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Potential effects of the COVID-19 lockdowns on long-term educational attainment in Uganda

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Executive Summary

The disruption due to COVID-19 in the pandemic's first two years has caused a significant loss in learning and quality of education in Uganda. Over 15 million learners are estimated to have missed school and some teachers resorted to other economic activities. This reduction in enrollment has consequences for other population-level education outcomes in the long run. This policy note uses the International Futures system to explore the potential impact of COVID-19 learning disruption on educational outcomes and long-term productivity in the 15 sub-regions of Uganda up to 2050. We examine the pre-pandemic development trajectory, which represents a "No COVID" scenario, and then model an "Education Shock" scenario that simulates the long-term impact of total school closure between 2020 and 2021. The "Education Restitution" scenario simulates an ambitious but reasonable sustained five-year recovery policy push from 2023 that improves and returns key education indicators to their pre-COVID trajectory.

Findings show that in the Education Shock scenario, by 2030, about 1.8 million more adults aged 15 years and over will not have completed primary education, and by 2050 nearly 3 million more adults will not have attained primary education relative to the No COVID scenario (projected at 22.7 million in that year). The number of adults attaining secondary education reduces by approximately 325,000 and 830,000 in 2030 and 2050, respectively. Geographically, all 15 sub-regions record educational outcomes lower than their No COVID trajectory. The regional gap in primary education outcomes widens over the time horizon and only starts reducing after 2030, although the sub-regions of West Nile, Tooro and Karamoja lag in their recovery compared to the other regions. Unlike primary attainment outcomes, which start to improve after 2030, the gap from the No COVID scenario in secondary attainment rates increases for every region over the forecast period. This is partly because of relatively low primary to secondary transition rates. By 2050, the COVID-19 pandemic and the subsequent setback in education result in a cumulative GDP loss of \$383 billion, relative to the No COVID scenario.

In the Education Restitution scenario, key educational outcomes and indicators return to the No COVID trajectory by 2030. In this scenario, 1.4 million more adults have primary educational attainment. This is 12 percent higher compared to the Education Shock scenario (11.7 million people). In addition, over 343 500 more adults attain secondary education by 2030. Even in this scenario, by mid-century, only about 47 percent of adults will have completed primary school, and only \$229 billion of the cumulative GDP loss is made up. Uganda will therefore require a lot more financial and human capital resources in the coming decade to significantly improve its educational outcomes.

There is an urgent need for policy actions that encourage and incentivize all learners to enroll back in school and resume learning to curb bottlenecks in the education system. Additionally, budgetary allocations to encourage student survival, train and adequately remunerate teachers and accelerate infrastructure that promote distance learning, especially for the poorly performing regions like Karamoja, are crucial in the face of COVID-19 pandemic uncertainty.

Background

Since its outbreak in November 2019, the coronavirus (COVID-19) pandemic has affected education systems globally. To reduce the spread of the disease, different countries adopted different containment measures. These ranged from partial to total lockdowns that saw schools in most countries closed for considerable amounts of time. In Uganda, schools were first closed in March 2020 and re-opened in a phased manner in October 2020. However, a second wave spurred by the Delta variant led to schools abruptly closing again in June 2021 and only re-opening in January 2022. This effectively means that schools were closed for about 22 months, the longest COVID-19-induced school closure globally (Green, 2022).

The extended school closure has had far reaching impacts on students, teachers, school operations and the country's human capital development efforts in general. Estimates show that over 15 million learners missed out on school for nearly two years (Ministry of Education and Sports, 2021). The National Planning Authority (NPA) estimates that the primary subsector was the hardest hit, with about 60 percent of learners unable to continue learning during the school closure period, whereas the secondary and tertiary sub-sectors are projected to have lost about 44 percent and 42 percent of learners respectively (NPA, 2021). Moreover, it is projected that about 30 percent of students may not return to school (NPA, 2021). Notably, there appears to be a disproportionate effect on females, with over 644,955 teenage pregnancies recorded during the school closures (UNFPA, 2021). Busoga, North Central, Lango, South Central, West Nile and Tooro regions recorded the highest numbers of teenage pregnancies (UNFPA, 2021). Beyond the effects on students, teachers also suffered uncertainty with respect to their livelihoods. Some, especially in private schools, went for prolonged periods without receiving a salary while others had to endure reduced salaries (Kahunde et al., 2022). To make matters worse, some schools closed due to the increasing cost of managing the schools without parents' contributions in the form of school fees (Mwesigwa, 2022).

The pandemic exposed discrepancies within an already-struggling education system. It exacerbated differences in access to education, quality of education and performance between rural and urban areas (UBOS, 2021). While many students in urban areas continued learning through the 22-month closure, either through private arrangements or efforts made by the government to ensure learning continuity, many learners from rural areas and from lower socio-economic backgrounds had no access even with government efforts due to limited access to mobile devices, televisions, radios and newspapers through which learning was being delivered (Parkes et al., 2020) as found in data collected through mobile phone

interviews in May-June 2020 with 18 girls and 16 boys (mainly aged 16-19 years. According to the Uganda Bureau of Statistics (UBOS, 2021), by November 2021, fewer children in households located in rural areas reported engagement in learning or education (30 percent) compared to those in households in urban areas (47 percent). Children in the Central region reported considerably higher participation in education activities (48 percent) compared to other regions. This exposes the glaring sub-national differences in the impact of the pandemic on the education sector. It should, however, be noted that we make uniform interventions across the regions, and this might not capture the true extent of region-specific disruptions in learning.

This policy note examines the long-term impact of COVID-19, specifically the prolonged school closure, on the educational outcomes and economic productivity in Uganda. The note measures educational outcomes through two indicators – the completion rate for both primary and secondary, and the average years of education, while economic productivity is measured through the gross domestic product (GDP).

Methodology

The International Futures (IFs) modeling platform is a global long-term forecasting tool that integrates human, social and physical development systems grouped into sub-models: Demography, economy and finance, education, health, agriculture, environment, energy, infrastructure, technology, governance, and international politics. The data in IFs come from several standardized international sources, including the World Bank, World Health Organization (WHO) and various United Nations (UN) bodies like the Food and Agricultural Organization (FAO) and United Nations Population Fund (UNPF).

The sub-models in IFs are dynamic and simulate how change in one system affects change across all the other systems. The education sub-model forecasts enrollment, financing and attainment of education by gender for 186 countries. Education is conceptualized like a pipeline, where attainment of one level enables attainment of the next, while bottlenecks at any point in the pipeline affect progress to subsequent educational levels. The model accounts for formal education at primary, lower and upper secondary and tertiary levels. Pre-primary data and forecasts are not included due to variability across countries (Irfan, 2017). Nonetheless, we recognize the importance of pre-primary education and the foundational role it plays to the success of students in ensuing learning stages.

Table 1 Summary of scenarios

Scenario	Description
No COVID	This scenario reflects the baseline trajectory of education outcomes and indicators before the pandemic – the most likely path forward if the COVID-19 pandemic had not happened. It is the projected continuation of historical trends from the dynamic integration of various sub-systems in IFs prior to 2019 before the pandemic hit.
Education Shock	This scenario simulates the negative impact of COVID-19 in Uganda. It reflects a set of changes in various education parameters to reach reduced enrollment values in 2020 and 2021 reflective of COVID-19 school closure and learning disruption. In 2022, a rebound is simulated with the re-opening of schools, and we show Uganda's likely trajectory until 2050.
Education Restitution	This scenario simulates a moderate recovery from COVID-19. It reflects the rebound of a set of educational parameters to at least aim for the pre-pandemic baseline trajectory in key educational indicators by 2030.

This brief explores three scenarios. The “*No COVID*” scenario shows the projected pre-pandemic baseline trajectory of Uganda, without the effect of COVID-19—what is likely to have occurred in the absence of the pandemic. The second scenario is the “*Education Shock*” scenario, and the interventions simulate a shock to the education sector as a result of prolonged lockdown in 2020 and 2021 due to COVID-19. The shocks are target adjustments for the two years of learning disruption as estimated by the National Planning Authority (NPA) and UBOS in 2021(NPA, 2021; UBOS, 2021). The adjustments are applied to various schooling parameters to simulate reduced enrollment. The specific adjustments and magnitudes of change are included in the annex. Finally, the “*Education Restitution*” scenario simulates a concerted policy effort to improve and return education outcomes to the pre-pandemic pathway. It pushes on primary and secondary levels where bottlenecks have been identified. The scenario assumes successful implementation of policies to ensure learners return and stay until the last grade of the relevant educational level to progress to the next stage.

