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The future of Zambian poverty to 2060: assessing national and sub-national trends across scenarios

Working paper

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Contents

Acknowledgements.....	5
Acronyms.....	5
Key definitions.....	6
Executive Summary	7
1. Introduction.....	10
2. Zambia’s historical and political-economy context.....	11
3. The current state of poverty in Zambia.....	14
4. Forecasting poverty and its drivers	17
4.1. Economic drivers of poverty.....	17
4.2. Demographic change	19
5. Forecast methodology	32
5.1. IFs and the Current Path scenario	32
5.2. IFs and poverty	34
6. The future of poverty in Zambia: Current Path	36
6.1. Long-term poverty projections of Zambia.....	36
6.2. Core assumptions in the Current Path.....	44
6.3. Structural drivers of poverty	46
6.3.1. Human development in the Current Path.....	46
6.3.2. Governance development in the Current Path	49
6.3.3. Infrastructure in the Current Path	51
6.3.4. Climate change impact in Zambia in the Current Path	53
7. Scenario analysis.....	54
7.1. Framing uncertainty of long-term poverty.....	54
7.1.1. Economic growth.....	54
7.1.2. Demographic change	54
7.1.3. Income distribution	55
7.1.4. Internal migration.....	55
7.1.5. Government debt.....	55
7.1.6. Framing results.....	55
7.1.7. Combined framing	56
7.2. COVID-19: assessing the potential impact on poverty in Zambia	59
7.3. Strategic interventions to reduce poverty in Zambia	60
8. Conclusion	64

Appendix A: Details of data gathered from 2015 LCMS	66
Appendix B: Details on IFs poverty projections.....	67
Appendix C: Comparison of IFs Current Path poverty forecasts with other projects	69
Appendix D: Scenario construction and benchmarking	70
References.....	72

List of Figures

Figure 1. Annual GDP growth rates, Zambia and regional comparisons	13
Figure 2. Share of exports (in value) from Zambia by 2-digit HS code, 2000-2017	14
Figure 3. Population living in poverty in Zambia at different thresholds.....	16
Figure 4. Life expectancy at birth, all countries with Zambia highlighted.....	21
Figure 5. Total deaths in Zambia by main categories of cause.....	22
Figure 6. Visual representation of International Futures (IFs) modeling platform.....	33
Figure 7. Projections of the number of people in poverty (millions) at different poverty thresholds, Current Path.....	36
Figure 8. Projections of the proportion of people in poverty (% of population) at different poverty thresholds, Current Path.....	37
Figure 9. Percent of population below \$1.90/day poverty line, Current Path	40
Figure 10. Number of people living below \$1.90/day poverty line (in millions), Current Path ..	40
Figure 11. Poverty gap at \$1.90/day level in Zambia, Current Path.....	41
Figure 12. Middle class population (population living between \$10 and \$110 per day), Current Path	42
Figure 13. Annual GDP growth rate, Zambia and comparative regional groups, 5-year moving average	45
Figure 14. Population, Zambian provinces, Current Path.....	46
Figure 15. Life expectancy at birth, Zambian provinces, Current Path.....	48
Figure 16. Electricity access, total, Zambian provinces, Current Path scenario.....	52
Figure 17. Electricity access in Zambia, by Rural, Urban, and Total, Current Path Scenario	52
Figure 18. Average emissions per capita vs. the estimated percent reduction in income as a result of climate impacts in 2060.....	53
Figure 19. Average emissions per capita vs. average change in agricultural yield as a result of climate impacts (2020-2060)	54
Figure 20. Percentage of people in extreme poverty (< \$1.90/day) in Zambia, Current Path vs. combined framing	57
Figure 21. Number of people in extreme poverty (< \$1.90/day) in Zambia, Current Path vs. combined framing	58
Figure 22. Poverty headcount (millions) at \$1.90/day level for Zambia across strategic interventions.....	62
Figure 23. Poverty headcount (millions) at \$1.90/day level for Copperbelt and Lusaka across strategic interventions	63
Figure 24. Poverty headcount (millions) at \$1.90/day level for rural provinces across strategic interventions.....	64

Figure 25. Demonstration of log-normal function for poverty in IFs 68
Figure 26. Demonstration of log-normal function and its use in forecasting poverty over time in IFs 68
Figure 27. Comparison of extreme poverty forecasts (< \$1.90/day) for Zambia to 2030 70

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Acronyms

CAGR: Compound Annual Growth Rate

COMESA: Common Market for Eastern and Southern Africa

COVID-19: Novel coronavirus

DHS: Demographic and Health Survey

GDP: Gross domestic product

HDI: Human Development Index

HIPC: Highly Indebted Poor Country

ICT: Information and communications technology

IFs: International Futures forecasting system

IIAG: Ibrahim Index of African Governance

IMF: International Monetary Fund

LCMS: Living Conditions Monitoring Survey

MDG: Millennium Development Goals

MER: Market Exchange Rates

PPP: Purchasing Power Parity

SADC: Southern African Development Community

SCT: Social cash transfers

SDG: Sustainable Development Goals

TAZAMA: Tanzania-Zambia Mafuta pipeline

TAZARA: Tanzania Zambia Railway Authority

Key definitions

Extreme poverty: Living on less than \$1.90 per day (2011 PPP terms).

Middle class: Definitions of “middle class” vary in terms of how they are operationalized and projected. Here, we follow Kharas (2017) and utilize upper limit of \$110 per day, but modify it to include \$10/day as the lower bound (all expressed in 2011 PPP terms).

National Poverty Line: The minimum adequate level of income to meet basic needs in a particular country. National poverty lines are often determined based on costs of food and non-food needs. The World Bank’s use of the \$3.10 per day poverty line (2011 PPP terms) is derived from national poverty lines and is classified as Lower Middle Income. In 2017, the World Bank adjusted this poverty line to \$3.20 per day (2011 PPP terms).

Poverty headcount: headcount is the number of people living below specified thresholds.

Poverty headcount ratio (or rate): headcount ratio is the percentage of the population living below specified thresholds.

Poverty gap ratio: The average shortfall (in percentage terms) of those below the poverty line.

Severe poverty: Living on less than \$1.00 per day (2011 PPP terms).

Executive Summary

Poverty in Zambia is extensive and a persistent problem. Zambia's recent period of positive macroeconomic performance did not lead to commensurate improvements for the poorest Zambians. Over half of all Zambians live below the national poverty line and about 1 in 3 live on less than \$1.00 per day. Long-term trends in development in Zambia suggest that poverty could remain a challenge for many years to come. In this report, we utilize the 2015 Living Conditions Monitoring Survey (LCMS) to understand the current state of poverty in Zambia. Next, we explore the potential long-term future of poverty in Zambia using the International Futures (IFs) forecasting system to project poverty in Zambia at national and provincial levels and across scenarios that reflect policy choices and possible patterns of development in Zambia. The IFs *Current Path*, a baseline scenario that assumes continuity of development patterns within and across integrated systems, suggests:

- A poor economic growth outlook and persistent inequality make it likely that poverty will remain an issue in Zambia through midcentury. The *Current Path* tells a somewhat mixed story of progress in poverty reduction in Zambia. In proportional terms, extreme poverty declines out to 2060, but taking into account the rate of population growth, the number of people in extreme poverty (< \$1.90 per day) grows relative to the amount seen today (from 8.8 million in 2015 to 15 million in 2040 declining to 13.6 million by 2060).
- In the *Current Path* scenario, Eastern and Northern provinces have the most people living in extreme poverty by mid-century (approximately 4.6 million people, and up from about 2.5 million today). Southern and Western provinces have approximately 1.6 and 2 million (respectively) living below the \$1.90 per day poverty line in 2050. Lusaka province has about half a million people living in extreme poverty in 2015. By mid-century, an additional 800,000 people in Lusaka would live in extreme poverty.
- In 2020, Zambia has the 12th highest poverty headcount rate and the 14th highest number of people in poverty in Africa (at \$1.90 level). Over the next forty years, the *Current Path* shows Zambia falling further behind the rest of Africa. By 2060, Zambia has the 6th highest poverty headcount rate in Africa (29 percent) and the third largest absolute number of people in poverty (13.5 million).
- In the *Current Path* scenario, Zambia's population is projected to grow by a factor of 2.5 from 2020 to 2060 (to about 46 million). Lusaka province's population triples and Copperbelt grows by a factor of 2.5 over the next forty years. In this scenario, the population of Lusaka province grows to over 10 million by 2060. This growth will strain provincial and city planning in housing development, jobs, traffic management, air quality, and service delivery.
- Today, roughly 5 percent of Zambians live in the middle-class income range (between \$10 and \$110 per day). By 2060, roughly 15 percent of Zambians are considered middle class in the *Current Path*. This growth is most dramatic in provinces with urban centers – Lusaka and Copperbelt. Lusaka's middle class grows to over 3 million people in the *Current Path* by 2060 – nearly the size of the province's current population. In Copperbelt, the middle class grows to roughly 2 million by 2060. This story of an emerging middle class could drive significant change in Zambia, including in consumption patterns, revenue potential from a growing tax base, and demand for quality government services.

In addition to analyzing the *Current Path*, we also create alternative scenarios to explore the effect of varying assumptions and changing policies on the future of poverty in Zambia. Some key takeaways include:

- Framing scenario analysis suggests some broad uncertainties in long-term poverty projections. Altering assumptions of our core demographic and economic drivers – economic growth, income inequality, and population change – have different degrees of impact and over different horizons. The scenario simulating sustained higher economic growth reduces poverty in Zambia most out to 2060. However, over a shorter-term horizon, alternate assumptions of fertility and income distribution show significant influence over poverty projections, suggesting areas where policy could lead to poverty reduction.
- In a *Worst Case* framing scenario, we find that poverty could increase to about 27 million in 2060, reflecting broad failures of the government and international actors to implement effective poverty reduction programs. This would constitute an increase in extreme poverty of about 17 million people from 2020 to 2060 – nearly the size of today’s population. In a *Best Case* scenario, we see a gradual reduction of poverty, but not for another 10 years. In this scenario, governments make choices that support broad human and economic development in Zambia, leading to a reduction in the number of people living on less than \$1.90 per day to about 3 million in 2060.
- We use the IFs model to assess the possible impact of the COVID-19 pandemic on poverty in Zambia. In the *Current Path*, we see an immediate impact on poverty in 2020 compared to a *World without COVID* counterfactual scenario. All poverty thresholds see an increase of about 100,000 people in poverty in 2020 – about a half percent increase compared with a *World without COVID*. By 2030, projections of severe poverty (below \$1 per day) show that 600,000 more people live below this threshold in the *Current Path* (about 2.4 percent higher than in a *World without COVID*).
- The strategic interventions presented in this analysis point to policy themes that may make eliminating poverty more of a reality. The *Pro-Poor Priority* scenario increases agricultural investments, improved access to family planning, and social cash transfer programs leading to the most significant reductions in poverty in the long term. Even in a scenario representing targeted interventions for the poor, poverty eradication appears to be a significant challenge over the next 40 years.
- The *Business First* scenario, which simulates an improved business environment that accelerates economic growth, has a larger impact on poverty reduction in Lusaka and Copperbelt, but less than *Pro-Poor Priority* in the aggregate.
- The *Human Capital Push* scenario, which emphasizes improvements in health outcomes and the efficiency and quality of the primary school system, has the second largest impact on poverty reduction among the more urban, economically-productive provinces (Lusaka and Copperbelt). Improving the quality of the primary education system, improving gender empowerment, and reducing mortality from communicable diseases has the largest impact from this scenario.
- We also explore a scenario called *Infrastructure Emphasis*, in which Zambia prioritizes large-scale infrastructure programs including water and sanitation, electricity, paved roads, and mobile broadband connectivity. The results from this scenario suggest that improving safe water and sanitation systems has the most meaningful impact on poverty reduction among infrastructure investments for both urban and rural provinces.

This report consists of three inter-related analytical pieces. First, we explore the past, examining the drivers of poverty and poverty reduction strategies in Zambia that could significantly shape this long-term future. Next, we use the International Futures forecasting system to project national and provincial poverty (and related drivers) in a *Current Path* scenario that explores where we seem to be heading. Finally, we conclude with scenario analysis in IFs, exploring the potential impact of a variety of scenarios that could shape the long-term future of poverty in Zambia.

1. Introduction

The World Bank reports that, in 2015, (the most recent observed data point) 58 percent of Zambia's 17 million people lived in extreme poverty, measured as the percentage of the population earning less than the international poverty line of \$1.90 per day at purchasing power parity (World Bank, 2018). Severe poverty (percentage share of the population living on less than US\$1.00 per day) was at 54 percent of the population. Poverty levels in Zambia are almost 20 percentage points higher than the regional average of 41 percent. The World Bank (2018:8) further shows that poverty in Zambia remains primarily a rural phenomenon with more than four-fifths (82 percent) of the poor living in rural areas (World Bank, 2018). In terms of sub-national poverty, of the ten provinces, Northern, Western and Luapula were the poorest while the capital Lusaka, Copperbelt and Southern had the lowest poverty levels.

Zambia had impressive economic growth rates of 7.4 percent per year from 2004 to 2014 and around 3.5 percent from 2015 to 2018, but insignificant corresponding reduction in national and subnational poverty (World Bank, 2018). Growth rates have now slowed to around 2.5 percent and the outlook may project slower economic growth with global economic slowdown from the COVID-19 pandemic. The World Bank attributes insignificant poverty reduction during high economic growth to high and increasing inequality in the country. The Zambian government attributes it to market liberalization policies and recurring drought spells. The last time such low levels of economic growth were recorded, Zambia was in economic crisis for nearly three decades and poverty had reached a high of 73 percent. Given the above discussion, and considering that economic growth rates have slowed significantly, and droughts are becoming even more frequent, what is the long-term future of poverty in Zambia? What are alternative scenarios of poverty over the long-term future? This report critically examines and answers the two aforementioned questions.

There are several reasons why the scope of this study is necessary and urgent. First, there are *11 million reasons*: 11 million Zambians – over half the population – live in extreme poverty (Central Statistical Office, 2015). Secondly, the poverty gap, which is a measure of the depth of those below the poverty line, has remained relatively unchanged for over a decade, indicating a persistent, systemic level of poverty. Finally, the current equilibrium (or trends in economic growth, income inequality, and population growth) does not suggest that significant poverty reduction is on the horizon in Zambia, especially for the poor in rural areas.

The report's outline is as follows: Section 2, provides a brief historical and political overview of Zambia. Section 3 outlines the severity of the poverty situation in Zambia, drawing upon data from the 2015 Living Conditions Monitoring Survey. Sections 4 and 5 introduce our methodology and framework for understanding long-term poverty, by drawing lessons from other similar research on the determinants of poverty and poverty reduction in Zambia. Section 6 examines *Current Path* projections from IFs at the national and provincial levels. Section 7 explores a variety of alternative scenarios that explore long-term poverty in Zambia.

2. Zambia's historical and political-economy context

Zambia is a South-Central African country classified as a lower-middle income country in 2011 by the World Bank. Zambia was a colony of Britain and was known as Northern Rhodesia until its independence in 1964. Since its independence, Zambia has experienced five discernable periods that have been significant in the country's historical profile of poverty. These periods have been characterized by economic expansion and contraction associated with changes in both internal political changes and external influences.

The first nine years as a nation following independence were characterized by economic expansion. Zambia maintained a free market economic system that it had inherited from the colonial economy. It enjoyed generous revenues from international market prices trading in its primary commodity – copper. During this phase, Zambia made massive investments in education and health. It also invested heavily in the political liberation of its neighboring countries by funding liberation struggles and hosting liberation movements. Although gains were slowly made during this period, losses were also incurred. Support for liberation struggles diverted financial resources from much needed development. In addition to liberation struggle expenditures, Zambia experienced loss in infrastructure due to bombings from colonial powers, for example the Ian Smith government in Southern Rhodesia now Zimbabwe, and the Apartheid government in South Africa.

However, economic contraction ensued. From 1973 to 1998, Zambia's economic performance declined with half the years registering negative economic growth rates. There were both internal political changes and external forces at play which produced a deadly mix for the country's development path. It began in 1969, when the government decided to pursue a version of socialism known as humanism. During the early 1970s, the government nationalized private enterprises either wholly or in part – obtaining a majority share (51 percent) in firms. The country also changed to a one-party state. The institutional shift allowed the government to provide many of the necessities for free, including housing, education, healthcare and even the maize staple and cooking oil, but was implemented at a time when revenues were in decline. Despite these institutional changes, the country continued to enjoy revenue from the high copper prices until 1973 when global commodity prices, including copper, fell significantly and oil prices increased. Zambia's expenditure increased significantly. Zambia airlifted oil imports, while also spending highly on the social sector and the liberation wars. Zambia began to borrow heavily from the international financial institutions as well as other donor countries. By the end of the 1970s, it was clear that the country was in high debt distress and at risk of default.

The third phase was characterized by continued economic contraction, but was a major watershed in the history of poverty in Zambia, and can be traced to the Structural Adjustment Years effectively from 1980 to 2000. The Malawian economist Thandika Mkandawire has referred to those years as a period of "Africa's great depression" (Meagher, 2019). Zambia's high and unsustainable debt burden had reached over \$7 billion, which affected expenditure on the social sector. Further, there was a reduction in foreign aid. The country approached the IMF for aid, which based it on conditions of removal of food subsidies (Associated Press, 1986). When removal of price controls was attempted by the Kaunda government in 1986, prices of the essential corn

meal/maize staple increased by 120 percent and, riots broke out in the worst social unrest since liberation struggles against colonialism. During this phase, removal of price controls on agricultural commodities, removal of agricultural subsidies, and trade liberalization led to poorer revenue for local exporters due to low competitiveness of their formerly highly subsidized prices following the end of import substitution industrialization strategies. Privatization and reduction in the size of the state also led to massive job losses. They also resulted in the reduction in the formal sector and bulging of the informal sector. The health care sector was reformed with minimal state funding and fees for primary and secondary education were introduced. At the same time, the Structural Adjustment Years saw very low economic growth rates of around 0.5 percent, and in some years negative growth.

The fourth phase came at the turn of the 21st century, when Zambia's economic growth bounced back and the economy grew rapidly. It began when Zambia qualified for debt relief under the Highly Indebted Poor Country (HIPC) initiative and copper prices increased on the international market. HIPC allowed for the reallocation of resources from debt-servicing to economic growth and poverty reduction under the poverty reduction strategies and five-year National Development Plans. Zambia also enjoyed massive investment flows from China, as well as unconditional low-interest loans which allowed it to embark on large scale infrastructure programs. However, the result of the strategies was jobless growth and economic growth was accompanied by insignificant poverty reduction in urban areas and increases in rural areas. Economic growth was around 7.4 percent between 2004 and 2014 and 3.5 percent per year from 2014 to 2018 (World Bank, 2018). Between 2002 and 2015, per capita income in current US dollars rose from \$382 to \$1,338, and the World Bank adjusted the country's classification upwards from low-income to lower middle-income country status. Meanwhile poverty as measured using the international poverty line increased from 58 percent in 2004 to 64 percent in 2010 and dropped back to 58 percent in 2015. The poorest performance was in rural areas. Rural poverty increased from 74 percent in 2010 to 77 percent in 2015. However, research is limited in explaining the performance and puzzle of poverty in Zambia. Later, in its Vision 2030, the government formalized its aspiration to reduce poverty to less than 20 percent of the population, primarily through non-contributory social protection with Social Cash Transfers (Republic of Zambia, 2006). This remains a central aspect of the government's poverty reduction efforts.

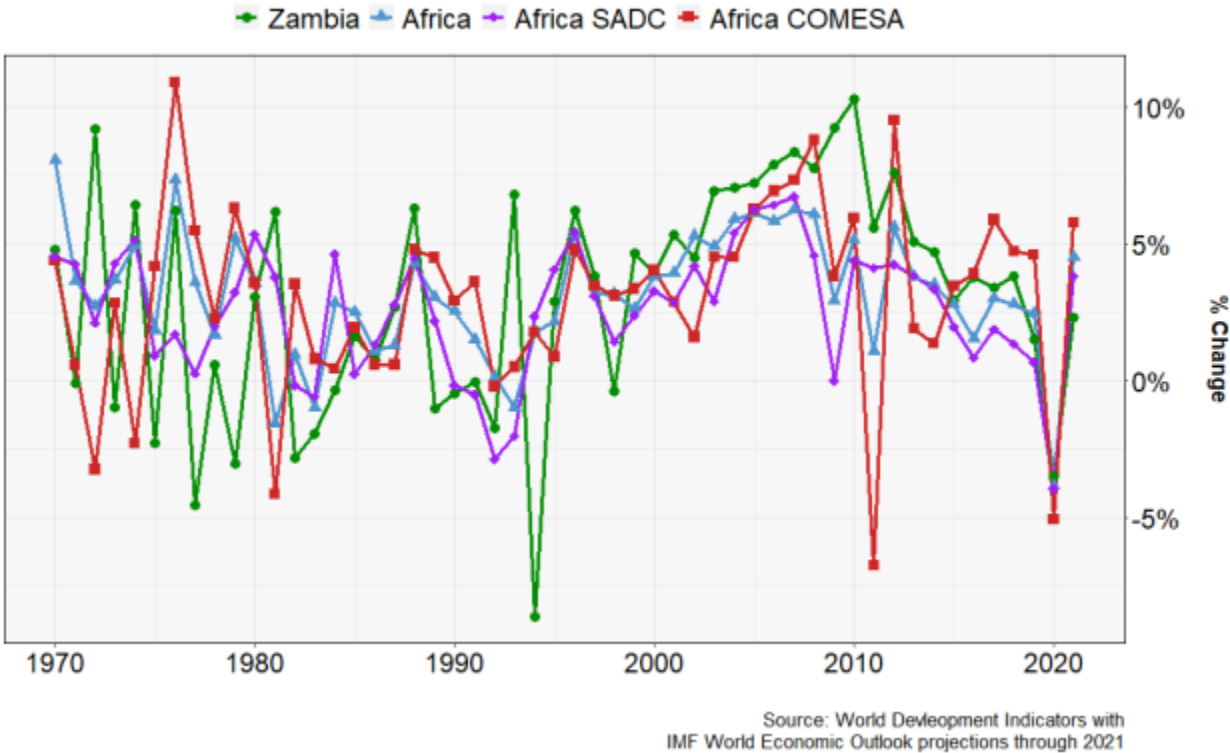
The fifth phase is the current phase where economic indicators show decline and debt distress which will have current and future implications for Zambia's poverty profile. Economic growth rates have reduced to around 2 percent per year (Republic of Zambia, 2020). Zambia found itself with overall debt of \$18.5 billion comprised of an external debt of US\$11.2 billion, most of it to China, government securities of ZMK80.2 billion (\$5.5 billion) and ZMK 26.2 billion (\$1.8 billion). The country has been classified by the IMF as being in debt distress and at risk of default, and poverty remains high. In addition, inequality rose substantially which meant that the majority of the population shared very little of the income.

Although the government emphasizes social cash transfers and other programs – such as the Farmer Input Support Program (FISP) and the Food Reserve Agency's (FRA) food purchasing programs – as a direct attack on poverty, it sees economic performance as the main driver of

poverty reduction (Republic of Zambia, 2019). In the 7th National Development Plan for 2017 to 2021, achieving economic growth is the first pillar out of five. Social cash transfers, FISP, and FRA purchasing programs fall under the second pillar. The section below informs the reader on how economic performance, distribution and other interventions have been thought to influence poverty in Zambia.

Zambia’s economic history is, in large part, a story following the cycles of boom and bust of the price of mineral resources – primarily copper. In the post-independence period, copper mining accounted for approximately 90 percent of Zambia’s total exports. Today, Zambia is the world’s 7th largest producer of copper, and the industry accounts for roughly 70 percent of Zambia’s export value (almost half of that to China in 2016). About 10 percent of Zambia’s economy is sourced from mining activity. Of all foreign direct investment inflows from 2004-2016, approximately 70 percent of it went to the mining sector. Approximately 26 percent of government revenue comes from mining (Liebenthal et al., 2018).

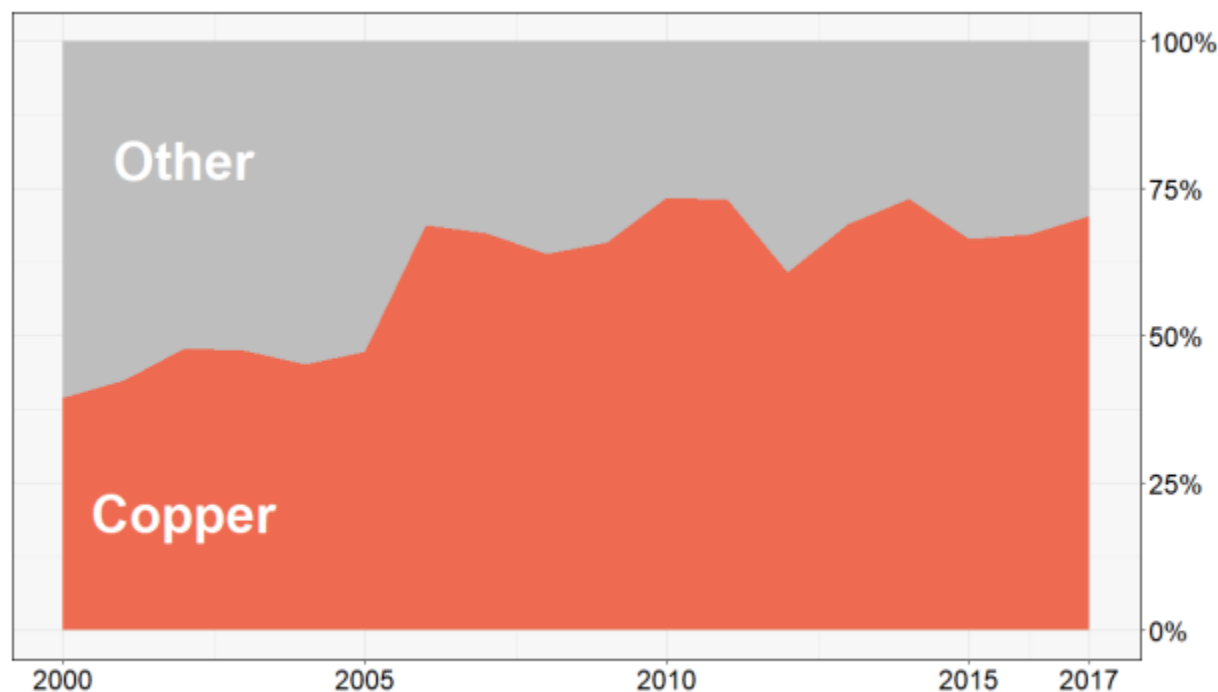
Figure 1. Annual GDP growth rates, Zambia and regional comparisons



Zambia’s economy emerged from a low growth period in the 1990s, buoyed by high copper prices, and grew by an average rate of nearly six percent per annum from 2001 to 2014. The slower growth in recent years has been driven by low commodity prices, and non-mining sectors have stepped up their contributions to Zambia’s economic growth, including financial services, construction, and tourism. Agriculture remains an important element of Zambia’s rural economy in spite of recent droughts. Zambia’s economic outlook remains relatively weak, given its reliance on commodity markets, broad load shedding, and its climate/agricultural vulnerability. However, the importance of the agricultural sector to Zambia should not be understated. As recently as 2017, 42 percent of

the labor force worked within the sector (Berardi & Marzo, 2017) and 4.6 million Zambians depended entirely upon agriculture as their only source of income (Juliet et al., 2016).

