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Human Capital Development, Institutional quality and poverty in Sub-Saharan Africa

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Abstract

This study investigated the effects of human capital development and institutional quality on poverty in Sub-Saharan Africa. Specifically, the study examined the effect of human capital development on poverty as well as the moderating role institutional quality on the effect of human capital development on poverty in Sub-Saharan Africa. The study used panel data for 29 Sub-Saharan African countries from the year 1996 to 2022 sourced from World Bank Poverty Platform (WBPP); World Development Indicators (WDI) World Governance Indicators (WGI) and World Income Inequality Database (WIID) using Two-Stage Least Squares (2SLS), the Driscoll and Kraay regression, the study found that human capital and institutional quality (governance indicators) significantly influences poverty. On poverty, the results showed that Secondary School Enrolment significantly reduces poverty in the SSA region. Secondly, Out of Pocket expenditures for health as a percentage of total health expenditure has a U-shaped effect on poverty in the region. Similarly, overall governance as well as all indicators of governance used in the estimations including control of corruption, rule of law, regulatory quality, government effectiveness, voice and accountability, and political stability and absence of violence all significant had negative effects on poverty. On the basis of the findings, the study recommends that policy makers should focus on initiatives that enhance access to and quality of secondary education, addressing barriers that may impede enrollment, particularly for marginalized groups.

1. Introduction

Despite progress in some areas, Sub-Saharan Africa continues to grapple with significant poverty rates. Poverty, both absolute and relative, hampers human potential and perpetuates cycles of deprivation. Poverty remains a pressing issue in Sub-Saharan Africa, with its rich cultural diversity, resources, and potential for growth (Kamgnia & Ahouré, 2023). In the sub-region, a significant portion of the population still lives in poverty, facing economic stagnation, human capital depletion, social inequality, health and well-being issues, education barriers, agricultural challenges, urbanization challenges, health pandemics, and migration and instability despite the rich potentials and abundant natural and human resources. Economic stagnation, human capital depletion, social inequality, health and well-being issues, education barriers, agriculture

challenges, urbanization challenges, health pandemics, and migration and instability are all exacerbated by poverty (Mood & Jonsson, 2015). Thus, addressing and tackling poverty is crucial for the growth and development of Sub-Saharan Africa.

Sub-Saharan African countries have implemented various policies such as social safety nets, education and skills development programme, healthcare access, agricultural development, gender empowerment, infrastructure development, land reform, labor market reforms, microfinance and small business support, good governance and anti-corruption measures, regional and international cooperation, and inclusive economic policies to address poverty and inequality (Fox, 2019; Beegle & Christiaensen, 2019). These policies have aimed to alleviate immediate poverty, enhance human capital development, and improve access to education, healthcare, and infrastructure. These policies aimed to reduce health disparities and improve overall well-being. For instance, the countries in the region have prioritized gender empowerment which has been deemed crucial for addressing poverty and inequality, with legal reforms, quotas for women's representation in political positions, and initiatives to improve women's access to education and economic opportunities (Narayan-Parker, 2002).

Furthermore, infrastructure development, such as transportation, energy, and telecommunications, plays a significant role in reducing inequality between urban and rural areas. Microfinance and small business support provide marginalized populations with access to credit and capital, enabling entrepreneurship and economic self-sufficiency has been among some of the frontline policies been pursued by the governments in SSA countries (National Youth Empowerment Strategy, 2015). Good governance and anti-corruption measures are essential for creating an environment that facilitates effective poverty reduction and inequality mitigation strategies (Mlambo, Zubane, & Mlambo, 2020). Sub-Saharan African countries often collaborate with regional organizations, international institutions, and development partners to share knowledge, resources, and best practices. Inclusive economic policies promote sector diversification, foreign investment attraction, and job creation, ultimately reducing income inequality have also been looked into.

However, despite these policies, the scourge of poverty still persists in the region. Statistics reveal that the region is one of the worst hits in terms of poverty in the world. For instance, data from the United Nations Development Programme (UNDP) 2023 Global Multidimensional Poverty Index (MPI) shows that SSA is home to half of the world’s poor. Specifically, it shows that out of the 1.1 billion multidimensional poor people in the globe, SSA is home to 534 million of the number (UNDP, 2023). The Millennium Development Goals (MDGs) (2000-2015) were notable for achieving a 50% reduction in the incidence of global poverty from what it was in 1990 before the age of Sustainable Development Goals (SDGs) (2015-2030) (Anyanwu and Anyanwu, 2017). Despite this wonderful worldwide outcome, the percentage of Sub-Saharan Africans positively affected is negligible and tiny. Today, with the global poverty line set at $1.90 per person per day, SSA houses the majority of the world's impoverished, displacing Asia in 2019 Nwani and Osuji, 2020). Similarly, at 2015, Africa had the second-highest wealth inequality level in the world behind the Asia-Pacific region, at 89.2. South Africa (84.0), Botswana (81.7), Namibia (81.6), and Nigeria (81.4) are the nations with the highest wealth Gini indexes; all of them are mining or oil-producing nations (Adesina, 2016).

Therefore, addressing these debacles are essential for the development of the sub region. The reduction in poverty promotes inclusive economic growth and social cohesion and stability. It also facilitates improved access to healthcare, education, skills and development. Tackling this challenge can unlock the economic potentials of the SSA. The major objective of this study is to investigate the effect of human capital development on poverty in Sub-Saharan Africa (SSA).

This study is divided into six (6) sections. Section 1 is the introduction, section 2 contains the literature review, section 3 presents the methodology of the study. Section 4 is the regression results while sections 5 and 6 contains the conclusion and recommendations respectively.

2. Literature Review

2.1 Conceptual Literature

Human Capital Development

Human capital development is defined as any improvement inequalities possessed by human beings that affect the person's productivity level and/or financial output (Kento, 2023). It also refers to any investment workers and/or labour to increase his/her economic value, knowledge, abilities, and/or skills (Becker, 1975; 1995). The development of human capital takes the form of investment in education, personnel training, skill development, investment in health, and some other factors that could make job owner to value, which may come as loyalty to the employer or the organization, and punctuality to work (Becker, 1995).