Findings

Primary education outcomes- enrollment and completion rates

As a country, Uganda has achieved universal primary enrollment thanks to an ambitious push to bring primary students into school. However, regional disparities exist. While 13 of 15 regions are estimated to have had gross primary enrollment rates of over 100 percent in 2019, Karamoja still lagged with a rate of 84 percent. Moreover, even of those enrolled, many students will not finish their primary education. Primary survival (the percent of an incoming cohort who continue through their primary education to completion) has been identified as a significant educational bottleneck in the country. In 2019, fewer than half of incoming primary students were expected to complete their primary education, and just 42 percent of of-age children have completed primary school.

Due to school closures in 2020 and 2021, gross enrollment¹ significantly declined. With schools re-opening, it is expected that enrollment will bounce back as many parents, teachers and students are eager to resume learning. However, reports indicate that many students who took up jobs to support their families during the pandemic and others who have fallen prey to early childhood marriage and teenage pregnancies may not return to continue their education (Bhatia et al., 2022). This could worsen existing bottlenecks in Uganda's educational system and affect attainment of subsequent educational levels.

In the *Education Shock* scenario, enrollment rates bounce back as children return to school, but it is only after 2030 that Uganda's enrollment rates go back to the pre-pandemic trajectory. Regions like Kampala and South Central have some of the highest educational access. This is unsurprising and can be attributed to the urbanized nature of both regions. Because of relatively better access to educational facilities, most learners can attend school and finish within the age-appropriate years. In addition, at the height of the pandemic, many learners in the two regions had comparatively better access to distance learning tools like the internet and radio thus disruption in schooling was less severe relative to most of the other regions (Biryomumaisho, 2020). By contrast, Karamoja is projected to continue to lag behind other regions even by 2050. The Karamoja region generally lags because it was already starting from a very low base due to comparatively limited access to educational opportunities prior to the pandemic (BMAU, 2018) and other underlying vulnerabilities like poverty, poor infrastructure, and inadequate teachers.

This disruption in the schooling pipeline will, in the long run, affect the overall population's educational attainment. The educational

¹ Gross enrollment refers to the number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. Thus, it is not uncommon, due to the enrollment of children outside of a level's typical age range, for gross enrollment rates to exceed 100 percent.

attainment level of adults aged 15 years and over in Uganda is projected to grow over time but will remain behind the *No COVID* scenario. By the end of 2050, just 68 percent of adults are projected to have completed primary education, compared to 72 percent in the *No COVID* scenario. Each region is expected to observe a lower primary completion rate than their *No COVID* scenario. By 2030, all the regions are expected to post even lower completion rates. Kigezi, Bugisu and Busoga show the greatest differences from their *No COVID* scenario. Every region shows improvement over the 2050 time horizon although the gap between Karamoja's *No COVID* and *Education Shock* scenario widens. Karamoja is forecast to have the fourth largest drop in its primary completion rate after West Nile, Ankole and North Central. This shows how regional recovery will differ and fluctuate over time for varying contextual reasons such as pre-existing rates of access to educational facilities and levels of development. Concerningly, the more marginalized regions show continued deterioration in their educational outcomes over the forecast period. Specifically, Karamoja will trail the rest of the regions with a 58.6 percent primary completion rate by 2050—a 13.6 percentage point difference with the best performing region, Kigezi, in the same year.

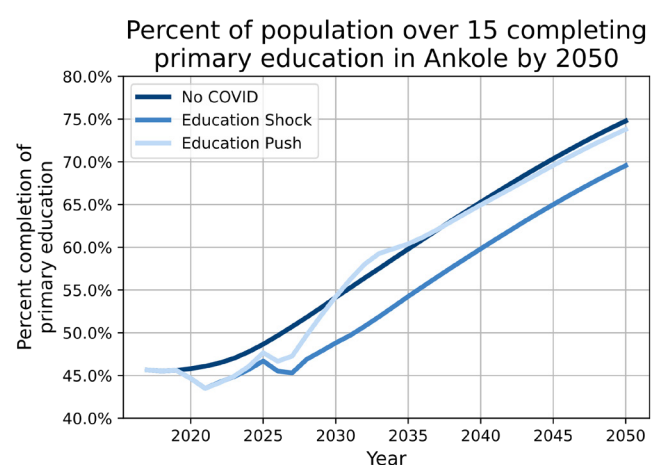
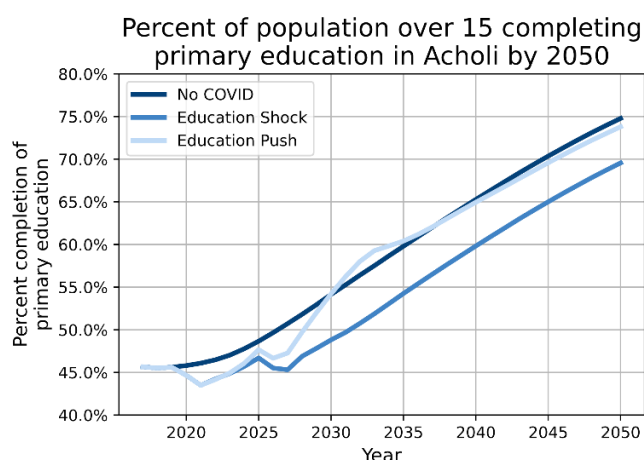
In the *Education Restitution* scenario, Uganda's enrollment rates are forecast to be much higher at about 130 percent relative to 117 percent in the *Education Shock* scenario by 2030, and Uganda's gross enrollment rates track the pre-pandemic trajectory to 2050. Adult primary completion rate is over five percentage points more than in the *Education Shock* scenario (48 percent) by 2030. This represents approximately 13 million adults with primary education compared to 11.7 million adults in the *Education Shock* scenario.

By 2050, the rate of adults having attained primary education is projected to reach 72 percent (32 million people) compared to 68 percent (31 million) in the *Education Shock* scenario. Regionally, 14 of the sub-regions will have adult primary completion rates of over 50 percent by 2030 with Kigezi, Ankole and West Nile in the top three. By 2050, West Nile, Kigezi, Ankole, Acholi, South Central and Teso will have the highest completion rates. Karamoja is the worst performer in both years.

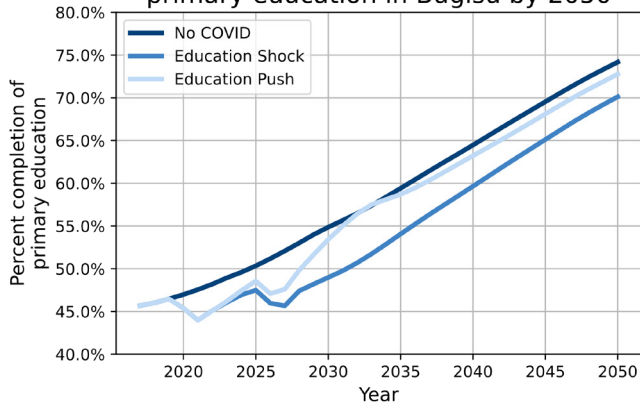
The *Education Restitution* scenario achieves a return to the pre-COVID trajectory for most of the regions. The boost in regions like Karamoja and Teso is particularly significant given that they start from a much lower base and improvements in educational outcomes could go a long way in their socio-economic transformation. However, the country will require a much greater and persistent push to improve overall education outcomes. Even at the *No COVID* scenario, Uganda's educational performance was not satisfactory. Such a push will require massive financial and human capital resources that the country must adequately raise, prioritize and allocate to the sector.

Figure 1 below summarizes regional performance in adult primary completion rates for the three scenarios. The Education shock generally propagates fast on primary completion rates of the population largely because Uganda has a very youthful population. This explains the prompt dip in primary completion rates by 2021 before the regions start to rebound. The Education Restitution scenario is labelled as Education Push in the figures below

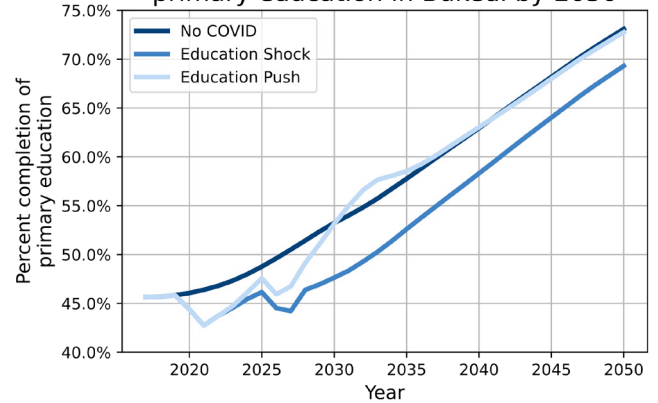
Figure 1 Primary completion rate for adults (age 15+) in each region across scenarios. Source: IFs 7.83 Uganda Sub-national.



