Cost of Not investing in Out of School Children in Ghana, Nigeria and Sierra Leone

By Centre for the Study of the Economies of Africa (CSEA) 2025

Introduction

Education is a fundamental pillar of human development and a key driver of sustainable and inclusive economic growth. Beyond imparting knowledge, education serves as a catalyst for building human capital, promoting equity, and breaking the cycles of poverty and discrimination (United Nations, 2020). It enhances personal and professional opportunities, raises per capita income, and contributes to reducing inequality. However, in many parts of Africa, millions of children remain out of school, limiting both their personal development and the economic potential of their countries. This study aims to assess the economic cost of out-of-school children in West Africa, emphasizing education's role in sustainable development and social equity.

Recognizing education as a human right means creating inclusive and equitable societies where every person can contribute meaningfully to collective progress (Baibhav, 2024). The United Nations Sustainable Development Goal (SDG) 4 reaffirms this by advocating for inclusive, equitable, and quality education for all, as well as promoting lifelong learning (Zickafoose et al., 2024). Education's transformative potential is also emphasized in the World Development Report (2018), which states: "When you invest in people, you invest in a nation." Investing in education is not only essential for social equity but also serves as a cornerstone for national economic strategies, promoting both economic growth and stability.

Despite these global commitments, Sub-Saharan Africa faces significant challenges in ensuring access to education for all. The UNICEF Education Strategy 2019-2030 highlights the progress made globally while drawing attention to persistent gaps between education quality and the skills required by modern economies. Out of 244 million out-of-school children worldwide, 98 million are in Sub-Saharan Africa, the region with the highest rates of educational exclusion (UNESCO, 2022). Specifically, Western Africa accounts for 40% of these out-of-school

children, followed by Eastern Africa (34%), Central Africa (13%), Southern Africa (10%), and Northern Africa (3%) (White, 2021). UNESCO noted that one-fifth of children aged 6 to 11 are not enrolled in school, about one-third of adolescents aged 12 to 14 are out of school, and nearly 60% of those aged 15 to 17 are not attending school.

The economic cost of this crisis is significant, as uneducated youth face lower job prospects, limiting their earning potential and contributing to diminished national productivity (World Bank, 2020). The economic cost of the out-of-school crisis in Africa is immense, with UNESCO estimating losses from educational deficiencies at $10 trillion annually. Additionally, reports on the economic cost of out-of-school children by the Development Institute (R4D) indicate that failing to educate out-of-school children can have financial implications that exceed average national economic growth, reinforcing the need for increased investment in education to drive economic growth and human capital development. According to the World Bank (2020), each additional year of schooling can increase an individual's income by 8-10%, which directly contributes to national economic growth. Several factors contribute to the high number of out-of-school children in West Africa, including poverty, armed conflict, inadequate educational infrastructure, and cultural practices such as early marriage and child labour. Insurgencies in regions like the Sahel and northeastern Nigeria have led to school closures and displacement, further denying children their right to education. These barriers limit access to education and perpetuate cycles of poverty and underdevelopment.

The economic implications and cost of not investing in education are not just economic but also social. Children without access to education are more likely to face poor health outcomes, engage in criminal activities, and become involved in social unrest. These negative outcomes impose additional financial burdens on governments through increased spending on healthcare, security, and welfare programs. The cycle of poverty continues, with uneducated populations remaining trapped in conditions that prevent upward mobility. Estimating the economic cost of out-of-school children is important because it highlights the significant financial losses and social challenges that arise from educational exclusion. Understanding these costs highlights the urgency of investing in education to foster economic growth, reduce poverty, and promote social stability. By quantifying the economic impact, policymakers can make informed decisions and allocate resources effectively to address the root causes of educational exclusion. As such, this study seeks to evaluate the economic cost of out-of-school children in West Africa, emphasizing the importance of education as a driver of sustainable development and social equity.

Stylised Fact

Ghana

In Ghana, the issue of out-of-school children presents significant long-term economic and social implications. According to UNESCO data[1] , in 2023, approximately 480,900 primary school-age children, 291,200 lower secondary school-age children, and 889,100 upper secondary school-age children are not enrolled in school (see figure 3). As these children age without the necessary skills and knowledge, the future labour market faces a severe skills gap, leading to reduced economic productivity. The increasing number of out-of-school children is closely tied to government spending on education, which has not kept pace with the growing needs of the population.

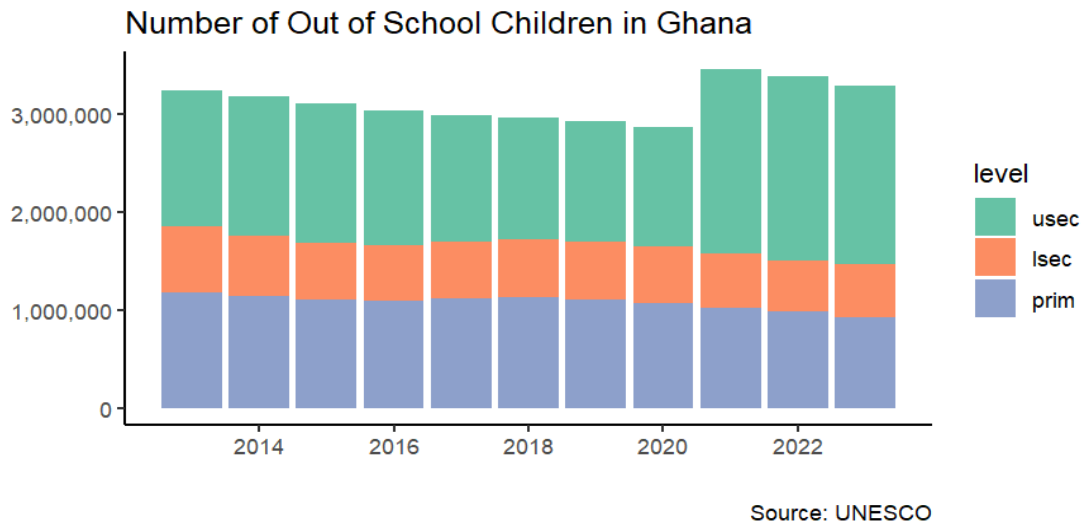

Figure 3: Number of Out of School Children in Ghana

Source: UNESCO data, 2023

Ghana's government expenditure on education has fluctuated over the years and consistently fallen below the UNESCO-recommended benchmark of 26% of total government spending. In 2022, education spending accounted for only 13.18% of government expenditure, down from 21.2% in 2013 (Figure 4). This underfunding contributes to systemic gaps in the education

