Full Length Research Paper

Causes of poverty in Sub-Saharan Africa: A layered theory approach to understanding significant factors

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Majority of studies on Sub Saharan Africa approach poverty solely as a lack of income. We believe that poverty is more than an economic status and is inclusive of educational attainment and gender inequality, for example. Our study analyzed poverty under a unique approach, and in a departure from previous studies, delineates between economic factors; political factors; health factors; educational factors; cultural factors; and agricultural factors of poverty. The research span over a 20-year period (1990 to 2010) based on five-year intervals with a sample size of 46 Sub- Saharan African countries. We found factors such as female literacy and corruption as key variables to poverty alleviation in Sub Saharan Africa over the last two decades.

Key words: Poverty, Sub Saharan Africa, layered approach, corruption, female literacy.

INTRODUCTION

The combined gross domestic product (GDP) of Africa is 15 times less than the GDP of the USA and 7 times less than the current GDP of China. Forty-eight percent of Sub Saharan Africans live on less than $1.25 a day while sixty-nine percent live on less than $2 a day. Sixty percent of countries in Africa are considered to have low human development. However one may look at poverty, as an ever present situation in Africa. These statistics should undoubtedly arouse no wonderment since Africa, the second largest continent has always been known to be the poorest continent. Yet, the question development economists have struggled to answer over the past decades lingers on: "Why is Africa poor". Perhaps, the more relevant question is "What are the key determinants of poverty in Sub Saharan Africa?" Many economists postulate and aver that the indigence in Sub Saharan Africa is largely due to the region's venality and impuissant economic and social policies. Others assert Africa's economic woes lie in the lack of well-structured institutions. While economists focus on economic status or progress as a measure of poverty, few use human development, contentiously the most important part of economic progress as a measure of poverty. We strongly adhere to the multi-dimensional theory of poverty and believe that such a theory is appropriate for our model on Sub Saharan Africa.

The measurement of poverty has different facets. There are the one-dimensional approach and multi-dimensional approaches. Some economists use a one-dimensional approach in measuring poverty and for ascertaining the determinants of poverty. For instance, an income based poverty measure is seen in some literature. Although this

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measure of poverty is not entirely wrong, it is inadequate. Inefficacious anti-poverty policies may be due to the use of the income based poverty approach (Watts, 2003). We postulate that the multi-dimensional approach, which is common in contemporary literature, is an adequate and a better approach for analyzing poverty. The harbinger of this approach and prominent economist, Armatya Sen, believed that the poverty head count ratio, for instance, is a crude index of measuring poverty due to the insensitivity towards the distribution of income to the poor. He advocated for poverty to be not only ordinal in nature but cardinal in nature as well (Sen, 1976). Sen (1976), further argued that policy makers should measure, analyze, and collate development not only by economic advances but also by improvements in the well-being of others. Harold Watts, a proponent of this approach, asserted that poverty is multidimensional and has both economic and various aspects to it (Watts, 2003).

We realized that not only is a vast preponderance of literature using income as the measurement of poverty when analyzing Sub Saharan Africa, most do not isolate the factors that cause poverty as if those are the only factors to have an effect on poverty. Our study analyzes poverty under a unique approach, and in a departure from previous studies, delineates between economic factors; political factors; cultural factors; agricultural factors; educational factors; and health factors. Huang (2010), used such an approach in finding the determinants of financial development. He investigated the political, economic and geographic determinants of the development of financial markets. In using a similar approach, Gregory Jordan argued that theorists and policy makers are primarily divided as to whether poverty is mainly structural, economic or cultural (Jordan, 2004). His paper examined the relevancy of each view and helped in gauging what the key determinants of poverty are. Not only have we added a few categories to this approach, our research focuses solely on Sub Saharan Africa over a 20 year period (1990 to 2010). With our model, comparative analyses between time periods are made to determine what categories or factors have had the most impact on poverty in Sub Saharan Africa. Our model would assist policy makers in enacting the right and appropriate anti-poverty programs that are specific and relevant to Sub Saharan Africa.

The paper is structured as follows. Section II consists of the literature review on measurements of poverty and the various determinants affecting poverty in Sub Saharan Africa. The data description and methodology is in Section III. Section IV analyses the results and policy implications. Section V presents the conclusions.

Literature review

We begin by averring that the definition of poverty is very paramount when research on poverty and its

determinants and perhaps effects are conducted. The literature is abound with GDP per capita and the growth of GDP as poverty measures and although they may be good measures, GDP per capita or the growth of GDP as poverty measures are too narrow in scope and lack any form of comprehensiveness since poverty is a broad concept. In light of this limitation, economists have begun to take a multi-dimensional approach to the measurement of poverty. A ubiquitous example may be that of the Human Development Index (HDI). Batana (2013), in his research postulates that the measurement of poverty should consist of an individual's assets, health, schooling and empowerment. He noticed that Sub Saharan African countries ranked very differently when their GDP was compared to their HDI values (Batana, 2013).