Human capital development tallies with knowledge asset or any other features which workers have either inherent in them and/or attained through learning and which increases his or her productivity levels (Vaidya, 2023; Kento, 2023; Becker, 1995). In other words, it could also be defined as the essential creative and/or productive abilities of humans which could be a pool of skills, knowledge, and among other individual qualities that stimulates productivity humans (Wilfred & Mbonigaba, 2019; Vaidya, 2023). Undertaking investments in education, health, trainings, and other skill acquisitions improves individual capabilities that enhances human capital development (World Bank, 2023). In this study therefore, human capital development is defined as any investment in people (human capital) either by government or private organization that have the tendency of increasing employees or peoples' capacities, while increasing the person's and organization's productivity and income level.

Poverty

Poverty has been defined as a situation in which people lack normal or socially desirable material possessions, wealth, and/or money (Calasanz, Oberlin, Bosco, & Salle, 2023). In the opinion of Calasanz, et al. (2023), poverty takes place anytime people and/or an individual has deficiency of the things needed for the satisfaction of the person's basic needs. It is the basic needs that one can use to identify who is poor and what constitutes poverty. In a narrow sense, it could be defined as the inability to get the necessities for survival. In a broad sense, it is seen as the inability of getting a normal standard of living in a particular country (Chikelu, 2016; Ahmad, Bashir, & Hussain, 2018; Calasanz, et al., 2023).To measure poverty, the standard way to do that would be to look at those that are below poverty line or those being considered to be closer to starvation or death exposure borderline. The next thing to look at would be to check out for those that are malnourished, that who lack shelter, and those without clothing (Chikelu, 2016).

The term poverty has also been linked to when one possesses poor health, poor/low skill levels, low educational levels, having great unruly or disruptive behaviour, coupled with carelessness (Adekoya, 2018). In fact, poverty has be termed to be multidimensional in many cases (Babu & Gajanan, 2022).

2.2 Theoretical Literature

Human Development Theory

(a) Human Capital Theory

This theory was first articulated by Becker (1962). It was later developed by Becker (1975) and Rosen (1976). This theory was later expanded by Becker (1995), and Almendarez (2011). The theory posits that each individual employee possesses some skills set and/or capabilities that could be enhanced or acquired by means of education and training. The theory supposed that proper education greatly serves as the appropriate mechanism through which the productive abilities of the people could be enhanced and/or improved. Human capital theory therefore rests on the assumption that human capital investment brings about higher output and/or productivity. In fact in the views of Becker (1995) and Almendarez (2011), educated employees would always make for productive employees. The theory of human capital underscores the need for education if worker's or employees' productivity and proficiency are to be developed/improved. This can be done by enhancing the reasoning stock level or mental abilities of the people, which would in turn make them to be more productive economically since they now possess more human capacity. This theory therefore highlights the distinctive capacities and investments in humans that makes them more productive and a better employee (Becker, 1962; 1975; 1995; Rosen, 1976; Almendarez, 2011). Here, investment in human capital comes in the form of formal education delivery and/or provision. In fact, human capital theory advocates were of the view that it is more valuable compared to physical capital provision (Almendarez, 2011).

The theory is of the view that the direct education/training cost (Cst) for enhancing human capital is determined at time zero and can be expressed mathematically as:

$$\sum_{i=0}^{\infty}\frac{Y_t^1}{1+\ R^i}-\sum_{i=0}^{\infty}\frac{Y_t^0}{1+\ R^i}\geq Cst\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2.1)$$

where; Y_t^0, for t = 0, 1, …, is defined as income path when the person/individual is not educated or trained. Y_t^1, for t = 0, 1, …, is defined as income path when the person/individual is educated or trained.Rrepresents interest rate or the rate of return on education/training.

Each time the return on education/training investment per period becomes constant, we have it that $Y_t^1 - Y_t^0 = \theta\ \ for\ t = 1, 2, \ldots,$ with the assumption that at the initial period (that is period zero)the individualtrained employee/person earnsnothing (i.e. zero amount), hence implying that, $Y_0^1 = 0$, but becomes $Y_0^0$when the individual employeeis untrained and/or uneducated. Therefore, people tend to undertake education/training investments whenever equation (2.2) holds as given below:

$$Cst + Y_0^0 < \frac{\theta}{R} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2.2)$$

Equation (2.2) posits that people would tend to undertake education/training investments the more, whenever the direct cost (Cst) is lesser, opportunity cost (Y_0^0) also tend to be smaller, the return on education/training investment (θ) tend to be higher, and then interest rate/borrowing cost (R) tend to be smaller as well.

Human capital and/or education investments have implications on poverty, institutional quality and inequality as well. Human capital investments related to spending that was carried out to obtain either education, acquire skills or training, knowledge, experience, and health (Ross, 2023). The connection here is that with rise in human capital and/or education investments, people would have their individual capabilities to get employed more developed, thereby, raising their productive capacities. This would increase per capita income levels, and hence, reduce poverty since more income would be earned with higher levels of education. This would further bridge the inequality gap among the people in that economy and or sub-region. Again, with more educated people, the institutional quality would no longer be weak. In fact, there would be stronger quality of institutions given the higher investments in education and trainings of the people, which would in turn, encourage stable growth of the economy and the SSA sub-region in general.