[1] https://education-estimates.org/out-of-school/data/

sector, worsening the out-of-school children crisis, with significant implications for the economy. However, the challenges extend beyond financing. Socioeconomic factors, such as poverty, cultural attitudes, and inadequate infrastructure, also contribute significantly to the out-of-school children crisis (Zickafoose et al., 2024). For example, children from poor households may be unable to afford school fees or supplies, while cultural norms that prioritize child labour or early marriage can prevent girls from attending school. Also, long distances to schools and lack of adequate infrastructure can make it difficult for children to access education. These factors limit the impact of government spending in addressing the problem. Therefore, while financing is crucial, it must be complemented by policies aimed at reducing these socioeconomic barriers.

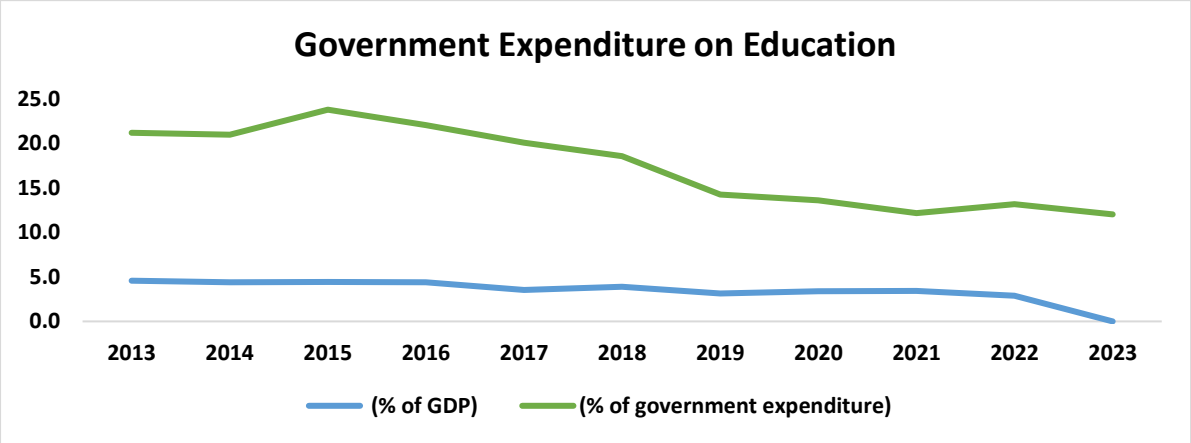

Figure 4: Government Expenditure on Education

Source: WDI, 2023.

The broader economic impact of out-of-school children is closely tied to Ghana's reliance on human capital for long-term growth. Education is central to producing a skilled labour force, and the high number of out-of-school children creates a significant bottleneck in the country's economic potential. Ghana's GDP growth, historically driven by sectors such as agriculture, mining, and services, is constrained by the limited educational outcomes of its future workforce reducing their contribution to the economy. The failure to invest in education not only affects individual earnings but also hampers national economic growth by reducing the pool of skilled workers needed to propel key sectors forward. The long-term consequences of the out-of-school children crisis include reduced competitiveness, hindered technological development, and a potential brain drain as skilled individuals seek opportunities elsewhere

In addition to the economic consequences, the social implications of having a large number of out-of-school children are immense and deeply intertwined with the country's development trajectory. Exclusion from education significantly impacts lifetime earnings, as these children are more likely to remain in low-income jobs or face prolonged unemployment, limiting their ability to contribute meaningfully to national growth. This situation also worsens inequality, particularly between urban and rural populations, where access to education remains uneven (Agbor, 2012). The widening gap further entrenches poverty, creating a cycle of disadvantage that is difficult to break.

Studies have shown that uneducated youth are twice as likely to engage in criminal activities compared to their peers with secondary education or higher (Webbink et al., 2012). Without adequate education, young people face greater vulnerability to exploitation and criminal activity, as their legitimate paths to success are severely limited. This increased vulnerability to social vices, such as can further worsen poverty levels and increase reliance on government support.

As Ghana strives to achieve sustainable growth and development, addressing these deep-rooted social challenges will require targeted policies that prioritize both educational access and quality. These efforts must also be complemented by initiatives aimed at reducing poverty and inequality to ensure sustainable development.

Nigeria

The rising number of out-of-school children in Nigeria constitute a major obstacle to achieving inclusive education - essential for national development and attainment of Sustainable Development Goal 4 (SDG4) (See figure 1). According to the recent data from UNESCO on 'out-of-school children in Nigeria', as of 2023, 8,576,000 primary school-age children, 4,055,000 lower secondary school-age children, and 5,541,000 upper secondary school-age children are not enrolled in school. This situation contributes to a widening skills gap in the workforce, with long-term consequences for Nigeria's economic growth. Thus, the growing number of out-of-school children in Nigeria shows the inadequacy of government spending on education, which is failing to keep up with the population's needs, exacerbating the socio-economic challenges.