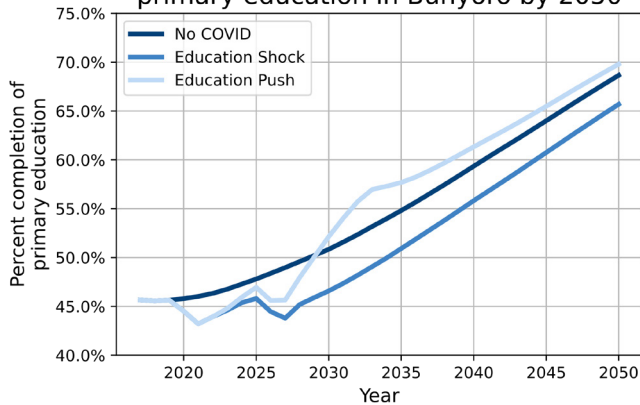
Percent of population over 15 completing primary education in Bugisu by 2050



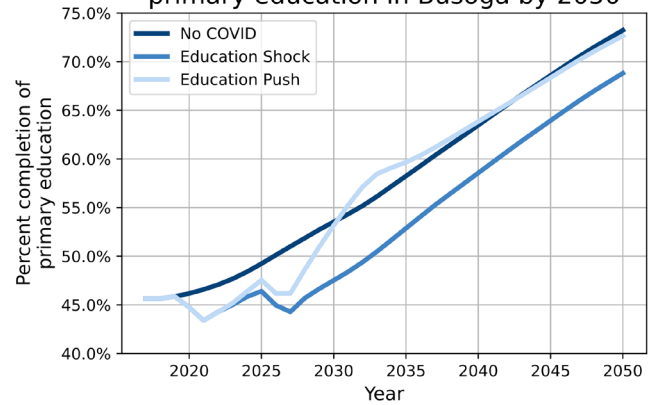
Percent of population over 15 completing primary education in Bukedi by 2050



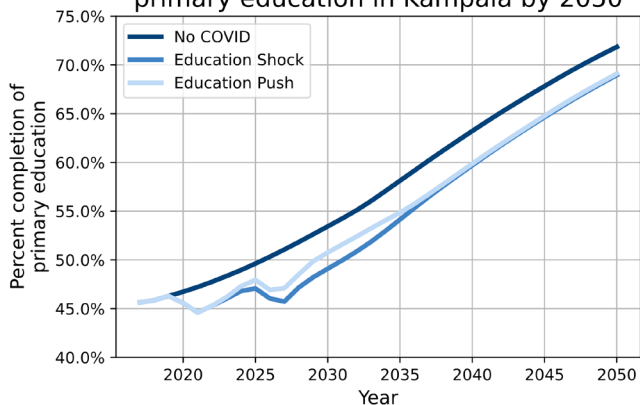
Percent of population over 15 completing primary education in Bunyoro by 2050



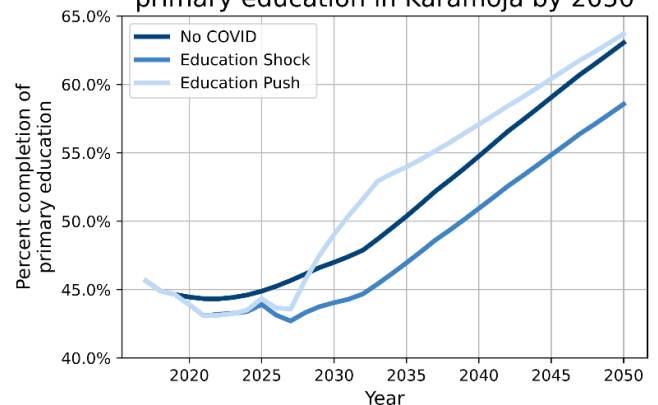
Percent of population over 15 completing primary education in Busoga by 2050



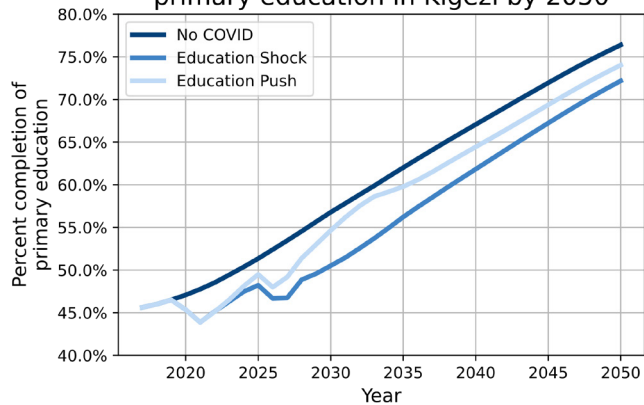
Percent of population over 15 completing primary education in Kampala by 2050



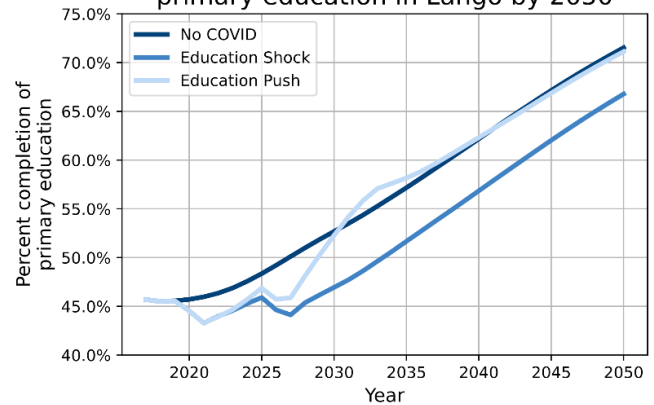
Percent of population over 15 completing primary education in Karamoja by 2050



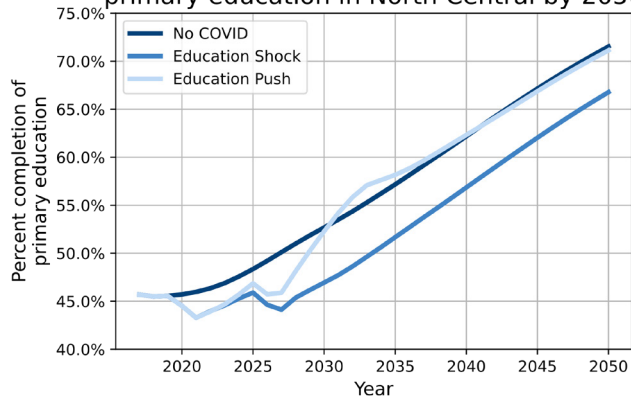
Percent of population over 15 completing primary education in Kigezi by 2050



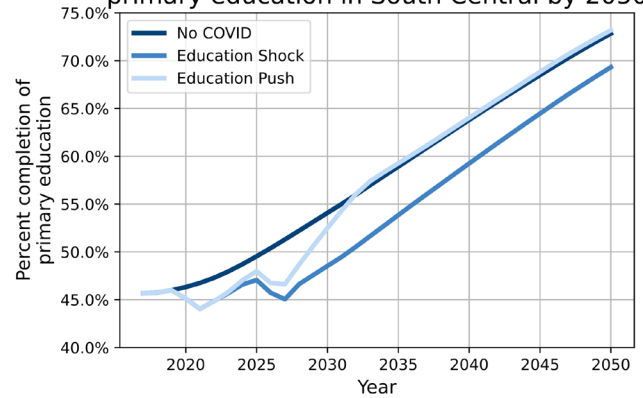
Percent of population over 15 completing primary education in Lango by 2050



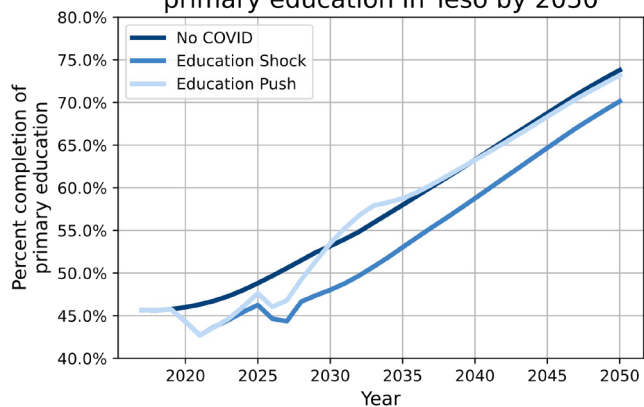
Percent of population over 15 completing primary education in North Central by 2050