Figure 2. Share of exports (in value) from Zambia by 2-digit HS code, 2000-2017



Source: Atlas of Economic Complexity Growth Lab at Harvard University

3. The current state of poverty in Zambia

Standardized poverty measurements are notoriously difficult to derive and analyze over time, as they rely on many varying sources of information, including household surveys, market basket analyses, and revisions to purchasing power estimates. These sources are often dated, infrequent, and regionally variant. International Futures (IFs), the core quantitative tool used in the projections for this research, relies on data from the World Bank’s World Development Indicators and PovcalNet projects. For this analysis, we also utilize data from Zambia’s 2015 Living Conditions Monitoring Survey (LCMS). This source had small but meaningful differences from the World Bank sources. In cases where these differences were found, the Zambian data source was used to initialize IFs model results. In all cases, we report poverty lines using 2011 Purchasing Power Parity (PPP) values, unless otherwise specified, to remain consistent with international poverty analyses. As such, these results differ in some ways with related reports on Zambian poverty. See Appendix A for further information and a comparison of the data.

The 2015 LCMS served as a data foundation for this analysis and the poverty forecasts in later sections (Central Statistical Office, 2016). The 2015 LCMS was administered in April and May 2015 across all ten Zambian provinces. The resulting survey report found several major challenges in Zambia:

- **High rates of persistent poverty:** 40.8 percent of the population was living in extreme poverty, and 54.4 percent was living below the national poverty line.¹
- **Chronic rural poverty:** over three-quarters (76.6 percent) of the rural population in Zambia was below the national poverty line at the time of survey. Nearly 90 percent of the rural population in Zambia is engaged in agricultural activity as its main source of livelihood. The poverty gap ratio, which is a measurement of the average depth of those below the poverty line, is five times greater in rural areas.
- **Severe inequality:** The bottom 50 percent of households earned only seven percent of the national income. Zambia's income gini coefficient, which is a measure of economic inequality, is among the highest in the world (56).²

For this analysis, we make use of the LCMS microdata to develop poverty estimates that allow for international comparisons with Zambia's circumstances. We find that 11 million Zambians – over half the population – live below the \$3.10 (2011 PPP) poverty line in 2015. One-third of Zambia's population lived on less than \$1 per day – extremely dire conditions. Despite the significantly large part of the population living under \$1.90, the trend line shows that this share of the population had been increasing since 1996 but that 2010-15 saw the first reduction in a decade. Table 1 illustrates Zambia's level of income poverty with those in the Southern African Development Community (SADC). Zambia has the 6th highest share of population living below the \$1.90 poverty line (the most widely used threshold for extreme poverty), and the 4th highest poverty gap ratio. These indicate an extensive and severe level of poverty in Zambia.

¹ The LCMS definition of extreme poverty is those whose total consumption is less than the food poverty line (set at K152 in 2015). The national poverty line is an additional K62 to account for adequate non-food expenditures.

² The income gini value reported in the 2015 LCMS Report is lower than the value reported by the World Bank (57.1).

Figure 3. Population living in poverty in Zambia at different thresholds

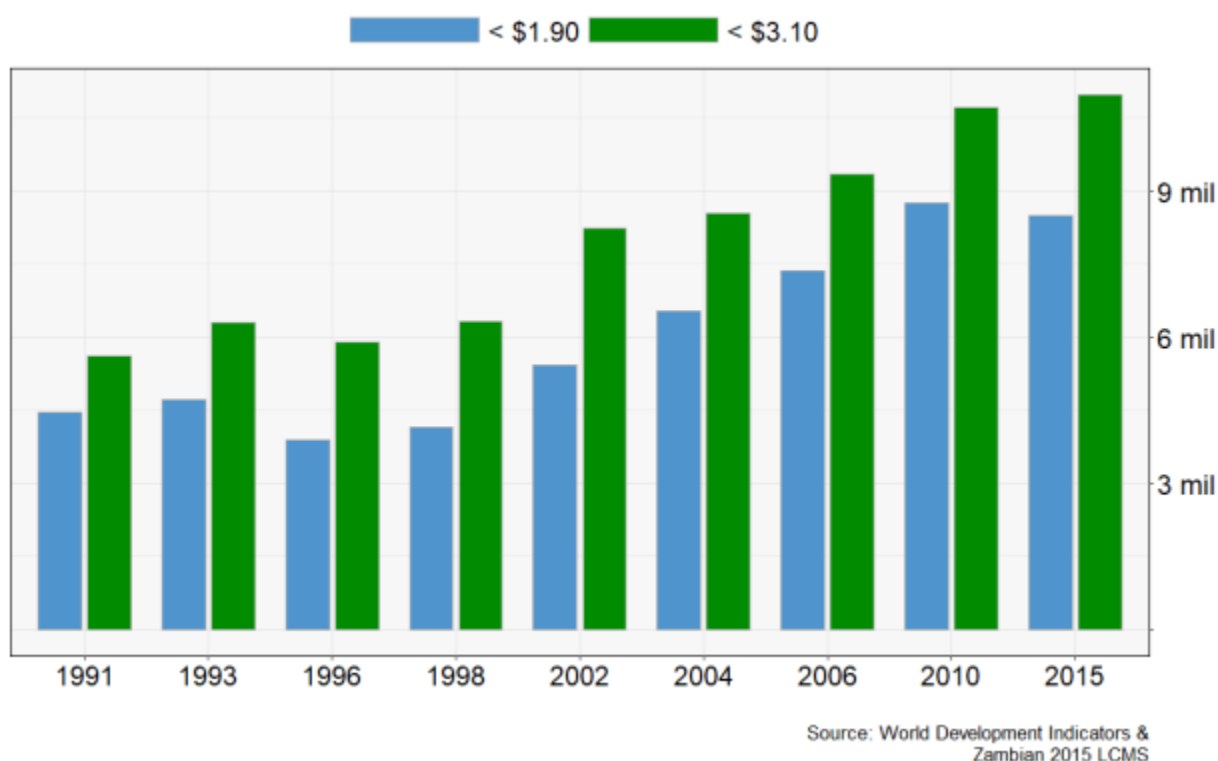


Table 1. Percent living in \$1.90/day poverty and \$1.90 poverty gap ratio, SADC region (source: World Development Indicators, using most recent data for all countries)

Country	% living on < \$1.90 / day	\$1.90 poverty gap ratio
Madagascar (2012)	77.6%	39.0%
Congo, Dem. Rep. (2012)	76.6%	38.6%
Malawi (2016)	70.3%	29.4%
Mozambique (2014)	62.4%	27.5%
Lesotho (2010)	59.7%	31.8%
Zambia (2015)	57.5%	29.5%
Tanzania (2011)	49.1%	15.4%
Eswatini (2009)	42.0%	16.6%
Angola (2008)	30.1%	9.6%
Zimbabwe (2011)	21.4%	5.2%
South Africa (2014)	18.9%	6.2%
Botswana (2015)	16.1%	4.3%
Namibia (2015)	13.4%	4.6%
Seychelles (2013)	1.1%	0.4%
Mauritius (2012)	0.5%	0.1%

Rural provinces struggle with particularly acute and prevalent poverty. The provinces of Western, Northern, and Luapula have the highest proportions in extreme poverty (all above 80 percent). In these provinces, the poverty gap ratio (at \$1.90 poverty line) is above 30 percent, meaning that the average person in poverty is 30 percent below this poverty line. Over 1.3 million people live below the \$1.90 poverty line in Eastern province, accounting for over 15 percent of the total in Zambia. The more urban provinces of Copperbelt and Lusaka have far lower rates of extreme poverty (30 percent and 17 percent, respectively) even though nearly one-third for Copperbelt still represents a significantly large number. These provincial variations underscore the need to understand subnational poverty trends in Zambia, their contribution to the national-level picture, and differential pathways for improving poverty in Zambia.

Table 2. *Zambian provincial poverty estimates (derived from 2015 LCMS microdata)*

Province	Population living on < \$1 / day (mill)	% living on < \$1 / day	Population living on < \$1.90 / day (mill)	% living on < \$1.90 / day	Population living on < \$3.10 / day (mill)	% living on < \$3.10 / day	\$1.90 poverty gap ratio
Western	0.62	63.0%	0.83	84.5%	0.9	91.3%	34.7%
Northern	0.78	60.6%	1.07	82.8%	1.17	90.6%	34.4%
Luapula	0.66	59.1%	0.94	83.7%	1.02	91.3%	32.7%
Muchinga	0.44	49.3%	0.65	72.7%	0.75	84.4%	29.2%
Eastern	0.81	44.8%	1.33	73.5%	1.57	87.2%	23.9%
North Western	0.29	35.1%	0.55	65.9%	0.7	84.0%	21.5%
Central	0.46	30.3%	0.88	58.1%	1.17	77.7%	17.9%
Southern	0.52	28.4%	1.08	58.7%	1.44	78.1%	18.1%
Copperbelt	0.26	10.9%	0.71	30.0%	1.18	49.8%	11.1%
Lusaka	0.16	5.8%	0.47	17.1%	1.07	38.6%	8.0%

4. Forecasting poverty and its drivers

4.1. Economic drivers of poverty

Projections of poverty tend to emphasize the economic and demographic drivers of poverty – the average income and the distribution of income in a population (Hughes et al., 2009). The dynamics of change of economic drivers – accelerated economic growth and improved income distribution – will typically lead to poverty reduction in the long term (all else remaining equal). To be sure, not all economic growth necessarily leads to poverty reduction, which has spawned an emphasis on “pro-poor” approaches to macroeconomic policy. In places where growth has not translated into poverty reduction, referred to as “immiserizing growth”, it is often because of growth elasticities of poverty in a specific context (Shaffer et al., 2019), particularly where inequality has

intensified (as is the case in Zambia since 2002), or population growth has outpaced economic growth leading to more impoverishment, or indeed where subnational or national measures of poverty incorporate more dimensions of impoverishment than just income (Shaffer et al., 2019). Poverty projections from International Futures are built from this standard drivers formulation (see Appendix B for more details), and this is augmented by the inclusion of deeper drivers of poverty, such as education, health, infrastructure, governance, and more. The following sections will begin our exploration of economic growth, demographic change, and income distribution.

4.1.1. Economic Growth and Poverty Reduction

Economic growth in Zambia has been associated with reduction in poverty, but this has been mitigated by inequality (Chrispin et al., 2017; MacCulloch et al., 2001; Thurlow & Wobst, 2004). During the 1990s marginal increases in economic growth were followed by a reduction of half a percentage point in poverty (Thurlow and Wobst, 2004). However, decreases in inequality generally had a detrimental effect on total poverty headcounts as it pulled non-extreme poor citizens across the poverty threshold. Nevertheless, reductions in inequality throughout the 1990s had a significant lowering effect upon the incidence of severe poverty. Reducing severe poverty seems to be best done through reductions in economic inequality, while stimulating economic growth is better at reducing the total incidence of poverty (Thurlow & Wobst, 2004).

Provincial analysis of the growth to poverty elasticity in Zambia shows some mixed results and will likely follow the same pattern. In 2006 and 2010, poverty reduction appears to have been more responsive to growth in urban areas, but in 2015, rural areas were more responsive (Mphuka et al., 2017). The Western province – the province with the highest proportion of its population in extreme poverty – was more inelastic in response to economic growth. Mphuka et al. (2017) found that agricultural growth became increasingly elastic for poverty headcount numbers, poverty gap numbers, and squared poverty gap numbers, making it an important part of reducing poverty in Zambia.

4.1.2. Income Distribution

During the high economic growth period at the turn of the century, Zambia’s per capita income rose from \$382 in 2002 to \$1,338 in 2015 (in current USD). However, during this period, poverty intensified, growing from 41.7 percent (1996) to a height of 64.4 percent (2010). Also, during this period, income inequality intensified from a low-point of 42.1 (2002) to a height of 57.1 (2015).

Table 3. Top 10 most unequal countries, as measured by income Gini coefficient estimates (Source: World Development Indicators, using most recent data for all countries)

Country	Income Gini Coefficient (0-100 scale)
South Africa (2014)	63.0
Namibia (2015)	59.1
Suriname (1999)	57.6
Zambia (2015)	57.1
Central African Republic (2008)	56.2

Lesotho (2010)	54.2
Mozambique (2014)	54.0
Belize (1999)	53.3
Botswana (2015)	53.3
Brazil (2017)	53.3

4.2. Demographic change

Zambia is experiencing two critical demographic trends that influence poverty today that will be important moving into the future. First, high rates of fertility have led to rapid population growth. Zambia's population has more than doubled since 1990. Eight of Zambia's provinces have average fertility rates above five children per woman. Secondly, Zambia also has a notably young demographic profile, with the 10th youngest population and the 6th largest youth bulge globally. This constitutes a significant demographic pressure for jobs and economic opportunity. According to the ILO, the unemployment rate for youth (15.9 percent) was more than twice the rate of the total workforce (7.1 percent) in 2019.

Table 4. Demographic indicators for Zambia and its global rank

Indicator	Value (most recent year of data)	Global rank	Source
Total fertility rate	5.05 (2015)	15 th highest	UN Population Division
Life expectancy at birth	58.7 (2016)	6 th lowest	Institute for Health Metrics and Evaluation
Youth bulge (ratio of population 15-29 to all adults)	.52 (2015)	6 th largest	UN Population Division
Median age of population	16.9 (2015)	10 th youngest	UN Department of Economics and Social Affairs

Urbanization, or migration from rural to urban areas, also plays a key role in demographic change. The more urban, economically-productive provinces of Lusaka and Copperbelt have experienced significant population growth as a result of migration from other provinces. The pace of urbanization has important implications for poverty. Rapid urbanization is directly connected to increasing poverty (Yousif, 2005). It is not that urbanization causes poverty, but rather that rural poverty becomes urban poverty. Rapid urbanization induces competition between incumbent labor and migrant labor driving down wages in total for both, increases land prices on the peripheries of growing cities, which is good for the few landowners but ultimately bad for a majority of the new migrants that are coming to that area, and increase congestion and environmental degradation (Sekkat, 2017). However, there are benefits that accrue to rural areas. Consumption in big cities could help to raise the wages of those who stay in rural areas and sell

food into cities, while remittances from urban to rural areas have positive effects on rural poverty (Sekkat, 2017).

4.3. The broader developmental context

4.3.1. Human Development

Amartya Sen, a pioneer in our understanding of poverty as a multifaceted issue, encouraged the exploration of poverty from the perspective of *human capabilities*, extending the exploration of deprivation into dimensions of health and education (Sen, 1995). The United Nations has recognized the importance of a broader capabilities approach in a multitude of its initiatives, including the Human Development Index (HDI), the Millennium Development Goals (MDGs), and the current Sustainable Development Goals (SDGs) framework. Effective poverty reduction strategies should recognize the need to concentrate on human capabilities and look beyond income-based poverty.

HDI is a useful composite indicator for exploring trends in human development across time and countries. The three pillars of HDI include: health (as measured by life expectancy), education (as measured by mean years of schooling of the adult population and school life expectancy), and a decent standard of living (as measured by Gross National Income per capita). In 1990, Zambia was below average according to HDI globally and among SADC countries (ranking 118th globally). In the most recent year of available data, Zambia improved relative to SADC countries but fell to 144th globally.

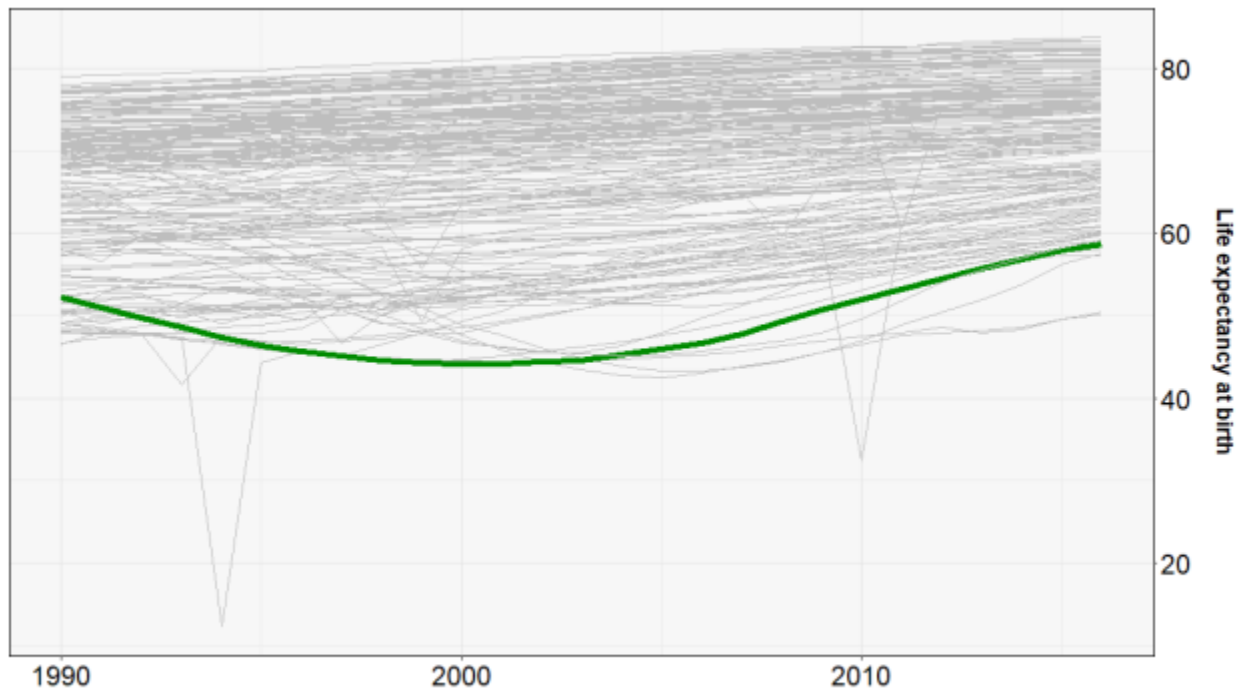
Table 5. Human Development Index, SADC and SADC countries, 1990-2017 (0-1 scale)

Country	1990	1995	2000	2005	2010	2015	2017
Africa SADC	0.432	0.436	0.436	0.458	0.499	0.534	0.542
Zambia	0.401	0.412	0.432	0.48	0.544	0.583	0.588
Angola			0.387	0.455	0.52	0.572	0.581
Botswana	0.581	0.577	0.565	0.596	0.66	0.706	0.717
Congo, Dem Rep	0.356	0.333	0.333	0.364	0.407	0.444	0.457
Lesotho	0.499	0.492	0.467	0.461	0.493	0.511	0.52
Madagascar			0.456	0.479	0.504	0.514	0.519
Malawi	0.34	0.398	0.399	0.38	0.441	0.47	0.477
Mauritius	0.619	0.648	0.673	0.713	0.749	0.782	0.79
Mozambique	0.209	0.229	0.298	0.357	0.403	0.432	0.437
Namibia	0.579	0.588	0.558	0.556	0.594	0.642	0.647
Seychelles			0.718	0.73	0.747	0.791	0.797
South Africa	0.618	0.649	0.63	0.614	0.649	0.692	0.699
Eswatini	0.548	0.543	0.506	0.502	0.526	0.541	

Tanzania	0.37	0.371	0.395	0.448	0.493	0.528	0.538
Zimbabwe	0.491	0.467	0.44	0.43	0.467	0.529	0.535

Zambia’s health system can be characterized by a high burden of communicable disease over the last generation. Life expectancy was already among the lowest in the world prior to the worst of the HIV/AIDS epidemic. Respiratory infections and diarrheal illnesses have also contributed substantially to the communicable disease burden in Zambia.

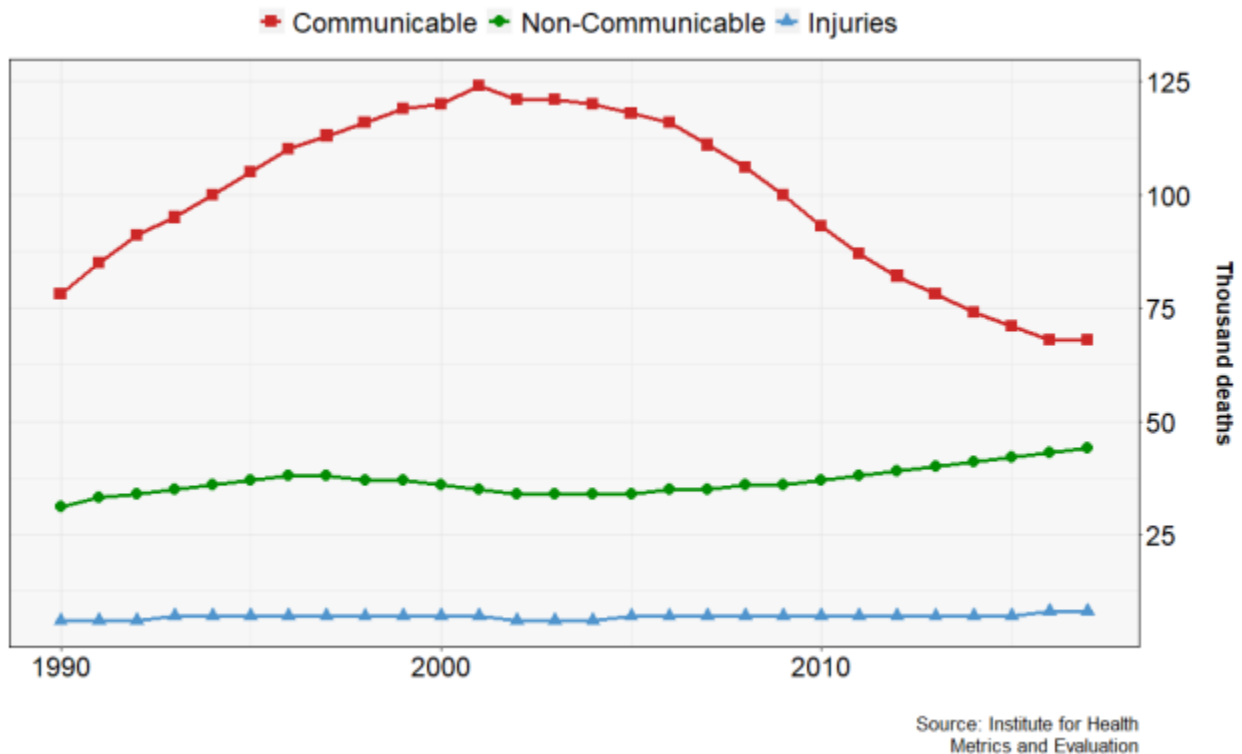
Figure 4. Life expectancy at birth, all countries with Zambia highlighted



Source: Institute for Health Metrics and Evaluation

Life expectancy has improved in Zambia since its low point in 2000 (approximately 44 years on average), largely as a result of improvements in the management and treatment of HIV. The management of communicable diseases has improved in the aggregate, resulting in fewer deaths from communicable causes since 2000 (Figure 5). Zambia is now entering a period known by epidemiologists as the “double burden” of diseases, where the communicable disease burden is still elevated but declining, and the burden from non-communicable diseases (such as cardiovascular diseases and cancers) are rising. The double burden of disease places added stress on healthcare systems, given the need to be equipped to manage a complicated mix of acute and chronic conditions simultaneously.

Figure 5. Total deaths in Zambia by main categories of cause



In Zambia, the HIV/AIDS epidemic has been an important driver of poverty historically, due to the devastation that it caused, often to breadwinners of households and will continue to affect especially participation in school attendance. The epidemic led to vicious and concurrent cycles of poverty. Elderly family members were often left to care for orphans, and orphans are more likely to dropout of school to earn some income for the household (Central Statistical Office et al., 2015).

Alcohol abuse and drunkenness is often cited as a drag on Zambia’s productivity. In 1974, then President Kenneth Kaunda threatened to quit politics and said he would rather die than run a country of drunkards (The New York Times, 1974). It was said then that drunkenness had cut industrial development and production and reduced government efficiency. In Zambia, there has been slight increases in per capita alcohol consumption over the years although alcohol consumption is lower than the WHO African region average per capita consumption of 6.3 liters. Forty-two percent of the population of 15 years and older consume alcohol. In 2016, average per capita alcohol consumption in individuals 15 years old and over was 4.8 liters (8.4 for males and 1.4 for females). In 2010, average per capita alcohol consumption was 4.5 liters, (7.8 for males and 1.3 for females). Nevertheless, Zambia’s average for alcohol disorder is 5.5 percent% of the population and 1.9 percent for alcohol dependence. This is higher than the WHO African region average of 3.7 percent and 1.3 percent respectively (World Health Organization, 2018). Although per capita consumption of alcohol by Zambian adults is relatively low, a high proportion of drinkers within Zambia are single occasion drinkers, showcasing an “all-or-nothing” behavior. There are time and productivity costs to drinking particularly in terms of reduced productivity of the drinker and potentially those around the person in question. The WHO (2016) report shows

that 9.8 percent of male drinkers in Zambia develop a disorder and 3.3 percent become dependent. For females, 1.2 percent develop a disorder and 0.05 percent become dependent. It is important to note that these numbers should be taken with limitations in mind. Many of the numbers offered by the WHO are unrecorded and hence estimated, many sources attest to the societal harm that accompanies drinking for females within Zambia (some of which are included in the reports). Therefore, these numbers most likely represent a best-case scenario.