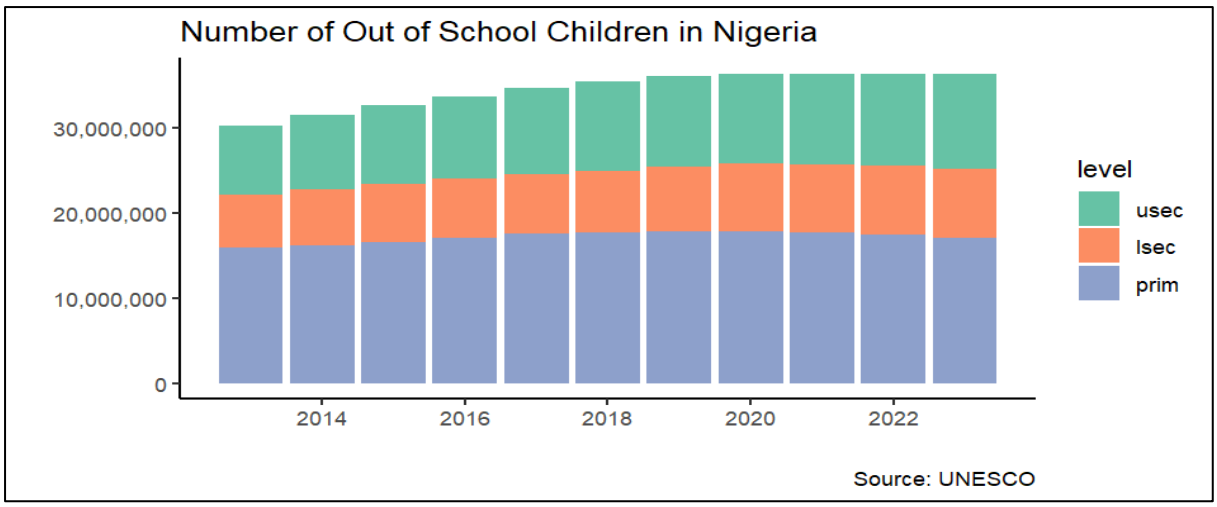

Figure 1: Number of out of school children in Nigeria

Source: UNESCO, 2023.

Nigeria's government spending on education has fluctuated over the years and consistently falls short of the UNESCO recommendation of 26% of total government expenditure. Figure 2 shows that between 2013 and 2023, government education expenditure increased from 390.40 billion Naira to 752.98 billion Naira, representing a growth of 92.8%. However, this growth has not met the 26% target, leading to gaps in human capital development and hindering inclusive economic growth. Thus, socioeconomic factors, such as poverty and cultural attitudes, further complicate access to education, making it difficult for children from low-income families to afford school fees. Additionally, practices like child labor and early marriage often keep girls from attending school, while long distances to educational institutions and poor infrastructure also limit opportunities for learning.

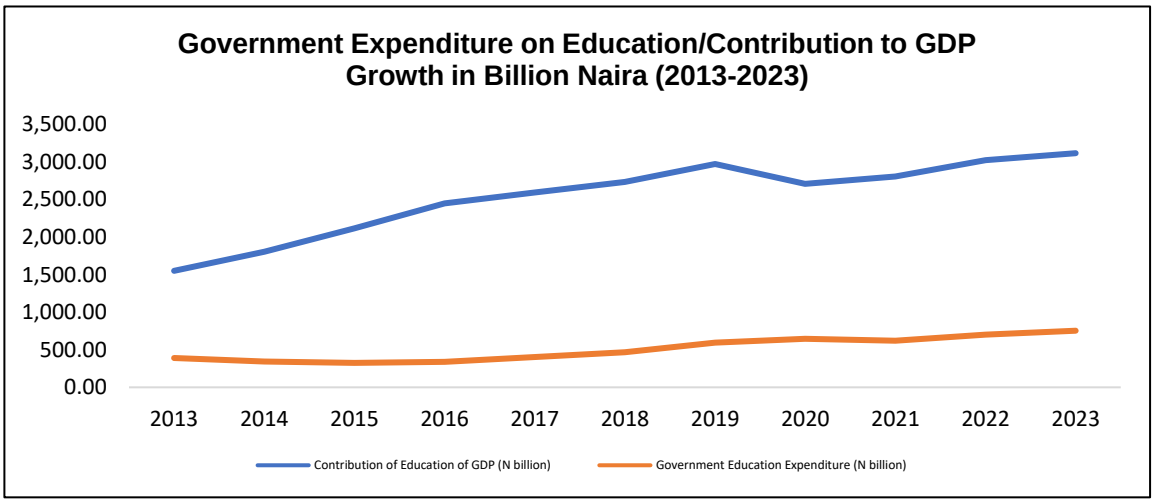

Figure 2: Government Expenditure on Education/Contribution to GDP growth

Source: Central Bank of Nigeria (CBN) statistical bulletin

However, the economic impact of out-of-school children in Nigeria is a significant barrier to achieving sustainable development. With approximately 8.6 million primary school-age children out of school, the country's reliance on human capital for growth is jeopardized. The out-of-school children crisis has long-term effects, including diminished competitiveness, slowed technological progress, and the risk of a brain drain as skilled individuals leave in search of better opportunities elsewhere. Socially, studies have shown that the consequences of a high number of out-of-school children limits children's lifetime earnings and exacerbates inequality, particularly between urban and rural populations, thereby creating a wide gap that entrenches poverty and creates a cycle of disadvantage (UNICEF, 2022). To substantiate this, Ogunode et al. (2022) noted that the social impacts of out-of-school children involve security challenges, a future shortage of skilled labor, a negative international reputation, increased illiteracy, and significant socio-economic and dependency problems.

Sierra Leone

In Sierra Leone, the challenge of out-of-school children poses significant long-term risks to both economic development and social stability. Data from UNESCO estimates highlight that approximately 208,000 primary school-age children and 108,600 lower secondary school-age children are not enrolled in school, with the number more severe at the upper secondary level, where around 279,900 children remain out of the education system in 2023 (See figure 5). Encouragingly, these numbers have been declining over the years, indicating that efforts to reduce the out-of-school population are making headway. However, despite this positive trend, the figures still represent a significant loss of human capital, directly translating into an economic shortfall for the country. As the country's labour market continues to evolve, the absence of a sufficiently educated workforce threatens to diminish productivity and limit future economic expansion. Without sustained strategic investment in both education and the broader education ecosystem, the skills shortage will undermine efforts to reduce poverty and foster inclusive growth in Sierra Leone's economy.