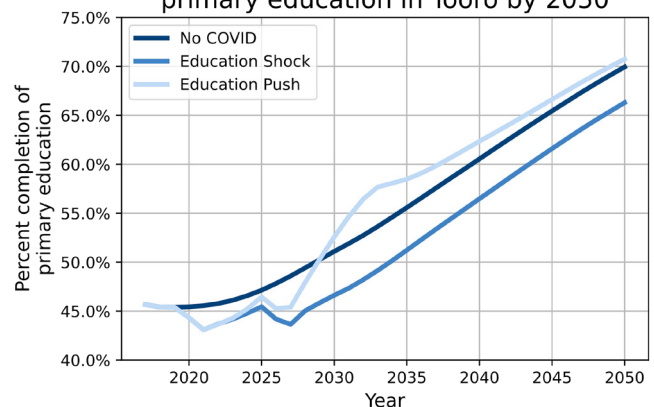
Percent of population over 15 completing primary education in South Central by 2050

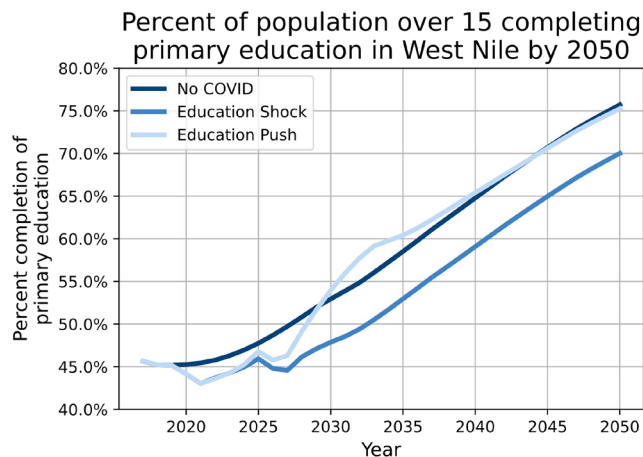


Percent of population over 15 completing primary education in Teso by 2050



Percent of population over 15 completing primary education in Tooro by 2050





Secondary education outcomes-enrollment and completion rates

Uganda introduced the Universal Secondary Education (USE) program in 2007 to extend free quality education and allow more Ugandans to pursue secondary education. However, despite these efforts, secondary education enrollment and attainment rates are still low. In 2019, only 7 of the 15 regions were estimated to have had gross enrollment rates of over 30 percent. Adult secondary completion rates were even lower with Kampala and South Central having the highest outcomes at only 10 and 5.5 percent, respectively. The learning disruption caused by the coronavirus pandemic is postulated to further exacerbate the state of secondary education outcomes.

The rate of secondary gross enrollment is expected to be a lot more repressed in its recovery compared to primary gross enrollment. In addition to secondary enrollment being quite low in the country even prior to the pandemic, many learners in their last grade of primary school were not able to continue learning nor sit their secondary qualifying exams thus making them ineligible to enter secondary school (Kerr & Baxter, 2020). Furthermore, the combined effect of higher tuition required for secondary schooling, reduced household income and other risk factors like early marriage and teenage pregnancies have the potential to negatively affect secondary enrollment rates and widen gender disparities in education (UNESCO, 2020).

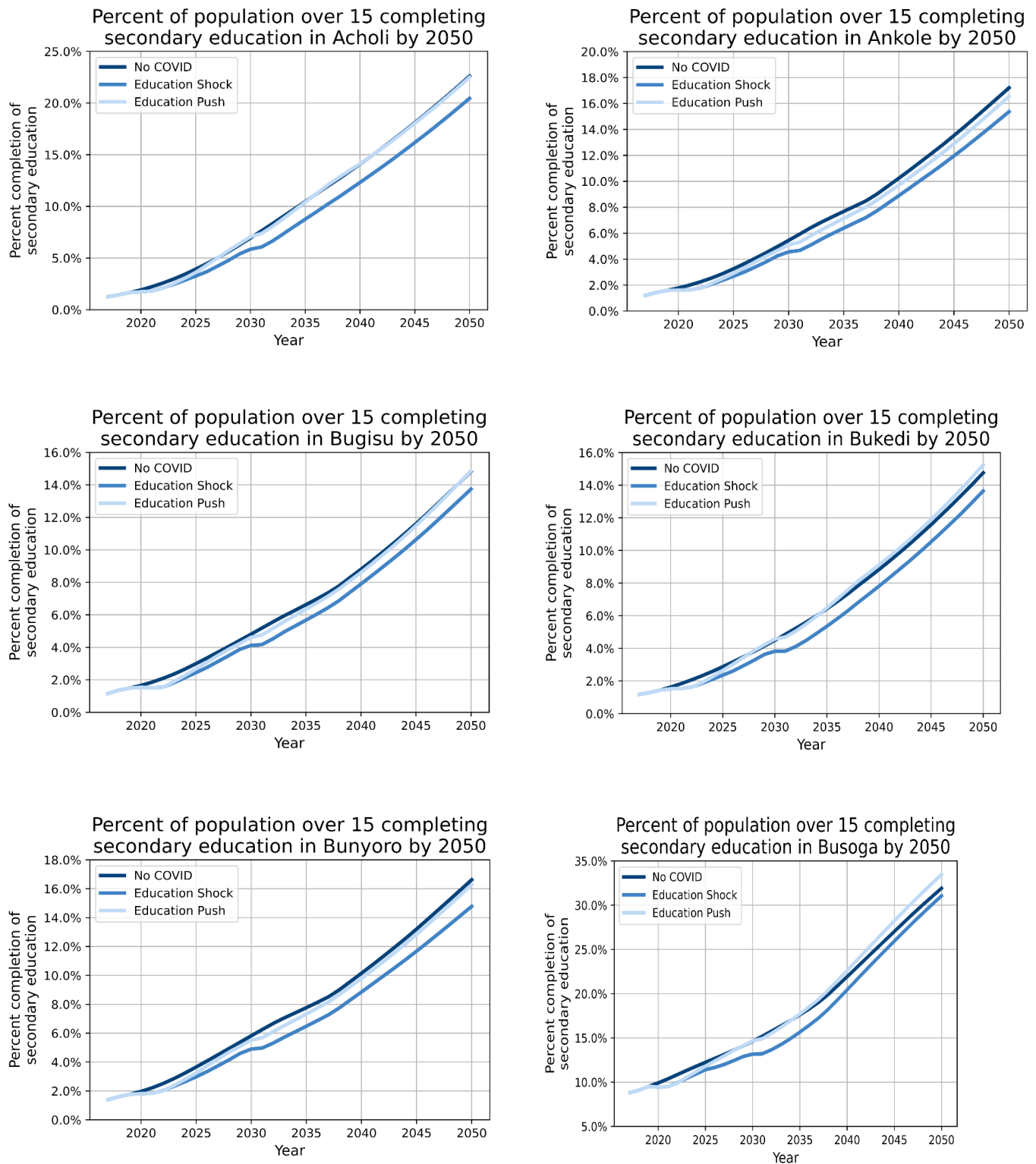
Although improvements are expected over time, by 2030, South Central, North Central and Ankole are expected to be the hardest hit in the *Education Shock* scenario and by 2050, West Nile, North Central, Ankole, Karamoja and Busoga will be the furthest off from their *No COVID* trajectory. Overall, Karamoja and Lango record the lowest enrollment rates throughout the forecast period.

Low secondary enrollment rates also affect the number of students completing secondary education in Uganda. Every region is projected to record a decline in adult secondary attainment over the next 28 years. By 2030, Karamoja, Lango, Bunyoro and Tooro will have the lowest secondary completion rates among the regions. Karamoja and Lango are forecast to lag throughout the forecast horizon. Specifically, Karamoja is expected to record a 20-percentage point gap with Kampala's adult secondary completion rate of 31 percent by 2050.

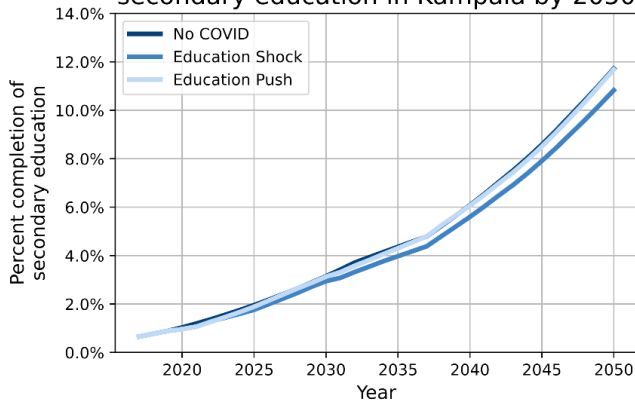
In the *Education Restitution* scenario, by 2030, only Kampala and South Central will have adult secondary completion rates of more than 10 percent. But by 2050, every region will have achieved this mark. Kampala, South Central, Ankole, Kigezi and Ankole will be the best performers while Karamoja, Lango, Bukedi, Bunyoro and Bukedi, respectively will be trailing.