(b) Social Exclusion Theory

This concept takes a critical appraisal of the social ills of classifying some individuals as social misfits in society. According to Daly & Silver, (2008), the above can be exhibited by classifying a segment of the population, rejection, separation, and discrimination. It emphasizes more on human relationships and way of life than on advancing the well-being, income, and consumption of people. This according to Dean, (2016) assures individuals of acceptance and integration into society. Another dimension is the exclusion brought because of market expansion, economic and political advancement, as poverty, economic alienation, and ill-treatment are seen as social challenges and not an impairment to economic development. According to Gerda & Vrooman (2007) and European Commission, 2002, Social Exclusion is used to describe some social vices in the society in the form of unemployment, illiteracy, income inequality, housing deficit, high rate of crime, environmental degradation, and poor healthcare.

Poverty Theory
(a). Theory of Poverty Culture

This theory was propounded by Lewis (1959). The theory of poverty culture states that poor people possess a given culture of their own that contains some varying values and manners compared to the rich ones and/or the non-poor. In other words, poverty culture model was of the view that poor people cultivate/establish particular behaviours or lifestyles that make them unable to pull their family members out of poverty, making generations to persist in poverty. The lifestyles/behaviours of the people who are in poverty encourages them to undertake some decisions that would help make them and their families to remain in poverty cycle (Swan, 2023).

This theory has been applied by many scholars like Coward, Feagin, & Williams (1973), Abell& Lyon (1979), Aratani, Lu, &Aber (2014), Swan (2023), among others. In fact, the application of this theory indicated that poverty culture model has failed in all ramifications to bring people to

richness and/or economic prosperity (Aratani, et al., 2014). Finding by Coward et al. (1973) indicated that in Southwestern city, less than half of their survey respondents were with the lifestyles or habits postulated by poverty culture model, however, the habits were situational and not cultural. Even Abell& Lyon (1979), and Swan (2023) showed in their study that income differences among the bottom poor and those at the mid class were just explained by structural features, as structural model demonstrated to be more reliable and effective.

(b). Structural Poverty Model

This poverty theory was first used in the Marxist doctrine (as quoted in Abdulai & Shamshiry, 2014). The theory posits that poverty exist due to the activities of the capitalist system created by the bourgeoisie as a mechanism to dominate the ownership of wealth and means of production in any given society. Hence, the supposed materialistic values which the capitalist class created led to poverty (Korankye, 2019). This theory has also been applied by many scholars such as Rank (2011), Sameti, Esfahani, & Haghighi (2012); Abdulai & Shamshiry (2014); Korankye (2019), among others. For instance, Rank (2011) was of the opinion that poverty in American emanated mainly because of the economic and political deficiencies seen all around the area but not from the level of individuals. Sameti, et al. (2012) were also of the view that poverty came into existence due to the living circumstances created by capitalism, hence the structural poverty model. The relevance of this theory to this study is that due to class identification and creation by the capitalists, poverty would automatically make inequality to be created and worsened the more in SSA. Inequality promotion would also worsen the already weakened SSA institutional quality, but would encourage human capital development and/or investment.

2.3 Empirical Study

Becker (1995) studied how human capital could be utilized to alleviate poverty through the employment of just literature review method and no empirical data. It was revealed by the study that there exist a very close association among economic growth, education, health measured by life expectancy, and some other proxies for human capital applied in the study. The study recommended among others that education/training, and health which represents the major factors that reduce poverty and as such stimulate economic growth, should be taken seriously by any government in power through increased innovations and investments.

Appleton & Teal (1998) in their study assessed how Africans' human capital formation could be brought to reality and how they influence economic growth and poverty and/or welfare. Using panel data and descriptive statistics, it was found that education and health were very significant in determining human capital, and enhance welfare and/or lessen poverty. Further, the index of poverty and/or welfare revealed that Africa has the least human development level compared to other regions of the world. It was suggested that human capital development need to be matched with corresponding increase in physical capital, so as to make poverty level drop.

Asaju (2012) interdependently carried out an overview of human capital development and poverty reduction in Nigeria using empirical literature review method. It was found that the development of human capital is a precondition for the growth of the economy and its required development, in conjunction with being a necessary and sufficient condition to alleviating poverty in the case of Nigeria. The study suggested that all stakeholder and governments should make investment in

human capital (that is from the side of education, science, and technology) a priority while trying to solve issues surrounding development of the economy, particularly poverty.

Davis (2015) in a related study assessed how human capital enhancement could be utilized to reduce poverty in SSA through the adoption of panel data obtained from 48 SSA countries before 2011 and OLS model. It was found that there exist strong evidence of human capital enhancement in reducing poverty in SSA. From the results outcome, it was shown that education was seen as the most significant factor that determine human capital development in SSA for poverty reduction. In another vein, it was shown by the study's findings that declining poverty does not only depend on capacity enhancement of the people through institutions and on economic phenomenon. It was recommended that combined policy mechanisms need to be adopted in order to make social and economic development a reality to bring about fall in poverty in SSA. Combined development of the human capital and inclusive growth approach were further recommended in this respect. Similarly, Lucas & Blomskog (2015) tried to determine whether human capital significantly encourage economic growth using panel data obtained from SSA from1988-2011 and panel data analysis. It was found that education insignificantly and positively determine economic growth, which in turn affects poverty. The study suggested further investigations with regard to education being the right proxy for human capital since it revealed insignificant results in line with previous studies.

Chikelu (2016) looked at possible ways of making poverty decline through the enhancement of human capital in Nigeria using time series data from 1986 – 2012. With the application of linear regression model based on OLS, Johansen cointegration approaches, ADF test, it was found that poverty rate was significantly explained education such as primary, secondary, and tertiary school enrolment; and income per capita. Thus, a further revelation by the study was that decreasing poverty and human capital enhancement in Nigeria have very close association. It was suggested however, that human capital in Nigeria need to be improved the more.

Shisoka & Wepukhulu (2018) applied time series data from 2005 – 2015 and multiple regression analysis based on OLS technique to study how human capital development impacts poverty in Kenya. It was found among others by the study that higher number of years of education, enhanced water sources, and number of paved roads significantly worsen poverty whereas, HIV significantly encourage poverty in Kenya. Again, the results showed a negative association between poverty and education, enhanced water sources, and paved roads, but revealed a positive connection between poverty and HIV prevalence. It was suggested that in a bid to ease poverty effects in Kenya, education outcomes must be enhanced.

