Int Journal of Social Sciences Management and Entrepreneurship 9(3): 13-25 2025

ISSN 2411-7323

www.sagepublishers.com

© SAGE GLOBAL PUBLISHERS

EFFECT OF HUMAN CAPITAL DEVELOPMENT ON POVERTY IN KENYA

SHISOKA Stephen Okiya [1] Dr. WEPUKHULU, Joshua Matanda[2]

[1,2] Jomo Kenyatta University of Agriculture and Technology

Abstract

Poverty remains one of the main global goals today. Goal 1 of the Sustainable development Goals is to "End Poverty in all its forms everywhere". Tremendous efforts have been made in ensuring there's reduction in the levels of poverty around the world. Developed world, donors and developing countries have come up with development policies targeting the poor to help alleviate poverty in the developing world. Such efforts have also been undertaken in Kenya to achieve reduction in poverty. The study sought to establish robust evidence of target sectors that will greatly impact reduction in poverty level in Kenya. The objective of the study is to establish a relationship between human capital development and poverty. Evidence based policy plays a key role in poverty alleviation. An accurate answer to which interventions work best will inform policies by the Kenyan government as it tries to design policies in assisting the poor improve their welfare. The study used secondary data collection from World Development Report and Human Development Index between 2005 and 2015. The annual reports give national estimates of socio-economic indicators on health, education, women empowerment, poverty (money metric and multi-dimensional) etc. The study used both descriptive and inferential research designs to establish any existing relationship between the dependent variable, poverty incidence and independent variables; health, education, access to safe water and sanitation and access to infrastructure. It used prevalence of HIV, expected years of schooling, improved water source and roads paved of total roads as proxies for health, education, access to safe water and sanitation and access to infrastructure. The study found prevalence of HIV, expected years of schooling and roads paved of total roads to be statistically significant but improved water source wasn't statistically significant at 5 percent level.

Key Words: Health, Poverty, Education, Access to Water and Sanitation, Infrastructure

Introduction and Background of the Study

Poverty remains a key issue both locally and internationally. According to World Bank statistics released in 2013, 10.7% of the world's population lived on less than US$1.90 a day (World Bank, 2013). There have been several efforts by the Kenyan government in ensuring high levels of economic growth and reduction in poverty incidence. Poverty is highly correlated with economic growth and development (Plotnick & Skidmore, 1975). Studies have shown that growth in GDP has had positive effect on poverty during expansionary periods (Adams, 2002; World Bank, 2002; Chen, 1997). Cross country studies show that a 10% increase in a country's average income will result in a 20 – 30% decrease in poverty incidence (Adams, 2002; Ravallion & Chen, 1997). Research conducted in several developing countries strongly suggests that sustained high level of economic growth is the most robust way of reducing poverty.

In 2000, the United Nations held a Millennium summit that adopted the United Nations Millennium Declaration and came up with 8 MDGs that were to be met by the year 2015. All the 191 member countries alongside with 22 international organizations made a pledge to make efforts towards achieving these goals. The aim of the declaration was to combat poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. The eight goals include:- eradication of extreme poverty and hunger, achievement of universal primary education, promotion of gender equality and empower women, reduction of child mortality, improvement of maternal health, combating HIV/AIDS, malaria, and other diseases, ensuring environmental sustainability and development of a global partnership for development. A significant number of MDGs fall under health and education outcomes. This is a strong indicator that health, education and infrastructure outcomes remain a vital contributor to poverty reduction.

The MDGs targeted three key areas, namely, human capital, infrastructure and human rights (social, economic and political) with the aim of improving the living standards of the world's population. The target areas of human capital include nutrition, healthcare (including child mortality, HIV/AIDS, tuberculosis and malaria, and reproductive health) and education. The target areas for infrastructure include access to safe drinking water, energy and modern information/communication technology; increased farm outputs using sustainable practices; transportation; and environment. Human rights objectives involve empowering women, reducing violence, increasing political participation, ensuring equal access to public services and increasing security of property rights. The MDGs aimed at increasing an individual's human capabilities and improve his/her productivity. Human productivity is strongly positively correlated to economic growth and development which consequently affects poverty incidence.

In January 2016, MDGs were succeeded by the SDGs. The SDGs build on the success of MDGs. The SDGs are also known as the "Global Goals". These are 17 goals that are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The goals are set to be achieved by 2030. The 17 goals have 169 targets covering a wide range of sustainable development issues. These issues include ending poverty and hunger, improving health and education, making cities more sustainable, combating climate change, and protecting oceans and forests. The 17 goals include: - no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice and strong institutions and partnerships for the goals.

