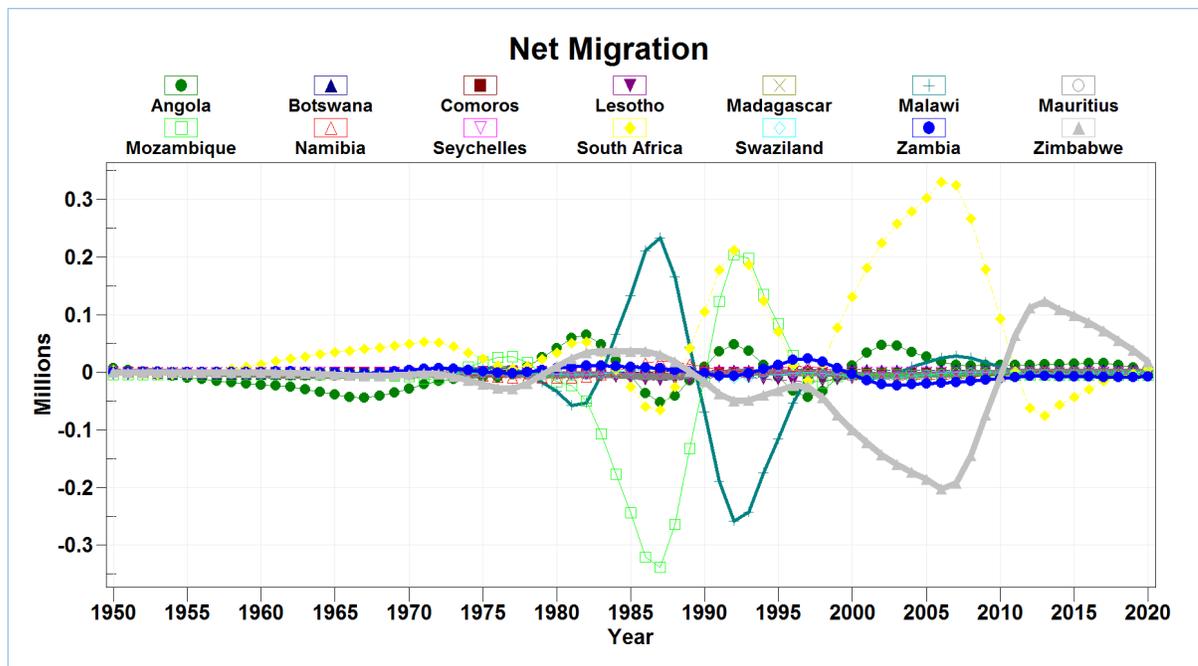
High regional migration due to disruptive governance transitions and prolonged periods of instability has caused spill-over effects and additional ripples of instability. In the future, potential instability, which is described in the

Governance section of this report, could heighten issues associated with regional migration. SADC and other regional organizations, therefore, will be incentivized to promote stability across the region, as a prerequisite for sustainable regional trade and development.

SADC has also attempted to lower barriers to regional migration for economic reasons, beginning with an ambitious Draft Protocol on the Free Movement of Persons in 1995. After that met resistance, SADC introduced the more restrictive Protocol on Facilitation of Movement of Persons in 2005, designed to eliminate obstacles to the free movement of people (in addition to capital, goods and services) between Member States. However, insufficient ratifications have prevented the Protocol from being put in force.

FIGURE 42. NET MIGRATION OF PEOPLE (MILLIONS), HISTORY AND FORECAST.