Although this may seem trite, the different rankings could have massive policy implications especially when determinants of poverty are being considered. Also, the quality of income/expenditures data is often poor in many developing countries especially Sub Saharan Africa. Well-being has a multi-dimensional nature and in accounting for poverty, different facets of well-being should be considered. However, weighting issues may arise since dimensions or measurements may be influenced by the size and the composition of the household (Batana, 2013). Other studies and eminent economists agree with Batana's assertion on the multi-dimensional approach to poverty. Alkire and Foster (2011), argue that measurement methods on poverty are largely cardinal in nature instead of being ordinal or categorical. Many countries are seeking multi-dimensional poverty measures to supplement official income poverty measures. In our analysis, we use such a view where we compare the results of two different dependent variables namely GDP and HDI. Alkire and Foster (2011) also agree that the multi-dimensional approach differs from the income based approach and perhaps may be a better measurement. Others such as Hutto et al (2011), posit that measurements of poverty should include child care, out of pocket medical expenses and variation in regional cost of living. In their research, when they accounted for all these factors, Hutto et al (2011), found that the rate of poverty tends to be higher than normal income based poverty measures. It can be concluded that existing income based poverty measurements do not adequately gauge the needs and resources of people. Batana and Duchos (2010), argue that although the multi-dimensional approach of measuring poverty is more adequate, the indicators used in the measurements tend to be quailtative, and hence, very difficult to measure.

Research on poverty reduction and development in Sub Saharan Africa is extensive and almost catholic in nature. We decide to approach the literature by looking at the economic, health, political, cultural, educational and agricultural impacts on poverty in Sub Saharan Africa in that order. In their research on aid in Africa, Nicholson and Lane (2013) confirm already existing theories that aid

has a significant impact on foreign investment flows to Africa and as such, helps in alleviating poverty in Africa. Foreign aid in the form of debt relief conditional on improved economic governance has led to increased foreign investment and capital formation on the continent. Debt relief through aid initiatives have been successful and have been a major factor of Africa's development (Nicholson and Lane, 2013). However, the theory of foreign development aid improving the well-being of people in Sub Saharan Africa is rejected by other development economists. Elbadawi et al (2009), aver that foreign aid can lead to an exchange rate overvaluation curtailing exports, a crucial component of Africa's growth.

Economic growth in Sub Saharan Africa largely depends on the fate of the exporting sectors which provide substantially to government finances, attract foreign investment and eventually lead to productivity gains. Unsustainable amounts of foreign aid can lead to disequilibrium, an appreciation of the real exchange rate, and this can have harmful effects on the export sectors (Elbadawi et al., 2009). Gatune (2010), argues that aid might not be central to development in Africa. He further posits that Africa needs to think beyond aid as the central plank of its development plans since development is more about mobilizing resources, having the capacity to use resources, and the proper allocation of resources. Through borrowing, Sub Saharan Africa, at times, has conceded policy space to its lenders who have forced it to implement deleterious policies (Gatune, 2010). Foreign aid in Sub Saharan Africa often comes with conditionality attached amounting to substantial encumbrances that outweigh possible benefits. Aid can discourage indigenous entrepreneurial initiative, weakening the necessity for these countries to outgrow the dependency on aid (Ilorah, 2008).

In terms of other economic factors such as foreign investment (FDI), economists such as Gohou and Soumare (2012) have found a rather significant relationship between foreign direct investment and poverty reduction in Africa. They admit that although the relationship is significant in parts of Africa, the positive relationship between foreign direct investment and poverty reduction is not significant in other parts of Southern and Western Africa. Over the last decades, FDI to Africa has increased on average. At the same time, HDI has been improving (Gohou and Soumare, 2012). On the other hand, Kobonang (2006) believes that FDI can equally be a source of economic harm. FDI may crowd out domestic markets and have a damaging effect on growth in developing countries. FDI may also lead to exploitation where well developed and industrialized countries prey on the least developed countries (Kobonang, 2006). The last economic component that is ubiquitous in the literature is that of the relationship of financial development and private credit in Sub Saharan Africa. Financial openness and private credit has a positive and significant relationship to poverty and economic growth. Overall,

better institutions are associated with higher income levels and lower levels of poverty (Imaiet al., 2010). In Sub Saharan Africa, private credit is not a significant determinant of poverty reduction. Perhaps the channel through which financial development affects poverty in developing countries is probably not through private credit (Fowowe and Abidoye, 2013).

There is widespread agreement that health is an important component of human development and a central part of the Human Development Index (HDI) (Canning, 2012). Healthy citizens, skilled or unskilled, enhance an economy's productive capacity by being both physically and mentally apt (Jaunky, 2013). Canning (2012), argues that health is a cause as well as a consequence of income growth. Jaunky (2013), asserts that there is a U-shaped relationship between health and wealth. This relationship however, varies over different stages of economic development. The period 1970 to 2005 has seen large improvements in life expectancy in most countries. However, in Sub Saharan Africa, high prevalence of Human immunodeficiency virus infection (HIV) has mitigated and stagnated life expectancy rates (Canning, 2012). Arimah (2004), argues that prevalence of Human immunodeficiency virus infection/acquired immune-deficiency syndrome (HIV/AIDS) is associated with increasing levels of poverty due to the reallocation of scarce financial resources from productive areas to the treatment of HIV/AIDS related ailments thereby reducing funds to fight poverty. Salinas and Haacker (2006), also agree that there is evidence that the fall in average income because of HIV/AIDS is significant in those African countries with high HIV prevalence such as Swaziland and Zambia. Another issue concerning poverty in Sub Saharan Africa has to do with poor governance and inefficacious policies drafted by feckless officials. There is no doubt that corruption is rife in Sub Saharan Africa. As of 2012, according to the Corruption Perception Index, 90% of African countries were deemed as highly corrupt. According to Szeftel (2000), the World Bank estimates that if only 5 percent of direct investment and imports into countries perceived to be extremely venal were lost through corruption, the take would be $80 billion a year.