We could not find recent scholarly work that shows the impact that alcohol use has on economic productivity but were able to find older studies by Buchanan (1988) on workers in the mines. Buchanan showed that 30 percent of all accidents within the mine involved one or more workers with measurable blood alcohol levels. Random breath tests before work showed that 33% of the workforce had measurable alcohol levels – 9 percent of which measured in at 17.6 mmol/l (above the legal driving limit). There were limited chances of getting caught by supervisor, hence the workers continued to drink. He concluded that drinking greatly increased the rate at which accidents occurred, and decreased productivity (lack access to full article and any quantification/qualification of this statement). Nevertheless, studies elsewhere (for example Jones & Richmond, 2006 in the United States) have shown that alcoholism can reduce an individual’s productivity by up to 40 percent.

Education is another key pillar of human development and productivity. Average years of educational attainment in Zambia has also shown substantial improvement since 1990. In 2015 (the last year of available data), the average Zambian had 7.6 years of formal education, which is equivalent to completing primary school. This is approximately 1.5 years greater than the regional average.

Table 6. Mean years of schooling attained, adults 15+, SADC countries (data unavailable for Angola, Madagascar, and Seychelles). Source: Barro and Lee.

Country	1990	1995	2000	2005	2010	2015
Africa SADC	4.455	5.039	4.976	5.358	5.847	6.162
Zambia	4.89	6.01	6.16	6.42	7.32	7.64
Botswana	6.86	8.24	8.82	9.22	9.55	9.905
South Africa	6.81	8.29	7.68	8.65	9.69	9.865
Zimbabwe	5.73	6.7	7	7.47	7.61	7.8
Mauritius	6.49	6.83	6.7	7.84	8.86	9.263
Lesotho	5.12	5.66	6.21	6.93	5.85	6.238
Namibia	6.15	6.05	5.72	5.97	6.17	6.462
Tanzania	4.09	4.38	4.73	5.11	5.81	6.154
Eswatini	5.09	5	4.44	2.99	5.06	5.51
Malawi	2.9	3.06	3.48	4.41	4.81	4.648
Congo, Dem Rep	3.18	3.37	3.37	3.49	3.66	4.126
Mozambique	1	0.93	1.08	1.28	1.93	3.126

Dropout or withdrawal from formal schooling is a significant issue in both primary and secondary levels. In 2018, over 770,000 of-age students were counted as non-participants in the Zambian school system (Ministry of General Education, 2019). The issue is most dramatic for girls in secondary school, but the issue is significant throughout. Secondary education is understood to be an important driver of economic growth and poverty reduction (Wieser, 2011). There are many causes that lead to dropout between primary and secondary school, including a dearth of secondary schools (or long distances between houses and the nearest school), teenage pregnancies (disproportionately impacting young girls), and the opportunity cost to households for students that could earn some income (UNICEF, 2014). Household costs (such as school fees) are also significant and lead to dropouts; a 2014 survey found that more than half of all primary schools and 93% of secondary schools rely on fees to finance operations (African Development Bank, 2020).

Table 7. Out-of-school children in Zambia by gender and grade level (source: Ministry of General Education)

		2015	2016	2017	2018
Male	Primary (age 7-13)	134,115	133,888	129,029	119,029
Female	Primary (age 7-13)	115,301	115,698	104,407	103,407
Total	Primary (age 7-13)	249,416	249,586	233,436	222,436
Male	Secondary (age 14-18)	224,963	213,459	213,403	249,506
Female	Secondary (age 14-18)	293,291	279,425	266,339	300,460
Total	Secondary (age 14-18)	518,254	492,884	479,742	549,966

The quality of education received in Zambia is wanting. Illiteracy is a powerful correlate of poverty, given the employment and information accessibility that it enables. Poor households are significantly more likely to be illiterate. Although roughly 83% of Zambian adults are literate, this rate falls off significantly for women, rural, and poor populations (Central Statistical Office et al., 2015).

Table 8. Adult literacy rates by gender, residence, and wealth quintile. Source: DHS 2013/14 and DHS 2018

	2014	2018
Women	67.5	66.4
Residence		
Urban	82.8	80.5
Rural	54.3	54.1
Wealth Quintile		
Lowest	37.6	36.9
Second	51.7	50.8
Middle	64.9	65.8

Fourth	77.5	75.3
Highest	92.7	91.3
Men	83	81.8
Urban	93.2	91
Rural	73.4	74.3
Wealth Quintile		
Lowest	62.4	63.7
Second	71.6	72.9
Middle	79.3	80.2
Fourth	91	88.6
Highest	97.6	95.7

4.3.2. Governance

Poverty can also be viewed from the perspective of *social capabilities*, or the governing or institutional environment that can enable or prevent people from falling into or escaping from poverty (Khan, 1998). Akanbi (2014) has found that governance is a significant determinant of poverty in Sub-Saharan Africa. Countries that have better governance ratings have lower levels of poverty, and poverty reduction accelerates as governance improves, suggesting that institutional impediments are important factors to economic growth and poverty reduction.

The Ibrahim Index of African Governance (IIAG) project is a significant player in the measuring, understanding, and improvement of African governance. According to the IIAG index and its sub-indices, Zambia is a leader in some aspects of governance and a poor performer in others. Zambia is one of eight countries to improve for eight consecutive years in the *Gender* sub-category (measuring inclusion) of the IIAG. Conversely, Zambia scores for *Transparency and Accountability* have deteriorated for six consecutive years. In 2019, Zambia's annual score for *Absence of Corruption in Government Branches* fell more than any other African country (Mo Ibrahim Foundation, 2019). According to Transparency International's Corruption Perception Index, Zambia's global rank has fallen from 96th in 2017 to 113th in 2019 (Transparency International, 2020).

4.3.3. Infrastructure

Improving infrastructure has widespread benefits to productivity and human well-being and has many direct linkages to poverty and poverty reduction. Infrastructure development leads to improved health and education (improving access, safety, quality, and delivery), reduced friction of market access, and increased productivity in economic enterprises (Brenneman & Kerf, 2002). The literature on physical capital in Zambia, and specifically on infrastructure shows that it not only limits productivity but exacerbates poverty, limits economic growth rates, and is a significant determinant of poverty along with poor governance institutions. What is more, climate change is

likely to impact urban infrastructure setting it back hundreds of millions of dollars if not maintained (Chinowsky et al., 2015).

Poor infrastructure in Zambia exacerbates poverty by limiting access to facilities and services. Greater distances are associated with increased household expenditure. A one percent decrease in the distance to markets yields a four percent reduction in agricultural household expenditure (Jorgensen & Loudjeva, 2005). Zambia’s Seventh National Development Plan for 2017 to 2021 seeks to improve the railroad infrastructure, to expand water infrastructure, increase ICT infrastructure and to build other methods of electricity supply besides hydropower. The plan for railroad infrastructure is to invest US \$1.3 billion in the Tanzania Zambia Railway Authority (TAZARA). Water infrastructure is being improved through rainwater harvesting, better aquifer management, and seeking other methods of water resource development. The government plans to increase ICT infrastructure through establishing a better legal framework. It will improve electrical access in education programs and build up other methods of electricity besides hydropower, including improving the Tanzania-Zambia Mafuta (TAZAMA) pipeline. Through this project Zambia hopes to get access to gas and linked access to diesel and petroleum.

Only 31 percent of people in Zambia had access to electricity in 2015. Much like other infrastructure types, electricity access has a strong rural-urban dimension; only 4.4 percent of rural individuals have access to electricity, while two-thirds of urban residents claim access (Central Statistical Office, 2015).

Table 9. Electricity access by rural/urban and province (Source: LCMS 2015 microdata and authors’ calculations)

Province	Total	Rural	Urban
Central	18.8%	5.8%	57.3%
Copperbelt	59.4%	1.1%	71.4%
Eastern	8.1%	2.3%	50.9%
Luapula	7.3%	1.6%	29.2%
Lusaka	70.2%	31.0%	76.8%
Muchinga	17.2%	6.6%	51.9%
Northern	9.8%	2.7%	41.2%
North Western	14.8%	2.4%	48.6%
Southern	22.5%	4.2%	74.9%
Western	7.1%	1.1%	49.9%
Zambia	30.8%	4.4%	67.6%

Zambia’s water, sanitation, and hygiene (WASH) systems are lacking for both urban and rural residents. These systems are critical to averting deaths and illnesses from preventable communicable diseases, which directly improves human wellbeing and leads to many indirect socio-economic benefits. 32.5 percent of Zambians utilized improved sanitation systems in 2015, and 17 percent had piped water on their property (Zambia Statistics Agency et al., 2019). In Northern province, about 26.5 percent of residents relied on surface water as the primary source

of water for the household, compared with only 19 percent that have access to piped water on the property. In Western province, sanitation systems are in even more critical need; approximately 30 percent of residents in Western province lack sanitation systems altogether. Lusaka and Copperbelt have relatively more prevalent WASH systems, but there are still millions of residents in need of access (Central Statistical Office, 2015). Access to safe WASH systems in Zambia is closely related to inequality; the highest wealth quintiles have near-universal access, while the majority living in the poorest quintile do not have access to improved WASH systems (Zambia Statistics Agency et al., 2019).

Investments in extending and enhancing WASH systems lead to direct improvements health. The spread of water-borne illnesses, which disproportionately affect vulnerable populations, is contained with safer WASH systems. In densely populated areas, the health threat from poor water and sanitation is perhaps more acute. A recent cholera outbreak in Lusaka led to 103 deaths, highlighting the threat that water-borne illnesses can be particularly dangerous in urban environments (UNICEF & Zambian Institute for Policy Analysis & Research, 2019). Furthermore, safe WASH systems reduce hunger and nutrient deficiencies by preventing diarrheal illnesses like cholera.

Table 10. Percent of population with access to water and sanitation systems by type (Source: 2015 LCMS microdata and authors' calculations, WHO & UNICEF Joint Monitoring Programme definitions)

Water				
Province	Piped	Surface	Other Improved	Other Unimproved
Central	18.4%	8.8%	57.7%	15.1%
Copperbelt	35.0%	4.6%	36.1%	24.3%
Eastern	23.4%	3.0%	59.0%	14.6%
Luapula	16.9%	12.6%	46.2%	24.3%
Lusaka	38.2%	2.1%	56.4%	3.3%
Muchinga	14.7%	15.3%	37.5%	32.5%
Northern	19.0%	26.5%	25.7%	28.7%
North Western	20.4%	12.0%	47.5%	20.0%
Southern	30.6%	9.5%	49.3%	10.6%
Western	21.7%	9.8%	31.2%	37.2%
Zambia	16.8%	11.0%	51.0%	21.3%

Sanitation				
Province	Improved	Open Defecation	Shared	Other Unimproved
Central	40.4%	4.5%	10.4%	44.7%
Copperbelt	48.5%	2.4%	5.4%	43.7%
Eastern	33.4%	4.8%	11.5%	50.3%
Luapula	35.3%	2.2%	8.2%	54.3%

Lusaka	57.0%	2.9%	17.9%	22.2%
Muchinga	29.0%	1.9%	11.9%	57.2%
Northern	28.4%	2.2%	6.5%	62.9%
North Western	27.4%	2.0%	10.7%	59.9%
Southern	40.0%	14.9%	10.9%	34.1%
Western	18.1%	29.7%	7.2%	45.0%
Zambia	32.5%	6.5%	11.7%	49.3%

Agriculture systems also benefit from enhanced infrastructure in many ways (Rothman et al., 2014). Extended road networks connect rural populations to marketplaces and reduce transportation costs. In Africa, transportation costs due to the quality of road networks have been estimated as five times higher as those experienced in Asia (Hodges et al., 2011). Irrigation systems and information and communications technology (ICT) networks improve agricultural productivity in a variety of direct and indirect ways. Access to stable electricity networks is critical to preventing post-harvest waste.

Several studies have explored the connection between infrastructure and inequality reduction, in both the short and long term. Improving road networks can connect and integrate less developed areas with more productive networks and opportunities. Electricity and safe WASH systems improve education and health, by enabling additional study time and reducing water-borne illnesses, respectively. However, improving access is only the beginning, because quality is also critical (Rothman et al., 2014).

4.3.4. Climate Change and Vulnerability

Zambia has one of the highest incidences of hunger in the world (as measured by the percent of population), surpassed only by four countries in 2017 according to Food and Agricultural Organization estimates.³ The 2019 *Global Hunger Index* ranked Zambia's 113th out of 117 countries in its hunger severity scale, classifying Zambia's level of hunger as "alarming" (von Grebmer et al., 2019). Malnutrition is now the largest risk factor for premature disability and death in Zambia (Institute for Health Metrics and Evaluation, 2017).

Stunting is a particularly harmful form of hunger that impacts long-term growth and physical and cognitive development in children.⁴ Zambia's rate of stunting is among the highest in the world, with 34.6 percent of children under five considered stunted. Stunting in Zambia is far more prevalent among the poorest quintile (40.1 percent) than in the highest (23.9 percent). (Central Statistics Office et al., 2019). However, the rural-urban difference in stunting rates is small, and

³ The five highest rates of hunger are: Central African Republic (59.6%), Zimbabwe (51.3%), Haiti (49.3%), North Korea (47.8%), and Zambia (46.7%).

⁴ Stunting is defined by UNICEF and the WHO as the "percentage of children under age 5 whose height for age is more than two standard deviations below the median for the international reference population ages 0-59 months."

the rates of stunting provincially are not highly correlated with extreme poverty, indicating a highly complex social issue (Zambia Statistics Agency et al., 2019).

The high rates of poverty and hunger in Zambia, especially amongst the rural population, is greatly exacerbated by climate change and climate variability upon the well-being of the Zambian economy and its population at large. Severe weather events caused by climate change, such as droughts, floods, and extreme temperature fluctuations greatly harm the food security of the state; a severe drought during the 2004-05 growing season resulted in a 120,000-pound food shortage and 1.2 million starving people (Kalantary, 2010). The drought experienced in the south and west in 2018-2019 led to an estimated 35 percent contraction in agricultural production (African Development Bank, 2019).

The Notre Dame Global Adaptation Index (ND-GAIN) is an effort to quantify a country's vulnerability to climate change and its readiness to adapt through mobilizing public and private sector resources (Chen et al., 2015), scoring countries by metrics such as food, water, and infrastructure systems, ecosystem durability, and economic, social, and governance readiness. Zambia scores in the bottom third of all countries from 1995 through 2017 in its adaptive capacity from economic, social, and governance systems. According to ND-GAIN, Zambia's vulnerability to climate change in the bottom quintile of 182 countries since 1995. Infrastructure, health, and food systems are among the most vulnerable sectors from this analysis, highlighting further potential for deep food security issues as a result of climate change. Zambia has the 12th highest "exposure" out of 192 countries, which is an effort to quantify the extent to which society is stressed by future climate conditions. This underscores that Zambia, a country already experience significant issues with food insecurity and other vulnerabilities, could be facing more dire conditions as a result of climate change.

The high rates of poverty and hunger in Zambia, especially amongst the rural population, is greatly exacerbated by climate change and climate variability upon the well-being of the Zambian economy and its population at large. Severe weather events caused by climate change, such as droughts, floods, and extreme temperature fluctuations greatly harm the food security of the state; a severe drought during the 2004-05 growing season resulted in a 120,000-pound food shortage and 1.2 million starving people (Kalantary, 2010). The drought experienced in the south and west in 2018-2019 led to an estimated 35 percent contraction in agricultural production (African Development Bank, 2019).

Climate-related shocks can plunge households into poverty and food insecurity. The Government of Zambia does not have leverage to mitigate climate change, but must prioritize a variety of adaptation strategies, including disaster preparedness and an increased emphasis on investments to improve access to low-cost agricultural inputs to improve productivity. Incentivizing the development of rural irrigation systems (and appropriate legal instruments around its use) will help ameliorate dependence on rain-fed agriculture (Neubert et al., 2011). A consistent finding is that governmental action is imperative to counteract the ever-growing effects of climate change on the marginalized rural poor.

4.4. Other determinants of poverty: Foreign aid and debt, social cash transfers, remittances and COVID-19

4.4.1. Social Cash Transfers

Evidence from impact evaluations of SCT programs (as well as similar programs globally) show that SCTs are effective at improving ultra- poverty reduction outcomes, not only in indicators of consumption but also production. Zambia's programs have been relatively successful and will continue to be expanded (Government of the Republic of Zambia, 2019). As Siachiwena (2016) showed, comparatively, Zambia's SCT programs expanded faster than those in some neighboring countries following the pilot phase, but the coverage remained smaller (p. 31-35). The 2014 national budget increased SCT funding by over 700 percent, planning to expand the number of beneficiary households from 24,500 (by the end of 2010) to 500,000 by 2016; former president Banda's plan had set a target of 69,000 by 2015. When the Michael Sata government took over power in 2011, 190,000 households (6 percent of the population) had been reached by 2015. The first phase of scale-up (2010-2013) expanded the number of districts from 12 to 19 and the second phase (2014-2015) added 31 more. These were selected according to extreme poverty rates but the government also added four urban districts to tackle increasing urban poverty and populations of persons with disability, which may have reflected a reward for urban supporters in the election (Siachiwena, 2016). The budget increase to ZMW 180 million also reduced the proportion of donor funding to 25 percent. In the 2019 budget, the government plans to expand the coverage to reach 700,000 households.

4.4.2. Foreign Aid

The impact of aid shows mixed results. Saasa and Carlsson (2002) have concluded that aid is largely mission unaccomplished with regard to economic growth path but more successful through project aid. Muyeba (2009) demonstrated that aid in Zambia is associated with poverty reduction when channeled through pro-poor sectors and under effective Public Expenditure Management conditions.

Chinese aid to Zambia has become a phenomenon of great concern for the future of economic development and poverty reduction, featuring in the New Africa Strategy announced by the US National Security Advisor and regularly featuring in the Economist. Chinese aid is attractive to Zambia because it comes without conditionality (Brautigam, 2009). Østvold (2013) argues that China offers aid on a non-conditional basis that also entails a non-interference policy which encourages bad governance via embezzlement and corruption. In highly corrupt, unstable, authoritarian countries where governments are far less accountable, like Zambia, China's aid is much less likely to produce broad gains that reduce poverty (Brautigam, 2009).

4.4.3. Debt Distress and Unsustainability

No evidence has been found of a relationship of association between debt servicing and economic growth in Zambia (Saungweme & Odhiambo, (2019b)). Domestic public debt has a negative effect

upon growth due to crowding out of private investment and the relative illiquidity of capital markets in Zambia (Saungweme & Odhiambo, (2019b). Indeed Banda (2011) showed that Zambia had racked up domestic debt between 2005 and 2010 but had been able to continuously restructure that debt while also increasing the GDP growth rate. This restructuring however cannot be a permanent solution because the debt has been growing towards unsustainability. Muleya & Nalishebo (2018) show that future borrowing has been hurt by the high debt burden, reducing the Zambian government's ability to borrow, invest, or restructure debt in the future. This predicament has resulted in social protection programs that are important for poverty reduction being crowded out by high debt servicing costs.

This unsustainable debt burden does impact poverty alleviation efforts in Zambia, as the burden would reduce public investment, income growth, and fiscal space for social spending as the government seeks ways to service the debt. For example, the Food Security Pack, part of the non-contributory assistance program suffered a 21 percent budget cut compared to the 2018 funding level. Less money will ultimately be available for the government's national development plans that are crucial to reducing poverty. A high debt burden also negatively impacts infrastructure budget allocations. Although Zambia has in recent years borrowed heavily from China primarily to build infrastructure, there is likely to be less investments and lack of resources for maintenance because of the country's debt distress status (Kapindula & Kaliba, 2019).

4.4.4. Remittances

In Zambia, remittances primarily increase household consumption, but it has been shown that these funds are often put toward human capital costs such as education and health care (Chishimba, 2007). Remittance funds are also used for survival purposes by the recipient, which includes meeting basic needs such as clothing, housing, and entrepreneurial ventures that enable income-seeking opportunities (Karikari et al., 2016). The five main OECD remittance-sending countries to Zambia are the United Kingdom, Canada, United States, Australia, and New Zealand (Akobeng, 2016).

4.4.5. COVID-19

The first cases of COVID-19 in Zambia were reported on March 18, 2020, prompting several government measures aimed at cushioning the economic impact. Since the pandemic is unprecedented, policy responses continue to unfold. The government has made efforts to counteract the projected economic contraction by releasing payment to domestic contractors supplying goods and services (K2.5 billion/ US\$137.66 million) and local road contractors (K140 million/ US\$7.7 million), and issued an 8 billion kwacha (\$438 million) COVID-19 Bond as a stimulus package to enhance economic activity. The bond will be used to pay retirees, contractors and suppliers in order to increase liquidity and stimulate spending (Reuters, June 23, 2020). The Bank of Zambia (Zambia's central bank) made a K10 billion (\$550.7 million) line of credit available and lowered interest rates by 9.25 percent (International Food Policy Research Institute, 2020). Further, the government instituted social protection measures, announcing in mid-June that it will make available K400 (\$22) to K800 (\$44) per month for each household that meets yet to

be specified criteria (at the time of writing) and will include urban households particularly those in the informal sector (International Food Policy Research Institute, 2020). The government instituted other policies such as a shutdown, including bans on public gatherings and travel.

5. Forecast methodology

5.1. IFs and the Current Path scenario

This study uses the International Futures (IFs) model to project the future of poverty and deprivation in Zambia. IFs is a tool for thinking about long-term, country-specific, regional, and global development. IFs integrate forecasts across many sub-models, including demographics, economics, health, education, infrastructure, agriculture, energy, technology, governance, international politics, socio-political issues, and the environment. These sub-models are dynamic and integrated, allowing for simulations that demonstrate how changes in one system lead to changes across all other systems. The scenario analysis capabilities of IFs – used extensively in this report – allow users to change model parameters and explore the potential impact of simulated policy interventions or frame long-term uncertainty within and across development systems. IFs forecasts development for 186 countries and their interaction, including 54 countries and territories in Africa (Western Sahara is currently not included).

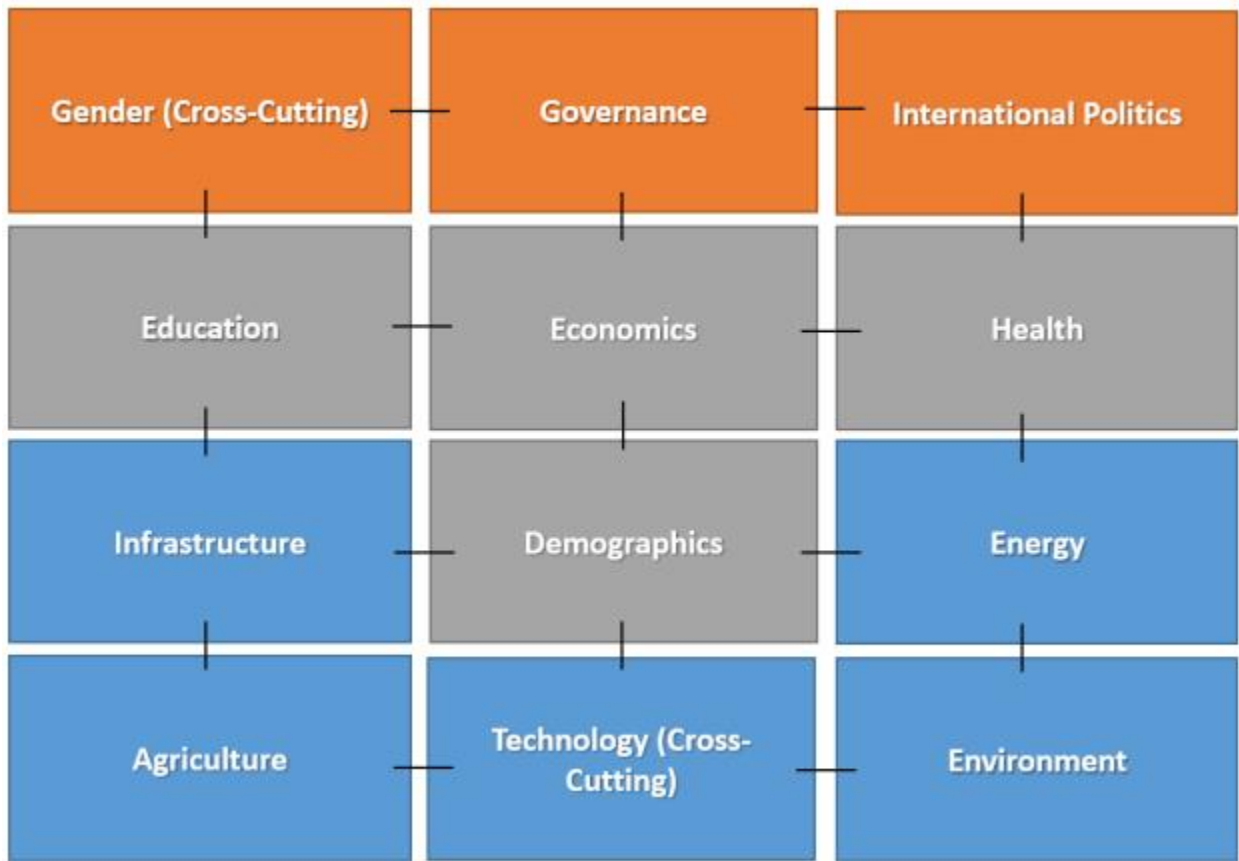
Text Box 1: Details on provincial data collection for this analysis

For this analysis, the project team collected data from a wide range of sources and reports to represent subnational development in Zambia. This information is utilized by International Futures to produce provincial projections of Zambian development to provide deeper analysis of poverty in Zambia. Some of the most utilized subnational data sources include:

- Resources from the Central Statistical Office of Zambia, including the 2010 Census of Population and Housing, Agricultural Census Analytical Report (2010), the Zambia Living Conditions Monitoring Survey Report and microdata (2015), and the Zambia in Figures 2018 Report;
- Zambian Demographic and Health Surveys from 2014 and 2018;
- Zambian Human Development Report 2016;
- Annual Statistical Bulletins from the Zambian Ministry of General Education.