Nearly all the regions bounce back to the pre-COVID trajectory in the *Education Restitution* scenario. However, improving secondary education outcomes will require even more effort by the government. Ensuring high transition rates from primary to lower secondary will be a key first step to ensure that there is a larger pool of learners in secondary school. Incentives to then keep and enable transition to upper and eventual completion of secondary school will also require massive financial and social support resources, particularly for girls who face challenges such as difficulty in going back to school after pregnancies or early marriage. Figure 2 below shows the trajectory of secondary completion rates in the three scenarios.

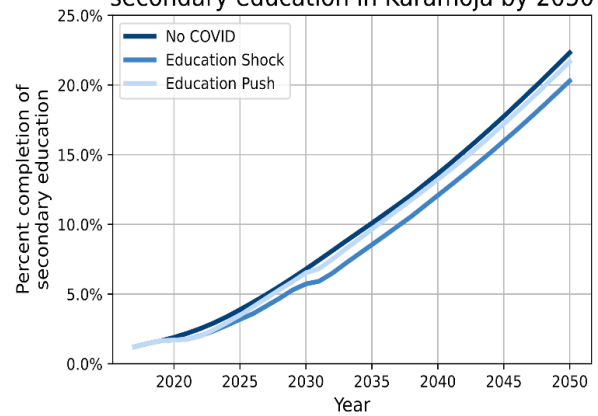
Figure 2 Secondary completion rate for adults (age 15+) in each region across scenarios. Source: IFs 7.83 Uganda Sub-national.



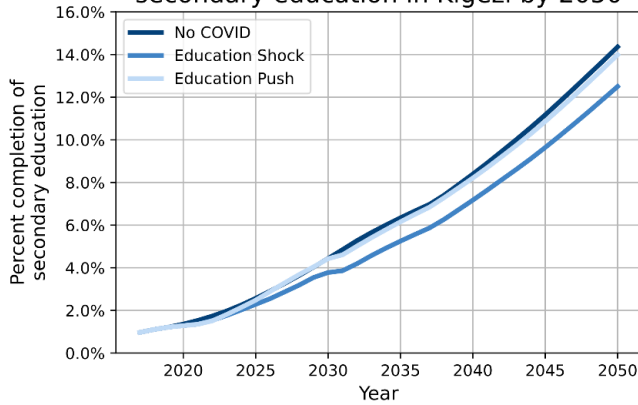
Percent of population over 15 completing secondary education in Kampala by 2050



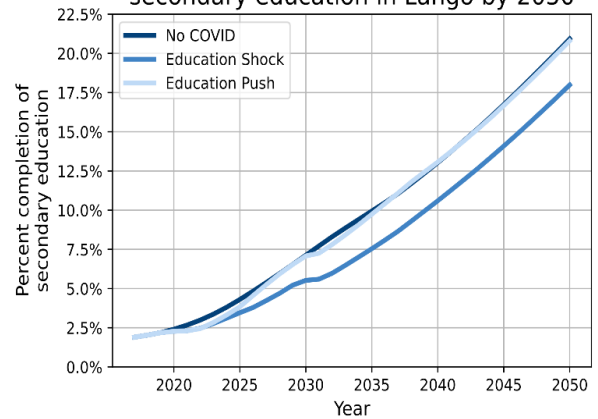
Percent of population over 15 completing secondary education in Karamoja by 2050



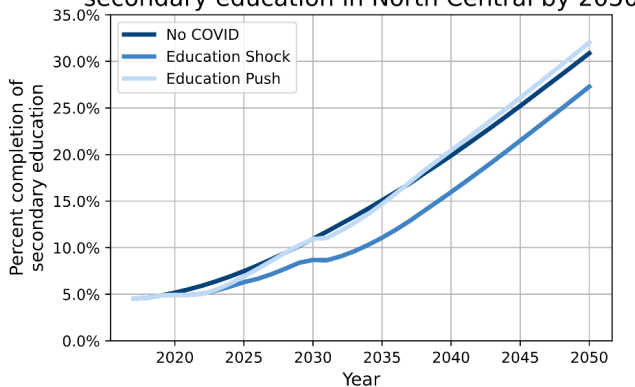
Percent of population over 15 completing secondary education in Kigezi by 2050



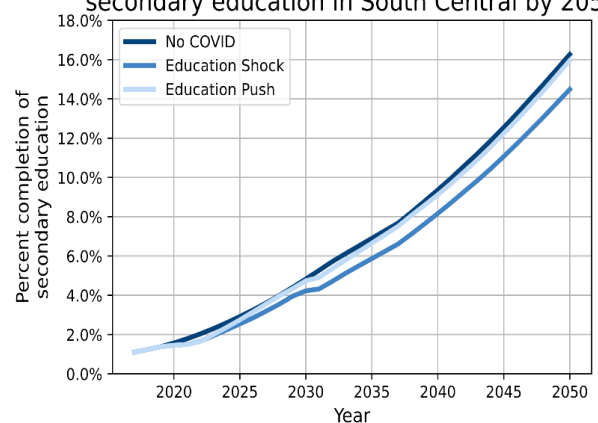
Percent of population over 15 completing secondary education in Lango by 2050

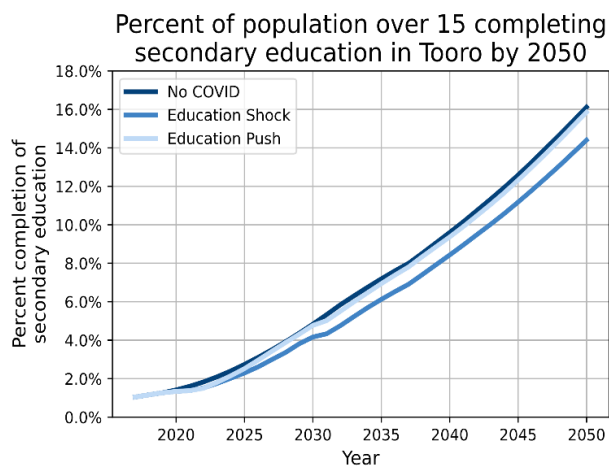
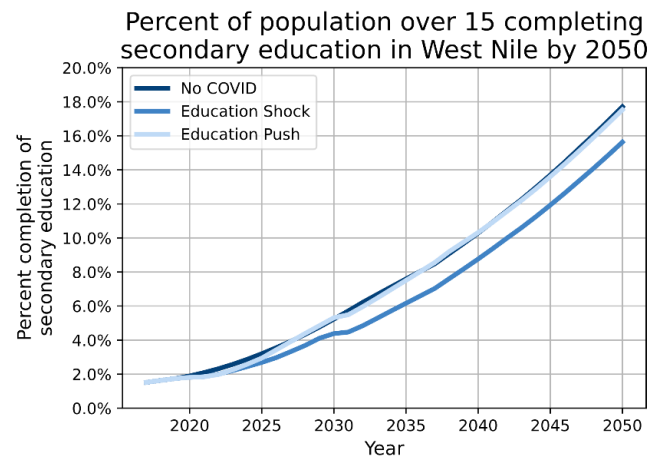
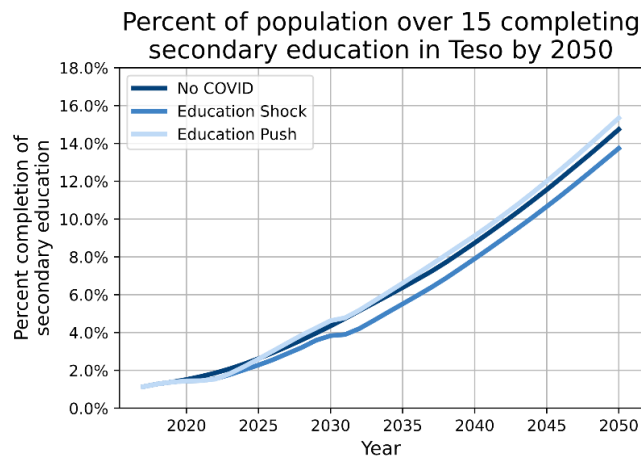


Percent of population over 15 completing secondary education in North Central by 2050



Percent of population over 15 completing secondary education in South Central by 2050





Average years of education

The average years of a population's education serves as a measure of the stock of education in the country. In the *No COVID* scenario, Uganda's mean years of education was estimated at about 6.4 years in 2021. However, reductions in the rate of adults with primary and secondary education will negatively impact the overall stock of education in the country. By 2030, the national average years of education is expected to fall by approximately 0.4 years and 0.3 years by 2050 relative to the *No COVID* scenario at 6.9 years and 8.7 years, respectively. Kampala and South Central are the two regions with the highest stock of education. Karamoja has the lowest stock of education and by 2050, the average adult is only forecast to have 4 years of education- about a 7.8-year difference in average years of education with Kampala. The average adult in Karamoja will still not have completed primary education in the next 28 years.