Babasanya, Oseni, &Subair (2018) tried to assess how impactful human capital development could be in terms of lessening poverty with regard to Nigeria using time series data from 1990-2017 and applying multiple regression analysis based on OLS technique. It was revealed from the study's results that poverty in Nigeria was significantly impacted by government real education spending and unemployment. Again, government real health spending was found to be exerting negative and insignificant impact on poverty in Nigeria. It was recommended that there is need for government to raise its investment on education and health through trainings, and improvement in the quality of health services.

Adekoya (2018) in a related study investigated how human capital development affect poverty in Nigeria using time series data for the period 1995-2017, Granger causality test, and vector error correction mechanism – VECM. It was indicated by the study results that human capital

development through education and health significantly influence poverty captured with per capita income. It was shown also that there exists causality in a uni-directional way between life expectancy, literacy rate, and poverty. It was recommended that government need to undertake more investments in health and education since there were shown to be the most significant factors that lessens poverty.

Wilfred & Mbonigaba (2019) in another study employed system GMM, fixed effect least square dummy variable – LSDV model, and panel data generated from 30 economies in SSA from 1980 to 2015 to study how human capital through higher education contributed to productivity which in turn affects poverty. The study revealed that higher education has positive significant impact on productivity and hence on poverty for HEE but exerts negative significant impact on productivity, and hence on poverty for HEG. It was suggested by the study that there is need for skills to be targeted adequately by higher education in SSA to ensure economic growth and poverty reduction.

Karambakuwa, Ncwadi, &Phiri (2019) used panel data analysis and generated data from 9 SSA economies from 1980 to 2016 to assess how human capital affects economic growth. It was shown empirically that human capital insignificantly impacts economic growth. Again, the interactive effect of human capital, government expenditure, and FDI revealed a similar result. However, it was found that there exists significant positive impact of the interactive variable on human capital and economic growth, which indirectly affects poverty. It was recommended that SSA countries need to embrace increased investments in human capital if poverty are to be reduced very significantly.

Ogundipe, Mobolaji, & Ogundipe (2020) just used only Johansen cointegration approach based on AK model and time series data to analyze how human capital investment impacts economic development with a pointer in Nigeria to see if new evidence would modify the existing ones. It was found among others by the study that human capital investment pointers have insignificant influences on Nigeria's economic development when likened with previous studies. Further, human capital development was found to be reduced significantly through the quality of education and skill acquisition in SSA, and which affects poverty indirectly with respect to other world regions.

Brixi, Rawlings, & Koechlein (2021) in their study adopted descriptive statistics and paned data to examine how human capital among women and girls could form a game changer for Africa. It was found that irrespective of the fact that SSA has improved its human capital in terms of skills and knowledge acquisition, that of health and education still need improvement in order to enable the people unlock their productive potentials that help them out of poverty. Hence, SSA still has a long way to go in terms of reducing poverty, although it has attained its productive potential of about 40%. It was recommended that full effort should be channeled towards unlocking SSA full potentials in a bit to spur economic growth that would lead to poverty reduction.

Wang, Hua, Tao, & Moldovan (2021) employed autoregressive distribution lag – error correction (ARDL-ECM) model and panel data from 2000 – 2019 to study what influence health human capital could have on poverty trap in SSA. It was revealed from the study's finding that there exist no indication of health human capital aiding SSA countries exit poverty trap in the long run. However, in the short run, it was shown that health human capital significantly and inversely impact poverty. It was suggested however that when healthcare spending is raised to take care of human capital, it would lift people out of poverty in SSA and then, enhance welfare, social security, and economic development.

In another related study, Moyo, Mishi & Ncwadi (2022) applied time series data and Pooled Mean Group – PMG model to determine in Eastern Cape province, how human capital formation impact poverty and inequality. It was indicated through the study's finding that poverty level falls with a rise in human capital, but human capital significantly encourages inequality in income. It was recommended among others that there is need for urgent policies geared towards making inequality in schools to fall in conjunction with schools' quality enhancement through community participation.

Olatunji (2022) examined with literature review method, without empirical data, how the enhancement of human capital could lead to poverty reduction in Nigeria. It was found that health and nutrition enhancement among women and children, education targeted investment, and enhanced labour force involvement in the economy were key determining factors that encourage poverty reduction in multi-dimensional way, which were also found to contributing to sustainable growth of Nigerian economy. It was recommended by the study that encouraging human capital investment the more in the country would help disrupt poverty cycle by lifting people out of multi-dimensional poverty, resolve inequality issues, and enhance labour output.

Shobowale, Olopade, & Oladeji (2022) looked at how human capital development in conjunction with total factor productivity impact economic growth in SSA using panel data from 1981-2020 and least squares panel model. It was established by the study that human capital development alone cannot bring about sustained economic growth. Further, it was revealed by the study's finding that human capital exerts a significant positive impact on economic growth, which in turn reduces poverty. It was recommended however that government expenditure need to be redirected to development of infrastructure.

In a study by World Bank (2023) and (2018), descriptive statistics and panel data were employed to examine how human capital-led economic growth through learning and skills could be used to alleviate poverty in Africa; and whether projects geared towards human capital enhancement in SSA had yielded significant results. It was found that even though SSA economies have recorded economic growth in the past 3 decades, it has not translated to significant rise in per capita income that would alleviate poverty in this region since the region is still the poorest among others in Africa in terms of the major indicators of human capital like education/learning, percentage of youth that possess suitable skills, out of school children, amount of adult survivals, and restrictions. Again, it was shown also that the projects have strengthened SSA countries by enhancing human capital, but they have not significantly lifted people above poverty level. The studies recommended among others, keen human capital investments with priorities given to education and health so as to accelerate the process of lifting people out of poverty.