In total, over 150 different indicators related to Zambian provincial development are included in the IFs model and drive the forecast results in this report.

Figure 6. Visual representation of International Futures (IFs) modeling platform



The foundation for this analysis is the *Current Path* scenario, which represents a plausible development trajectory for Zambia. The *Current Path* is an integrated collection of projections across issue areas that are not linear extrapolations of historical data. In light of the current global pandemic of novel coronavirus (COVID-19), this analysis reflects our understanding of some impacts on Zambia and long-term poverty projections. See Box 2 for a summary of how COVID-19 is incorporated into this analysis.

The *Current Path* represents a “most likely” scenario of future development but is not a prediction about the future. Instead, it is used to explore assumptions about the future and explore alternative scenarios. In this report, we explore the possible impact that alternative assumptions of development have on the drivers of poverty in Zambia – all relative to this *Current Path* scenario.

The emergence and rapid spread of novel coronavirus (COVID-19) around the world has led to mounting concerns of its long-term social and economic impact. Around the world, over half a million cases have been confirmed, and due to lack of testing availability, it is understood that this confirmed count is well under-counting the spread of the virus. COVID-19 presents the gravest danger for elderly populations and those with pre-existing medical conditions. The impact of the virus has been far reaching, including large-scale government quarantines and lockdowns, disruptive unemployment, general panic and uncertainty. In Sub-Saharan Africa, the spread of the pandemic may be in an early stage, with the first confirmed cases occurring in mid-March and still inadequate testing regimes. Although Zambia has one of the world's youngest populations, there are significant subpopulations that have pre-existing conditions like TB and HIV that compromise their immune systems, leaving them potentially vulnerable to the most severe consequences of COVID-19.

There is still uncertainty about the seasonality and potential longevity of coronavirus, which lends itself well to a scenario-based approach to thinking about the potential socioeconomic impact of the virus. This analysis is exploring the long-term future of poverty in Zambia; however, COVID-19 presents a significant event that could shift our projections of poverty and development in Zambia. It should be noted that the IFs model does not capture the epidemiological realities of coronavirus, including the rate and pattern of infection or differential mortality rates across age groups or countries. Further, IFs is best suited for exploring the effects of long-term structural changes within and across systems. It was not developed with the intent of exploring short-term shocks or wildcard events, but short-term changes in model parameters can have some utility. Our proposed representation of the COVID-19 impact is limited to a proxy of the aggregate economic impact of the virus. This is, of course, a narrow reflection of the impact of the virus, which has had a massive human cost on a global scale.

The *Current Path* scenario reflects our evolving understanding of the effects of COVID-19 on economic growth in Zambia. The International Monetary Fund's World Economic Outlook takes into account country-specific growth forecasts in the short term that reflects their expert understanding. We consider alternative scenarios of how the pandemic could affect economic growth in Zambia later in the report.

5.2. IFs and poverty

The economic model of IFs is driven by changes in labor, capital, and technology (or how productively labor interacts with capital). The drivers of population change – fertility, mortality, and migration – determine the potential size of the labor force in a given country. IFs then takes into account the female labor participation rate, the level of unemployment, and the size of the

informal economy to estimate the size of the economically-active labor force over time.⁵ Capital stocks are forecast in IFs through investment and depreciation rates. As capital accumulation occurs, its value-add contribution to GDP increases, which encourages more investment. Depreciation rates of capital stock are represented in IFs by an estimate of the lifetime cycle of capital.

While labor and capital are important, long-term economic forecasting is significantly influenced by productivity, which is a deep driver of poverty and poverty reduction in IFs. The IFs *Current Path* suggests that labor and capital are small net contributors to Zambia’s economic growth, while Zambia’s level of productivity results in a significant net loss. We will return to this notion of low productivity later in the report.

The final core economic driver of poverty is income inequality. Long-term projections of income distribution are deeply uncertain, perhaps more than either of the other core demographic or economic drivers (Burt et al., 2014). To address these uncertainties, poverty projections often pursue the following strategies:

1. **Constant assumption:** the baseline projection for inequality remains constant over the duration of the projection (Kharas, 2017).
2. **“Business as usual”:** the baseline projection is a linear extrapolation from historical data (Edward & Sumner, 2013).
3. **Optimistic and pessimistic scenarios:** build off baseline projections by framing a high and low assumption by inequality moving forward (Edward & Sumner, 2013; Hughes et al., 2009; Ravallion, 2013).

In this analysis, the *Current Path* projections of inequality in Zambia follow the assumption that inequality is constant between 2015 and 2060. This is due to a number of reasons. First, the recent historical period suggests that even high growth in Zambia is not distributed in a way that markedly improves incomes for the poor. We find no compelling reason to expect income inequality in the *Current Path* – our most likely scenario of development – will change substantially in Zambia (either improving or getting worse). Finally, by using the constant assumption of income inequality, we can more readily explore the effects of framing scenarios and the leverage that income inequality has on poverty reduction efforts (more on this in Section 7).

Table 11. Assumptions of core drivers of poverty in Zambia in the *Current Path*

Variable	<i>Current Path</i> assumption
Population	Annual population growth declines from roughly 3% annually to 1.4% by 2060. Continuation of rural-urban migration trend within Zambia. Nearly half of all Zambians live in urban areas by 2060.
GDP	The Zambian economy (MER terms) grows at a relatively modest level, averaging 5% over the next 40 years (CAGR).

⁵ IFs also accounts for the retirement age of a country in its economically-active population, but in a country like Zambia, this is not of significant importance due to its youth.

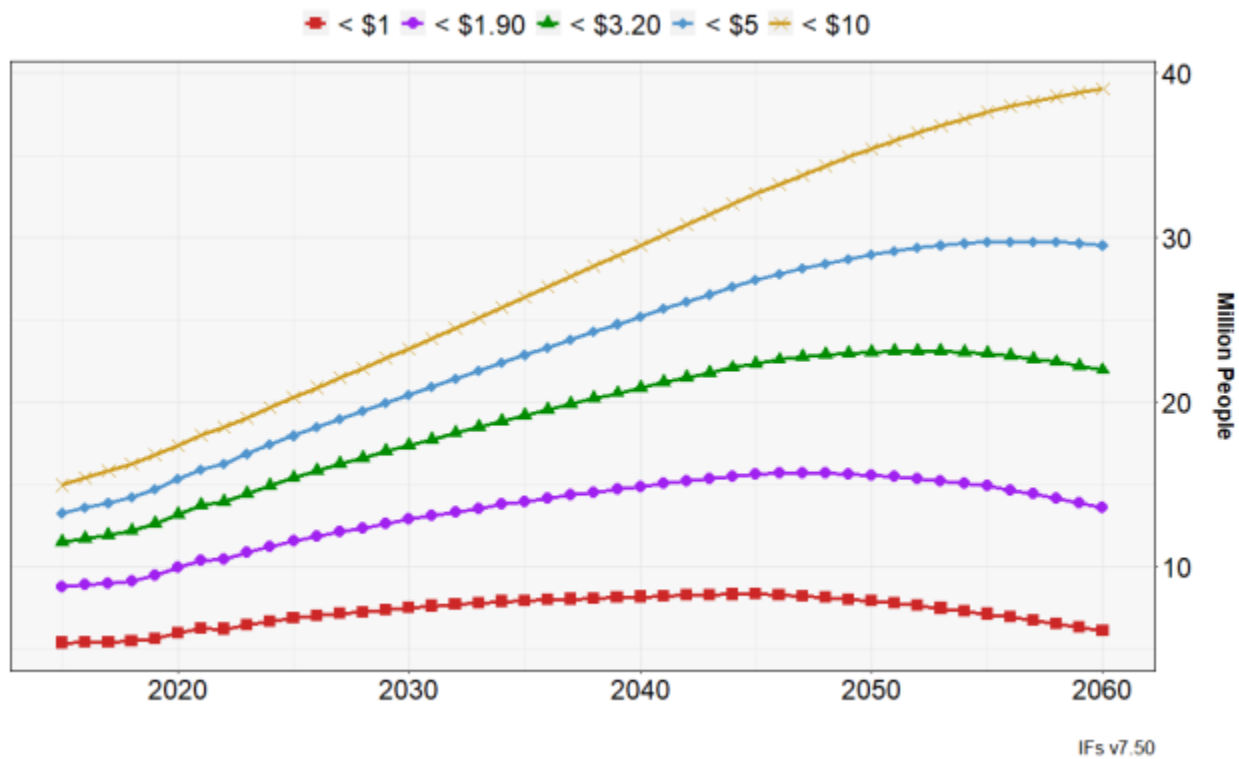
6. The future of poverty in Zambia: Current Path

6.1. Long-term poverty projections of Zambia

This section presents Zambian poverty projections from International Futures using various poverty levels in the *Current Path* scenario. Zambia’s relatively modest economic growth outlook and persistent inequality make it likely that poverty will remain an issue in Zambia through midcentury. The *Current Path* tells a somewhat mixed story of progress in poverty reduction in Zambia. In proportional terms, extreme poverty declines out to 2060, but taking into account the rate of population growth, the number of people in extreme poverty (< \$1.90 per day) grows relative to the amount seen today (from 8.5 million in 2015 to over 14 million in 2040 and declines to about 11 million by 2060).

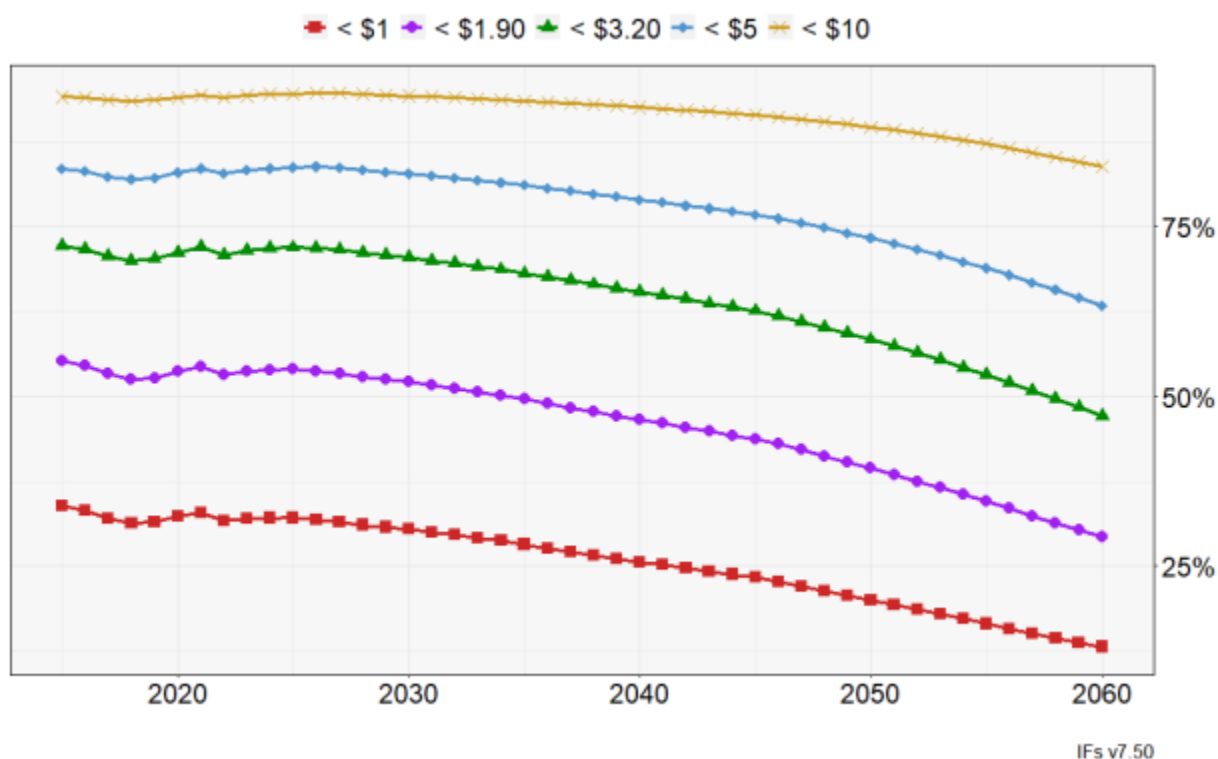
In the medium run, the extreme poverty headcount rises in the *Current Path* before eventually declining. It is important to remember, though, that even beyond this medium run, a decline in those classified in extreme poverty still means that a substantial number of people still live marginally above extreme poverty. This is a population that remains vulnerable to re-entering poverty as a result of human or natural disaster, such as the loss of a primary income earner or weather events that damage infrastructure or lead to hikes in food prices.

Figure 7. Projections of the number of people in poverty (millions) at different poverty thresholds, Current Path



Poverty Line	2015	2030	2045	2060
< \$1	5.4	7.5	8.3	6.1
< \$1.90	8.8	12.9	15.6	13.6
< \$3.20	11.5	17.4	22.4	21.9
< \$5	13.3	20.4	27.4	29.5
< \$10	15	23.3	32.7	39

Figure 8. Projections of the proportion of people in poverty (% of population) at different poverty thresholds, Current Path



Poverty Line	2015	2030	2045	2060
< \$1	33.8%	30.4%	23.3%	13.1%
< \$1.90	55.2%	52.1%	43.7%	29.2%
< \$3.20	72.2%	70.4%	62.6%	47.1%
< \$5	83.5%	82.8%	76.7%	63.4%
< \$10	94.1%	94.3%	91.4%	83.8%

A key feature of Zambian poverty is its rural prevalence; today, over three-quarters of rural poverty in Zambia is below the national poverty line, and the poverty gap ratio is five times greater in rural areas. International Futures does not disaggregate poverty by urban-rural division, but we have established the ability to analyze projections at the provincial level. Although it does not capture

rural poverty in precise fidelity, the ability to separate poverty in Lusaka and Copperbelt from the remaining provinces is relevant from a policymaking perspective.

Tables 12 and 13 show the population projections for Zambia’s provinces and the projections of Zambians living on less than \$1.00 per day. Table 12 shows the total population along with each provinces’ relative proportionality (or their percent of the whole of Zambia). Table 13 shows the severe poverty headcount and headcount percent. Key takeaways from these *Current Path* projections include:

- Zambia’s population is projected to grow by a factor of 2.5 from 2020 to 2060.
- Lusaka’s population triples and Copperbelt grows by a factor of 2.5 over the next forty years. Lusaka’s and Copperbelt’s populations eclipse 10 million and 7 million, respectively.
- The *Current Path* projection suggests that the population living below the \$1.00 poverty line will grow in absolute terms from an estimated 6 million in 2020 to 8.2 million by 2040 before declining to 6 million by 2060. In short, severe poverty remains stagnant in absolute terms the *Current Path* over the next forty years.
- In the *Current Path*, the rural poverty headcount grows by nearly two million people to 2040. However, the percent of those in severe poverty declines from 45.5 percent in 2020 to 19.5 percent in 2060. The headcount percent in Western and Northern provinces fall from roughly 60 percent to 33 percent from 2020 to 2060. Although these are clear improvements, the *Current Path* illustrates just how far Zambia is from eradicating severe poverty.

Table 12. Population projections for Zambian provinces and their share of the country total, *Current Path*

Province	Population (Current Path)					
	2020		2040		2060	
	Mil People	% of Total	Mil People	% of Total	Mil People	% of Total
Central	1.8	10%	3.1	10%	4.4	10%
Copperbelt	2.8	15%	4.8	15%	7	15%
Eastern	2.1	11%	3.3	10%	4.3	9%
Luapula	1.3	7%	1.9	6%	2.4	5%
Lusaka	3.4	18%	6.6	21%	10.7	23%
Muchinga	1.1	6%	1.8	6%	2.5	5%
Northern	1.6	9%	2.8	9%	4.2	9%
North-Western	1	5%	1.4	4%	1.8	4%
Southern	2.3	12%	4.1	13%	6.3	14%
Western	1.2	7%	2	6%	2.8	6%
Total	18.6	100%	31.8	100%	46.4	100%

Table 13. Poverty projections (<\$1.00/day) for Zambian provinces and their share of the country total, Current Path

Province	Population living on < \$1.00/day (Current Path)					
	2020		2040		2060	
	Headcount (mil)	Headcount %	Headcount (mil)	Headcount %	Headcount (mil)	Headcount %
Central	0.58	31.9%	0.87	27.9%	0.55	12.2%
Copperbelt	0.25	8.8%	0.33	6.8%	0.17	2.4%
Eastern	0.99	47.0%	1.21	36.8%	0.8	18.7%
Luapula	0.77	59.1%	0.77	40.3%	0.52	21.2%
Lusaka	0.23	6.7%	0.43	6.4%	0.26	2.4%
Muchinga	0.52	48.7%	0.79	44.3%	0.7	27.9%
Northern	0.96	61.0%	1.51	53.8%	1.38	32.9%
North-Western	0.28	29.0%	0.21	14.8%	0.11	6.0%
Southern	0.68	30.3%	0.96	23.1%	0.65	10.2%
Western	0.72	62.3%	1.05	53.3%	0.92	32.6%
Total	6.0	32.3%	8.1	25.5%	6.1	13.0%

Figure 9 shows persistent extreme poverty headcount percent (below the \$1.90 poverty line) across Zambia's provinces to 2060. However, in absolute terms, the headcount in extreme poverty grows in the *Current Path*. This growth in absolute headcount is most dramatic in more rural provinces of Eastern, Southern, and Northern, where an additional 1.9 million people live below this poverty line between 2015 and 2060. Lusaka has about half a million people below the \$1.90 poverty line in 2015. By mid-century, an additional 800,000 people in Lusaka live below this poverty line.

Figure 9. Percent of population below \$1.90/day poverty line, Current Path

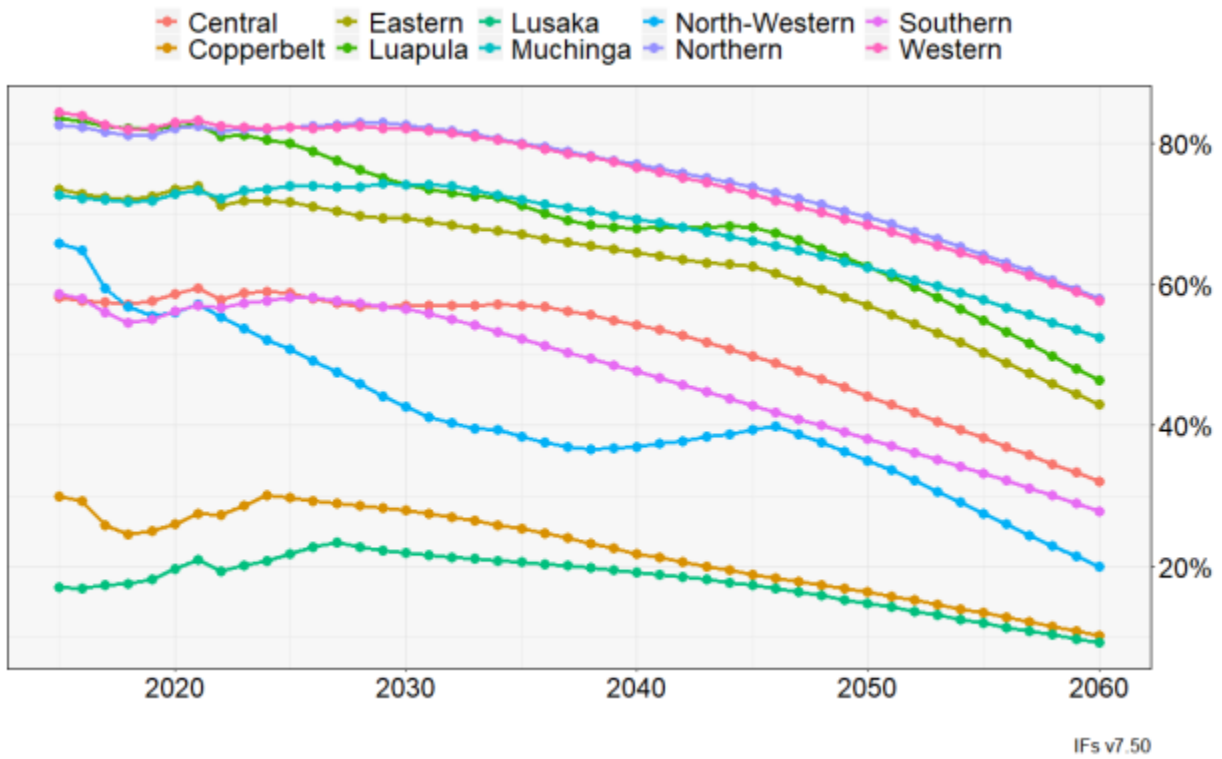
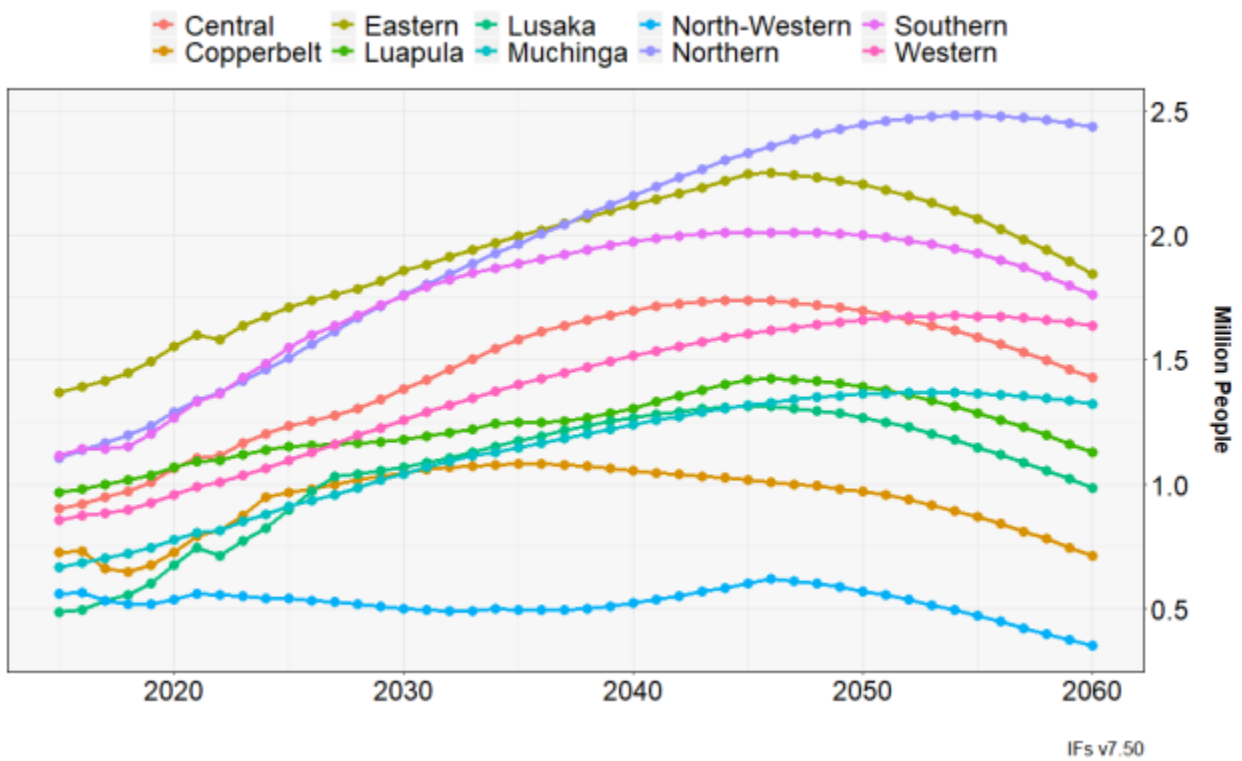
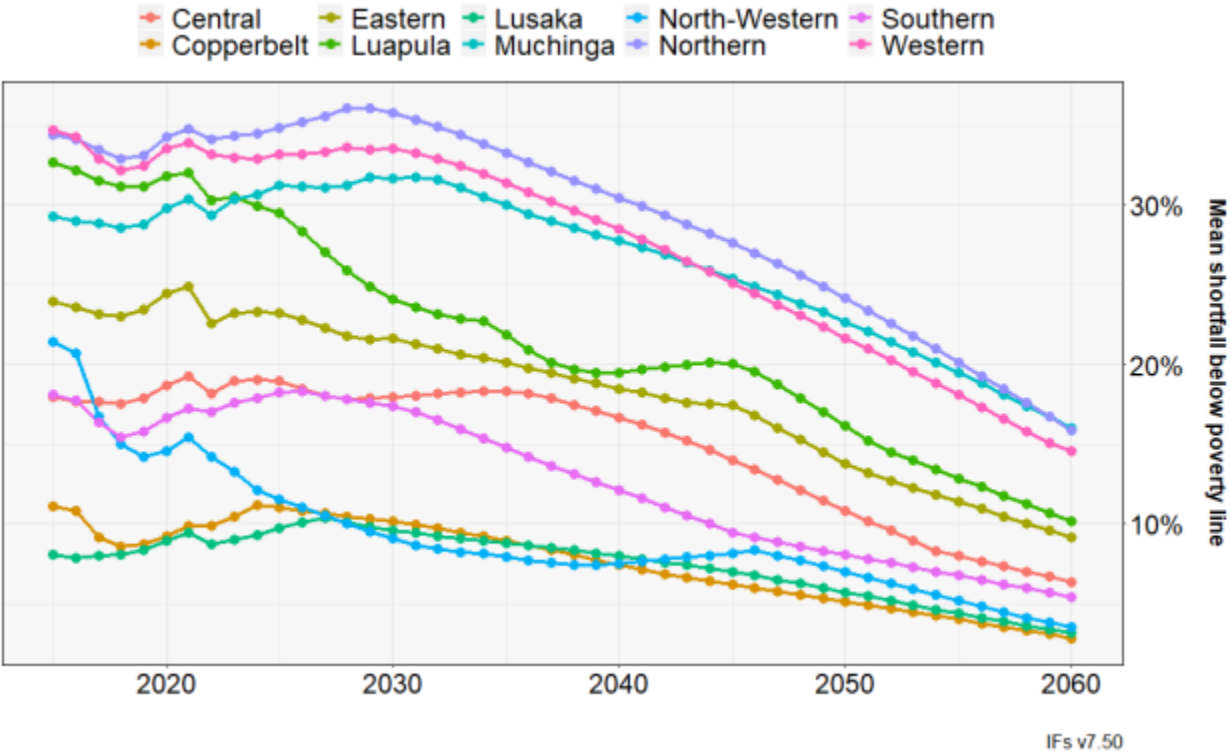


Figure 10. Number of people living below \$1.90/day poverty line (in millions), Current Path



Poverty headcount and percentage indicators fail to capture the severity in terms of the depth of income poverty experienced in populations. Poverty gap measures the mean shortfall of those below poverty lines, while treating all above the poverty line as having no shortfall. The interpretation of poverty gap is the average shortfall (in percentage terms) of those below the poverty line. Today, the average Zambian below the \$1.90 poverty line is about 20 percent below this line. Out to 2060, the poverty gap in Zambia does close substantially, falling to seven percent.