Gyimah-Brempong (2011) and Guisan and Exposito (2007), suggest that education has a positive and significant impact on development. Education improves development by increasing the productivity of existing resources, creating and rapidly diffusing new technology and lastly, increasing the quality and efficiency of institutions (Gyimah-Brempong, 2011). In his research, Gyimah-Brempong (2011) found that all levels of education have significantly positive impacts on income growth rate in Africa with tertiary education having the most effect.

During 1970 and 1990, several countries in Africa experienced real declines in agricultural growth and showed the lowest growths in national Gross National

Product (GNP), and increase in poverty. Small-scale farmers and irrigators may be influential in alleviating poverty. For instance, irrigated agriculture has been a strategy for poverty reduction and there is evidence that this can be achieved. Yeh (2012), believes rural sector agriculture can lift some countries out of poverty. Income generated in the rural sector would be multiplied by increases in income from induced consumption expenditures in Sub Saharan Africa. About 63% of the population in Sub Saharan Africa lives in rural areas and depends largely on agriculture as the main source of income. As such, agricultural incomes must be increased in order to generate the growth in aggregate demand that powers economic development (Yeh, 2012).

DATA AND METHODOLOGY

This section describes the sample of the countries on which our research is conducted, the measures of economic, political, geography, health, education, cultural and agricultural factors/ (determinants of poverty) across the five time periods, and the empirical framework employed.

EMPIRICAL FRAMEWORK

Layered approach

In deviating from the literature, we developed an approach we coined "layered approach" which uses a comprehensive analysis of poverty. Our layered approach is simple. It is quite evident from the review of the literature that there are many determinants of poverty. We determined that a good model would include all the major determinants across different time periods, specifically, five year periods. We use this approach in order to give policy makers and researchers a "time travel" analysis of the significant determinants of poverty through the comparison of determinants across the time periods. With such an approach, one can assess factors of poverty once significant in the past and not in the present, the degree to which factors have changed, and the magnitude of these factors on poverty. As such, we run a simple Online Learning Support (OLS) for each category and for every time period. Our only limitation was the availability of certain variables over the time periods. To make the analysis comprehensive, we use both HDI and the natural log of GDP as dependent variables in separate models. The model is used for every time period.

Sample

The sample consists of all countries in Sub Saharan Africa. This means North African countries such as Egypt, Libya, Tunisia, Algeria, Morocco and Western Sahara were ommitted. However, islands such as Cape Verde, Seychelles and Mauritius were included. Due to the availability of data, some countries were ommitted over the time periods. During the 1990 period, there were 31 countries, 34 countries in 1995, 39 countries in 2000, 45 countries in 2005, and 46 countries during 2010 when HDI was used as the dependent variable. When using GDP as the dependent variable, there were 42 countries during 1990 and 1995 and 46 countries in 2000, 2005 and 2010. It is evident that using GDP as the dependent variable produced the most sample size due to availability of data.

Economic variables

To examine what siginificant effect economic factors have on poverty reduction and development, we decided to include three major economic varaibles in our analysis. These are *net_official_aid*, *fdi_inflows*, *private_sector_credit* (%). *Net_official_aid* involves development assistance, the disbursements of loans made on concessional terms, and grants by mulitlateral institutions to promote economic development and welfare in countries and territories. It is measured in current US dollars(World Bank). *Fdi_inflows* involves the net inflows of investment to acquire a lasting management in an enterprise operating in an economy other than that of the investor. It is the sum of the equity capital, reinvestment of earnings, other long term capital and short-term capital as shown in the balance of payments measured in current US dollars. *Net_official_aid* and *fdi_inflows* are in natural log. The *private_sector_credit* (%) involves financial resources provided to the private sector by financial corporations such as through loans, trade credits, and the pruchases of nonequity securities. We included *private_sector_credit* (%) in our analysis since it indicates the financial development of a country. Developemental aid and foreign direct investment in Sub Saharan Africa have increased over the years hence their inclusion in our research.

Model: HDI = β_0 + β_1*net_official_aid* + β_2*fdi_inflows* + β_3*private_sector_credit* + ε

GDP = β_0 + β_1 *net_official_aid* + β_2 *fdi_inflows* + β_3 *private_sector_credit* + ε

Political variables

Our political variables are: *one_party*, which is a dummy variable, *corruption_index*, and *press_freedom_index*. The *one_party* dummy serves as a control for countries that are under one party rule or under a dictatorship. *Corruption_index* ranks countries based on how corrupt their public sector is perceived to be. Countries with higher scores are percevied to have low levels of corruption while countries with lower scores are perceived to have high levels of corruption. Finally, the *press_freedom_index* measures the attitudes and intentions of governments towards media freedom in the medium and long run. Countries with low press freedom scores had governments that encouraged press freedom while countries with high scores had goverments that restricted the press.

Model: HDI = β_0 + β_1*one_party* + β_2*corruption_index* + β_3*press_freedom_index* + ε

GDP = β_0 + β_1*one_party* + β_2*corruption_index* + β_3*press_freedom_index* + ε

Geography

To assess the role of geography and poverty in Sub Saharan Africa, we picked a key variable namely, *landlocked*, a dummy variable indicating countries that are landlocked and have limited access to the sea or ports.