Table 2 Average years of education of the adult population (age 15+) in each region across scenarios. Source: IFs 7.83 Uganda Sub-national.

Region	Scenario	2017	2030	2040	2050
Acholi	No COVID	6.0	6.8	7.6	8.7
	Education Shock	6.0	6.3	7.2	8.3
	Education Restitution	6.0	6.9	7.7	8.7
Ankole	No COVID	6.3	7.2	8.2	9.3
	Education Shock	6.3	6.8	7.8	8.8
	Education Restitution	6.3	7.4	8.2	9.2
Bugisu	No COVID	6.3	7.1	7.8	8.8
	Education Shock	6.3	6.6	7.4	8.4
	Education Restitution	6.3	7.1	7.7	8.6
Bukedi	No COVID	5.9	6.7	7.4	8.3
	Education Shock	5.9	6.2	7.0	7.9
	Education Restitution	5.9	6.8	7.4	8.3

Bunyoro	No COVID	5.3	5.9	6.7	7.6
	Education Shock	5.3	5.6	6.4	7.3
	Education Restitution	5.3	6.1	6.9	7.7
Busoga	No COVID	6.5	7.2	8.0	8.9
	Education Shock	6.5	6.7	7.6	8.5
	Education Restitution	6.5	7.3	8.0	8.9
Kampala	No COVID	10.3	10.6	11.3	12.1
	Education Shock	10.3	10.3	11.0	11.9
	Education Restitution	10.3	10.5	11.1	12.0
Karamoja	No COVID	1.1	2.0	3.1	4.4
	Education Shock	1.1	1.8	2.8	4.0
	Education Restitution	1.1	2.3	3.3	4.4
Kigezi	No COVID	6.6	7.6	8.5	9.5
	Education Shock	6.6	7.1	8.1	9.1
	Education Restitution	6.6	7.5	8.3	9.3
Lango	No COVID	5.7	6.4	7.1	8.0
	Education Shock	5.7	6.0	6.8	7.7
	Education Restitution	5.7	6.5	7.2	8.0
North Central	No COVID	6.6	7.3	8.1	9.1
	Education Shock	6.6	6.8	7.6	8.6
	Education Restitution	6.6	7.4	8.2	9.1
South Central	No COVID	8.1	8.7	9.6	10.8
	Education Shock	8.1	8.2	9.1	10.3
	Education Restitution	8.1	8.7	9.7	10.8
Teso	No COVID	6.5	7.2	7.9	8.8
	Education Shock	6.5	6.8	7.5	8.5
	Education Restitution	6.5	7.4	7.9	8.8
Tooro	No COVID	6.0	6.5	7.3	8.2
	Education Shock	6.0	6.2	7.0	7.9
	Education Restitution	6.0	6.8	7.5	8.3
West Nile	No COVID	5.0	5.9	7.0	8.2
	Education Shock	5.0	5.5	6.6	7.7
	Education Restitution	5.0	6.1	7.1	8.1

In the *Education Restitution* scenario, the mean years of education records a considerable increase in each of the regions with Kampala, South Central, Ankole and North Central, respectively having the largest stock of education. In Karamoja, the average adult is projected to have only about 4.4 years of education even by 2050. Mean years of education for a country move slowly thus, much more sustained investment in improving primary and secondary outcomes is necessary and will more positively affect the stock of education and overall human capital in Uganda.

Impact on gross domestic product (GDP)

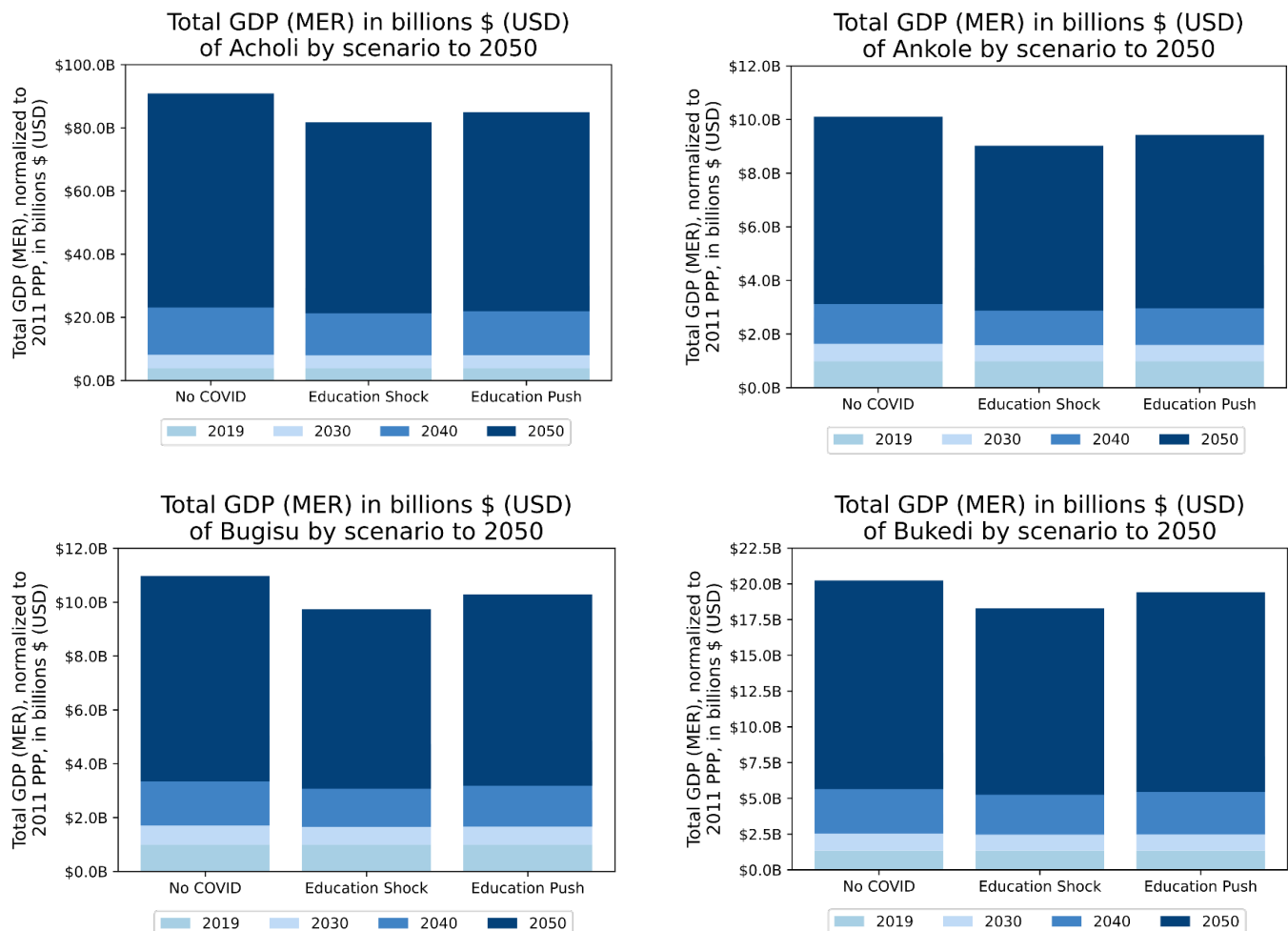
Education is a key driver of change and significantly determines the socio-economic prospects of a country. However, education is a slow-moving system and some of its benefits only manifest in the long-term. In Uganda, the negative impact on GDP owing to disruption in education grows significant over time and not only reflects the learning loss in absolute numbers but also the deterioration in the quality of education and associated skills and opportunities required to increase productivity in the country. These

two aspects contribute to the reduction in the size of the economy. By 2050, Uganda is expected to have a GDP nearly \$71 billion less than that projected along the *No COVID* development trajectory. South Central, Ankole, North Central, Kampala and Busoga are the largest regional economies and thus the largest declines in absolute GDP values are also projected to happen in these regions. Additionally, all the regions record between 10 and 12 percent decline in GDP relative to their *No COVID* scenarios in 2050.