Figure 11. Poverty gap at \$1.90/day level in Zambia, Current Path



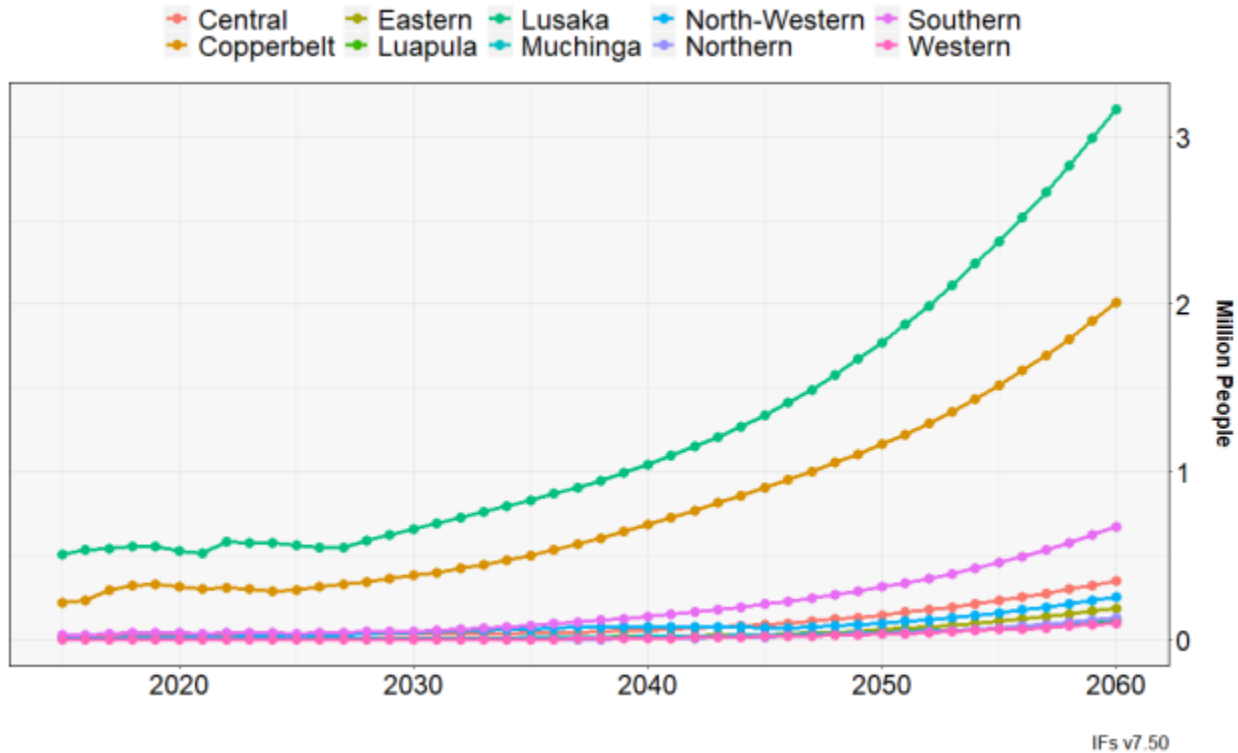
An important poverty storyline in Zambia will be the rise of those earning above the current internationally-used poverty lines but are still well below the average per capita income level. Those living on less than \$5 and \$10 per day have not escaped hardship or achieved financial stability. In 2020, approximately 83 percent of Zambians live on less than \$5 each day, and 94 percent live on less than \$10 per day (approximately 15 million and 17 million people, respectively). In the *Current Path*, those living below these poverty lines increase as a result of population growth and success in reducing extreme poverty. By 2060, 29 million Zambians live on less than \$5 per day, and 39 million on less than \$10 per day. As a point of reference, Zambia’s population is about 17 million today.

With rising incomes and progress made toward poverty reduction in the *Current Path* scenario, Zambia emerges with a growing middle class.⁶ Today, roughly 5 percent of Zambians live in the

⁶ Definitions of “middle class” vary in terms of how they are operationalized and projected. Here, we follow Kharas (2017) and utilize upper limit of \$110 per day, but modify it to include \$10/day as the lower bound (all expressed in

range that we use for middle class (between \$10 and \$110 per day). By 2060, roughly 15 percent of Zambians are considered middle class in the *Current Path*. This growth is most dramatic in provinces with urban centers – Lusaka and Copperbelt. Lusaka’s middle class grows to over 3 million people in the *Current Path* by 2060 – nearly the size of its current population. In Copperbelt, the middle class grows to 2 million by 2060. This story of an emerging middle class could drive significant change in Zambia, including in consumption patterns, revenue potential from a growing tax base, and demand for quality government services.

Figure 12. Middle class population (population living between \$10 and \$110 per day), *Current Path*



In the *Current Path*, we compare results for Zambia with the broader African context.⁷ In 2020, Zambia has the 12th highest poverty headcount rate and the 14th highest number of people in poverty in Africa (at \$1.90 level). Over the next forty years, the *Current Path* shows Zambia falling further behind the rest of Africa. By 2060, Zambia has the 6th highest poverty headcount rate in Africa (29 percent) and the third largest absolute number of people in poverty (13.5 million). Although Zambia’s poverty headcount rate is nearly cut in half from 2020 to 2060, population growth in Zambia leads to an overall increase of those living in poverty. Zambia is one of seven African countries that have an increase in poverty in absolute terms (at \$1.90 level) between 2020 and 2060, and Zambia has the second largest increase among those seven countries, following only the Democratic Republic of Congo. These results indicate that, while other countries are making

2011 PPP terms). This methodology differs from a report by the Zambian Institute for Policy Analysis & Research (2013), which uses a household-based income distribution approach. These methods are not directly comparable.

⁷ These results exclude Equatorial Guinea due to data quality issues.

headway in poverty reduction in the *Current Path*, Zambia is among a small collection of countries that see poverty increasing in absolute terms.

Table 14. \$1.90 poverty headcount, percent, total, and ranks for African countries

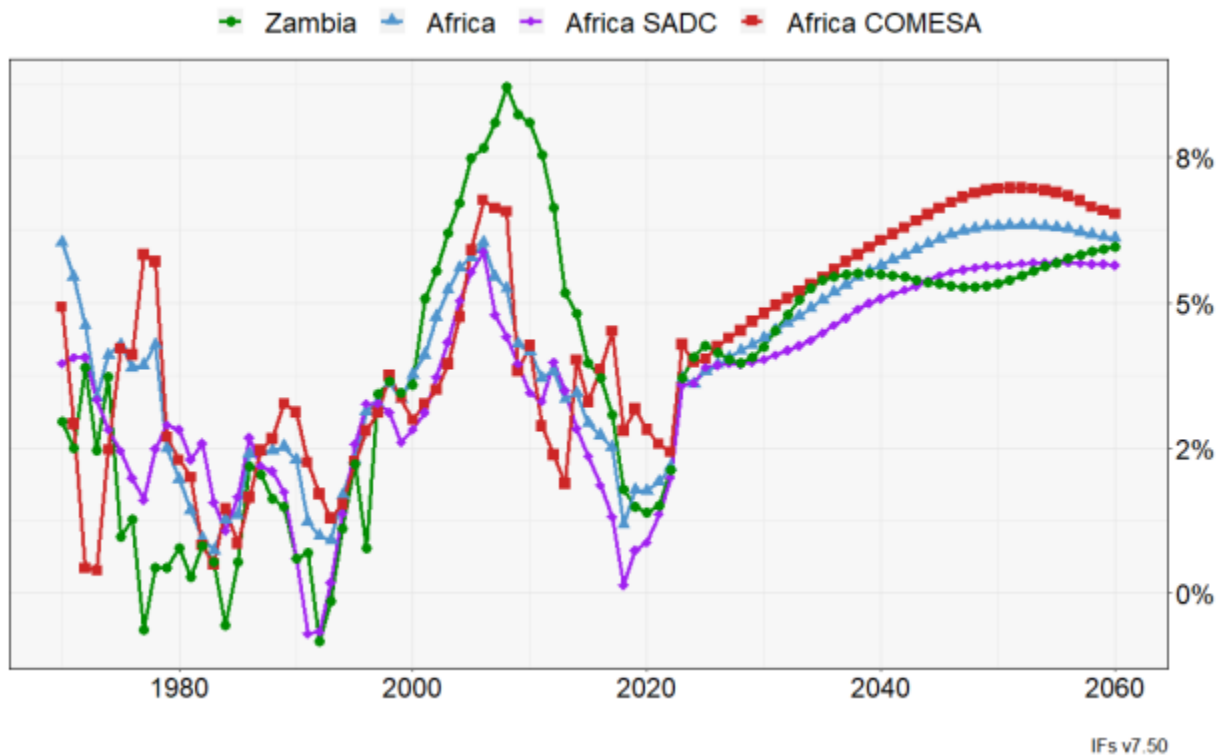
Country	2020				2040				2060			
	Headcount %	Rank	Headcount (mil)	Rank	Headcount %	Rank	Headcount (mil)	Rank	Headcount %	Rank	Headcount (mil)	Rank
Madagascar	74.8%	1	20.51	5	75.1%	2	32.07	3	17.4%	10	9.785	7
Burundi	74.2%	2	8.5	16	77.1%	1	13.37	12	34.4%	4	8.462	8
Congo, Dem Rep	72.8%	3	65.29	2	69.3%	5	111.7	2	31.0%	5	75.69	2
Sudan South	68.5%	4	7.538	17	66.8%	6	11.67	15	38.1%	2	10.47	5
Central Afr Rep	67.6%	5	3.312	30	71.6%	4	5.287	24	46.8%	1	4.708	13
Malawi	65.5%	6	12.56	10	53.6%	10	16.52	9	16.7%	11	6.779	11
Mozambique	63.8%	7	19.94	6	50.5%	11	26.28	5	11.5%	17	8.299	9
Somalia	63.6%	8	10.13	13	64.9%	7	18	8	27.6%	8	11.33	4
Guinea Bissau	62.4%	9	1.228	36	49.8%	12	1.521	34	10.5%	19	0.435	32
Lesotho	61.3%	10	1.332	35	56.9%	9	1.465	35	36.2%	3	1.003	25
Nigeria	56.0%	11	117.4	1	37.8%	15	135.7	1	15.7%	13	84.9	1
Zambia	53.7%	12	9.918	14	46.4%	13	14.79	11	29.0%	6	13.51	3
Sierra Leone	53.2%	13	4.322	27	72.8%	3	9.259	18	24.7%	9	4.22	14
Liberia	52.4%	14	2.668	32	62.8%	8	5.035	25	15.7%	12	1.725	20
Togo	49.2%	15	4.094	28	32.2%	21	4.168	28	5.7%	23	0.992	27
Benin	47.8%	16	5.826	23	34.9%	18	6.952	21	10.0%	20	2.739	16
Eritrea	47.8%	17	1.709	34	27.5%	24	1.378	36	2.3%	32	0.152	39
Rwanda	46.6%	18	6.004	22	29.7%	23	5.723	23	4.4%	25	1.061	24
Mali	46.5%	19	9.433	15	35.4%	17	12.26	14	1.2%	37	0.573	31
Chad	43.0%	20	7.188	19	32.9%	20	10.43	17	13.2%	15	6.837	10
Niger	42.6%	21	10.33	12	44.4%	14	21.29	7	1.7%	34	1.289	22
Tanzania	41.7%	22	24.99	3	24.5%	25	25.01	6	1.4%	36	2.049	18
Congo, Rep	39.9%	23	2.187	33	31.8%	22	2.68	30	10.8%	18	1.172	23
Angola	39.9%	24	13.2	9	23.7%	26	14.89	10	6.4%	22	6.524	12
Uganda	37.9%	25	17.62	8	34.1%	19	28.98	4	1.1%	38	1.337	21
Eswatini	37.7%	26	0.543	38	36.5%	16	0.69	38	27.9%	7	0.604	30
Burkina Faso	35.9%	27	7.479	18	18.9%	28	6.58	22	1.6%	35	0.806	28
Guinea	35.6%	28	4.647	26	10.2%	38	2.152	32	2.3%	31	0.679	29
Kenya	32.9%	29	17.85	7	15.3%	30	12.38	13	1.8%	33	1.761	19

Senegal	32.9%	30	5.501	25	14.5%	32	3.837	29	2.8%	30	1.003	25
Sao Tome and Principe	31.4%	31	0.07	49	13.1%	33	0.042	48	0.9%	40	0.004	50
Zimbabwe	24.6%	32	3.775	29	12.1%	36	2.635	31	0.9%	41	0.228	35
Cameroon	22.8%	33	6.076	21	18.9%	29	8.233	19	4.7%	24	2.844	15
Comoros	21.4%	34	0.188	46	12.8%	34	0.167	44	3.1%	29	0.053	43
Cote d'Ivoire	21.4%	35	5.709	24	11.1%	37	4.911	26	4.1%	26	2.595	17
Ethiopia	20.2%	36	23.05	4	4.2%	42	7.402	20	0.0%	51	0.046	45
South Africa	20.0%	37	11.75	11	14.9%	31	10.48	16	13.5%	14	10.43	6
Namibia	19.7%	38	0.509	39	12.5%	35	0.45	39	8.4%	21	0.37	34
Djibouti	19.0%	39	0.187	47	21.2%	27	0.257	40	12.8%	16	0.162	37
Sudan	16.1%	40	7.105	20	6.6%	40	4.4	27	0.5%	43	0.403	33
Botswana	12.3%	41	0.285	43	7.2%	39	0.218	41	4.0%	27	0.143	40
Gambia	9.6%	42	0.234	44	2.1%	45	0.088	47	0.1%	49	0.006	48
Ghana	8.8%	43	2.741	31	3.8%	43	1.729	33	0.3%	46	0.194	36
Mauritania	7.6%	44	0.348	41	2.8%	44	0.2	43	0.8%	42	0.073	41
Cape Verde	6.5%	45	0.036	51	4.9%	41	0.032	50	3.5%	28	0.023	46
Libya	6.0%	46	0.399	40	2.0%	46	0.132	46	1.0%	39	0.053	43
Gabon	1.9%	47	0.042	50	0.5%	49	0.016	51	0.1%	47	0.006	48
Tunisia	1.7%	48	0.206	45	1.0%	47	0.137	45	0.4%	44	0.06	42
Egypt	1.0%	49	1.035	37	0.6%	48	0.735	37	0.1%	48	0.153	38
Algeria	0.8%	50	0.326	42	0.4%	50	0.201	42	0.0%	53	0.003	51
Morocco	0.2%	51	0.083	48	0.1%	52	0.034	49	0.0%	50	0.01	47
Seychelles	0.1%	52	0.0001	53	0.4%	51	0.0003	53	0.4%	45	0.0003	52
Mauritius	0.1%	53	0.001	52	0.1%	53	0.001	52	0.0%	52	0	53

6.2. Core assumptions in the Current Path

In the *Current Path* scenario, the Zambian economy grows by an average annual rate of 5 percent to 2060 (in MER terms). This long-term outlook is modest, given its robust growth potential. This rate of growth is similar to the *Current Path* projections for relevant regional groups, but significantly slower than even the baseline scenario used in the Government's Vision 2030 document, which assumes an average growth rate of six percent out to 2030 (Republic of Zambia, 2006).

Figure 13. Annual GDP growth rate, Zambia and comparative regional groups, 5-year moving average



The *Current Path* suggests that Zambia’s economic potential is held back by low levels of productivity (as measured by total factor productivity in IFs). In Zambia, both labor and capital provide a small, positive lift to economic growth rates, but productivity is a drag on economic growth. In subsequent sections, we will take a closer look at productivity in Zambia.

Text Box 3. Long-term economic projections in IFs

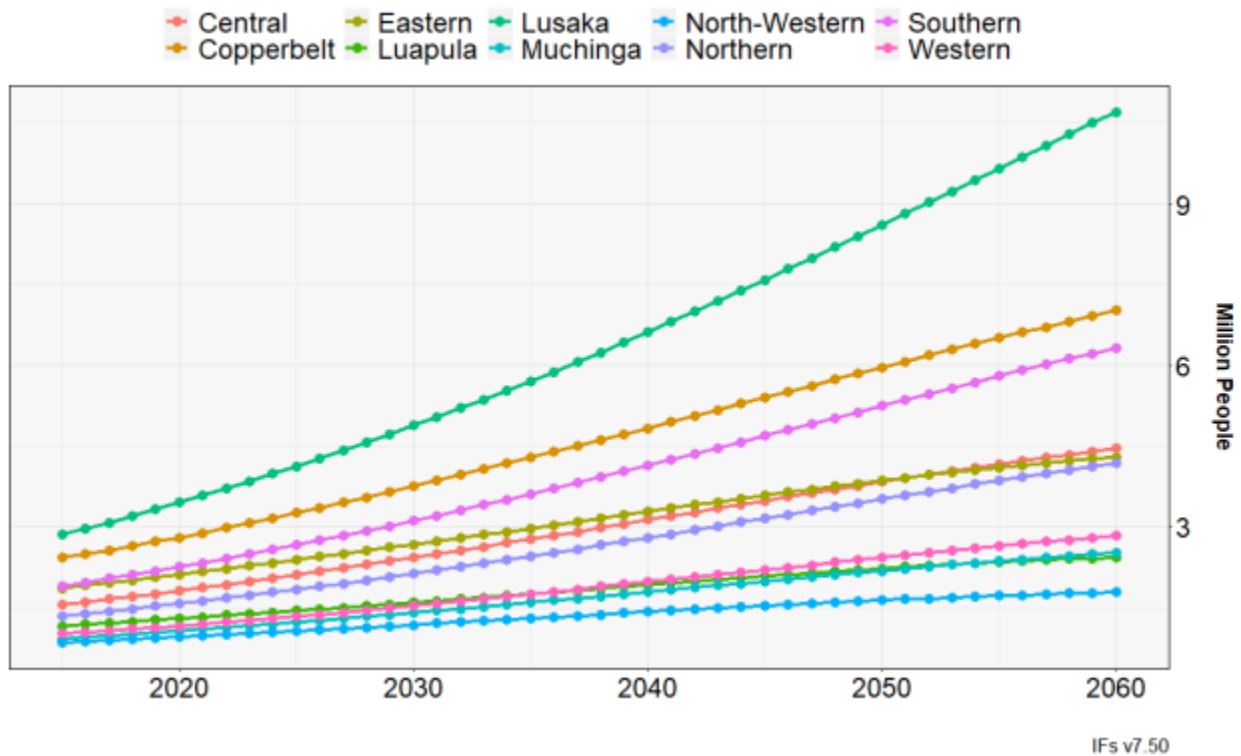
The emphasis of the IFs model is in long-term projections in human, social, and natural systems. With respect to economic growth projections, IFs does not attempt to capture or anticipate fluctuations related to business cycles, market sentiment, or other short-term disruptions, leading to a smoother forecast than its associated historical data. Nevertheless, it should be noted that the IFs economic model produces dynamic forecasts in response to its drivers across sub-models in IFs. Short-term, negative disruptions to Zambia’s economic growth trajectory (including the projected impact as a result of COVID-19) will lead to higher estimates in poverty.

In the *Current Path* scenario, Zambia’s population is projected to nearly triple over the next forty years, growing from nearly 15.5 million in 2015 to over 46 million by 2060. This is due in large part to the projected high rates of fertility, particularly in rural provinces. By 2030, seven of Zambia’s ten provinces still have fertility rates above 4.5 in the *Current Path*, and by 2060, only two provinces (Copperbelt and Lusaka) have fertility rates at or below replacement level (2.1).

Urbanization, or rural-to-urban migration is a key driver of demographic change, particularly in Lusaka and Copperbelt provinces. According to the 2015 LCMS, Lusaka and Copperbelt

experience the highest rates of net migration in Zambia (considerably higher than the next province). In the *Current Path*, net migration is assumed to be constant across time, similar to an approach used by the Zambian government (Central Statistical Office, 2013). In the *Current Path*, the population of Lusaka province eclipses 10 million by 2060. This growth will strain provincial and city planning in housing development, jobs, traffic management, air quality, and service delivery.

Figure 14. Population, Zambian provinces, Current Path



6.3. Structural drivers of poverty

Deeper drivers of poverty in IFs are factors that influence change in the aforementioned the economic and demographic drivers. Productivity is a significant deep driver of poverty, and it is represented in IFs in four categories: human development, governance, infrastructure, and knowledge. Human development includes the core drivers of human capabilities, including indicators of population health and educational attainment and quality. Governance is a representation of a society’s government and its ability to mobilize fiscal resources and implement effective policy. Infrastructure includes access to traditional and modern infrastructure, as well as spending on infrastructure. Finally, knowledge represents technology spillovers from international trade, expenditures on R&D, and university education completion.

6.3.1. Human development in the Current Path

As mentioned previously, Zambia has made significant strides in improving health and education. Communicable disease prevention and management has improved in recent years, and gross

enrollment rates in primary education are high. By many indicators, Zambia’s primary education system performs well; however, some regional disparities exist in enrollment and attainment. In the *Current Path*, Zambia falls particularly far behind secondary enrollment and completion targets, indicating that this is an area of weakness in the Zambian school system.

Table 15. Education throughput indicators for Zambia, *Current Path* (2015 is historical data)

	2015	2030	2045	2060
Gross Primary Intake	116.6%	105.0%	103.1%	101.5%
Primary Survival	88.4%	91.9%	96.3%	99.0%
Lower Secondary Transition	66.1%	78.4%	84.7%	89.9%
Lower Secondary Graduation	52.1%	52.3%	58.4%	70.0%
Upper Secondary Transition	45.0%	61.4%	71.1%	80.3%
Upper Secondary Graduation	21.6%	29.0%	37.4%	53.8%
Tertiary Intake	22.4%	22.1%	27.1%	39.5%
Tertiary Graduation	3.1%	5.2%	9.9%	18.1%

With respect to health, life expectancy in Zambia is projected to rise in all provinces to 2060. This rise in life expectancy is due in large part to improvements in maternal and child health and in an overall decline in communicable disease mortality. Maternal and child (under-5) mortality have fallen dramatically since 2000, and the death rate from HIV/AIDS has been reversed, though much work remains in these areas. In Luapula and Western provinces, life expectancy was lowest in 2015 (below 50 years on average).⁸ The *Current Path* projects modest growth in these provinces, eclipsing 60 by 2060. Meanwhile, in Copperbelt and Lusaka, the *Current Path* scenario shows modest growth to 66 and 68 years, respectively.

⁸ Data from the Zambian Central Statistical Office (53.3 years on average) differs substantially from World Bank estimates (61.7) in 2015. This difference warrants deeper investigation but is beyond this scope.