Health

In examining what role health plays in poverty and development in Sub Saharan Africa, we use four major health varaibles. They are: *access_to_water*, *HIV_prevalence*, *infant_mortality* and *health_per_capita*. *Access_to_water* refers to the percentage of the population using an improved drinking water source. *HIV_prevalence* looks at the percentage of population affected with HIV/AIDS. *Infant_*

mortality is defined as the number of infants dying before reaching one year of age per 1000 live births in a year (World Bank). *Health_per_capita* involves the sum of public health and private health expenditures as a ratio of total population measured in constant US dollars.

Model: HDI = β_0 +β_1 *access_to_water* + β_2 *HIV_prevalence* + β_3 *infant_mortality* + β_4*health_per_capita*+ ε
 GDP= β_0 +β_1 *access_to_water* + β_2 *HIV_prevalence* + β_3 *infant_mortality* + β_4 *health_per_capita* + ε

Education

We know education plays a crucial role in analysing poverty and as such, we chose our variables carefully. We decided to use *female_literacy*, *tertiary_nrllmnt*, *studnt_tchr*, *public_spend_educ* and *sec_nrllmnt*. *Female_literacy,* involves the percentage of females age 15 and above who can read and write a short simple statement on their everyday life.It is important to note that literacy also involves numeracy, the ability to make simple arithmetic calculations. *Tertiary_nrllmnt,* another key component on education, is defined as total enrollment in tertiary education regardless of age, expressed as a percentage of the total population of the five year age group following on from secondary school leaving. *Studnt_tchr,* is the number of pupils enrolled in primary school divided by the number of primary school teachers. *Public_spend_educ,* is the total public expenditure on education expressed as a percentage of the GDP in a given year. Public spending on education includes government spending on educational institutions, education administration, and transfer/subsidies for private entities. *Sec_nrllmnt,* involves the total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age.

Model: HDI = β_0 +β_1*female_literacy*+ β_2*tertiary_nrllmnt* + β_3*studnt_tchr*+ β_4*public_spend_educ*+β_5*sec_nrllmnt*+ ε
 GDP= β_0 +β_1*female_literacy*+ β_2*tertiary_nrllmnt* + β_3*studnt_tchr*+ β_4*public_spend_educ*+β_5*sec_nrllmnt*+ ε

Cultural

Cultural factors are major determinants of poverty in Sub Saharan Africa. To capture the relationhip between culture and poverty, we included the variables: *fertility_rate*, *ethnic_diversity*, *religious_diversity* and *age_dpndcy*. Our *ethnic_diversity* and *religious_diversity* were obtained from Alesina and Ferrara's (2003) analysis on ethnic and religious fractionalization. Countries with high scores are highy ethnically or religiously diverse. *Fertility_rate,* represents the number of children that would be born to a woman if she were to live to the end of her child bearing years. *Age_dpndcy,* looks at the ratio of dependents(people younger than 15 or older than 64) to the working population (ages 15-64).

Model: HDI = β_0 +β_1*fertility_rate*+ β_2*ethnic_diversity*+ β_3*religious_diversity*+ β_4*age_dpndcy*+ ε
GDP= β_0 +β_1*fertility_rate*+ β_2*ethnic_diversity*+ β_3*religious_diversity*+ β_4*age_dpndcy*+ ε

Agriculture

With the agriculture category, we restrict our analysis to two key varaibles namely *agric_value* and *food_prod*. *Agric_value,* is the percentage of GDP added by agriculture. In defining agriculture, the World Bank includes forestry, hunting and fishing, the cultivation of crops and livestock production. *Food_prod,* is an index that covers food crops that are considered edible and that contain nutrients.

Model: HDI = β_0 +β_1*agric_value* + β_2*food_prod* + ε
GDP= β_0 +β_1 *agric_value* + β_2 *food_prod* + ε

Data was obtained from the World Bank[1], the United Nations[2], and the IMF[3].

EMPIRICAL RESULTS

We begin by looking at interesting relationships over the time periods. Figure 1, shows a scatter plot for the relationship between HDI and percentage of people enrolled in secondary education in 1990. Figure 2, shows a key scatter plot in 1995; the relationship between HDI and infant mortality. It can be argued that infant mortality reduces HDI values. Appendix 1-6, show the results when HDI is used as a dependent variable. Appendix 7-12, shows the results when the natural log of GDP is used as the dependent variable. Both multicollinearity and heteroscedasticity were controlled for and corrected.

From Appendix 1, it can be extrapolated that *private_sector_credit* has a positive relationship with HDI and it is significant. Moreover, this significance has been consistent for the last two decades in Sub Saharan Africa. The model controls for 'landlocked' and 'one party regime' countries as well. Although, foreign direct inflows have some positive impact on HDI, the effect is not as significant as expected. It is interesting that *net_official_aid* has a negative relationship with HDI and although not significant in the 1990s as determined by our model, it is significant in later years. The relationship confirms theories held by some economists that Africa needs to be independent from foreign aid as it curtails the continent's development. When GDP is used as the dependent variable, *net_official_aid* still has a negative relationship with HDI with the coefficients all being significant over the years. In addition, on average, countries in Sub Saharan Africa that are landlocked have a lesser GDP. Our results also show that countries with one party rule on average have a higher HDI and GDP than countries with a multi-party system.