International Futures 7.24



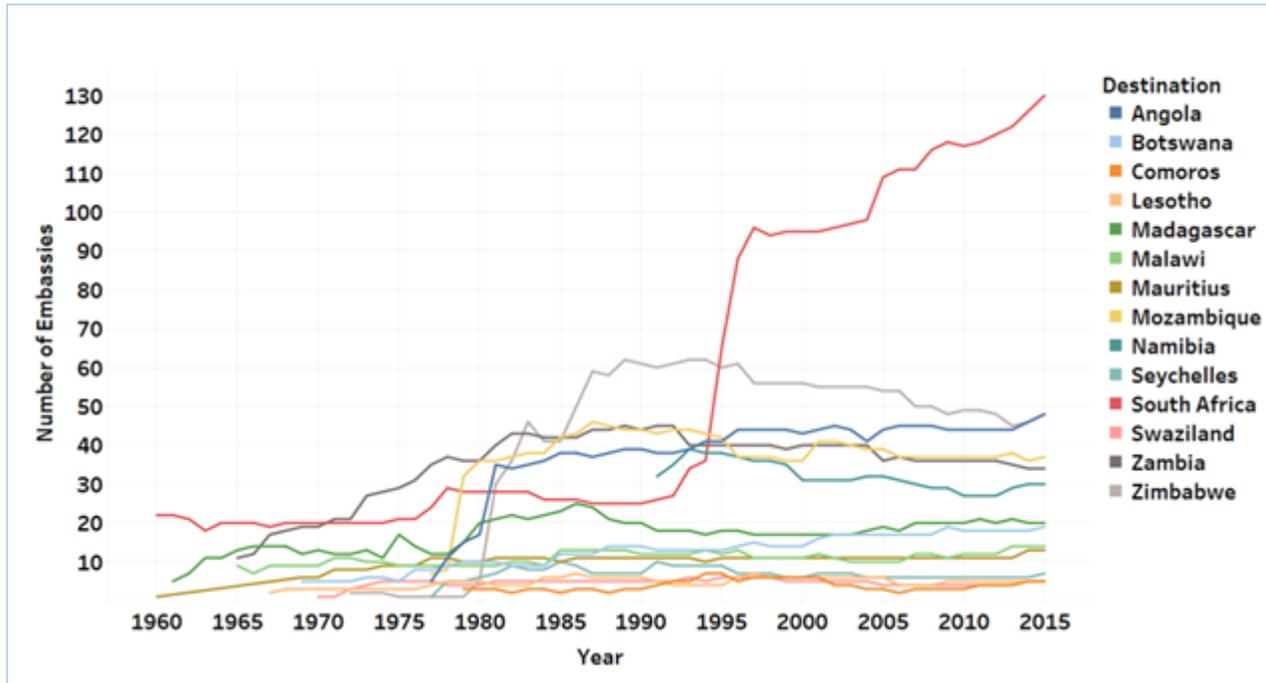
FOREIGN AFFAIRS

Diplomatic ties, both within and outside of the region, have been expanding. Figure 44 shows the number of foreign embassies hosted within Southern African countries. Following the apartheid, South Africa has led Southern Africa in diplomatic representation. Today, it hosts 127 embassies, which is double the number found in any other country in the region. Some countries, such as Zimbabwe, have seen a decline in the number of hosted embassies, as countries have elected to open offices for multiple representations within Pretoria.

The opening of Southern African embassies overseas has grown at a more gradual rate. While South Africa and Angola continue to open new embassies abroad, most Southern African countries have seen little growth in external representation. Like trade, diplomatic ties have traditionally been strongest with Europe. Today there is an increasing concentration of Southern African embassies in rising economies like India, China, Russia, and Brazil.

FIGURE 43. NUMBER OF EMBASSIES HOSTED IN COUNTRY.

Diplometrics



The opening of Southern African embassies overseas has grown at a more gradual rate. While South Africa and Angola continue to open new embassies abroad, most Southern African countries have seen little growth in external representation. Like trade, diplomatic ties have traditionally been strongest with Europe. Today there is an increasing concentration of Southern African embassies in rising economies like India, China, Russia, and Brazil.

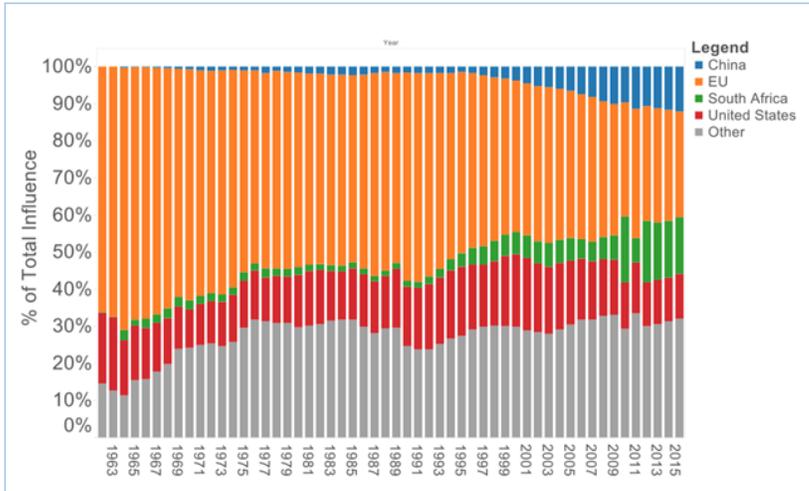
The Influence Index combines dimensions of trade and trade agreements, diplomatic representation, co-membership in

intergovernmental organizations, alliances, foreign aid, arms trade, and other forms of international exchange. Figure 44 shows the changing share of influence that countries and regions have had over Southern Africa. Like with trade and migration, Europe's overwhelming historic dominance has been falling as the influence of other countries rise. The influence of the United States grew through the 1990s, but its share has fallen since 2008. China's influence has grown dramatically; it is now the second most influential country in the region. This growth in influence is mostly due to the rapid escalation in materials exports to China.