Figure 15. Life expectancy at birth, Zambian provinces, Current Path

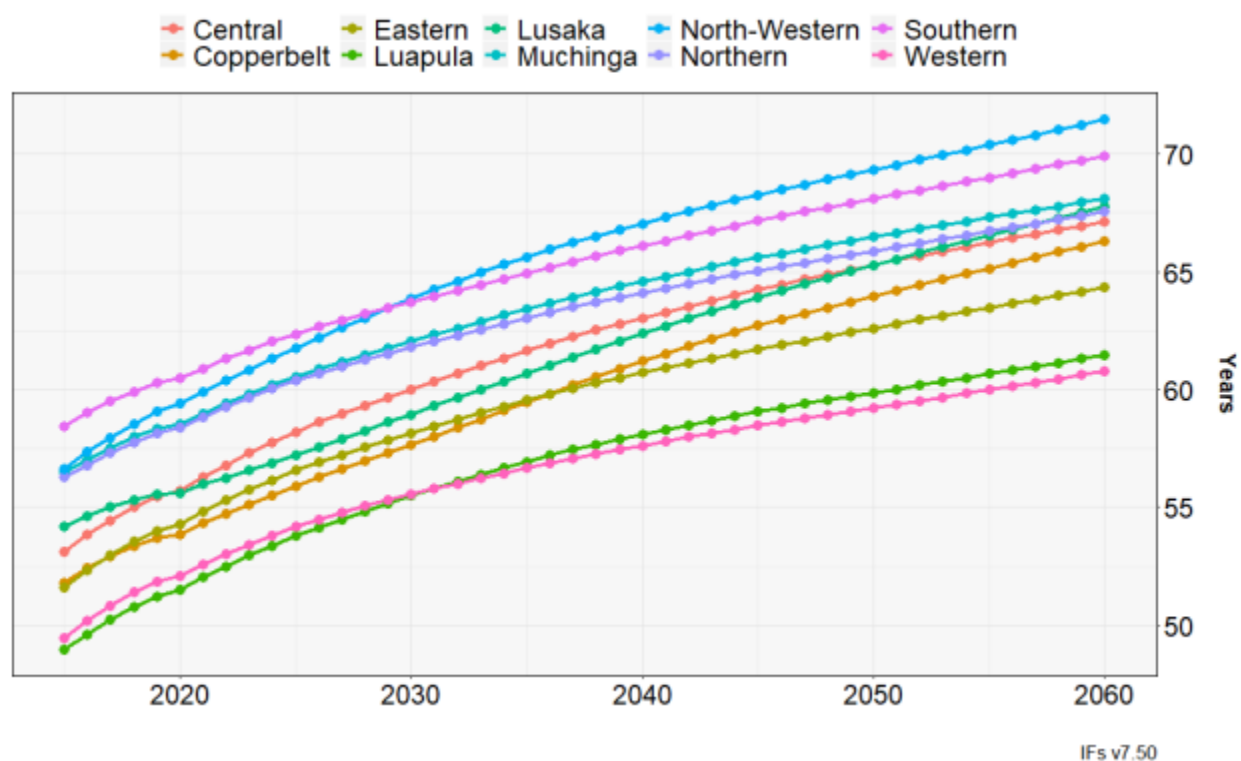


Table 16 provides a summary of Zambia’s progress toward a selection of human development-related Sustainable Development Goals. In the *Current Path* scenario, Zambia does achieve some education-related Sustainable Development Goals (SDGs). Gross primary enrollment (which measures students of all ages) and gender parity measures in primary schooling are expected to meet SDG targets (some of which have already met target levels). Zambia does not achieve any health-related SDGs by 2030, though measurable progress has been made toward many goals.⁹ Still, Zambia doesn’t achieve goals in maternal and child health until 2040 and 2050, respectively.

Table 16. Selection of SDG targets and Current Path projections for Zambia

Target	Indicator	2015	2030	Target value
2.1. End hunger	Prevalence of undernourishment	44.4	26.4	3
2.2 End all forms of child malnutrition	Child undernourishment (by weight)	13.9	10	3
3.1. Maternal mortality ratio to less than 70 per 100,000 live births	Maternal mortality ratio	447	291	70
3.2. End preventable deaths of newborns and children under 5 years of age	Under-five mortality rate	74.6	48	35
3.3. End the epidemic of AIDS	Number of new HIV infections (millions)	0.047	0.036	0

⁹ Most African countries are not expected to achieve any health-related SDGs (Lozano et al., 2018; Mejía-Guevara et al., 2019; UNICEF et al., 2018).

4.1. Ensure that all girls and boys complete free, equitable and quality primary education	Net primary enrollment rate, total	89	92	97
	Gross primary enrollment rate, total	110.2	101.7	100
	Gross lower secondary enrollment rate, total	60.2	71.9	97
	Upper secondary graduation rate	21.6	26	97
4.5. Eliminate gender disparities in education and ensure equal access to all levels of education	Gender parity index, net primary enrollment (female/male)	1.05	1.05	1
	Gender parity index, gross lower secondary enrollment (female/male)	.94	.97	1

6.3.2. Governance development in the Current Path

Governance in IFs is thought of across three dimensions: security, capacity, and inclusion (Hughes et al., 2014). Improved governance, or a government's ability to mobilize resources and implement effective, inclusive policy, can unlock positive economic and human development. Governance influences productivity in IFs in the social capital category, which includes elements of economic freedom, democratic institutions, and government corruption and effectiveness.

Zambia's record on governance-related metrics is mixed. Zambia's highest performing dimension is in inclusion, which is an index of democratic institutional performance and gender empowerment. Zambia's performance on this inclusion index is buoyed by its relatively high performance on democratic institutions (as measured by the Polity project from the Center for Systemic Peace). Zambia performs relatively poorly in gender empowerment (as measured by the UN Development Programme). Zambia's lowest performing dimension is in capacity, which is an index reflecting a country's ability to raise tax revenues and its level of corruption. The IFs Security Index, which is a measurement of the risk of domestic conflict, also scores poorly for Zambia.

Table 17. IFs Governance Inclusion Index, Current Path, SADC countries with global rank

Country	2020		2040		2060	
	Score (0-1)	Rank	Score (0-1)	Rank	Score (0-1)	Rank
Zambia	0.629	77	0.642	83	0.707	76
Angola	0.341	135	0.368	146	0.421	148
Botswana	0.747	50	0.798	47	0.837	41
Congo, Dem Rep	0.469	117	0.464	129	0.496	134
Lesotho	0.763	44	0.824	36	0.882	28
Madagascar	0.598	88	0.641	84	0.689	80
Malawi	0.534	102	0.573	105	0.624	101
Mauritius	0.768	41	0.79	50	0.799	55
Mozambique	0.544	100	0.574	104	0.652	91
Namibia	0.726	56	0.798	47	0.907	20

Seychelles	0.745	51	0.734	66	0.748	64
South Africa	0.835	24	0.871	21	0.902	21
Eswatini	0.3	144	0.398	138	0.512	131
Tanzania	0.598	88	0.64	85	0.732	70
Zimbabwe	0.565	95	0.599	97	0.668	86

Table 18. IFs Capacity Index, Current Path, SADC countries with global rank

Country	2020		2040		2060	
	Score (0-1)	Rank	Score (0-1)	Rank	Score (0-1)	Rank
Zambia	0.322	128	0.419	126	0.498	125
Angola	0.382	109	0.469	111	0.586	97
Botswana	0.693	36	0.8	30	0.888	25
Congo, Dem Rep	0.199	156	0.254	163	0.384	149
Lesotho	0.641	43	0.674	57	0.736	55
Madagascar	0.243	147	0.304	158	0.39	148
Malawi	0.237	149	0.343	148	0.537	113
Mauritius	0.479	82	0.54	92	0.633	81
Mozambique	0.296	135	0.379	139	0.504	123
Namibia	0.608	49	0.679	55	0.809	37
Seychelles	0.719	32	0.778	36	0.754	51
South Africa	0.629	46	0.745	43	0.777	47
Eswatini	0.454	86	0.53	94	0.607	89
Tanzania	0.296	135	0.387	135	0.506	121
Zimbabwe	0.326	127	0.433	123	0.572	102

Table 19. IFs Security Index, Current Path, SADC countries with global rank

Country	2020		2040		2060	
	Score (0-1)	Rank	Score (0-1)	Rank	Score (0-1)	Rank
Zambia	0.677	119	0.719	122	0.773	108
Angola	0.638	132	0.691	130	0.773	108
Botswana	0.794	70	0.844	57	0.881	46
Congo, Dem Rep	0.569	142	0.627	137	0.71	118
Lesotho	0.617	137	0.686	131	0.762	112
Madagascar	0.676	120	0.732	115	0.815	90
Malawi	0.71	108	0.756	107	0.82	88
Mauritius	0.886	35	0.916	32	0.933	24

Mozambique	0.665	124	0.716	124	0.793	99
Namibia	0.728	99	0.787	90	0.85	66
Seychelles	0.874	40	0.882	43	0.888	42
South Africa	0.69	114	0.752	108	0.793	99
Eswatini	0.629	135	0.702	129	0.764	110
Tanzania	0.723	101	0.775	95	0.844	70
Zimbabwe	0.691	113	0.761	105	0.817	89

6.3.3. Infrastructure in the Current Path

Infrastructure (known in IFs as physical capital) access in Zambia is generally poor, which can lead to and aggravate poverty and inequities. Infrastructure access is skewed toward urban, more developed provinces, with less developed, rural areas having limited access to quality infrastructure. The *Current Path* shows this story improving, but at a painfully slow rate, considering the distance that Zambia remains from achieving SDGs related to infrastructure access.

Electricity access in Zambia's provinces does show improvements in the *Current Path*, improving to 70 percent of Zambia's population by 2060 (up from 31 percent in 2015). Copperbelt and Lusaka approach universal access by 2060, while more rural provinces lag behind (Figure 16). Rural electricity, which was only 4.4 percent in 2015, improves to 60 percent by 2060.

Figure 16. Electricity access, total, Zambian provinces, Current Path scenario

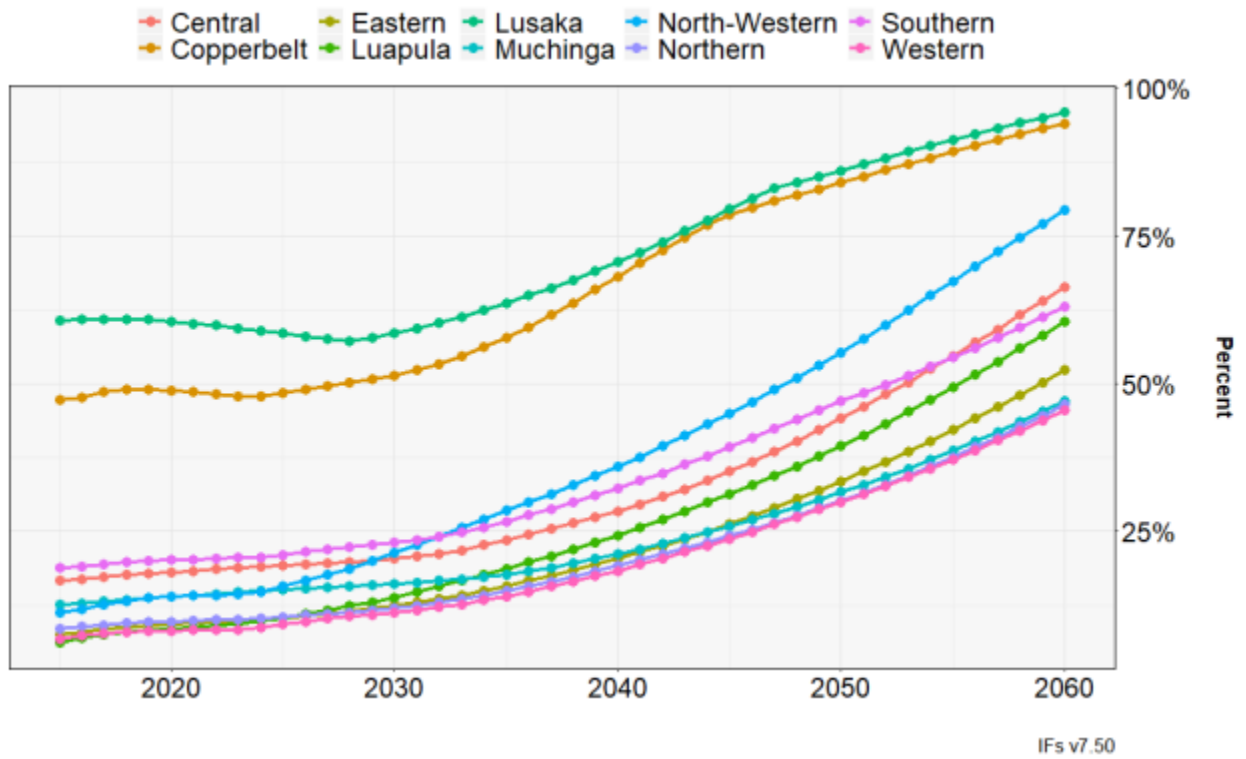
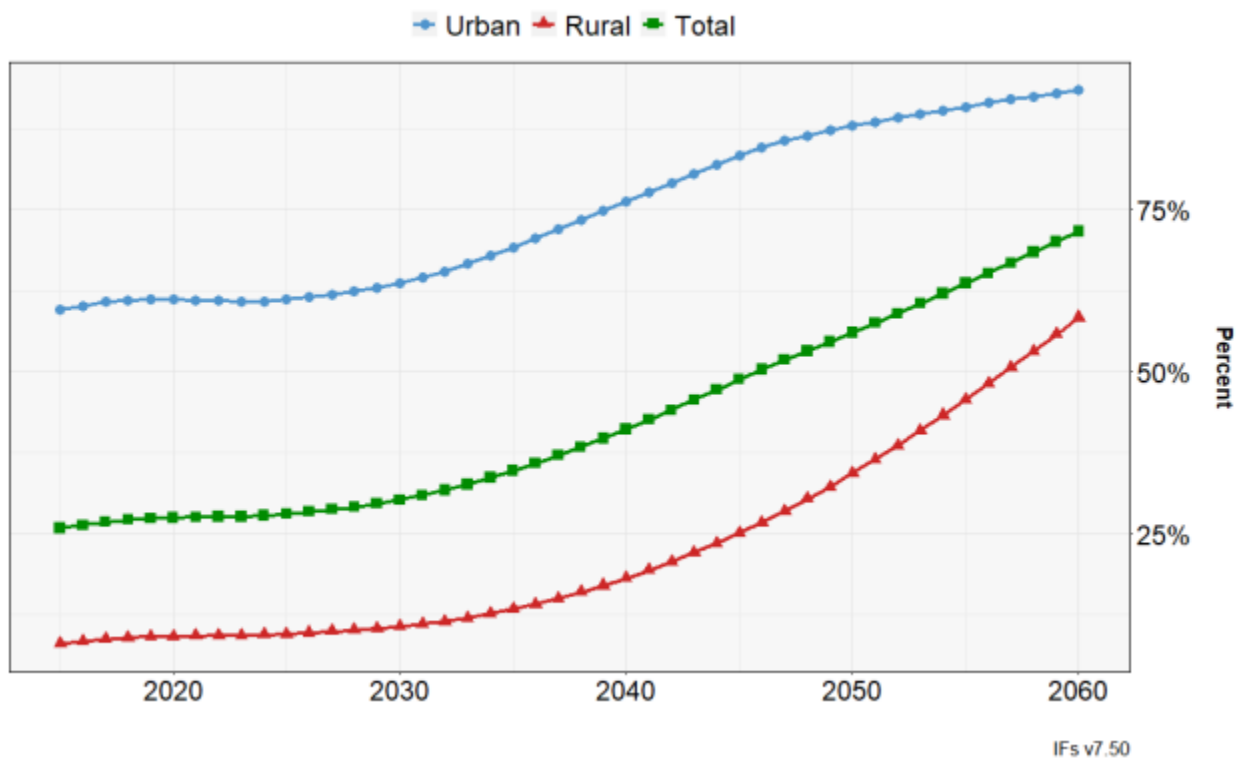


Figure 17. Electricity access in Zambia, by Rural, Urban, and Total, Current Path Scenario

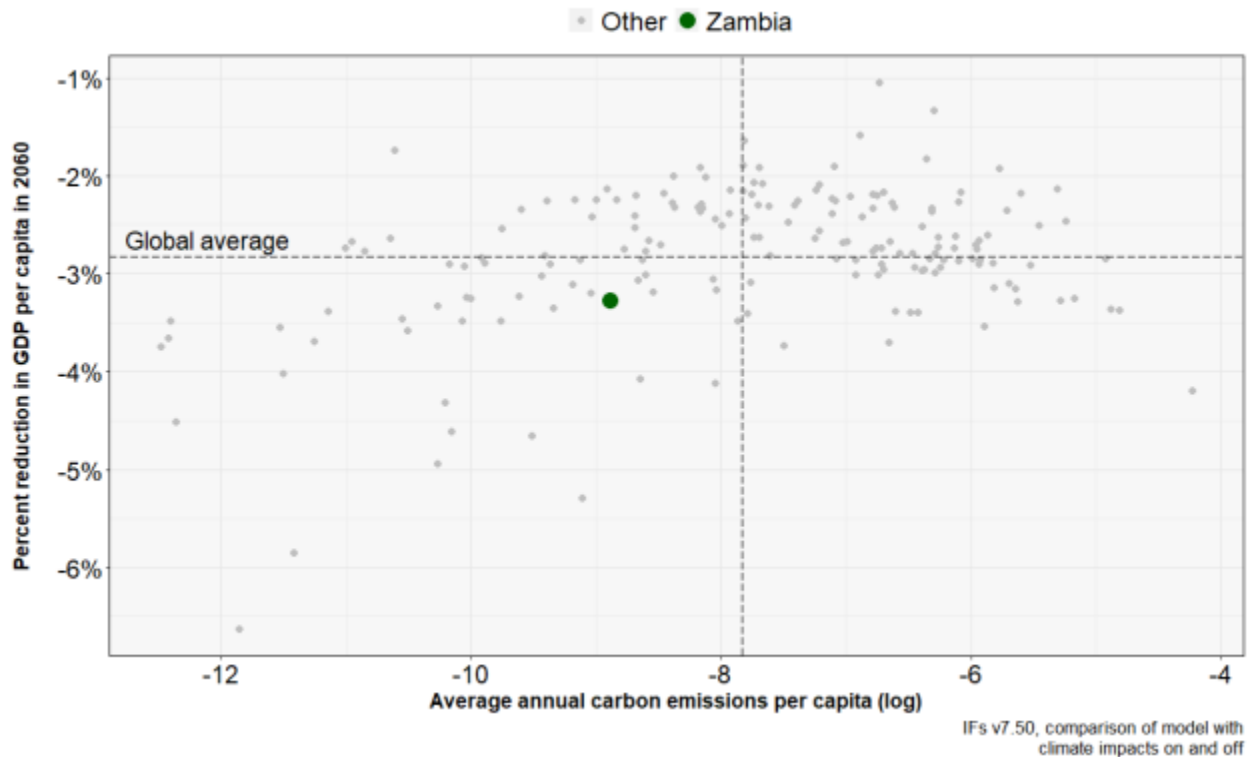


Access to improved sanitation systems also improves in the *Current Path*, but universal access is still an aspiration. By 2060, about 85 percent of Zambians have access to improved sanitation, with Lusaka and Copperbelt reaching 90 percent access. Rural Zambian provinces reach an average rate of 80 percent by 2060.

6.3.4. Climate change impact in Zambia in the Current Path

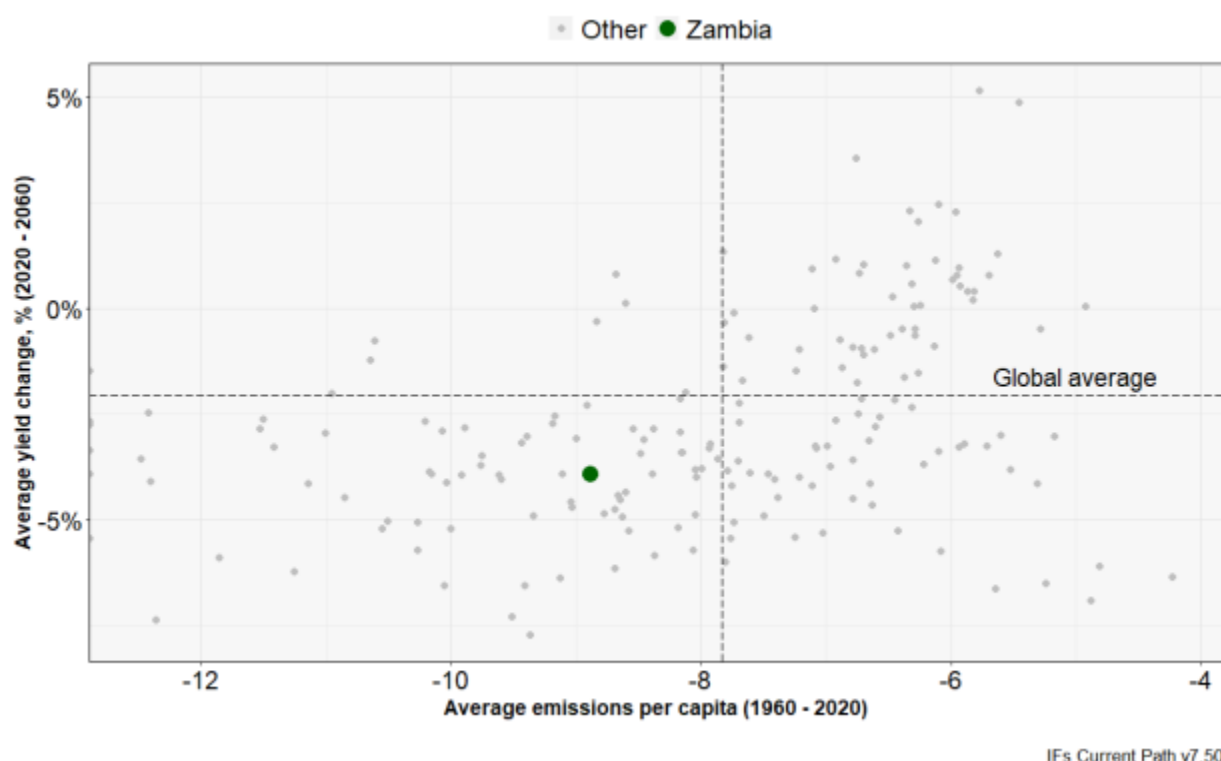
Figure 18 shows each country’s average annual per capita carbon emissions historically with the percentage reduction in GDP per capita from the *Current Path*, benchmarked against an IFs model projection with the impact from climate change removed. This exercise shows the estimated impact from climate change on world economies in the IFs system. This demonstrates that, although Zambia has emitted less cumulative carbon than the average country, it experiences a disproportionately negative reduction in per capita GDP as a result of climate change.

Figure 18. Average emissions per capita vs. the estimated percent reduction in income as a result of climate impacts in 2060



Zambia has historically contributed well below the global average emissions (on a per capita, country-level basis). However, the *Current Path* suggests that Zambia, along with many other Sub-Saharan African countries, will have disproportionate negative consequences to agricultural productivity as a result of climate change. These results indicate a substantial impact on Zambian development as a result of climate change. Out to 2060, the *Current Path* suggests that Zambia could experience an average yield reduction of about 4 percent and a reduction in GDP per capita of 3.3 percent. This further complicates poverty reduction strategies, particularly for the rural poor.

Figure 19. Average emissions per capita vs. average change in agricultural yield as a result of climate impacts (2020-2060)



7. Scenario analysis

7.1. Framing uncertainty of long-term poverty

In this section, we explore the potential bounds of poverty futures by varying the core demographic and economic drivers of poverty: economic growth, population growth, and income distribution. Given their importance in Zambia’s context, we include internal migration or rural-urban population flows and government debt to this group of core drivers. This approach to scenario analysis, called framing, allows us to consider the range of likely possibilities for the poverty landscape in Zambia. This approach is particularly valuable when considering a long time horizon, where considering alternate assumptions could yield substantially different projections. This section will explore varying each of these drivers in turn and then in combination.

7.1.1. Economic growth

Economic growth has a significant long-term impact on poverty projections. If Zambia’s economy grows more rapidly than the *Current Path* suggests, poverty will fall (all else remaining equal). The converse if unfortunately true as well – slower growth in Zambia over the next forty years will lead to worsening poverty. In the *Current Path*, Zambia’s economy grows by an average of 5 percent out to 2060; in the slow and fast growth scenarios, Zambia grows by an average rate of 4 percent and 6.5 percent, respectively, for the next forty years.

7.1.2. Demographic change

In Zambia’s context, the most significant driver of demographic change is the total fertility rate. As identified earlier, Zambia’s current fertility rate is around five children per woman, placing it

among the highest fifteen countries globally. This could indicate that rapid reductions in fertility below the *Current Path* could have significant leverage over the absolute number of people living in poverty. In the low fertility scenario, Zambia's fertility rate declines to replacement level (2.1 children per woman) by 2050. Framing scenarios should allow us to explore another alternate future – what if fertility rates in Zambia do not decline as fast as the *Current Path* suggests?

7.1.3. Income distribution

Zambia's income inequality is among the highest in the world. As noted earlier, the *Current Path* for this analysis holds an assumption of constant income inequality over the 2060 horizon given the significant uncertainty in forecasting inequality. In the high inequality scenario, Zambia income inequality (as measured by the Gini coefficient) increases over time; still, it remains within what is experienced globally today to keep the projection grounded in what has been experienced historically. The scenario with improvements to income inequality still keeps Zambia among the average for countries in Southern Africa. Policies that improve income distribution can be quite effective in the short term, such as social cash transfer programs targeted to lifting consumption of those most in need. Over the long term, though, economic growth proves to be a more effective force for poverty reduction.

7.1.4. Internal migration

Rural-urban migration can be an important driver for poverty reduction in a predominantly rural country like Zambia. Urban or semi-urban settings often provide a multitude of productive avenues for employment. It should be noted that internal migration is not always a force for poverty reduction, particularly in the multidimensional poverty sense. Rural migrants seeking employment in more urban settings are not always absorbed into the formal labor market, and they often settle in marginal, slum dwellings.

7.1.5. Government debt

The political and historical context can often influence the effectiveness of different poverty reduction programs. In the case of Zambia, high external debt and the associated debt servicing requirements could constrain or enable the fiscal environment in Zambia toward poverty reduction programs, depending on the pace and burden of servicing requirements. As noted earlier, the current debt load in Zambia is leading to delays in social cash transfer payments, impacting those in poverty in a noticeable way today. In IFs, we operationalize this debt servicing obligation via an increase in government spending to non-productive sectors. This approach will allow us to simulate the possible “crowding out” effect of government spending obligations on debt servicing.

7.1.6. Framing results

Table 20 shows a summary of these framing results. Out to 2060, long-term GDP growth rates provide the most leverage over extreme poverty. However, over a nearer time horizon (2030 or 2040), alternate assumptions of high and low fertility and income distribution still show significant influence over extreme poverty projections. Although inter-provincial migration and government debt show an effect on poverty projections (particularly in the shorter term), their impact is relatively smaller than the core demographic and economic drivers.