Although this may seem strange, due to the fact of one –party regimes being tyrannical, in terms of productivity and efficiency, one party system may perform better than multi-party systems. The results also show that the more corrupt a country is, the lesser the country's economic productivity or human development. Access to drinking water does improve GDP and HDI as our results show, although this may not have been significant over the years. On the other hand, infant mortality rate has been

Secondary Enrollment (%) and HDI   (1990)
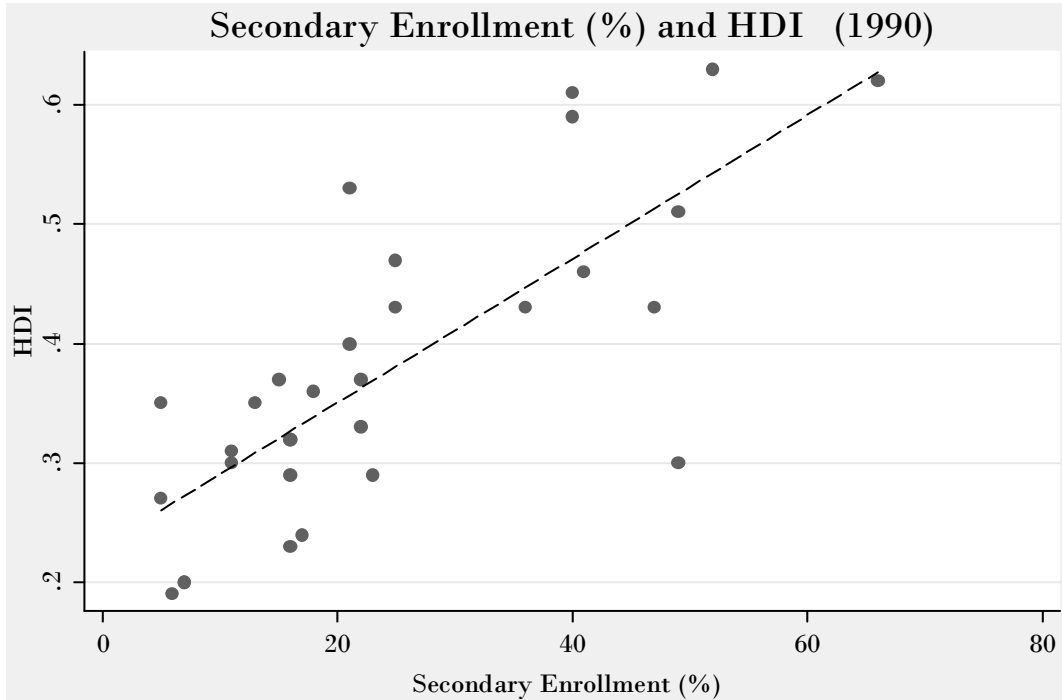
Figure 1. The relationship between HDI and the percentage of school going population enrolled at the secondary level.

Infant Mortality and HDI (1995)
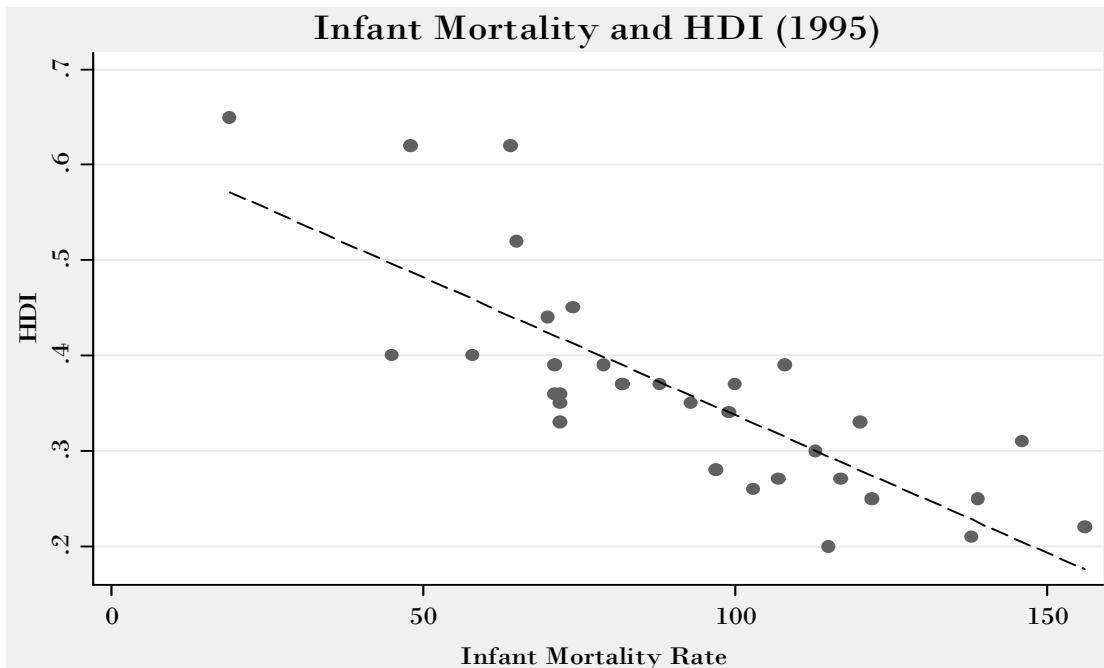
Figure 2. Higher infant mortality rates lead to lower HDI values.

largely significant in reducing HDI and GDP over the last two decades in Sub Saharan Africa. In relation to policy implications, governments should increase their health implications, governments should increase their health expenditure as it helps in increasing HDI and GDP. In looking at education, it can be inferred that female literacy rates and the percentage of tertiary enrollment

have the most effect on human development and the reduction of poverty in Sub Saharan Africa. Our culture model shows two key variables that affect economic growth and human development in Sub Saharan Africa and they are fertility rate and the age dependency ratio. Both have a negative effect on HDI and GDP. Finally, agriculture through the value added per worker, and food production plays a significant role in poverty and human development in Sub Saharan Africa as well.