Similarly, Bazie, Thiombiano, & Maiga (2023) utilized panel data obtained from 35 SSA economies for 1996–2018 with system GMM to examine how institutions could help in the enhancement of human capital development in SSA, which in turn impacts poverty. It was found that corruption has significant reverse impact on education output, average studying period, and life expectancy. Again, corruption was found to exhibit deleterious direct effect on education performance. Corruption also alters public spending distribution to favour other sectors and institutions such as the mining, military, energy, transport, among others, against that of education and health spending. It was suggested that governments in SSA should effectively fight corruption in all sectors if human capital are to be developed in these countries.

Wirajing, Nchofoung, & Etape (2023) in a related study tried to use panel data from 48 countries in Africa for the period 2000 to 2019 and system GMM to determine how human capital influences economic growth, and poverty in turn. It was shown by the study's results that economic growth significantly encourages human capital development, and hence poverty reduction in Africa. Again, gender was found to be significantly affecting human capital development and poverty in turn in Africa. It was recommended among others that policymakers and governments in Africa need to urgently commit more resources to education and health sectors in a bid to improve human capital development, guarantee sustained economic growth, and reduce poverty in turn.

3. Methodology

3.1 Two-Stage Least Square

The econometric approach in this study is based on the two-stage least squares modelling technique. In the modelling exercise, this method is applied to take simultaneity and reverse causality into consideration. When the error term is related to the explanatory components of the model, simultaneity arises. The two-stage least square method takes simultaneity into account by using instruments. The delays of the model's regressors serve as the instruments for the original equation in this investigation. In the first step of the two-stage least squares technique, each regressor in the model is regressed with its initial lag.

$$X_{i,t} = \propto_0 + \propto_1 X_{i,t-1} + \varepsilon_{i,t} \quad (3.1)$$

In Equation (1), X is a model regressor and $X_{i,t-1}$ is the model regressors' initial lag. $\varepsilon_{i,t}$ is the error term, while $\propto_0$ is a constant. In order to derive the instruments for the regressors, the study uses the ordinary least square (OLS) regression with heteroscedasticity and autocorrelation consistent standard errors. The regressors in the second stage regression are then given the fitted values from the OLS regression, which are used as instruments:

3.2 Dricscoll and Kraay's Fixed Effects Model

This study uses the Driscoll and Kraays fixed effects estimate technique for three key reasons. First of all, unobservable country-specific characteristics are always likely to have a detrimental impact on the consistency and reliability of results when using panel data analysis. Second, a common issue with panel data is reverse causality/simultaneity among regressors. Third, the estimator is used due to its ability to present unbiased estimates in the presence of cross-sectional dependence.

$$X_{i,t} = \alpha_0 + \alpha_j \left(X_{i,t-1}\right) + u_{i,t} \quad (3.2)$$

Where, $X_{i,t}$ is a regressor in country i at time t. α_0 is the intercept, $X_{i,t-1}$ is the first lag of the regressor and $u_{i,t}$ is the error term.

3.3 Model Specification

The functional form of the model adopted to estimate the objective of this study can be given as;

POV = f (SSE, OH, OH Squared, GVN, LGDP, ICT, INF, GLOB) (3.3)

Where; SSE is secondary school enrollment; OH and OH Squared are out of pocket expenditures and the squared term; GVN is the governance variable including all the indicators depending on

the model estimated; LGDP is economic growth; ICT is access to technology; INF is inflation; and GLOB is globalization.
The model can thus be specified econometrically as;

$$POV_{i.t} = \delta_0 + \delta_1 SSE_{i.t} + \delta_2 OH_{i,t} + \delta_3 OHSQ_{i,t} + \delta_4 GVN_{i,t} + \boldsymbol{X\beta} + \alpha_i + \varepsilon_{i,t} \quad (3.4)$$

Where $\boldsymbol{X\beta}$ contains the control variables are their coefficients including LGDP, ICT, INF, and GLOB.

3.4.Data

This study employs 29 Sub-Saharan African countries from the year 1996 to 2022 in a panel data framework. The time period and the number of countries employed in the study is guided by the availability of data. Poverty and Inequality will serve both as the dependent variables in the study. The countries to used included Angola, Benin, Burkina Faso, Burundi, Cameroon, Cabo Verde, Chad, Djibouti, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, South Africa, Togo, and Uganda. STATA 15 software was used for the analysis

Table 1.1: Variables and Source

Variable	Proxy	Source
Poverty	Share of population living below $3.15 per day	WBPIP (2022)
Human Capital	Secondary School Enrolment (SSE)	WDI (2022)
Human Capital	Out-of-Pocket Expenditures for Health (OOH)	WDI (2022)
ICT	Share of population with access to internet (ICT)	WDI (2022)
Per capita income	GDP Per Capita in 2015 Constant Prices (GDP)	WDI (2022)
Inflation Rate	Inflation, CPI (INF)	WDI (2022)
Globalization	KOF Globalization Index (GLOB)	WDI (2022)
Corruption	Control of Corruption (CFC)	WGI (2022)
Government Effectiveness	Government Effectiveness: Estimate (GE)	WGI (2022)
Political Stability	Political Stability and Absence of Violence/Terrorism: Estimate (POLS)	WGI (2022)
Regulatory Quality	Regulatory Quality: Estimate (RQ)	WGI (2022)
Rule of Law	Rule of Law: Estimate (RL)	WGI (2022)
Voice and Accountability	Voice and Accountability: Estimate (VC)	WGI (2022)
Governance	Governance Index Generated Using Principal Component Analysis (GVN)	STATA 15 Computation

Abbreviations: WBPP, World Bank Poverty Platform; WDI, World Development Indicators; WGI, World Governance Indicators; WIID, World Income Inequality Database

Source: Authors compilation.