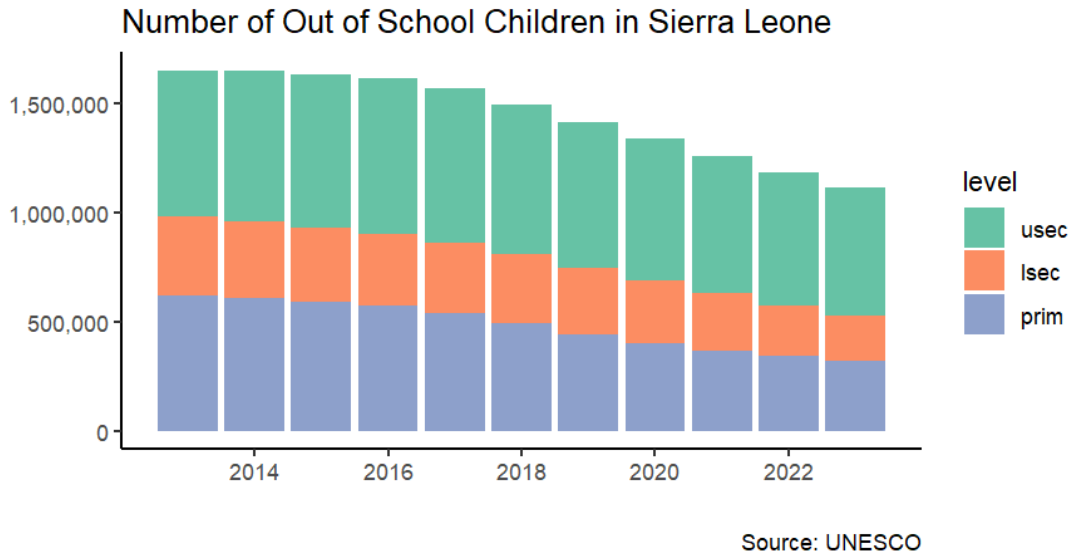

Figure 5: Number of Out of School Children in Sierra Leone

Source: UNESCO 2023

The situation of education spending presents an intriguing context. Despite government expenditure on education exceeding UNESCO's 26% benchmark, reaching as high as 35% in 2019, there remains a significant number of out-of-school children and a GDP loss of 83% according to our findings. While the declining trend in out-of-school children is a welcome development, it also suggests that the financial commitment to education, although substantial, is not the only factor at play. Inefficiencies in the education system, as well as socioeconomic and cultural barriers, continue to limit children's access to education. This situation necessitates a systems thinking approach to understanding the disconnect between spending and outcomes, as well as a holistic review of the entire education ecosystem. Factors such as the quality of education, access in rural areas, and societal attitudes towards education may still be contributing to the problem. Therefore, targetted interventions in areas like teacher training, curriculum relevance, and resource allocation need to be considered to reduce the out-of-school population further and mitigate the associated economic losses.

The economic implications of out-of-school children in Sierra Leone are significant, as the country faces a substantial loss of potential GDP due to the lack of an adequately educated workforce. According to UNESCO estimates, despite the decline in the number of out-of-school children, a large proportion of school age children, particularly at the secondary level, remain outside the education system. This limits the country's ability to diversify its economy and transition away from its dependency on extractive industries, such as mining. Without the

necessary human capital, Sierra Leone struggles to meet the demands of sectors that require a skilled workforce, such as agriculture, services, and emerging industries. Studies show that countries with higher education rates experience more rapid economic growth, as education enhances productivity and innovation (Hanushek & Woessmann, 2021). The loss of educational opportunities, therefore, has a direct correlation to economic underperformance, further widening the income gap between the educated and uneducated populations (Barro & Lee, 2013).

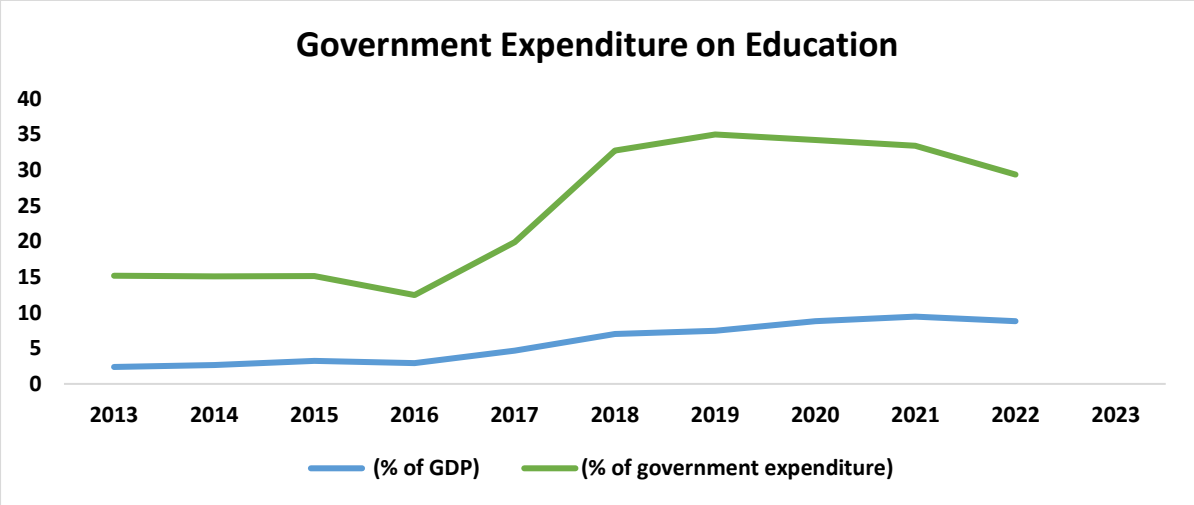

Figure 6: Government Expenditure on Education, Sierra Leone

Source: WDI, 2023.