CONCLUSION

This research investigated the significant determinants of poverty in Sub Saharan Africa over the years. Poverty was measured by both the HDI and GDP values of a country. Our research utilized the "layered approach" where different categories and models affecting poverty were analyzed over periodic years. The analysis was done to find the impact of certain factors on poverty overtime in Sub Saharan Africa.

In our research, we found that economic variables such as net official aid, cultural variables such as fertility rate, and health variables such as infant mortality rates had a negative impact on human development in Sub Saharan Africa. On the other hand, factors such as credit to the private sector, access to drinking water, and food production have a significant impact on poverty reduction Sub Saharan Africa. In comparison, both the HDI and GDP models produced minimal differences. We can infer that the income measure (GDP) and the multi-dimensional measure (HDI) are both accurate measures of poverty. Our analysis on poverty has revealed the layered levels that characterize poverty. Poverty can and should be analyzed at the individual level, through the community, and at the national level. Policies used in alleviating poverty at the national level may not always be applicable at the individual level. We can strongly conclude that policies have major impacts on poverty and human development in Sub Saharan Africa as well.

We provide some further recommendations based on the results. Sub Saharan Africa policy makers should enact policies and programs that ensure a fair distribution of economic growth amongst its citizens. Corruption should also be rooted out not only at the individual level, but at the societal level as well. Our results indicate that high corruption levels lead to an exacerbation of poverty levels in Sub Saharan Africa. Corruption leads the funneling of scarce resources to uneconomic high projects at the expense of much needed projects such as schools, hospitals, roads and reliable institutions. Governments should also ensure broader access to education and technology among marginalized groups. Our results showed that female literacy rates and tertiary enrollments are significant drivers of economic growth and poverty alleviation. Finally, government capacity should be improved to provide universal access to services such as

potable water; affordable food; primary health care; education etc.

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Appendix 1. Economic Model

	1990	1995	2000	2005	2010
	HDI	HDI	HDI	HDI	HDI
Net_official_aid	-0.055	-0.032	-0.058	-0.034	-0.052
	(2.05)	(2.01)	(4.47)**	(3.70)**	(4.48)**
Fdi_inflows	0.003	0.018	0.015	0.012	0.019
	(0.29)	(1.75)	(1.24)	(1.90)	(2.84)**
Private_sector_credit	0.004	0.005	0.002	0.002	0.002
	(2.62)*	(3.15)**	(3.37)**	(3.50)**	(3.80)**
Landlocked	-0.024	-0.008	-0.052	-0.049	-0.028
	(0.51)	(0.24)	(1.59)	(1.74)	(1.04)
One_party	-0.001	0.060	-	-	-
	(0.03)	(1.69)	-	-	-
CONSTANT	0.632	0.415	0.621	0.549	0.649
	(3.57)**	(4.41)**	(9.45)**	(10.40)**	(9.62)**
Observations	31	33	39	45	46
R-Squared	0.33	0.52	0.56	0.52	0.53
Adj. R-Squared	0.19	0.43	0.50	0.47	0.49

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 2. Political model

	2000	2005	2010
	HDI	HDI	HDI
One_party	0.113	0.036	0.059
	(3.45)**	(1.08)	(2.03)*
Corruption_index	0.089	0.062	0.079
	(5.94)**	(3.62)**	(6.41)**
Press_freedom_index	-0.000	-0.001	-0.000
	(0.17)	(0.81)	(0.74)
Landlocked	-0.097	-0.084	-0.085
	(3.57)**	(2.82)**	(3.48)**
CONSTANT	0.170	0.291	0.255
	(2.34)*	(4.29)**	(5.48)**
Observations	39	45	46
R-squared	0.65	0.41	0.58
Adj. R-Squared	0.61	0.35	0.53

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 3. Health model

	1990	1995	2000	2005	2010
	HDI	HDI	HDI	HDI	HDI
access_to_water	0.002	0.000	0.001	0.000	0.001
	(2.27)*	(0.11)	(1.37)	(0.69)	(2.04)*
hiv_prevalence	-0.000	-0.000	-0.000	-0.000	-0.001
	(0.03)	(0.05)	(0.06)	(0.05)	(0.74)
infant_mortality	-0.002	-0.002	-0.002	-0.002	-0.002
	(4.21)**	(4.20)**	(5.10)**	(4.55)**	(4.18)**
landlocked	0.054	-0.011	-0.037	-0.058	-
	(1.94)	(0.42)	(2.00)	(3.10)**	-
one_party	-0.004	0.014	-	-	-
	(0.14)	(0.64)	-	-	-
health_per_capita		0.001	0.003	0.001	0.008
		(4.13)**	(4.61)**	(5.62)**	(5.69)**
Constant	0.434	0.484	0.503	0.510	0.440
	(4.76)**	(7.36)**	(7.68)**	(8.15)**	(6.52)**
Observations	31	33	39	45	46
R-squared	0.73	0.80	0.87	0.84	0.74
Adj. R-Squared	0.68	0.75	0.85	0.81	0.71