Kenya was a participant in the United Nations summit which formulated the MGDs and therefore became one of its signatories. Since then, there have been efforts in Kenya towards

achieving the MDGs. For instance, in 2003 the Kenyan government pursued the universal primary education through provision of Free Primary School Education. In the health sector, the government gave a waiver to mandatory charges for deliveries in public health institutions. Other efforts have been made to reduce prevalence of diseases such as HIV and AIDS, malaria and tuberculosis. In 2012, there were efforts to construct a Standard Gauge Railway that links Kenya, Uganda and Rwanda and possibly South Sudan and Ethiopia. The first phase of the construction of the railway was inaugurated in Mombasa on 28 November 2013 and would cover 937 km at an estimated cost of $13.5 billion. President Uhuru Kenyatta launched the railway in May 2017. There is also the proposed LAPSSET railway project that is to connect Kenya, Ethiopia, and South Sudan. It will be built from Lamu in Kenya to Juba and Addis Ababa. These two projects are a milestone towards increased access to infrastructure.

In June 2008, the then president His Excellency Mwai Kibaki launched Kenya Vision 2030. This is the socio-economic development programme of the country from year 2008 to 2030. The aim is to make Kenya "newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment" (Vision 2030). The vision is based on three pillars; economic, social and political. The economic pillar aims to achieve an average economic growth rate of 10% per annum and sustaining the same until 2030. The social pillar seeks to engender just, cohesive and equitable social development in a clean and secure environment, while the political pillar aims to realize an issue-based, people-centered, result-oriented and accountable democratic system. The Kenya Vision 2030 is to be implemented in consecutive five-year plans. The first Medium Term Plan was implemented between 2008–2012. The Vision 2030 was to assist the country meet its MDGs by its deadline in 2015. However this has not been achieved. The Vision 2030 targets 10 key sectors namely;- infrastructure; science, technology and innovation; public sector reforms; tourism; agriculture; trade; manufacturing; BPO (Business Process Outsourcing) and ICT (Information Communication and Technology); financial Services; education and training.

Statement of the problem

Goal 1 of the SDGs is "No Poverty" where Kenya is one of the signatory countries and consequently seek to achieve. There are several other goals like good health and well-being (Goal 3), quality education (Goal 4), clean water and sanitation (Goal 6) and industry, innovation and infrastructure (Goal 9) that are part of SDGs. However these goals still remain targets for Kenya. According to HDR (2016) report the poverty rate in Kenya was 45.5% and a human development index of 0.555. As a country there are vital sectors that lie behind in spite of them having an important role in reducing poverty. The aim of the proposed research work is to establish the effectiveness of human capital in achieving poverty reduction.

In their study in Kenya Duflo *et al.* (2012) found that interventions like improving school governance, providing teacher incentives, and reducing pupil-teacher ratios largely improved education outcomes. There was another study conducted to analyze the effect of subsidizing education by providing textbooks to children in Kenya (Glewwe *et al.* 2009). The authors found improved test scores outcomes for the best students. They also found that most students were not able to use them effectively since the books were written in English which was their third language.

Miguel and Kremer (2004) found great impact of deworming on both education and health outcomes on students in Western Kenya. The intervention led to reduced school absenteeism by 25%. The researchers found that deworming substantially improved health and school participation among untreated children in both treatment schools and neighboring schools. In their study on subsidizing the cost of bed nets, Cohen and Dupas (2012) found that malaria prevalence reduced due to the intervention. They found that little costs have great benefits in improving health outcomes Dreilelbis *et al*. (2014) conducted a cluster-randomized trial in

Kenya to assess the impact of school water, sanitation and hygiene interventions on the health of younger siblings of pupils. The study found that WASH improvements were associated with decreased odds of diarrhea (odds ratio [OR] = 0.44; 95% confidence interval [CI] = 0.27, 0.73) and visiting a clinic (OR = 0.36; 95% CI = 0.19, 0.68), compared to control schools. They conclude that robust improvements in water supply can reduce diarrheal diseases among young children.

In spite of the country having very poor health and education outcomes, the government expenditures on health and education sectors still remain very low. The government expenditure on health and education as a share of GDP was 3.5% and 5.51% respectively (Human Development Index, 2016). There's evidence from studies that health, education, access to water and sanitation and infrastructure outcomes have great potential in reducing poverty in Kenya. It's important to outline the untapped potential in human capital as a means of achieving poverty alleviation. There are many interventions that can be undertaken in order to improve health, education, access to safe water and sanitation and access to infrastructure that would lead to reduced poverty incidence in Kenya. The government can undertake such interventions in order to improve these outcomes and as a result help improve living conditions of poor population. The study will inform the government as it formulate and implement its policies such as Vision 2030 as it aims at reducing levels of poverty in Kenya. Vision 2030 doesn't integrate significantly the aspect of human capital (such as health and education) as a potential stimulus for economic growth. The study sought to establish the benefits of targeting sectors such as health, education, access to safe water and sanitation and infrastructure as a way of achieving economic growth and development. Evidence from the study may be a motivation for the government as it comes up with one of the MTP for Vision 2030.