On the social loss, the high rate of out-of-school children worsens inequalities, especially in rural areas where access to education is limited. These disparities disproportionately affect girls, who often face sociocultural barriers that prevent them from attending school, thereby reinforcing gender inequality. As children miss out on education, they are more likely to engage in early labour, forced marriages, and other socio-economic vulnerabilities that stifle their personal and professional development (UNICEF, 2021). This drives a cycle of poverty and social exclusion, as children from disadvantaged backgrounds have fewer opportunities to improve their livelihoods. The long-term cost of out-of-school children is seen in the perpetuation of societal divisions, weakening social cohesion and limiting the overall well-being of the nation. Addressing these social challenges requires comprehensive education policies that target not only access but also quality and inclusivity, particularly in marginalized communities.

Methodology

In our approach, we extended the Mincerian framework to estimate the economic cost of lower mean years of schooling (MYS), specifically caused by high numbers of out-of-school children (OOSC). Rather than focusing solely on the positive impact of education, we aimed to quantify the GDP loss associated with reduced educational attainment. To achieve this, we controlled for variables such as the labour force participation rate, the working-age population ratio, and capital stock per working-age population. By incorporating these controls, we aimed to capture how the shortfall in education directly impacts economic output, offering a clearer understanding of the broader economic cost of lost education.

Data on Gross Domestic Product (GDP), labor force participation rate (LFPR), and capital stock (Capstock) were sourced from the World Development Indicators (WDI) across various countries. The mean years of schooling were obtained from the 2023/2024 UNDP Human Development Report composite indices time series. The working-age population was calculated as the ratio of the working-age group to the total population.

Model Specification

$$\log GDP = \beta_0 + \beta_1 mys_i + \beta_2 lfpr_i + \beta_3 wapr + \log \beta_4 capstock/wap + \epsilon_i$$

where

mys_i = mean years of schooling,

$lfpr_i$ = labour force participation rate$_i$

$wapr_i$ = working age population ratio$_i$

$capstock/wap_i$ = capital stock per working age population$_i$

Findings

Findings from the analysis provide insights into the relationship between MYS and GDP, showing how an additional year of schooling can influence economic growth, while also reflecting the GDP loss caused by reduced MYS. This further implies the estimated cost of the increasing number of out-of-school children. The results indicate that investment in education plays a critical role in driving GDP growth. In other words, insufficient investment in education

would lead to significant economic losses for several African countries, stemming from a decline in Mean Years of Schooling (MYS). This highlights the significant contribution of education to economic development, emphasizing that raising educational attainment is essential for sustaining long-term growth and preventing potential economic setbacks.

In Sierra Leone, each additional year of lost schooling results in an approximate 83% reduction in potential GDP growth, highlighting a severe opportunity cost to the nation's economy. In Nigeria, this impact translates to a 34% reduction in GDP growth potential per year out of school, while Ghana experiences a 12% decrease for each missed year. This cumulative loss not only affects current economic growth but also widens the educational access gap as children move through the system.

For other countries, for example in Mauritania, Senegal, and Togo, an additional year of schooling leads to a 29.3%, 28.2%, and 14.8% increase in GDP respectively. On the other hand, these countries stand to lose the same percentages of their potential GDP due to lower mean years of schooling. This highlights the significant economic cost of inadequate educational attainment: for every year children remain out of school, these economies forfeit substantial growth opportunities.

In Mali, and Benin, where the coefficients are 87.7%, and 60.2% respectively, the data reveals the tremendous economic potential that could be realized through just one additional year of schooling. The cost of not investing in these countries translates into substantial losses in GDP. For instance, Sierra Leone forfeits approximately 83.1% of its potential GDP if it fails to make adequate investments in education.

These figures emphasize that education is not merely a social good but a critical economic imperative, directly influencing national productivity and long-term growth. The data also illustrates how insufficient investment in education can constrain economic growth, as these countries miss opportunities to enhance productivity and innovation through higher educational attainment. By increasing mean years of schooling, these economies stand to unlock new growth avenues and reduce their vulnerability to stagnation.

Conclusion

This paper analyses the economic costs associated with out-of-school children (OOSC) across various countries, particularly in Sub-Saharan Africa. The data demonstrates that educational attainment is not only a crucial determinant of individual income potential but also a significant

driver of national economic growth. Countries with higher mean years of schooling tend to experience more substantial GDP gains, highlighting the long-term economic benefits of investing in education. However, the variation in economic returns across different nations points to the importance of context, with factors such as the quality of education, labour market alignment, and broader economic conditions influencing the effectiveness of educational investments.

Despite global commitments to education, many countries still struggle with insufficient funding, which directly impacts their ability to provide quality and inclusive education. Underfunding worsens the issue of OOSC, limiting the productive potential of the workforce and hindering sustainable economic growth. This research highlights the need for more strategic and targeted policies that not only increase educational spending but also focus on improving education quality and addressing structural barriers. By prioritizing education, governments can significantly reduce the opportunity costs of leaving children out of school and unlock greater economic potential for future generation.

Variation in the significance and direction of the coefficients highlights the importance of context. Education's contribution to economic growth is not automatic; simply increasing the quantity of schooling may not be sufficient. It depends on factors such as the alignment of educational outcomes with labour market needs, the quality and relevance of education, and broader economic conditions. For policymakers, these findings emphasise the need to focus not only on increasing educational attainment but also on ensuring that education is relevant, high-quality, and effectively.