Table 20. Extreme poverty (\$1.90/day) across framing scenarios

Scenario	Population living on < \$1.90/day (Millions)				
	2020	2030	2040	2050	2060
Current Path	9.9	12.9	14.9	15.6	13.6
Population High	9.9	13.1	16.1	18.2	17
Population Low	9.9	12.5	13.2	12.6	10.3
Inequality High	9.9	13.2	15.9	17.5	16.1
Inequality Low	9.9	12.3	13.3	12.8	10.2
GDP Growth High	9.9	12.6	13.3	11.7	8.2
GDP Growth Low	9.9	12.9	15.5	17.9	18.3
Government Debt High	9.9	12.9	15.1	16.4	15.3
Government Debt Low	9.9	12.8	14.7	15	12.5
Migration High	9.9	12.8	14.6	15	12.8
Migration Low	9.9	12.8	14.8	15.4	13.4

	Population living on < \$1.90/day (Percent)				
	2020	2030	2040	2050	2060
Current Path	53.7%	52.1%	46.6%	39.4%	29.2%
Population High	53.7%	52.6%	48.2%	41.7%	31.6%
Population Low	53.7%	51.4%	44.3%	36.4%	26.6%
Inequality High	53.7%	53.6%	49.9%	44.2%	34.6%
Inequality Low	53.7%	50.0%	41.6%	32.5%	21.8%
GDP Growth High	53.7%	50.9%	41.6%	29.8%	17.8%
GDP Growth Low	53.7%	52.3%	48.6%	45.2%	39.0%
Government Debt High	53.7%	52.3%	47.4%	41.5%	32.7%
Government Debt Low	53.7%	52.1%	46.1%	38.1%	27.0%
Migration High	53.7%	51.9%	45.8%	38.1%	27.5%
Migration Low	53.7%	52.1%	46.4%	39.1%	28.8%

7.1.7. Combined framing

Finally, we complete this framing analysis by considering the combination of the core demographic and economic drivers (plus internal migration and government debt). These scenarios are grouped into what could be thought of as a best and worst case for poverty in Zambia. For example, a Zambia with low economic growth, high population growth, high income inequality, high debt servicing obligations, and low internal mobility of its population would constitute a worst-case framing scenario. This combination of outcomes may be unlikely, but they help frame the long-term possibility of growth in poverty in Zambia. We consider the *Current Path* scenario our “most likely” forecast, but it must still be noted that this scenario is not a prediction and is ultimately a low probability.

Figures 20 and 21 show the results of the *Current Path* as compared with the *Best Case* and *Worst Case* scenarios. In *Best Case*, the proportion of population living in extreme poverty falls to 7.5 percent (or only 2.9 million people) by 2060. In *Worst Case*, a future where inequality intensifies, GDP growth averages only 3.5 percent annually, and the total fertility rate is above four children per woman in 2050, half of all Zambians live in extreme poverty (about 27 million people) by 2060.

Figure 20. Percentage of people in extreme poverty (< \$1.90/day) in Zambia, Current Path vs. combined framing

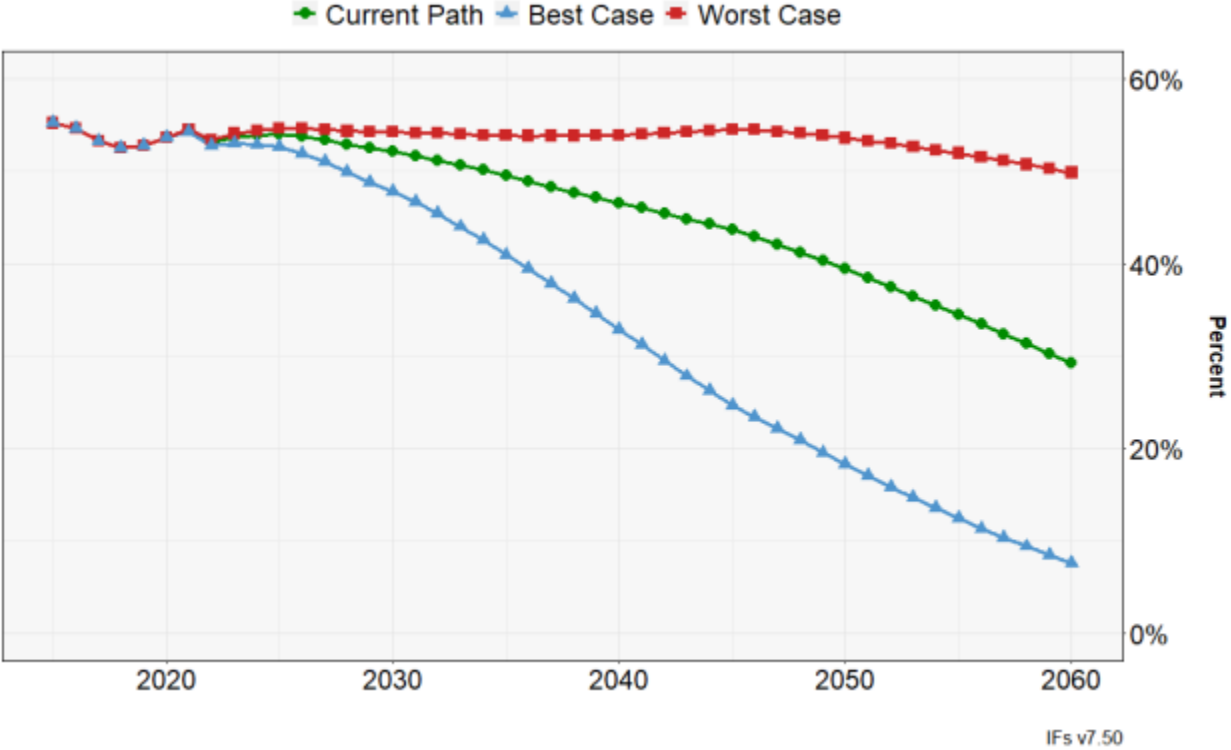
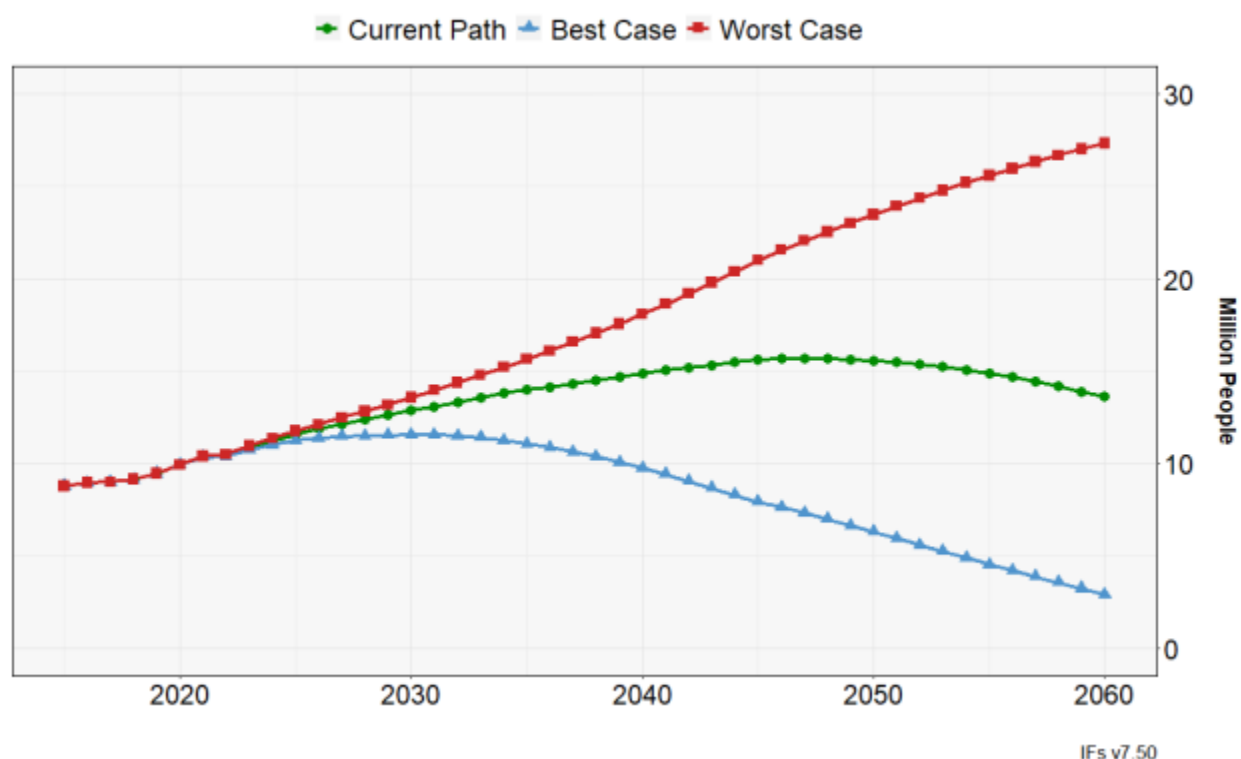


Figure 21. Number of people in extreme poverty (< \$1.90/day) in Zambia, Current Path vs. combined framing



These framing scenarios begin to demonstrate some of the wide-ranging uncertainty that exists in long-term poverty projections. Still, there is utility in exploring the boundaries of what is possible. Strategic policy interventions aimed at reducing poverty will likely lead to smaller impacts than these framing scenarios on many direct drivers of poverty. In the *Best Case* scenario, where many development trends fall in Zambia’s favor, extreme poverty is *nearly* eradicated by 2060. At the \$3.20 per day poverty line, the *Best Case* scenario still has about nine percent of Zambians in poverty (about 4 million people). The *Worst Case* is worryingly persistent poverty (in percentage terms) at this poverty line; approximately 79 percent (or 36 million Zambians) live below the \$3.20 poverty line in 2060 in *Worst Case*.

Table 21. Population below \$3.20/day poverty line, Current Path vs. combined framing

Scenario	Population living on < \$3.20/day (Millions)				
	2020	2030	2040	2050	2060
Current Path	13.2	17.4	20.9	23.1	21.9
Best Case	13.2	16.3	15.7	12.1	7
Worst Case	13.2	18	23.8	30.9	36.8

Scenario	Population living on < \$3.20/day (Percent)				
	2020	2030	2040	2050	2060
Current Path	71.2%	70.4%	65.4%	58.4%	47.1%

Best Case	71.2%	66.1%	49.3%	30.7%	14.9%
Worst Case	71.2%	72.8%	74.7%	78.3%	79.1%

7.2. COVID-19: assessing the potential impact on poverty in Zambia

There is broad uncertainty associated with the duration and long-term impact of coronavirus. This analysis is exploring the long-term future of poverty in Zambia; however, COVID-19 presents a significant event that impacts our projections of poverty and development in Zambia. The *Current Path* scenario includes the latest estimates of the impact on economic growth from the IMF. One way of assessing the impact of COVID-19 is to evaluate the results from IFs in the *Current Path* relative to the results from the model prior to the updated economic growth projections. This use of the IFs model is effectively comparing the current growth projections relative to a *World without COVID-19*.

Table 22. Economic growth assumptions for *Current Path* and *World without COVID* scenarios

Scenario	Source	2020	2021
Current Path	IMF World Economic Outlook April 2020 release	-3.5%	2.3%
World without COVID	IMF World Economic Outlook October 2019 release	1.695%	1.728%

Tables 23 and 24 compare the results of the *Current Path* and the *World without COVID* scenario across poverty thresholds over time. Some key takeaways from these results include:

- We see an immediate impact on poverty in 2020 as a result of the COVID-19 pandemic. All poverty thresholds see an increase of about 100,000 people in poverty – about a half percent increase compared with *World without COVID*.
- In *World without COVID*, about 700,000 fewer people live in severe poverty (< \$1 per day) in 2060 compared to 2020. The *Current Path* projection suggests that severe poverty could remain at nearly the same level in 2060 (though it is increasing and declining over this time horizon).
- In both scenarios, poverty is expected to increase at the \$1.90 and \$3.20 thresholds. The *Current Path* projections of poverty peak higher across all thresholds than the *World without COVID* scenario.
- By 2030, projections of severe poverty (below \$1 per day) show that 600,000 more people live below this threshold in the *Current Path* (about 2.4 percent higher than *World without COVID*).
- By 2060, the about 3.7 percent more people live below the \$3.20 per day threshold in the *Current Path* compared to *World without COVID*.

Table 23. Comparison of scenario results (*Current Path* and *World without COVID*) across poverty thresholds, million people

Poverty Line	Scenario	2020	2030	2040	2050	2060
< \$1	Current Path	6	7.5	8.2	7.9	6.1

	World without COVID	5.9	6.9	7.4	7	5.2
	Difference	0.1	0.6	0.8	0.9	0.9
	Current Path	9.9	12.9	14.9	15.6	13.6
< \$1.90	World without COVID	9.8	12.2	13.9	14.3	12.2
	Difference	0.1	0.7	1	1.3	1.4
	Current Path	13.2	17.4	20.9	23.1	21.9
< \$3.20	World without COVID	13.1	16.8	19.9	21.7	20.2
	Difference	0.1	0.6	1	1.4	1.7

Table 24. Comparison of scenario results (Current Path and World without COVID) across poverty thresholds, percent

Poverty Line	Scenario	2020	2030	2040	2050	2060
< \$1	Current Path	32.3%	30.4%	25.6%	20.0%	13.1%
	World without COVID	31.8%	28.0%	23.1%	17.6%	11.2%
	Difference	0.6%	2.4%	2.5%	2.4%	1.9%
< \$1.90	Current Path	53.7%	52.1%	46.6%	39.4%	29.2%
	World without COVID	53.1%	49.4%	43.5%	36.2%	26.2%
	Difference	0.6%	2.7%	3.1%	3.3%	3.1%
< \$3.20	Current Path	71.2%	70.4%	65.4%	58.4%	47.1%
	World without COVID	70.7%	68.1%	62.4%	54.9%	43.4%
	Difference	0.5%	2.4%	3.0%	3.5%	3.7%

These results should be interpreted with caution. This analysis of COVID-19 is limited to a proxy of the aggregate economic impact of the virus. This is a narrow reflection of the impact of the virus, which has had a massive human cost on a global scale, but the trajectory of the virus in Zambia remains significantly uncertain. Some of Zambia's socioeconomic characteristics could leave it especially vulnerable to the virus: the economy is heavily dependent on commodity exports, there is a large informal economic sector, and a large population suffers from pre-existing health conditions. There could be larger uncertainties associated with morbidity and mortality patterns and downstream economic effects (among other things) that are not captured in this analysis.

7.3. Strategic interventions to reduce poverty in Zambia

Poverty reduction strategies take many forms. In this section, we use the International Futures (IFs) forecasting system to project long-term poverty dynamics in Zambia in alternative scenarios from the *Current Path*. These scenarios explore some of the deep drivers of poverty and poverty reduction by focusing on different systems that interact with poverty. We categorize strategic interventions for poverty reduction into four scenarios: **Business First**, **Pro-Poor Priority**, **Human Capital Push**, and **Infrastructure Emphasis**. Each of these categories, although not always distinct, provide different lenses through which to explore poverty reduction strategies in Zambia over the next forty years. These scenarios are comprised of the following interventions:

Business First: This scenario simulates improvements in the business environment in Zambia and its potential impact on poverty reduction. This scenario increases inflows of foreign direct investment to Zambia, improves government transparency, improves access to fixed broadband connectivity (important for fast and secure business transactions), and enhances economic freedom of Zambians (measured by protection of property rights and a reliable regulatory environment).

Pro-poor Priority: This scenario represents the implementation of a broad social protection scheme to address many key characteristics of poverty as it is experienced in Zambia. This scenario prioritizes improvements in the agricultural system by increasing efficiency and productivity in agriculture while reducing loss.¹⁰ Improvements in agricultural production lead to more income for rural farmers and reductions in food prices for domestic consumers. This scenario increases flows of remittances, which rural households rely upon more as a coping strategy for income insecurity. Social cash transfer programs are also prioritized (specifically to unskilled households), providing poor households with a greater ability to cope with stressors on household finances. Government effectiveness is improved in this scenario to simulate an improved capacity for implementation of these rural poverty programs. Finally, this scenario simulates the effect of increasing access to modern contraceptives to better meet family planning and reproductive health needs (a need that is more acute in rural areas of Zambia).

Human Capital Push: This scenario emphasizes improvements in health outcomes in Zambia and the efficiency and quality of the primary school system. HIV-related and other communicable disease mortality is reduced, as well as deaths as a result of unintentional injuries and childbirth complications. The efficiency of the primary education system is also emphasized, improving the intake, throughput, and graduation rates, as well as investing in improving the quality of education received. Gender inclusivity, as measured by the UN Development Programme's Gender Empowerment Measure, is improved in this scenario relative to the *Current Path*.

Infrastructure Emphasis: This scenario prioritizes large-scale infrastructure expansion programs to improve access to higher quality systems for Zambians. This scenario simulates greater access to piped water and flush sanitation systems throughout Zambia. Electricity access and mobile broadband connectivity are scaled up, enabling access to higher-value productivity. Finally, this scenario increases the proportion of paved roads in Zambia, which improves the physical connectivity of households to schools, health facilities, and markets.

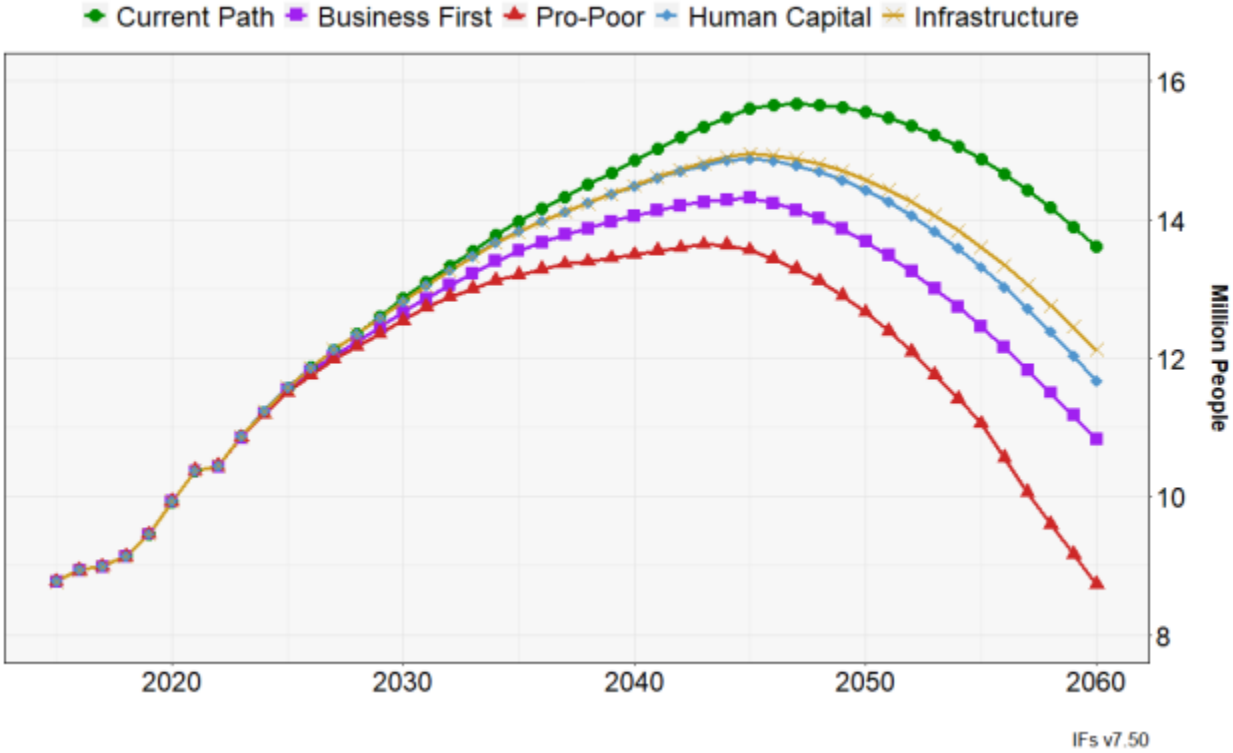
In the *Current Path*, 13.5 million Zambians will live on less than \$1.90 per day in 2060 (29 percent of the population). The strategic intervention scenarios (outlined above) show differential impacts on poverty over the long term – both in the aggregate (Zambia as a whole) and

¹⁰ It should be noted that agricultural investments can be concentrated toward large-scale commercial farming, which would likely limit the pro-poor potential of the investment. In this scenario, agricultural investment is coupled with an emphasis on domestic caloric consumption and other pro-poor policies to simulate the potential for this to have a targeted impact on poverty reduction.

provincially. The *Pro-Poor* scenario has the largest impact over the long run, resulting in nearly 6 million fewer people living below the \$1.90 poverty threshold in 2060, relative to the *Current Path*. *Business First*, which emphasizes FDI, governance, and economic freedom, has the next largest impact on poverty reduction across Zambia, followed by the *Human Capital Push* and *Infrastructure Emphasis* scenarios.

In *Business First*, the Zambian economy grows at roughly 5.7 percent per annum between 2020 and 2060, and \$1.90 poverty is reduced by approximately 29 percentage points during this 40-year period (down to 10.7 million people in 2060). Conversely, the *Pro-Poor Priority* scenario benefits more rural, high-poverty provinces most, by increasing social cash transfers and remittances and improving efficiency and productivity in the agricultural system. Agricultural yield nearly triples present-day levels, placing Zambia among regional leaders by 2060. In *Pro-Poor Priority*, the economy grows by approximately 5.3 percent per annum between 2020 and 2060, and \$1.90 poverty falls by 33 percentage points over that period (down to 8.6 million people in 2060). The results from *Pro-Poor Priority* indicate that some of the largest reductions in poverty come from improved agricultural productivity and improved access to modern contraceptives.

Figure 22. Poverty headcount (millions) at \$1.90/day level for Zambia across strategic interventions



The *Human Capital Push* scenario, which emphasizes improvements in health outcomes and the efficiency and quality of the primary school system, has the second largest impact on poverty reduction among the more urban, economically-productive provinces (Lusaka and Copperbelt). Improving the quality of the primary education system, improving gender empowerment, and reducing mortality from communicable diseases has the largest impact from this scenario. In

Human Capital Push, GDP growth between 2020 and 2060 averages 5.5 percent (compared to 5 percent in the *Current Path*).

In *Infrastructure Emphasis*, which prioritizes large-scale infrastructure programs, Zambia experiences poverty reductions vis-à-vis the *Current Path*. In this scenario, the average GDP growth rate from 2020 to 2060 is 5.4 percent. By 2060, 12.1 million Zambians live on less than \$1.90/day, or about 1.5 million fewer than the *Current Path*). The results from this scenario suggest that improving safe water and sanitation systems has the most meaningful impact on poverty reduction among infrastructure investments for both urban and rural provinces.

These strategic interventions have different impacts on a provincial basis, given their respective development characteristics. The results of these scenarios tell a story of two tracks of development and poverty in Zambia – urban centers and the rural periphery – both with different benefits from varying policy initiatives. The provinces with the largest economies and urban populations (Lusaka and Copperbelt) benefit most in terms of poverty reduction in the *Business First* scenario. *Pro-Poor Priority* leads to the most dramatic reductions in poverty in the other rural provincial grouping (of the other eight provinces of Zambia).