4. Regression Results

TABLE 1: Human Capital, Institutional Quality and Poverty without Interactions

	(1) POV2	(2) POV2	(3) POV2	(4) POV2	(5) POV2	(6) POV2	(7) POV2
LGDP	-15.67***	-17.77***	-17.04***	-13.77***	-15.65***	-18.95***	-17.46***
	(1.520)	(1.392)	(1.352)	(1.529)	(1.512)	(1.377)	(1.416)
SSE	-0.0925*	-0.0980*	-0.0623	-0.111*	-0.0931*	-0.159**	-0.109*
	(0.0469)	(0.0478)	(0.0482)	(0.0461)	(0.0467)	(0.0538)	(0.0463)
OH	-1.135***	-1.159***	-1.057***	-1.082***	-1.134***	-1.218***	-1.195***
	(0.110)	(0.111)	(0.111)	(0.109)	(0.109)	(0.116)	(0.109)
OH Squared	0.0101***	0.0107***	0.00938***	0.00931***	0.0101***	0.0119***	0.0112***
	(0.00136)	(0.00136)	(0.00136)	(0.00135)	(0.00135)	(0.00141)	(0.00133)
ICT	-0.245***	-0.142*	-0.199***	-0.244***	-0.245***	-0.123*	-0.167**
	(0.0618)	(0.0577)	(0.0575)	(0.0584)	(0.0617)	(0.0598)	(0.0582)
INF	-0.0738*	-0.0615*	-0.0693*	-0.0493	-0.0738*	-0.0440	-0.0726*
	(0.0297)	(0.0299)	(0.0293)	(0.0288)	(0.0297)	(0.0306)	(0.0299)
GLOB	0.440***	0.304***	0.348***	0.368***	0.441***	0.357***	0.280***
	(0.0487)	(0.0483)	(0.0457)	(0.0455)	(0.0482)	(0.0482)	(0.0489)
Governance	-4.559***						
	(0.841)						
CFC		-5.327***					
		(1.209)					
RL			-7.427***				
			(1.205)				
GE				-10.18***			
				(1.451)			
RQ					-9.358***		
					(1.708)		
VC						0.468	
						(1.059)	
POLS							-4.214***
							(0.838)
_cons	173.4***	193.2***	181.7***	159.3***	168.6***	202.7***	194.6***
	(10.10)	(8.542)	(8.666)	(10.22)	(10.55)	(8.668)	(8.438)
R^2	0.843	0.838	0.845	0.848	0.844	0.829	0.842
F	260.3	250.7	262.3	269.5	261.4	232.9	259.9
N	430	431	431	430	431	431	431

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1 shows the results of the models estimated to ascertain the effect of human capital on poverty without interactions with governance. Here, seven models are estimated based on each indicator of governance and overall governance index. From the results, human capital and institutional quality (governance indicators) significantly influences poverty. For human capital, the results show that SSE significantly reduces poverty in the SSA region. This is consistent across all models estimated. Secondly, OOP expenditures for health as a percentage of total health expenditure has a U-shaped effects on poverty in the region. Furthermore, overall governance as well as all indicators of governance used in the estimations including control of corruption, rule of law, regulatory quality, government effectiveness, voice and accountability, and political stability and absence of violence all significant had negative effects on poverty. That is, they significantly reduced poverty. For other control variables in the study, GDP and ICT significantly reduced poverty, while globalization significant increased poverty in the SSA region.

TABLE 2: Human Capital (Education), Institutional Quality and Poverty with Interactions

	(1) POV2	(2) POV2	(3) POV2	(4) POV2	(5) POV2	(6) POV2	(7) POV2
LGDP	-14.36***	-16.81***	-14.55***	-11.69***	-14.34***	-18.52***	-15.07***
	(1.474)	(1.434)	(1.370)	(1.548)	(1.468)	(1.336)	(1.419)
SSE	-0.0934*	-0.135**	-0.152**	-0.188***	-0.146**	-0.136**	-0.139**
	(0.0467)	(0.0503)	(0.0493)	(0.0507)	(0.0484)	(0.0524)	(0.0451)
OH	-1.106***	-1.114***	-0.922***	-1.023***	-1.105***	-1.162***	-0.997***
	(0.110)	(0.113)	(0.111)	(0.111)	(0.109)	(0.113)	(0.115)
OH Squared	0.00971***	0.0103***	0.00809***	0.00856***	0.00968***	0.0114***	0.00906***
	(0.00135)	(0.00137)	(0.00135)	(0.00137)	(0.00135)	(0.00137)	(0.00138)
ICT	-0.269***	-0.144*	-0.235***	-0.270***	-0.269***	-0.112	-0.199***
	(0.0608)	(0.0573)	(0.0561)	(0.0582)	(0.0607)	(0.0581)	(0.0567)
INF	-0.0633*	-0.0586*	-0.0487	-0.0466	-0.0633*	-0.0282	-0.0623*
	(0.0299)	(0.0298)	(0.0288)	(0.0289)	(0.0299)	(0.0298)	(0.0292)
GLOB	0.444***	0.262***	0.294***	0.361***	0.445***	0.322***	0.171**
	(0.0485)	(0.0524)	(0.0456)	(0.0458)	(0.0479)	(0.0472)	(0.0531)
Governance	-2.039						
	(1.372)						
Gov*SE	-0.0521*						
	(0.0204)						
CFC		-1.023					
		(2.533)					
CSE		-0.0982*					
		(0.0503)					
RL			2.606				
			(2.280)				
RSE			-0.216***				
			(0.0416)				
GE				-4.843			
				(2.540)			
GSE				-0.117**			
				(0.0419)			
RQ					-4.217		
					(2.793)		
RQSE					-0.106*		
					(0.0417)		
VC						8.948***	
						(1.950)	
VSE						-0.202***	
						(0.0395)	
POLS							1.525
							(1.562)
PSE							-0.163***
							(0.0366)
_cons	164.8***	190.9***	171.7***	149.4***	162.5***	201.8***	184.4***
	(9.867)	(8.497)	(8.534)	(10.15)	(10.24)	(8.404)	(8.291)
R^2	0.845	0.840	0.854	0.847	0.845	0.840	0.850
F	233.5	225.6	248.3	237.0	234.5	222.7	244.1
N	430	431	431	430	431	431	431

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2 shows the results of the models estimated to ascertain the effect of human capital on poverty with interactions with governance. In these results, governance is interacted with education as a component of human capital. Generally, all results are similar with those in Table 1 with respect to the key variables of the study and the controls. However, of key interests are the interactive effects. From the table, the coefficients of the various interactions of all governance indicators and overall governance index with SSE were negative and significant. This showed that the interaction between education as a component of human capital and governance significantly reduce poverty in the SSA region.