References

Agbor, J. (2012, September 26). *Poverty, Inequality and Africa's Education Crisis*. Brookings. https://www.brookings.edu/articles/poverty-inequality-and-africas-education-crisis/

Arkorful, V. E., Basiru, I., Anokye, R., Latif, A., Agyei, E. K., Hammond, A., ... & Abdul-Rahaman, S. (2020). Equitable access and inclusiveness in basic education: Roadblocks to sustainable development goals. *International Journal of Public Administration*.

Camilleri, M. A., & Camilleri, A. C. (2020). The sustainable development goal on quality education. *The Future of the UN Sustainable Development Goals: Business Perspectives for Global Development in 2030*, 261-277.

Colclough, Christopher, et al. "The Pattern of Returns to Education and Its Implications." *ResearchGate*, unknown, 2009, www.researchgate.net/publication/242485333_The_Pattern_of_Returns_to_Education_and_its_Implications. Accessed 3 Oct. 2024.

de Brauw, Alan, and Scott Rozelle. "Reconciling the Returns to Education in Off-Farm Wage Employment in Rural China." *Review of Development Economics*, vol. 0, no. 0, 10 Aug. 2007, p. 070811025356002-???, https://doi.org/10.1111/j.1467-9361.2007.00376.x.

Galvao, Marcelo; "Heterogeneity in the Returns to Education and Informal Activities." *Insper Working Papers*, Insper Working Paper, Insper Instituto de Ensino e Pesquisa, Oct. 2010, ideas.repec.org/p/ibm/ibmecp/wpe_216.html. Accessed 4 Oct. 2024.

Hanushek, E. A., & Woessmann, L. (2021). Education and Economic Growth. *Oxford Research Encyclopedia of Economics and Finance*, *1*(1). https://doi.org/10.1093/acrefore/9780190625979.013.651

Joubert, Pierre. "Estimating the Returns to Education in Cameroon Informal Sector." *ResearchGate*, unknown, 2014, www.researchgate.net/publication/46405346_Estimating_the_returns_to_education_in_Cameroon_informal_sector. Accessed 4 Oct. 2024.

Mincer, Jacob. "Education, Experience, and the Distribution of Earnings and Employment: An Overview." *NBER Chapters*, 2 Feb. 1975, pp. 71–94, ideas.repec.org/h/nbr/nberch/3693.html. Accessed 4 Oct. 2024.

Ogunode, N. J., Adanna, C. M., & Ayoko, V. O. (2022). Out of school children in Nigeria: Causes, social implications and way forward. *International Journal on Integrated Education*, *5*(12), 82-91.

Patrinos, Harry A, and George Psacharopoulos. "Returns to Investment in Education: A Further Update." *ResearchGate*, 2004, www.researchgate.net/publication/24079155_Returns_to_Investment_in_Education_A_Further_Update.

Patrinos, Harry A., and George Psacharopoulos. "Education: Past, Present and Future Global Challenges." *Papers.ssrn.com*, 1 Mar. 2011, papers.ssrn.com/sol3/papers.cfm?abstract_id=1799163.

Thomas, Milan , and Nicholas Burnett. "A Moral Obligation, an Economic Priority: The Urgency of Enrolling Out-of-School Children | Results for Development." *Results for Development*, 17 May 2017, r4d.org/resources/moral-obligation-economic-priority-urgency-enrolling-out-school-children/. Accessed 3 Oct. 2024.

United Nations Development Programme (2018). Poverty Level Report in Nigeria. Abuja: UNDP, 2008-2009.

United Nations International Children's Emergency Fund, UNICEF (2022). UNICEF Nigeria Cheat Sheet Out-of-School Children. Retrieved from https://www.unicef.org/nigeria/media/7746/file/UNICEF%20Nigeria%20Cheat%20Sheet:%20Out-of-school%20Children.pdf.

UNICEF. (2021). *Child Labour and Child Marriage: A Discourse Analysis*. https://www.unicef.org/rosa/media/15836/file/The%20Relationship%20between%20Child%20Labour%20and%20Child%20Marriage:%20A%20Discourse%20Analysis%20.pdf

UNESCO. (2020). *Out-of-school numbers are growing in sub-Saharan Africa*. Retrieved from https://www.unesco.org/gem-report/en/2022-out-school.

Webbink, D., Koning, P., Vujic, S., & Martin, N. G. (2012). Why Are Criminals Less Educated than Non-Criminals? Evidence from a Cohort of Young Australian Twins. *Journal of Law, Economics, and Organization*, *29*(1), 115–144. https://doi.org/10.1093/jleo/ews014

World Bank (2018). *World Bank human capital index report*. Washington D.C: World Bank. Retrieved from World Bank Document.

World Bank (2018). *World Bank human capital index report*. Washington D.C: World Bank. Retrieved from World Bank Document.

Yamasaki, Izumi. "The Effect of Education on Earnings and Employment in the Informal Sector in South Africa." *Semantic Scholar*, 2012, www.semanticscholar.org/paper/The-Effect-of-Education-on-Earnings-and-Employment-Yamasaki/a95857c687aca17325b06a3846e04f10160d9acc.

Zickafoose, A., Ilesanmi, O., Diaz-Manrique, M., Adeyemi, A. E., Walumbe, B., Strong, R., Wingenbach, G., Rodriguez, M. T., & Dooley, K. (2024). Barriers and Challenges Affecting Quality Education (Sustainable Development Goal #4) in Sub-Saharan Africa by 2030. *Sustainability*, *16*(7), 2657. https://doi.org/10.3390/su16072657

APPENDIX 1 : Key Methodological Shortcomings in Current Literature

Understanding the economic cost of out-of-school children (OOSC) is important in developing countries, highlighting the significant opportunity cost of forgone education. This loss not only limits the children's ability to contribute to economic growth but also hinders their income potential. Various methodologies have been employed across studies to estimate this cost, highlighting both the direct economic benefits of investing in education and the broader implications of children remaining out of school. Most of these methods focus on the returns to education, which are often measured in terms of individual earnings, productivity, and broader economic growth. However, each approach comes with its strengths and limitations, shaped by the specific context, data availability, and focus of the study.