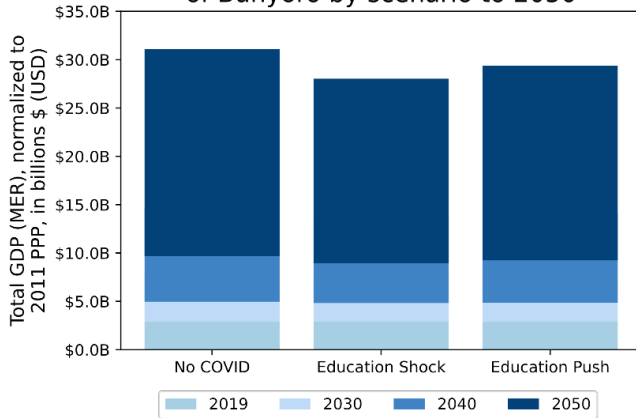
In the *Education Restitution* scenario, South Central, North Central, Ankole and Kampala, respectively would be the leading economies

with a total GDP size of approximately \$328.5 billion in 2050. This accounts for 75 percent of Uganda's economy and is five percent greater than in the *Education Shock* scenario at \$316.5 billion in that year. Karamoja and Lango lag with GDP sizes of no more than \$5.6 billion each by 2050. A much more educated population has skills necessary for greater economic productivity. Figure 4 shows the economic expansion that is possible if Uganda and its geographical regions were to improve their educational outcomes to pre-pandemic levels.

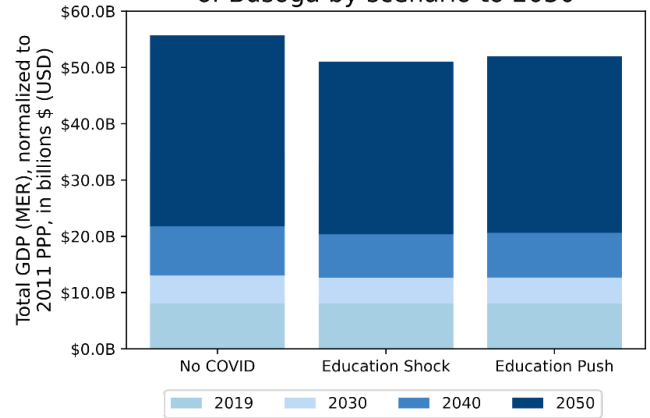
Figure 3 GDP (MER) in 2011 US Dollars in each region across scenarios. Source: IFs 7.83 Uganda Sub-national.



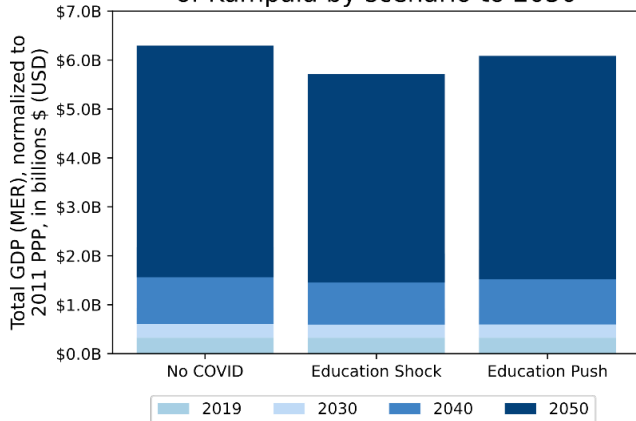
**Total GDP (MER) in billions \$ (USD)
of Bunyoro by scenario to 2050**



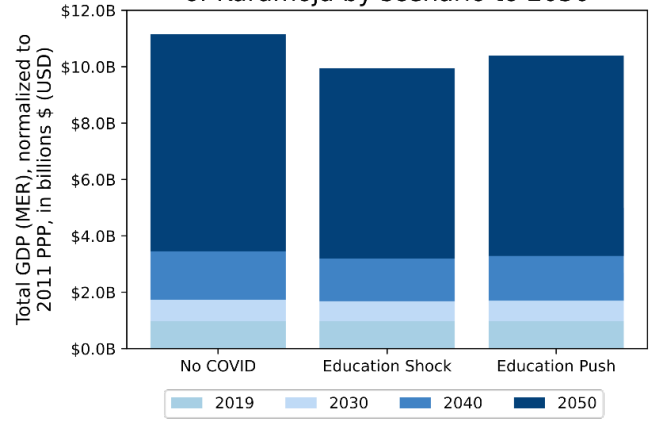
**Total GDP (MER) in billions \$ (USD)
of Busoga by scenario to 2050**



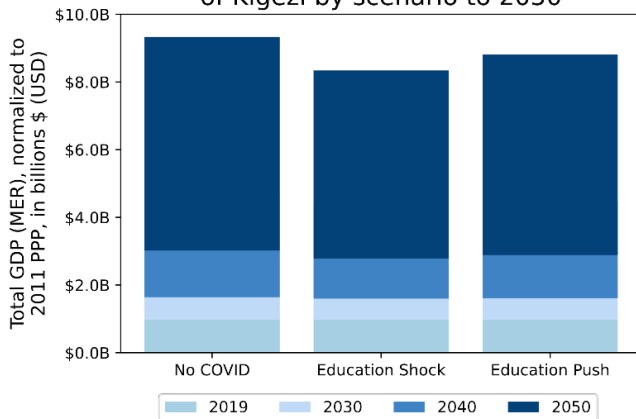
**Total GDP (MER) in billions \$ (USD)
of Kampala by scenario to 2050**



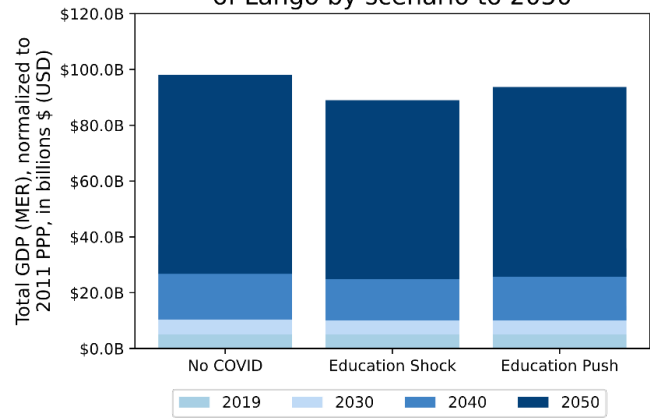
**Total GDP (MER) in billions \$ (USD)
of Karamoja by scenario to 2050**