TABLE 3: Human Capital (OOP expenditures for health), Institutional Quality and Poverty with Interactions

	(1) POV2	(2) POV2	(3) POV2	(4) POV2	(5) POV2	(6) POV2	(7) POV2
LGDP	-15.86***	-18.51***	-16.97***	-14.59***	-15.85***	-18.98***	-19.40***
	(1.602)	(1.448)	(1.423)	(1.632)	(1.598)	(1.382)	(1.579)
SSE	-0.0912	-0.0684	-0.0639	-0.0961*	-0.0915	-0.159**	-0.0459
	(0.0472)	(0.0499)	(0.0492)	(0.0471)	(0.0471)	(0.0538)	(0.0501)
OH	-1.102***	-1.094***	-1.061***	-1.048***	-1.121***	-1.209***	-1.004***
	(0.121)	(0.114)	(0.113)	(0.110)	(0.111)	(0.120)	(0.114)
OH Squared	0.00972***	0.00925***	0.00951***	0.0083***	0.010***	0.0117***	0.0082***
	(0.00147)	(0.00146)	(0.00148)	(0.00146)	(0.0015)	(0.00153)	(0.00143)
ICT	-0.238***	-0.148*	-0.200***	-0.229***	-0.238***	-0.123*	-0.175**
	(0.0640)	(0.0574)	(0.0578)	(0.0592)	(0.0639)	(0.0599)	(0.0566)
INF	-0.0719*	-0.0560	-0.0697*	-0.0468	-0.0718*	-0.0439	-0.0631*
	(0.0299)	(0.0299)	(0.0294)	(0.0287)	(0.0299)	(0.0306)	(0.0294)
GLOB	0.431***	0.291***	0.350***	0.356***	0.432***	0.355***	0.277***
	(0.0511)	(0.0484)	(0.0463)	(0.0458)	(0.0507)	(0.0487)	(0.0478)
Governance	-3.698*						
	(1.686)						
Gov*OH	-0.0197						
	(0.0319)						
CFC		-0.184					
		(2.427)					
COH		-0.120*					
		(0.0485)					
RL			-8.006**				
			(2.921)				
ROH			0.0122				
			(0.0553)				
GE				-5.849*			
				(2.936)			
GOH				-0.0970			
				(0.0557)			
RQ					-7.548*		
					(3.442)		
RQOH					-0.0412		
					(0.0650)		
VC						1.021	
						(2.113)	
VOH						-0.0130	
						(0.0428)	
POLS							5.722*
							(2.390)
POH							-0.205***
							(0.0439)
_cons	174.6***	197.9***	181.1***	165.6***	170.7***	203.0***	203.8***
	(10.53)	(8.888)	(9.333)	(11.09)	(11.52)	(8.733)	(9.075)
R^2	0.844	0.840	0.845	0.850	0.844	0.829	0.849
F	231.1	224.4	232.9	242.2	232.2	206.5	241.2
N	430	431	431	430	431	431	431

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Similarly, Table 3 shows also the results of the models estimated to ascertain the effect of human capital on poverty with interactions with governance with focus on OOP health expenditures. In the results, governance is interacted with OOP health expenditures as a measure of human capital. Generally, all results are also similar with those in Table 1 with respect to the key variables of the study and the controls. However, of key interests are the interactive effects. From the table, the coefficients of the various interactions of all governance indicators and overall governance index with OOP were largely insignificant, with those which were significant and negative (control of

corruption and political stability) have their coefficients significantly smaller. This shows that governance significantly attenuates the effects OOP health in inducing poverty in the SSA region.

4.1 Discussion of Findings

The results of the analysis of this study yield interesting findings. From the results, human capital and institutional quality (governance indicators) significantly influences poverty. On poverty, the analysis found that; (1) Secondary School Enrolment significantly reduces poverty in the SSA region, (2) Secondly, Out of Pocket expenditures for health as a percentage of total health expenditure has a U-shaped effect on poverty in the region. The linear coefficient has a negative effect on poverty, while the quadratic term has a positive effect. Further simulations show a threshold or turning point of 56%. This means that when OOP expenditures for health reaches 56% of total health expenditure, it induces poverty, (3) overall governance as well as all indicators of governance used in the estimations including control of corruption, rule of law, regulatory quality, government effectiveness, voice and accountability, and political stability and absence of violence all significant had negative effects on poverty. That is, they significantly reduced poverty, (4) the interaction between education as a component of human capital and governance significantly reduce poverty in the SSA region, and (5) governance significantly attenuates the poverty inducing effects of OOP health expenditure in the SSA region.

The findings shed profound light on the intricate dynamics between human capital, institutional quality (gauged through governance indicators), and poverty within the context of Sub-Saharan Africa (SSA). The negative correlation between secondary school enrolment and poverty aligns seamlessly with established economic theory and empirical evidence. Education, particularly at the secondary level, acts as a catalyst for individual economic empowerment. It not only enhances employability but also cultivates critical thinking skills and fosters innovation, contributing significantly to poverty reduction. The U-shaped effect identified in the relationship between out-of-pocket (OOP) expenditures for health and poverty introduces a layer of complexity. The negative linear coefficient reflects the positive impact of initial increases in health spending on poverty reduction, emphasizing the role of accessible and affordable healthcare in improving overall well-being. However, the emergence of a positive quadratic term signifies a tipping point at 56%, suggesting that excessive reliance on OOP expenditures becomes counterproductive. This threshold underscores the vulnerability of households to catastrophic health expenditures, emphasizing the imperative for robust and inclusive health financing mechanisms to avert the impoverishing effects of healthcare costs.