Figure 23. Poverty headcount (millions) at \$1.90/day level for Copperbelt and Lusaka across strategic interventions

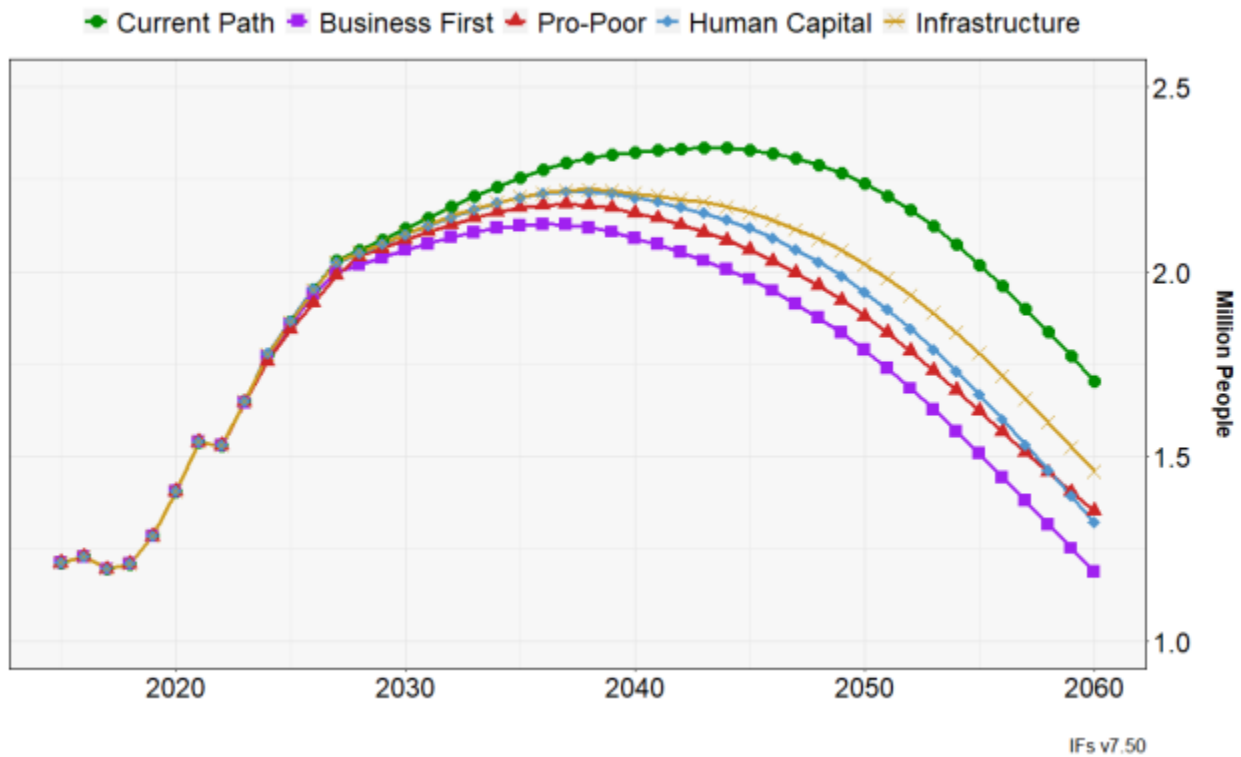
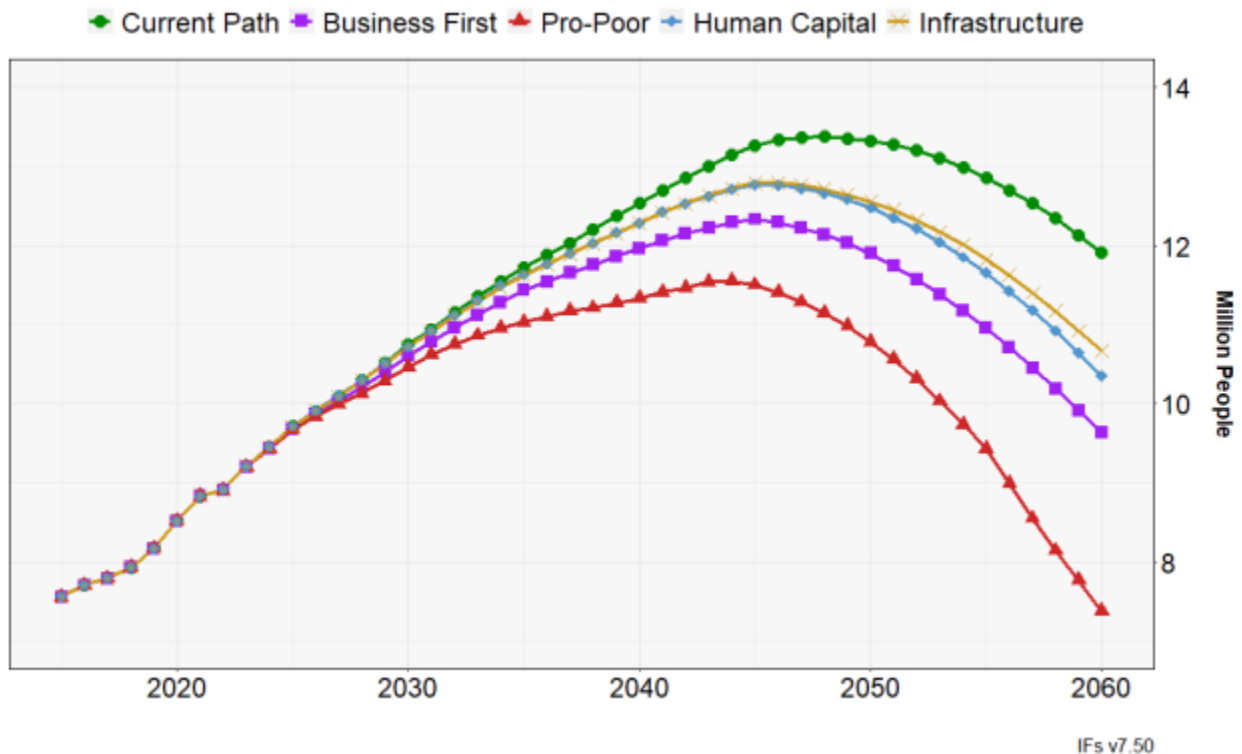


Figure 24. Poverty headcount (millions) at \$1.90/day level for rural provinces across strategic interventions



A notable characteristic of these results is the significant upward pressure on poverty in the *Current Path* and all strategic intervention scenarios. Even in a scenario representing targeted interventions for the poor, poverty eradication appears to be a significant challenge over the next 40 years. These results should not suggest that investments and infrastructure and human capital are less important for poverty reduction. In reality, policy initiatives are blended and take into account efforts to address priorities across demographic groups and locations.

8. Conclusion

Poverty in Zambia is extensive and a persistent problem. Over half of all Zambians live below the national poverty line and about 1 in 3 live on less than \$1.00 per day. Rural poverty is both deep (as measured by the poverty gap) and highly prevalent, and nearly 90 percent of rural Zambians rely on agriculture for their livelihoods. The *Current Path* shows that the core drivers of poverty – economic growth, income inequality, and demographic change – are trending in ways that make ongoing poverty reduction efforts particularly challenging. Severe poverty (as measured by the \$1 per day poverty line) is expected to persist in absolute terms to 2060 (but would represent a declining share of the population). As incomes rise above this severe poverty line, the *Current Path* suggests that \$1.90 and \$3.20 poverty will rise. These results indicate that there is significant upward pressure on poverty that could keep Zambia far from eradicating poverty – even over the long term.

Framing scenario analysis suggests a wide range of uncertainty in these long-term poverty projections. In the *Worst Case* framing scenario, we find that poverty could increase to about 27 million in 2060, reflecting broad failures of the government and international actors to implement effective poverty reduction programs. The scenario simulating sustained higher economic growth reduces poverty in Zambia most out to 2060. In the *Best Case* scenario, we see a gradual reduction of poverty, but not for another 10 years. In this scenario, governments make choices that support broad human and economic development in Zambia, leading to a reduction in the number of people living on less than \$1.90 per day to about 3 million 2060.

Altering assumptions of our core demographic and economic drivers – economic growth, income inequality, and population growth – have different degrees of impact and over different horizons. However, over a shorter-term horizon, alternate assumptions of fertility and income distribution show significant influence over poverty projections, suggesting areas where policy could lead to poverty reduction. Government debt and urbanization show smaller but significant effects on poverty.

The IFs model was also used to assess the possible impact of the COVID-19 pandemic on poverty in Zambia. In the *Current Path*, we see an immediate impact on poverty in 2020 compared to a *World without COVID* counterfactual scenario. All poverty thresholds see an increase of about 100,000 people in poverty in 2020 – about a half percent increase compared with *World without COVID*. By 2030, projections of severe poverty (below \$1 per day) show that 600,000 more people live below this threshold in the *Current Path* (about 2.4 percent higher than *World without COVID*). This analysis suggests that the current pandemic could have a smaller impact on poverty than alternate assumptions of some core demographic and economic drivers of poverty.

The strategic interventions presented in this analysis point to policy themes that may make eliminating poverty more of a reality. The issue of deep and chronic rural poverty presents a particularly significant challenge. By 2060, the predominantly rural provinces of Zambia will have nearly 12 million people living on less than \$1.90 per day (about 41 percent of the population of these). The *Pro-Poor Priority* scenario increases agricultural investments, improved access to family planning, and social cash transfer programs leading to the most significant reductions in poverty in the long term. However, even in a scenario representing targeted interventions for the largest impoverished population, poverty eradication appears to be a significant challenge over the next 40 years.

Poverty in Lusaka and Copperbelt is small relative to other provinces, but due to persistent trends in urbanization, these provinces will experience growth in severe and extreme poverty out to 2060. The *Business First* scenario, which simulates an improved business environment that accelerates economic growth, has a larger impact on poverty reduction in Lusaka and Copperbelt.

Appendix A: Details of data gathered from 2015 LCMS

Table 25. 2015 LCMS data alignment with IFs database

Variable	Definition [IFs]	Units	IFs value 2015	Transformed 2015 LCMS values	Difference (units)	Difference (%)
(1) GDP2011	GDP with calculated values from 2010 to 2021 using the previous year and IMF World Economic Outlook growth rate	Bill 2011\$	28.696	28.675	0.022	0.1
(2) GDP2011PCPPP	GDP per capita (constant 2011 PPP International \$)	2011 PPP\$	3,627.20	4,407.40	780.2	21.5
(3) HouseCon%GDP	Household final consumption expenditure as percent of GDP	Percent	48	45.8	2.2	4.8
(4) GiniExtended	Gini index of income inequality (lower = more equal)	Index	57.1	56	1.1	2
(5) IncBelow1D90c%WDI	Population below poverty line of \$1.90 per day PPP (2011)	Percent	57.5	55.2	2.3	
(6) IncBelow3D10c%WDI	Population below poverty line of \$3.10 per day PPP (2011)	Percent	76.4 (IFs model est.)	71.3	5.1	
(7) Population	Population in millions [Medium variant-life expectancy, World Population Prospects: The 2017 Revision]	Millions	16.1006	15.47391	0.627	4.1
(8) PovertyGap\$1c90perDay	Poverty gap at \$1.90 per day (PPP), percent	Percent	29.5	42.3	12.8	

Table 26. Poverty estimates derived from LCMS

Province	Poverty headcount below \$1 (%)	Poverty headcount below \$1.90 (%)	Poverty headcount below \$3.10 (%)	Poverty gap below \$1.90 per day (%)
Western	63.0%	84.5%	91.3%	65.9%
Luapula	59.1%	83.7%	91.3%	62.0%
Northern	60.6%	82.8%	90.6%	65.4%
Eastern	44.8%	73.5%	87.2%	45.5%
Muchinga	49.3%	72.7%	84.4%	55.6%
North-Western	35.1%	65.9%	84.0%	40.8%
Southern	28.4%	58.7%	78.1%	34.3%
Central	30.3%	58.1%	77.7%	34.1%
Copperbelt	10.9%	30.0%	49.8%	21.1%
Lusaka	5.4%	17.1%	38.6%	15.3%
Zambia	32.5%	55.2%	71.3%	22.2%

Appendix B: Details on IFs poverty projections

IFs makes use of a log-normal function for forecasting populations below poverty lines. This distribution is used as a general approximation for the composition of the population at any level of income (see Figure 25). Although this distribution does not hold for all countries (South Africa has a known bi-modal distribution of income), the log-normal assumption is common for analyzing income levels of a population. Finally, this assumption allows for IFs to estimate the income distribution of any population with just two parameters – average income and an estimate of that income distribution (Gini coefficient). As IFs forecasts these parameters and their drivers, the mean and standard deviation of the distribution changes. This, in turn, projects the proportion of populations below poverty lines dynamically over time (see Figure 26). Technical documentation on poverty and other IFs sub-models is available on the Pardee Center wiki ([https://pardee.du.edu/wiki/International_Futures_\(IFs\)](https://pardee.du.edu/wiki/International_Futures_(IFs))).

Figure 25. Demonstration of log-normal function for poverty in IFs

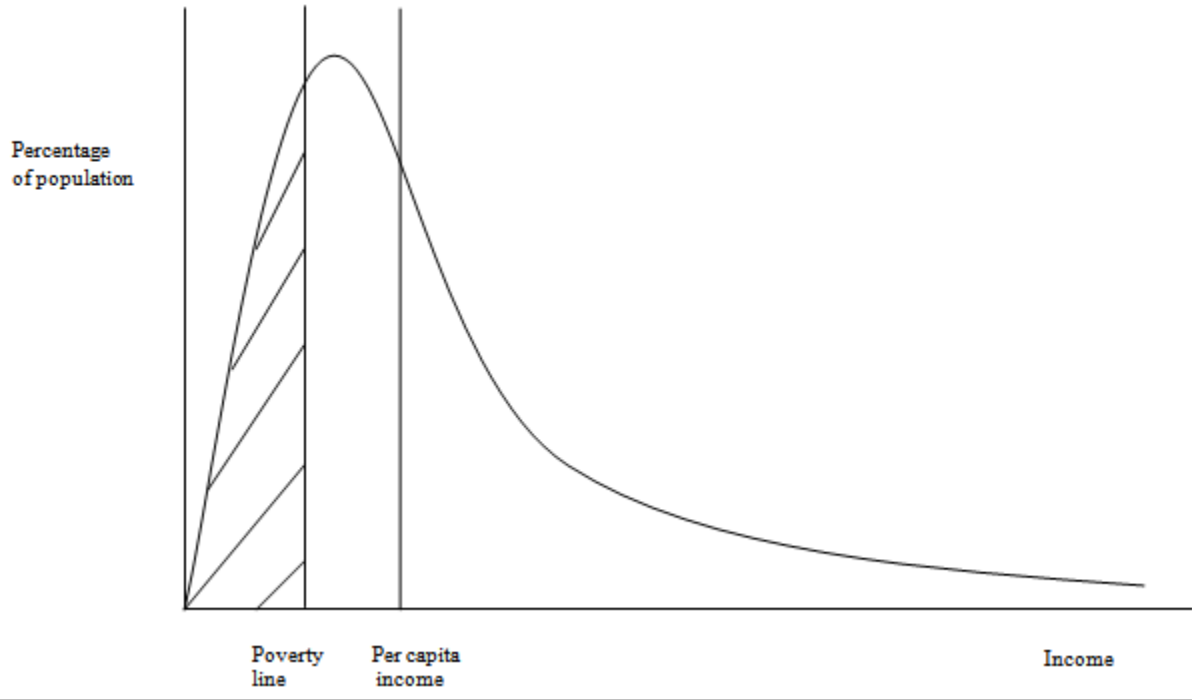
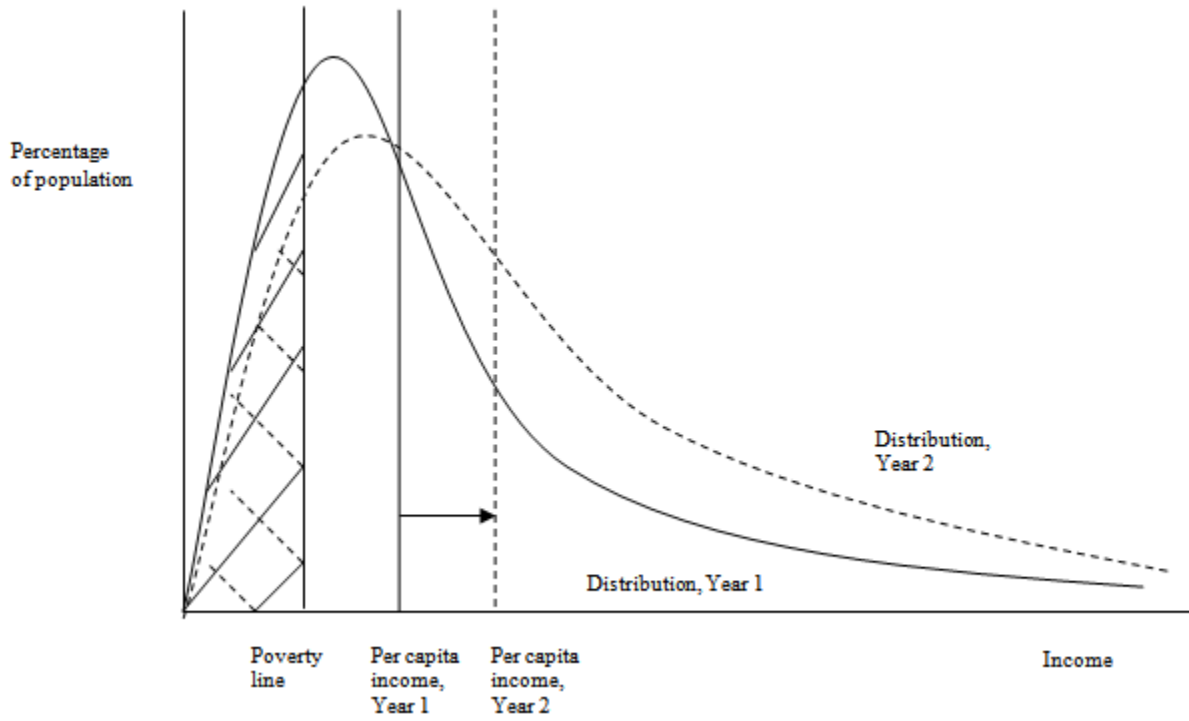


Figure 26. Demonstration of log-normal function and its use in forecasting poverty over time in IFs



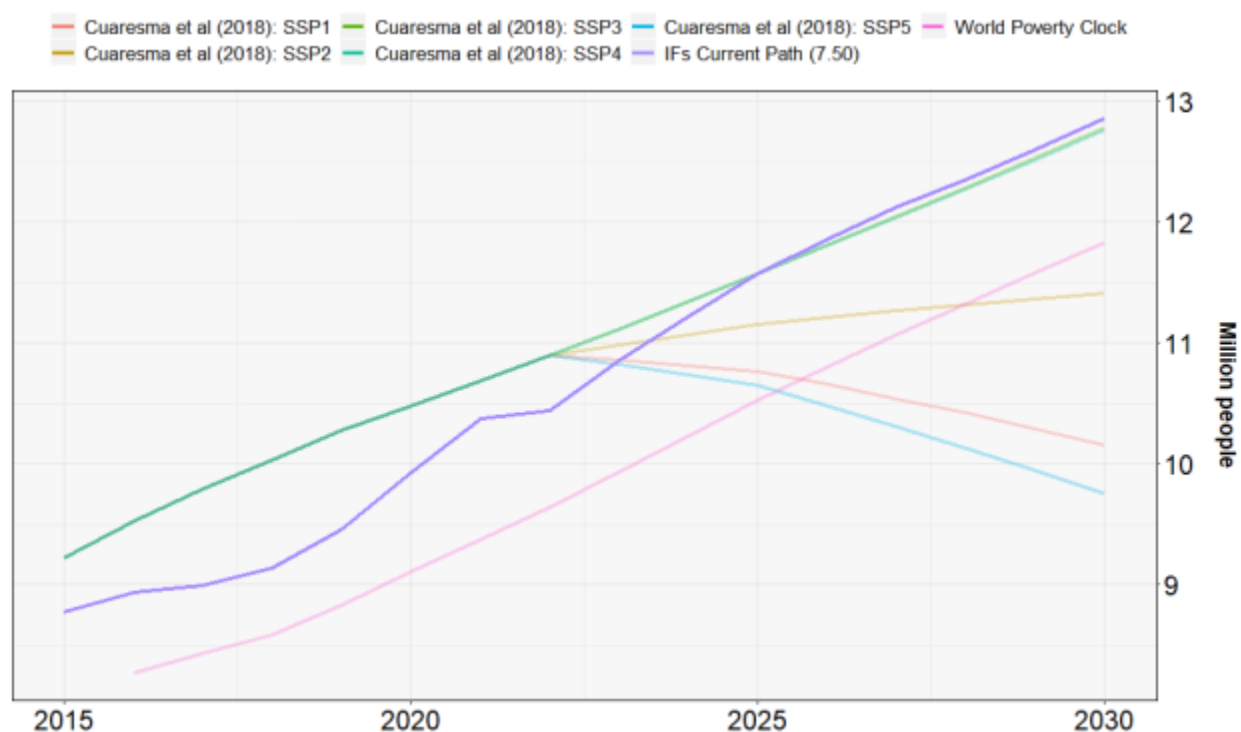
Appendix C: Comparison of IFs Current Path poverty forecasts with other projects

Other projects have taken up the task of forecasting poverty in Zambia out to 2030 and beyond. Here, we compare these projects (this list may not be exhaustive) with the IFs *Current Path*, in order to place this analysis in the broader research context. Table 27 summarizes these projects and compares their results with the IFs *Current Path*, and Figure 27 visualizes the results for projects with available annual estimates to 2030. It should be noted that the results of these comparison projects are all prior to the COVID-19 pandemic.

Table 27. Comparison of long-term poverty projections for Zambia

Project	Findings	Horizon	Comparison with IFs <i>Current Path</i>
World Poverty Clock, Kharas et al. (2018)	Estimates that extreme poverty in Zambia (\$1.90/day 2011 PPP) will grow to 11.8 million, or roughly 55% of the population by 2030. By their estimates, Zambia would have the 9 th largest stock of those in extreme poverty in 2030.	2030	Estimates that 12.9 million will be in extreme poverty (approximately 52%). The IFs <i>Current Path</i> projects roughly 3 million more Zambians in 2030 than the population estimates used by World Poverty Clock.
Cuaresma et al., (2018)	Forecasts that Zambia's poverty is growing in three of the five scenarios explored, including the baseline scenario (SSP2). They also project poverty by age and gender.	2030	Forecasts relative stagnation in the rate of extreme poverty to 2030, but with significant decline beyond.
Gates Foundation <i>Goalkeepers</i> Report (Gates & Gates, 2018)	Forecasts an increase of people in extreme poverty in Zambia from 9 million in 2017 to 17 million in 2050. Forecasts a total Zambian population of 34 million in 2050.	2050	Forecasts 15.6 million below \$1.90 line (roughly 39% of the population) in 2050. Forecasts 39 million Zambians in 2050.

Figure 27. Comparison of extreme poverty forecasts (< \$1.90/day) for Zambia to 2030



Appendix D: Scenario construction and benchmarking

The following tables outline the components of each strategic intervention scenario, including their operationalization in IFs and the benchmark (the historical or global context that suggests the reasonableness of its magnitude). Historical benchmarking is not possible for all indicators or parameters.

Table 28. Business First scenario notes

Parameter	Intervention	Notes
Total multifactor productivity, additive (mfpadding)	Interpolate to .015 over 30 years and hold	On its own, increases GDP growth rate by a modest amount, but in combination with other interventions in this set, the aggregate increase is about .5% per year over the 2020-2060 period.
Foreign direct investment inflows, multiplier (xofdifinm)	Interpolate to 1.5 over 20 years and hold	Increases FDI as % of GDP by an average of 1.5% over Current Path from 2020-2060.
Government effectiveness, multiplier (goveffectm)	Interpolate to 1.2 over 20 years and hold	Historical benchmarking not readily available for this indicator. On this 5-point scale, OECD countries average 3.8 and non-OECD countries average 2.1 (with most recent data). As such,

		20 percent increase over the <i>Current Path</i> was deemed reasonable.
Government corruption, multiplier (govcorruptm)	Interpolate to 1.2 over 20 years and hold	Historical benchmarking not readily available for this indicator. On this 10-point scale, OECD countries average 6.9 and non-OECD countries average 3.4 (with most recent data). As such, 20 percent increase over the <i>Current Path</i> was deemed reasonable.
Economic freedom, multiplier (econfreem)	Interpolate to 1.2 over 20 years and hold	Historical benchmarking not readily available for this indicator. On this 10-point scale, OECD countries average 7.9 and non-OECD countries average 6.5 (with most recent data). As such, 20 percent increase over the <i>Current Path</i> was deemed reasonable.

Table 29. Pro-poor Priority scenario notes

Parameter	Intervention	Notes
Agricultural yield, multiplier (ylm)	Interpolate to 1.6 over 20 years and hold	This improves yield to 6 metric tonnes per hectare in 2050. Rwanda improved its yield from 5.9 to 9.7 in 14 years (2000 to 2014).
Modern contraception use, multiplier (contrusm)	Interpolate to 1.2 over 20 years and hold	According to DHS, unmet family planning needs are most significant in rural provinces.
Caloric consumption per capita, multiplier (clpcm)	Interpolate to 1.2 over 10 years and hold	Necessary to include so that improvements in agricultural productivity are consumed in Zambia and not exported.
Agricultural loss in transportation from farm to consumption, multiplier (aglosstrasm)	Interpolate to .4 over 20 years and hold	Holds agricultural loss relatively constant to 2060.
Investment in agriculture, multiplier (aginvm)	Interpolate to 1.7 over 20 years and hold	Doubling agricultural investment over <i>Current Path</i> by 2060.
Worker remittances (inflows), multiplier (xworkremitm)	Interpolate to 1.2 over 20 years and hold	Historical benchmarking not readily available for this indicator.
Government to household transfers, (unskilled households), multiplier (govhtrnwelm)	Interpolate to 2 over 20 years and hold	Historical benchmarking not readily available for this indicator. By 2050, household transfers comprise approximately 15% of Zambia's GDP (compared with 8.5% in the <i>Current Path</i>). Cumulatively, this scenario increases social cash transfer spending by over 80 billion dollars through 2060 (using a 3% discount rate).

Table 30. Human Capital Push scenario notes

Parameter	Intervention	Notes
AIDS death rate as % of infection rate, multiplier (aidsdratem)	Interpolate to .5 over 20 years and hold	50 percent reduction relative to the <i>Current Path</i> .
Primary education quality score, multiplier (edqualpriallm)	Interpolate to 1.2 over 20 years and hold	Improves average score to 45 in 2050 (compared to 36 in the <i>Current Path</i>).
Maternal mortality ratio, multiplier (matmorratiom)	Interpolate to .5 over 20 years and hold	Reduces the maternal mortality rate to 38 per 100,000 live births in 2050, effectively

		achieving this SDG target (< 75) approximately 10 years sooner than the <i>Current Path</i> .
Mortality from communicable diseases, multiplier (hlmortm)	Interpolate to .9 over 20 years and hold	10 percent reduction relative to the <i>Current Path</i> .
Mortality from unintentional injuries, multiplier (hlmortm)	Interpolate to .9 over 20 years and hold	10 percent reduction relative to the <i>Current Path</i> .
Net primary intake rate, multiplier (edpriintnm)	Interpolate to 1.2 over 20 years and hold	Angola increased from 45% to universal intake in 12 years (1998-2010)
Lower secondary transition rate from primary school, multiplier (Edseclowtranm)	Interpolate to 1.2 over 20 years and hold	Available benchmarks: <ul style="list-style-type: none"> • Tanzania: 21% to 52% from 2000 to 2010 • Burundi: 15% to 61% from 1990 to 2005 • Ivory Coast: 71% to 92% from 2006 to 2015
UNDP Gender Empowerment Measure (GEM), multiplier (gemm)	Interpolate to 1.5 over 20 years and hold	Botswana improved from .4 to .55 in 14 years (1995 to 2009). Improves GEM to the level of the SADC leader (South Africa) by 2050.

Table 31. Infrastructure Emphasis scenario notes

Parameter	Intervention	Notes
Sanitation access, improved quality, multiplier (sanitationm)	Interpolate to 2 over 20 years and hold	Access to improved sanitation reaches 76 percent of Zambians by 2040 (compared to 54 percent in 2040 in the <i>Current Path</i>).
Paved roads, multiplier (infraroadpavedpctm)	Interpolate to 1.5 over 20 years and hold	Percent of paved roads improves to 60 percent by 2040.
Water access, improved quality (watsafem)	Interpolate to 3.5 over 20 years and hold	Access to piped water reaches 69 percent of Zambians by 2040 (compared to 40 percent in the <i>Current Path</i>).
Mobile broadband access, multiplier (ictbroadmobilm)	Interpolate to 1.2 over 20 years and hold	Access reaches 130 subscriptions per 100 people in 2040.
Electricity access, multiplier (infraelecaccessm)	Interpolate to 1.3 over 20 years and hold	Access to electricity reaches half of all Zambians by 2040 (compared to 41 percent in the <i>Current Path</i>).

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