Arbex et al. (2010) provide a comprehensive analysis of the returns to education within Brazil's informal economy, demonstrating that education continues to yield positive returns even in less regulated sectors. Using Instrumental Variables Quantile Regression (IV-QR) to estimate the returns across different earnings levels, they reveal that the education premium grows as one moves up the income distribution, with higher returns observed in the middle and upper quantiles. This finding highlights the economic cost of not investing in education, particularly for those likely to end up in the informal sector, where education, though still valuable, may yield lower returns compared to formal employment. Although the study acknowledges the challenge posed by unobserved variables like individual ability, which may lead to an underestimation of the true returns to education, it makes clear that the future earning potential of children who remain out of school is significantly compromised, especially as they are more likely to enter lower-paid and less secure jobs in the informal economy.

While this result explains the scenario of the cost of not investing in education, the IV-QR approach relies on strong instruments to correct for endogeneity, a situation where unobserved factors (such as individual ability) may affect both education and earnings. The challenge lies in finding valid instruments that are strongly correlated with education but not directly related to earnings, which can be difficult, especially in informal settings. Also, the wide confidence intervals at higher quantiles suggest a degree of uncertainty in estimating returns at the upper end of the earnings distribution. While this method provides valuable insights into the cost of OOSC in informal economies, the model's limitations in dealing with unobserved factors and the potential biases they introduce remain a concern.

In an attempt to address some of the methodological shortcomings seen in previous studies, Pierre (2010) adopts matching methods and selection models to evaluate the economic returns of education in Cameroon's informal sector. This approach seeks to control for observable characteristics (e.g., age, gender, location) that might affect both educational attainment and income, thereby providing a clearer picture of the true opportunity cost of out-of-school children in informal economies. By focusing on basic and secondary education, Pierre's study estimates that completing education can boost income by as much as 28% in agricultural jobs, which are prevalent in many developing countries. While the study highlights the importance of investing in basic education, and his matching method improves upon simpler models by accounting for selection bias, it still relies heavily on observable variables, which may overlook unobservable factors such as family background or individual motivation. These unmeasured variables could influence both educational outcomes and earnings, potentially leading to biased estimates of the economic cost of OOSC.

Yamasaki's (2012) showed that formal sector workers earn significantly more from education compared to their informal sector counterparts by employing a two-stage least squares method with selection corrections, but she supplemented it with quantile regression and decomposition models to analyse returns to education across the two different sectors (formal vs. informal) and demographics (race and gender). The paper also attempts to account for biases related to who enters the informal versus formal sectors - an important factor when estimating the true economic loss from OOSC. Despite this multi-method approach that explains the complexities of the informal sector, the limitations regarding small sample sizes for certain racial groups and the limitations in capturing informal sector dynamics, such as unreported earnings and informal education, still affect the generalisability of the results, particularly in highly heterogeneous societies like South Africa, where disparities in educational outcomes can further skew estimates of economic costs associated with being out of school.

A study by Psacharopoulos and Patrinos (2004) offers a comprehensive global analysis of returns to education, demonstrating that the benefits of schooling are especially high in low- and middle-income countries. They adopted the Mincerian earnings function, a widely adopted econometric model used to calculate the returns to education and, by extension, the economic cost of out-of-school children. The model estimates how each additional year of schooling impacts individual earnings. In developing countries, where the labour market is characterised by low levels of education, the returns are notably higher, often averaging around 10% per additional year of schooling. For children who remain out of school, this translates into a direct

loss in lifetime earnings, which not only affects individual well-being but also has significant macroeconomic implications. By not investing in education, countries forgo potential GDP growth, as the cumulative effect of millions of undereducated individuals results in lower productivity and economic output.

While the Mincerian earnings function is effective for providing an overall estimate of education's impact on income, it has its limitations. One notable limitation is that it does not account for unemployment or underemployment, which are common issues in developing countries. For out-of-school children, the cost of lost education might be compounded by their inability to find work or by being confined to low-productivity sectors. Moreso, the Mincer model assumes linear returns to education, which may not always hold, particularly in informal economies where the relationship between education and earnings could vary significantly. The inability of this method to capture non-linear effects limits its effectiveness in fully understanding the economic costs of keeping children out of school, particularly in complex labor markets where informal work dominates.

One of the most direct methods of estimating the economic cost of OOSC is to quantify its impact on national GDP. Burnett et al. (2013) used both microeconomic and macroeconomic approaches to estimate the lost productivity due to children not completing primary education. At the micro level, the report calculates the wage differentials between educated and uneducated workers, thereby estimating the potential earnings that OOSC misses out on. on. This reflects the individual opportunity cost of education, where children who do not complete school are significantly disadvantaged in terms of future earnings. At the macroeconomic level, the paper models GDP loss by estimating what economic growth could have been achieved had past generations attained universal primary education. This method shows the broader national opportunity cost of OOSC, as lower productivity in the labour force translates into slower economic growth and less competitive economies. Results indicate that countries like Mali and Yemen experience multiple years' worth of GDP growth losses due to their large populations of out-of-school children, illustrating the profound impact of not investing in education.

However, this approach has its limitations. For one, it assumes that wage premia for formal education apply uniformly across sectors, including informal economies, which is often not the case. Informal workers might not see the same returns to education as formal sector workers, (as demonstrated by Yamasaki’s (2012)), leading to an overestimation of the economic benefits

of universal primary education. Also, the model does not adequately account for non-market benefits of education, such as improved health outcomes, lower crime rates, or enhanced social cohesion, which could further amplify the economic cost of OOSC. These factors are crucial in developing countries, where the returns to education often extend beyond income alone.