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 4. Education model

	1990	1995	2000	2005	2010
	HDI	HDI	HDI	HDI	HDI
Female_literacy	0.002	0.002	0.003	0.002	0.002
	(1.30)	(2.43)*	(3.74)**	(3.41)**	(3.74)**
Student_tchr	-0.001	-0.001	-0.002	-0.001	-0.001
	(0.70)	(0.73)	(1.24)	(0.62)	(0.95)
Tertiary_nrllmnt	0.028	0.019	0.006	0.003	0.000
	(2.81)**	(3.42)**	(1.45)	(1.33)	(0.35)
Landlocked	0.020	-0.029	-0.053	-0.021	-0.022
	(0.49)	(1.01)	(1.48)	(0.98)	(0.93)
One_party	0.003	-0.006	-	-	-
	(0.08)	(0.22)	-	-	-
Public_spend_educ	-	0.005	0.007	-	-
	-	(0.77)	(0.89)	-	-
Sec_nrllmnt	-	-	-	0.002	0.002
	-	-	-	(3.48)**	(3.51)**
Constant	0.278	0.248	0.292	0.258	0.279
	(3.22)**	(3.93)**	(3.70)**	(4.47)**	(4.56)**
Observations	31	33	39	45	46
R-squared	0.50	0.67	0.62	0.77	0.71
Adj. R-Squared	0.40	0.59	0.56	0.74	0.67

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 5. Culture model

	1990	1995	2000	2005	2010
	HDI	HDI	HDI	HDI	HDI
fertility_rate	-0.107	-0.052	-0.048	-0.027	-0.017
	(4.55)**	(2.81)**	(2.60)*	(1.52)	(0.77)
ethnic_diversity	0.123	-0.118	-0.052	-0.008	-0.003
	(1.65)	(1.37)	(0.64)	(0.14)	(0.04)
religious_diversity	0.027	0.036	-0.048	-0.024	0.021
	(0.38)	(0.49)	(0.72)	(0.40)	(0.35)
age_dpndcy	0.001	-0.001	-0.003	-0.005	-0.004
	(0.54)	(0.39)	(1.60)	(2.64)*	(2.71)**
landlocked	-0.016	-0.044	-0.039	-0.037	-0.035
	(0.48)	(1.11)	(1.16)	(1.40)	(1.22)
one_party	0.015	0.000	-	-	-
	(0.48)	(0.01)	-	-	-
Constant	0.796	0.828	0.973	0.964	0.856
	(4.86)**	(5.48)**	(10.18)**	(12.12)**	(14.35)**
Observations	31	33	39	45	46
R-squared	0.69	0.58	0.70	0.69	0.62
Adj. R-Squared	0.61	0.47	0.65	0.65	0.58

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 6. Agriculture model

	1990	1995	2000	2005	2010
	HDI	HDI	HDI	HDI	HDI
agric_value	-0.005	-0.004	-0.005	-0.005	-0.005
	(3.92)**	(4.57)**	(6.46)**	(6.41)**	(6.51)**
food_prod	0.000	0.001	0.002	-0.001	-0.000
	(0.17)	(1.19)	(2.49)*	(0.38)	(0.58)
landlocked	0.037	-0.031	-0.058	-0.065	-0.056
	(0.92)	(1.05)	(2.30)*	(2.56)*	(2.26)*
one_party	0.028	0.035	-	-	-
	(0.70)	(1.09)	-	-	-
Constant	0.495	0.408	0.390	0.689	0.641
	(4.01)**	(4.48)**	(4.86)**	(2.27)*	(8.40)**
Observations	31	33	39	45	46
R-squared	0.45	0.53	0.69	0.56	0.57
Adj. R-Squared	0.36	0.46	0.66	0.53	0.54

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 7. Economic model

	1990	1995	2000	2005	2010
	LG GDP	**LG GDP**	**LG GDP**	**LG GDP**	**LG GDP**
Net_official_aid	-0.456	-0.355	-0.550	-0.368	-0.631
	(3.65)**	(2.91)**	(5.87)**	(4.40)**	(4.87)**
Fdi_inflows	0.029	0.132	0.174	0.155	0.227
	(0.58)	(1.98)	(2.71)**	(2.82)**	(3.07)**
Private_sector_credit	0.027	0.030	0.016	0.014	0.014
	(2.86)**	(2.12)*	(3.05)**	(2.39)*	(2.39)*
Landlocked	-0.250	-0.127	-0.201	-0.151	-0.057
	(1.04)	(0.45)	(0.93)	(0.60)	(0.19)
One_party	0.186	0.099	-	-	-
	(0.72)	(0.34)	-	-	-
Constant	9.318	8.367	9.180	8.646	9.969
	(12.65)**	(11.19)**	(21.63)**	(17.85)**	(13.33)**
Observations	42	42	46	46	46
R-squared	0.43	0.41	0.56	0.47	0.47
Adj. Square	0.34	0.32	0.52	0.42	0.41

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 8. Political model

	2000	2005	2010
	LG GDP	**LG GDP**	**LG GDP**
One_party	0.548	0.676	1.033
	(2.02)	(2.11)*	(2.78)**
Corruption_index	0.482	0.457	0.629
	(3.93)**	(2.85)**	(4.00)**
Press_freedom_index	-0.014	-0.010	-0.004
	(1.37)	(1.15)	(0.47)
Landlocked	-0.508	-0.478	-0.616
	(2.04)*	(1.69)	(1.99)
Constant	6.251	6.308	5.760
	(11.93)**	(10.61)**	(9.72)**
Observations	46	46	46
R-squared	0.41	0.30	0.37
Adj R-squared	0.30	0.24	0.30