China has also increased political interaction in the last few decades through expanded IGO membership and an increased diplomatic presence. India has also seen a growth in influence, largely driven by increased trade, and in 2014 it became the fifth most influential country in Southern Africa.

Within the region, South Africa has been the single most influential country since 2000. The other most influential countries intraregionally are Zambia, Zimbabwe, and Angola. Though these countries only rank as the 16th, 27th, and 33rd most influential countries in the region, respectively.

FIGURE 44. SHARE OF TOTAL INFLUENCE IN SOUTHERN AFRICA.



TRANSBOUNDARY NATURAL RESOURCES

Regional cooperation could help Southern Africa to address these multi-faceted vulnerabilities on human populations and the natural world, improving the region's collective resilience to both short-term shocks and the long-term stressors of climate change and variability. The Lesotho Highlands Water Project (LHWP) provides an example of what enhanced bilateral cooperation could achieve in Southern Africa, for example. Although cooperation of this magnitude can often move slowly (the project's roots date back 30 years), the LHWP could have wide-reaching mutual

benefits for South Africa and Lesotho's economic and human development.

The Southern African Development Community (SADC) has made transboundary water resource management a fundamental element of regional integration and poverty alleviation. SADC developed the "Climate Change Adaptation Strategy" with an expressed goal of improving water system management and resilience in the region. This framework divides adaptation strategies into areas, levels, and stages of action to put the

region on a more resilient path over the next two decades (SADC, 2011: 3-9). Regional cooperation such as this could prove critical in information gathering and knowledge transfers, agenda setting, and cross-policy coordination in Southern Africa.

CONCLUSION

Each set of interventions described in the sections above have costs and benefits. The most beneficial intervention for each country requires an understanding of desired outcomes. While it is difficult to create scenarios that are directly comparable, we have adjusted each of the combined intervention sets described above to demonstrate how each perform against different development indicators. Below is a table which summarizes some indicators for the region for each scenario.

FIGURE 45. PERCENT IMPROVEMENT FOR SELECTED DEVELOPMENT INDICATORS COMPARED TO THE CURRENT PATH IN 2040.

Scenario Name	Carbon Emissions (Decrease)	Average Years of Education	GDP at MER	GDP Per Capita at PPP	Government Revenue	HDI	Infant Mortality (Decrease)	Life Expectancy	Malnourished People (Decrease)	Poverty (Decrease)
Agricultural Resilience	-0.5	0.0	1.7	1.6	2.5	0.3	4.8	-0.1	33.5	8.0
Strengthening Governance	-3.5	0.3	8.5	5.9	9.5	0.6	3.3	0.3	2.5	3.9
Improving Health	-2.5	0.5	4.3	2.4	4.5	2.1	15.1	3.3	0.1	0.4
Enhancing Education	-2.0	9.1	4.9	4.1	5.4	3.8	6.1	0.9	2.5	4.2
Extending Infrastructure	4.5	-1.0	5.2	3.7	5.5	0.2	4.9	0.3	1.6	2.6
Reducing Fertility	1.5	2.0	-0.7	4.1	-0.4	1.0	1.5	0.2	7.7	10.3
Transitioning Informality	-1.5	2.3	3.9	3.0	10.5	1.3	5.1	0.4	2.4	2.9

The darkest blue represents the highest percent increases in each row.

Agricultural Resilience is by far the best scenario in terms of reducing hunger. In this scenario undernourishment is reduced by 33.5 percent compared to the Current Path in 2040. Poverty is also reduced significantly in this scenario, by 8 percent compared to the Current Path.

Strengthening Governance is the best scenario for increasing GDP and GDP per capita (PPP). It also leads to a considerable increase in government revenue.

The Improving Health scenario leads to the greatest decreases in infant mortality and the largest increase in life expectancy of all the scenarios.

The Enhancing Education scenario has the largest impact on education of all the scenarios, and since education is a direct component of HDI, it also has the largest impact on HDI.

The Extending Infrastructure scenario leads to the largest reductions in carbon emissions of all of the scenarios, as well as a significant increase in GDP, GDP per capita, and government revenue. Infant mortality is also reduced because increased access to water and sanitation decreases the prevalence of communicable diseases.

Reducing Fertility leads to the largest decrease in poverty of all the scenarios. While overall GDP is actually lower in this scenario than in the Current Path, because the population

does not increase as much, GDP per capita still increases. This is also the only scenario other than infrastructure that leads to a reduction in carbon emissions relative to the Current Path.

Finally, the Transitioning Informality scenario increases government revenue as a percent of GDP more than any other scenario. It also increases overall economic growth.

The effects of each intervention vary considerably by country and in the outputs in the table above. Please see the reference report for more detailed country-level analysis.

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