APPENDIX 2: Tables from Regression

Table 1: `Regression Result`

	Dependent variable:			
	log(gdp)			
	Benin	Ghana	Mali	Mauritania
	(1)	(2)	(3)	(4)
mys	0.602**	0.123	0.877***	0.293**
	(0.256)	(0.398)	(0.315)	(0.141)
lfpr	-0.005	-0.333**	-0.029	0.016
	(0.019)	(0.124)	(0.022)	(0.031)
wap_ratio	41.295*	-39.119	-9.305	17.776***
	(21.037)	(27.543)	(8.150)	(5.308)
log(cap_stoc_wap)	-0.208	0.382	0.857***	3.033***
	(0.493)	(0.328)	(0.259)	(0.324)
Observations	31	31	31	31
R2	0.956	0.952	0.929	0.975
Adjusted R2	0.950	0.944	0.918	0.972
F Statistic (df = 4; 26)	142.313***	127.811***	84.954***	256.841***
Note:				*p<0.1; **p<0.05; ***p<0.01

	Dependent variable:			
	log(gdp)			
	Nigeria	Senegal	Sierra Leone	Togo
	(1)	(3)	(4)	(5)
mys	0.341	0.282**	0.831***	0.148
	(0.251)	(0.132)	(0.101)	(0.096)

```
lfpr                        -0.074    -0.034*    -0.083***     0.117
                            (0.085)   (0.019)     (0.015)     (0.136)

wap_ratio                   -15.007  20.282***    -1.813      38.127**
                           (22.224)  (6.273)      (4.009)     (17.455)

log(cap_stoc_wap)          0.473***  -0.510*    -0.243**     0.644**
                            (0.161)  (0.260)     (0.088)     (0.239)

-------------------------------------------------------------------------------
Observations                  31        31          31          31
R2                           0.735    0.901       0.949       0.942
Adjusted R2                  0.695    0.885       0.942       0.933
F Statistic (df = 4; 26) 18.050*** 58.861***  122.195***   105.604***
===============================================================================
Note:                                              *p<0.1; **p<0.05; ***p<0.01
```

Source: Author's computation using data from WDI (2023)

Country	Rate of Out of School Children (2023)	OOSC Costs estimate	Economic Growth (2023)	% of government expenditure on education	Government expenditure on education as % of GDP
Benin	29%	60%	6.4%	19.0	3.2
Ghana	17%	12%	2.9%	12.0	2.9
Mali	47%	87%	5.2%	19.1	4.0
Mauritania	36%	29%	3.4%	..	2.3
Nigeria	32%	34%	2.9%	*no data*	*no data*
Senegal	36%	28%	6.4%	22.5	5.6
Sierra Leone	22%	83%	3.7%	*no data*	8.8
Togo	20%	14%	3.4%	14.8	3.8

APPENDIX 3: Choice of Variable Choice of Variable

In selecting the variable for our analysis, we aimed to overcome some of the key limitations identified in previous studies, bearing in mind comparable data and availability across West African countries. Earlier approaches to estimating the economic cost of out-of-school children, while insightful, often fell short in addressing the full complexity of informal labour markets and unaccounted demographic factors. To improve upon these, we included variables that better capture the dynamics of labour participation, capital availability, and the working-age population's size, alongside the mean years of schooling. This will allow us to isolate the economic impact of lost education more accurately and, in doing so, present a clearer estimate of the GDP losses attributable to OOSC.

Mean Years of Schooling (MYS): Mean years of schooling is a key indicator of a population's educational attainment and plays a critical role in economic performance. It reflects the average number of years of formal education completed by individuals within a given population. For our analysis, MYS is particularly useful in quantifying the economic cost of lost education due to out-of-school children. A lower MYS, driven by higher numbers of OOSC, can reduce the skill level and productivity of the workforce, leading to a direct loss in GDP. By focusing on MYS, we aim to estimate the extent to which GDP decreases with each year of education lost, highlighting the economic consequences of insufficient schooling.

Labour Force Participation Rate (LFPR): The Labour Force Participation Rate is essential to understanding the extent to which the educated population is actually contributing to the economy. One of the limitations observed in studies like Pierre (2010) is that they often focused solely on educational attainment without adequately considering labour market participation rates. A country may have a relatively high average education level, but if a large portion of the working-age population is not actively participating in the workforce, the economic benefits of that education remain unrealised. Also, a reduced LFPR as a consequence of lower educational attainment due to out-of-school children, further amplifying the economic losses. By including LFPR as a control variable, we address this gap, ensuring that our analysis distinguishes between the potential and actual contributions of the educated workforce. This helps us identify the specific economic loss resulting from lower MYS among OOSC, independent of labour market participation.

Capital Stock per Working-Age Population: Capital stock per working-age population is included to address the interaction between education and productivity. One limitation of the Mincerian earnings function, as highlighted in Psacharopoulos and Patrinos (2004), is its assumption of linear returns to education, which fails to account for complementary factors such as capital availability. In developing economies where education is less effective due to a lack of capital or infrastructure (as seen in Yamasaki (2012) for informal sector workers), the GDP gains from additional schooling might be overstated. By controlling for capital stock, we prevent this overestimation and ensure that our analysis accurately reflects the contribution of education to economic output, independent of capital availability, enabling better estimating the GDP losses attributable to OOSC in contexts where capital limitations exacerbate the productivity gap caused by inadequate education.

Working-Age Population Ratio (WAP Ratio): The working-age population ratio refers to the proportion of the total population that is within the working age, typically defined as individuals aged 15 to 64. This variable is critical in understanding how the economic impact of education, or the lack thereof, translates into GDP. A larger working-age population means more potential workers who can contribute to the economy, provided they have the necessary education and skills. However, when a significant portion of this group lacks adequate education due to high numbers of out-of-school children (OOSC), the economy misses out on its full productive potential. By controlling for the working-age population ratio, we account for differences in the demographic structure across countries or regions. This allows us to assess how much the educational deficits among the working-age population - stemming from lower mean years of schooling - affect overall economic output, while also considering the size of the labour pool available to contribute to GDP.