Appendix 9. Health model

	1990	1995	2000	2005	2010
	LG GDP	LG GDP	LG GDP	LG GDP	LG GDP
Access_to_water	0.009	0.008	0.008	0.001	0.012
	(1.37)	(1.30)	(1.57)	(0.09)	(2.07)*
HIV_prevalence	-0.016	-	-	-0.002	-
	(0.50)	-	-	(0.13)	-
Infant_mortality	-0.013	-0.000	-0.007	-0.003	-0.003
	(3.49)**	(0.15)	(1.95)	(0.66)	(0.95)
Landlocked	-.2172	-0.187	-0.214	-0.305	-0.263
	(0.85)	(1.01)	(1.24)	(1.79)	(1.61)
One_party	.1955	-0.276	-	-	-
	(0.83)	(1.34)	-	-	-
Health_per_capita	-	0.006	0.003	0.004	0.003
	-	(6.53)**	(4.42)**	(4.63)**	(6.61)**
	-	-	-	-	-
	-	-	-	-	-
Constant	8.102	6.413	7.011	7.032	6.343
	(11.53)**	(12.50)**	(14.68)**	(15.31)**	(13.43)**
Observations	42	42	46	46	46
R-squared	0.51	0.72	0.65	0.73	0.70
Adj R-Squared	0.47	0.68	0.62	0.70	0.67

value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 10. Education model

	1990	1995	2000	2005	2010
	LG GDP	LG GDP	LG GDP	LG GDP	LG GDP
Female_literacy	0.000	0.008	0.014	0.012	0.020
	(0.02)	(1.25)	(2.36)*	(1.79)	(2.59)*
Studnt_tchr	-0.014	-0.003	-0.015	-0.015	-0.021
	(1.76)	(0.33)	(1.36)	(1.42)	(1.54)
Public_spend_educ	0.077	0.145	0.016	-	-
	(1.63)	(1.70)	(0.24)	-	-
Tertiary_nrllmnt	0.226	0.144	0.078	0.040	0.012
	(3.81)**	(2.02)	(2.11)*	(2.07)*	(0.72)
One_party	0.131	0.003	-	-	-
	(0.53)	(0.01)	-	-	-
Landlocked	-	-0.369	-0.126	0.120	-0.027
	-	(2.15)*	(0.42)	(0.54)	(0.08)
Sec_nrllmnt	-	-	-	0.013	0.006
	-	-	-	(1.45)	(0.62)
Constant	6.913	6.106	6.876	6.637	6.851
	(14.46)**	(9.44)**	(10.11)**	(10.10)**	(7.75)**
Observations	42	42	46	46	46
R-squared	0.47	0.51	0.44	0.56	0.44
Adj. R- Squared	0.40	0.42	0.37	0.50	0.37

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 11. Culture model

	1990	1995	2000	2005	2010
	LG GDP	**LG GDP**	**LG GDP**	**LG GDP**	**LG GDP**
fertility_rate	-0.591	-0.472	-0.315	-0.326	-0.128
	(5.25)**	(3.12)**	(2.01)	(1.76)	(0.43)
ethnic_diversity	0.124	-0.347	0.161	0.362	0.457
	(0.21)	(0.53)	(0.27)	(0.68)	(0.57)
religious_diversity	-0.232	-0.068	-0.729	-0.846	-0.218
	(0.45)	(0.12)	(1.26)	(1.54)	(0.56)
landlocked	-0.047	-0.176	0.034	0.033	-0.070
	(0.19)	(0.59)	(0.13)	(0.12)	(0.22)
one_party	0.259	-0.150	-	-	-
	(1.14)	(0.65)	-	-	-
age_dpndcy	-	-0.006	-0.032	-0.030	-0.040
	-	(0.39)	(2.16)*	(1.68)	(2.47)*
Constant	10.666	10.877	11.946	11.684	11.117
	(18.05)**	(11.64)**	(14.23)**	(15.33)**	(16.36)**
Observations	42	42	46	46	46
R-squared	0.56	0.54	0.56	0.52	0.41
Adj. R-Squared	0.50	0.46	0.50	0.46	0.33

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix 12. Agriculture model

	1990	1995	2000	2005	2010
	LG GDP	**LG GDP**	**LG GDP**	**LG GDP**	**LG GDP**
Agric_value	-0.036	-0.041	-0.037	-0.050	-0.051
	(5.82)**	(6.81)**	(6.31)**	(7.45)**	(6.55)**
Food_prod	0.009	0.012	0.011	-0.012	-0.002
	(2.13)*	(3.25)**	(1.48)	(0.53)	(0.23)
landlocked	-0.292	-0.256	-0.299	-0.261	-0.340
	(1.56)	(1.72)	(1.62)	(1.40)	(1.28)
one_party	0.114	0.182	-	-	-
	(0.57)	(1.09)	-	-	-
Constant	7.751	7.585	7.512	9.995	9.122
	(16.99)**	(19.35)**	(11.11)**	(4.29)**	(11.16)**
Observations	42	42	46	46	46
R-squared	0.62	0.74	0.59	0.65	0.54
Adj. R-Squared	0.58	0.71	0.56	0.63	0.51

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%