Delving into the governance indicators, the across-the-board negative effects on poverty signify the far-reaching impact of good governance. The findings affirm the theoretical premise that effective governance structures, encompassing dimensions like control of corruption, rule of law, regulatory quality, government effectiveness, voice and accountability, and political stability, create an environment conducive to economic growth and equitable development. The negative correlations reflect the inherent ability of strong governance to mitigate systemic barriers, ensuring that the benefits of economic progress are distributed more inclusively, thus reducing poverty. Justifications for these relationships lie in the fundamental principles of development economics and political economy. Education and health are universally recognized as key drivers of human development, with a direct impact on poverty reduction. Likewise, the relationship between governance and poverty has been extensively documented, emphasizing the role of effective institutions in fostering economic progress. The insights regarding the threshold effect in health

spending contribute a policy-relevant dimension, urging policymakers to carefully calibrate health financing strategies.

The finding that the interaction between education and governance significantly reduces poverty aligns with the conceptual understanding that the impact of education is not in isolation but is contingent on the quality of governance. While education equips individuals with skills, knowledge, and the ability to participate in economic activities, effective governance ensures that the opportunities generated by education are translated into tangible socio-economic benefits. When education and governance interact synergistically, the positive effects of education are amplified, leading to more inclusive and sustainable poverty reduction. This result underscores the importance of not just increasing educational access but also improving the overall governance framework to maximize the poverty-alleviating potential of education.

Again, the finding that governance significantly attenuates the poverty-inducing effects of out-of-pocket (OOP) health expenditure in the SSA region underscores the protective role of good governance in the face of health-related financial shocks. In contexts where healthcare financing relies heavily on individual contributions, effective governance mechanisms can act as a buffer against the impoverishing effects of excessive health spending. This result implies that, even in the absence of comprehensive health insurance systems, well-governed countries are better equipped to manage the impact of health-related financial burdens on households, ensuring that such expenditures do not push individuals into poverty. This finding reinforces the idea that governance is not only critical for poverty reduction in general but plays a crucial role in safeguarding vulnerable populations from the economic fallout of health crises. In a broader context, these results underscore the interconnected nature of different elements within the development landscape. They emphasize that effective poverty reduction strategies in SSA should adopt a holistic approach that considers the interplay between education, health, and governance. Furthermore, the findings advocate for policies that not only focus on increasing educational access and improving healthcare but also prioritize the enhancement of governance structures to create an environment where the benefits of education and health can be fully realized in the fight against poverty.

5. Conclusion

In conclusion, the comprehensive analysis of poverty in the Sub-Saharan Africa (SSA) region yields a rich tapestry of insights that should inform strategic policy making. The multifaceted relationships identified in this study underscore the interconnectedness of education, health, governance, and technology in shaping the socio-economic landscape of the region. The findings highlight the critical role of Secondary School Enrollment as a potent tool for poverty alleviation. Policy makers should prioritize initiatives that enhance educational access and quality to empower individuals and break the cycle of poverty. Additionally, the relationship between Out-of-Pocket health expenditures and poverty, with a discernible threshold, emphasizes the need for targeted health financing strategies to prevent catastrophic health expenditures that push individuals into poverty. Governance emerges as a linchpin in the pursuit of socio-economic development. The consistent negative effects of governance indicators on both poverty underscore the imperative of fostering transparent, accountable, and effective governance structures. Efforts to combat corruption, strengthen the rule of law, and enhance regulatory frameworks are paramount for creating an environment conducive to economic growth and equitable resource distribution.

The intricate interplay between education and governance in reducing poverty highlights the synergies that can be harnessed through integrated policy approaches. Strategies that simultaneously improve educational opportunities and enhance governance structures can have a compounding effect on poverty reduction.

6. Recommendations

The rich array of findings from this study offers several recommendations for policy and practice aimed at alleviating poverty in the Sub-Saharan Africa (SSA) region.

Promoting Secondary School Enrollment for Poverty Alleviation:

The evidence suggesting that Secondary School Enrollment significantly reduces poverty underscores the importance of investing in education. Policymakers should focus on initiatives that enhance access to and quality of secondary education, addressing barriers that may impede enrollment, particularly for marginalized groups. This could include targeted scholarship programs, infrastructure development, and awareness campaigns to emphasize the long-term economic benefits of education.

Mitigating the Impact of Out-of-Pocket Health Expenditures:

The U-shaped effect of Out-of-Pocket (OOP) expenditures for health on poverty, with a threshold at 56%, indicates the need for careful management of health financing. Policymakers should consider policies that prevent health expenditures from reaching the identified threshold, ensuring that individuals are not pushed into poverty due to excessive healthcare costs. Strategies may involve strengthening health insurance systems, increasing government health expenditure, and implementing targeted interventions for vulnerable populations.

Enhancing Governance for Poverty Reduction:

The consistently negative effects of governance indicators on poverty imply that good governance is pivotal for poverty reduction. Policymakers should prioritize efforts to improve governance structures, including addressing corruption, strengthening the rule of law, and enhancing regulatory quality. These measures can create an environment conducive to economic development, job creation, and effective service delivery, all of which contribute to poverty alleviation.

Leveraging the Synergy Between Education and Governance:

The interaction between education and governance in reducing poverty highlights the importance of an integrated approach. Policy makers should consider initiatives that simultaneously enhance educational opportunities and improve governance structures. This may involve targeted interventions in education that consider the broader socio-economic context, such as vocational training programs aligned with market needs.

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