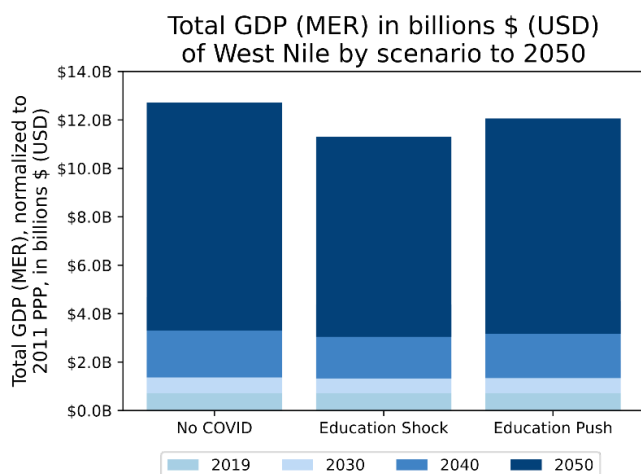
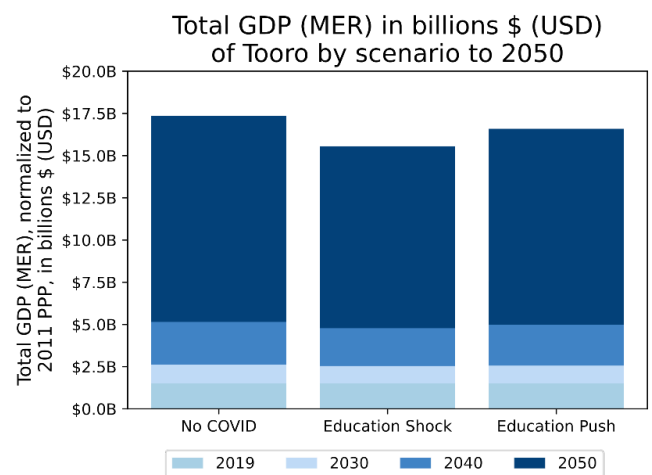
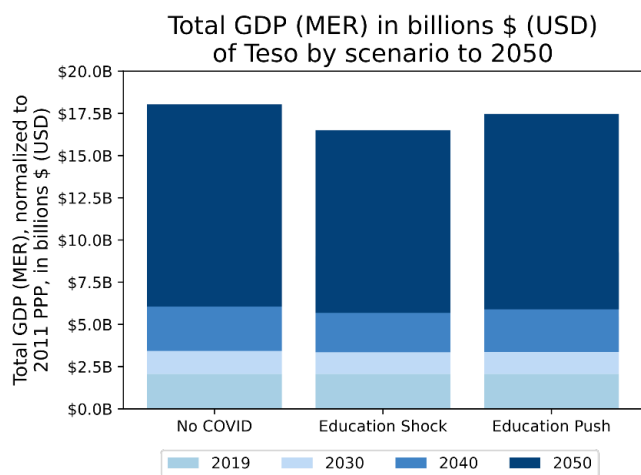
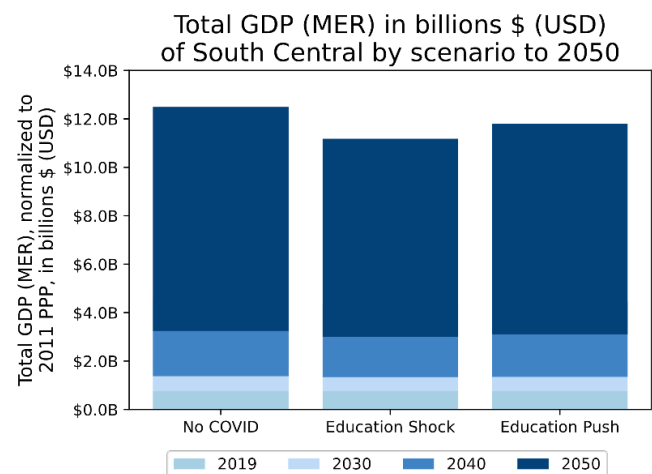
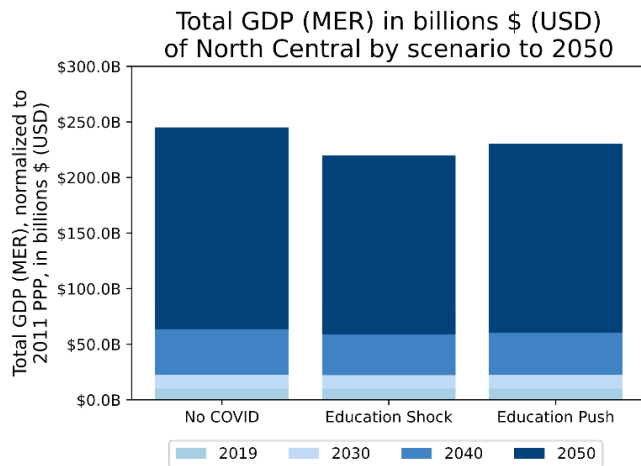


**Total GDP (MER) in billions \$ (USD)
of Kigezi by scenario to 2050**



**Total GDP (MER) in billions \$ (USD)
of Lango by scenario to 2050**





Conclusion

The COVID-19 pandemic has significantly set back the gains made in Uganda's education system. Over 15 million learners missed learning at the height of the pandemic in 2020 and 2021. Consequently, considerable drops in enrollment, attainment and quality of education are observed at all levels of the education system. Other associated risk factors like increased early marriages and teen pregnancies have further exacerbated existing gender disparities in learning. Because of the slow-moving nature of the education system, the effects of disruption in learning are much more visible in the long-term. By 2050, only about 17 percent of Uganda's adult population is projected to have completed secondary education. Ultimately, this also affects Uganda's productivity and GDP is expected to reduce by a cumulative \$383 billion by 2050 relative to the *No COVID* scenario.

From a regional perspective, areas such as Karamoja and Lango that are already marginalized in terms of access to education and

other pre-existing vulnerabilities like poverty are the hardest hit and their educational outcomes lag relative to the other regions. More urbanized regions like South Central, North Central and Kampala are not as severely impacted and make a considerable rebound with the reopening of schools and over the forecast horizon. However, the gains that were expected in the *NO COVID* scenario are eroded by varying degrees in all the 15 administrative regions of Uganda.

The *Education Restitution* scenario demonstrates that Uganda can get back to its *No COVID* trajectory and although it is encouraging that the country can bridge the gap between its *Education Shock* scenario and its *No COVID* trajectory, a lot more needs to be done as Uganda's educational outcomes were not satisfactory in that pathway either. This will require significant financial resources that Uganda will need to raise and adequately allocate to its education sector by region.

Because of the negative upstream effects expected in the education system due to low enrollment rates caused by COVID-19 learning disruptions, getting as many learners as possible to enroll back in school, especially at the primary level should be a priority of policy makers in Uganda.

Recommendations

Uganda should amplify efforts and awareness campaigns for all learners to enroll back in school with the reopening of educational institutions. In addition, the government should incentivize learners who would typically drop out due to teenage pregnancies to return to school. Financial burden on teenage mothers has been identified as one of the impediments to continued learning and measures that provide social protection in the form of cash transfers to teenage mothers could alleviate suffering and support continued schooling. The government should also rein in on the practice of early marriage, particularly in the more marginalized regions like Karamoja and Lango.

The uncertainty of COVID-19 should encourage the government of Uganda to accelerate digitalization and a system that facilitates distance/ e-learning across all regions, particularly in its rural and marginalized regions.

To improve the quality of education, keep learners and teachers in school, the government should consider re-prioritization in its budgetary allocations to ensure appropriate remuneration and training of its teachers, a relevant and up-to-date curriculum and adequate educational facilities and supplies.

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Appendix

Interventions in the Education shock scenario

The outcomes compare rates between pre-pandemic levels in 2019 and at the end of 2021. The outcomes do not necessarily correspond to the magnitudes of change implemented in the various parameters.

Table 3: List of interventions in the Education Shock scenario

Intervention	Outcome
Primary survival rate	The rate of students finishing the last grade of primary school reduces by nearly 90 percent in 2021 from 2019
Primary intake rate	Gross primary intake rate for primary reduces by 86 percent from 2019 to 2021
According to the NPA (NPA, 2021), prolonged lockdown led to 51 percent of learners across the entire education system and about 60 percent in the primary sector to stop learning. Primary survival and intake rates are adjusted accordingly to reach a target enrollment rate in this range.	
Lower secondary transition rate	The rate of students transitioning from primary to lower secondary decreases by half from 2019
Lower secondary graduation rate	Lower secondary graduation rate reduces by a quarter from 22 percent in 2019
Upper secondary transition rate	The rate of students proceeding from lower to upper secondary reduces by 64 percent from the 2019 level at 72 percent
Upper secondary graduation rate	Upper secondary graduation rate drops by half from about 7.5 percent in 2019
The NPA (NPA, 2021) estimates a 44 percent learning loss at secondary level. The secondary interventions above are adjusted accordingly to reach target enrollment rates in this ballpark.	
Primary education quality	The quality of primary education drops 60 percent from 2019 levels
Secondary education quality	The quality of secondary education declines by 60 percent from 2019 score
Although there was not a specific target value, literature emphasizes the deterioration in quality of education. The quality parameters were adjusted to simulate a 40 percent reduction.	

Interventions in the Education Restitution scenario

The interventions are simulated within reasonable magnitudes to show possible improvements if there is a sustained policy push on various educational parameters between 2023 and 2028.

Table 4: List of interventions in the Education Restitution scenario

Intervention	Outcome
Primary survival rate (female)	The rate of female students finishing the last grade of primary school is simulated higher than that of male students to represent interventions targeted at getting more female students back to schooling.
Primary survival rate (male)	The total survival rate increases by 17 percent between 2023 and 2028
Primary intake rate	Gross primary intake rate for primary reaches 112 percent
Lower secondary transition rate	The rate of students transitioning from primary to lower secondary increases by three percent from 2023 to 2028
Lower secondary graduation rate	Lower secondary graduation rate increases by 24 percent between 2023 and 2028
Lower secondary vocational share	Modelled to simulate more people getting technical skills post-lower secondary if they are unable to continue schooling The share of lower secondary vocational training increases by 61percent between 2023 and 2028
Upper secondary transition rate	The rate of students proceeding from lower to upper secondary increases by 8 percent from 2023 to 2028
Upper secondary graduation rate	Modelled to simulate more people getting technical skills post-upper secondary if they are unable to continue to tertiary level Upper secondary graduation rate rises by 56 percent between 2023 and 2028
Upper secondary vocational share	The share of upper secondary vocational training increases by 10 percent between 2023 and 2028
Primary education quality	The quality of primary education increases by 10 percent between 2023 and 2028
Secondary education quality	The quality of secondary education score increases by11 percent between 2023 and 2028

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