Objectives of the Study

The study was guided by the following specific objectives:-

i. To ascertain the effect of health on poverty in Kenya.
ii. To establish the effect of education on poverty in Kenya.
iii. To determine the effect of access to water and sanitation on poverty in Kenya.
iv. To analyze the effect of access to infrastructure on poverty in Kenya.

Justification of the study

The study will help inform policies that may be implemented by the government in their aim of economic growth and development. This will help in informing potential Vision 2030 policies with aim of poverty reduction and improved livelihoods. Poverty has immense negative effects to a population and as a result there needs to be efforts made in ensuring that the challenge is addressed. It's important to identify key sectors and interventions that can stimulate economic growth and in turn reduce poverty.

NGOs design poverty targeted programs in efforts to reduce poverty in Kenya. There are several potential interventions that can help in achieving this objective. The findings of the study will help the NGOs in identifying which outcomes have great effect in the alleviation of poverty in Kenya. This will inform programs that they will design as they formulate measures to improve the livelihoods of the poor population in Kenya. The NGOs will be able to identify the effective target sectors like health, education, water and sanitation and access to infrastructure and their respective outcomes that have great impact on poverty reduction in Kenya.

The study will also be of significance to scholars and researchers who may be interested in conducting more research on the role played by human capital development in reducing poverty in another country (apart from Kenya), comparative studies between different countries and also between different socio-economic countries. The work will also therefore

go to enrich empirical literature in the area of development policy thereby benefiting economists and researchers interested in areas of poverty alleviation.

Literature Review

Classical Poverty Theory

This theory was proposed by Lewis (1961) during his study on poverty in Mexico and Puerto Rico in 1961. Miller (1958); Rainwater (1966); Clark (1965); Liebow (1967) have also contributed to the evolution of the classical poverty theory. Classical poverty theorists argue that individuals are ultimately responsible for their own poverty. This theory proposes that poverty is caused by personal traits. It explains the cause of poverty in the traits of the poor themselves. The theory explains poverty in terms of the conditions under which the poor live: unemployment, underemployment, poor education, and poor health. The classical economic theorists provide a foundation for laissez-faire policies in trying to alleviate poverty. The theory have an advantage of using monetary units to measure poverty and the ease of designing policies in order to alleviate poverty. The theory also deals with the role of incentives on individual behaviour and the relationship between income and productivity. The theory encompasses monetary aspects, the individual as opposed to the group, and the limited role played by the government. It also believes that poverty is often cyclic, in other words successive generations of the same family remain poor.

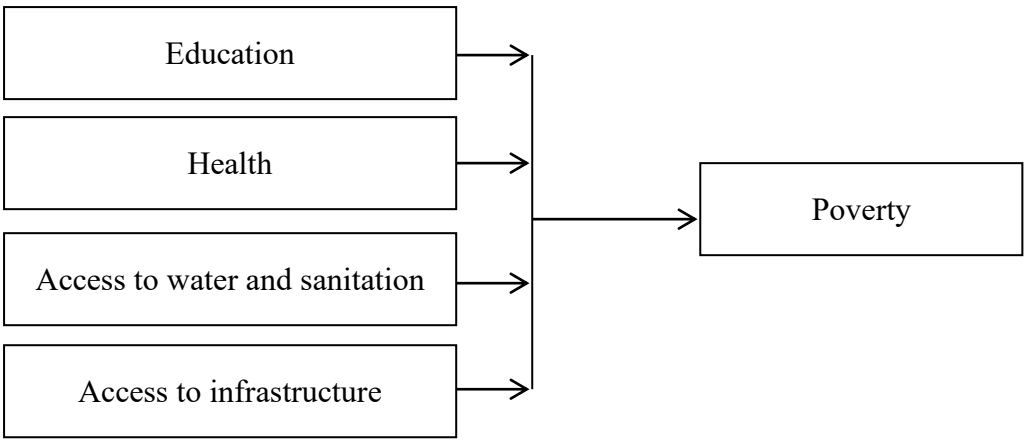
Human Capital Theory

The proponents of this theory are Gary S. Becker in 1962 and Jacob Mincer in 1981. The theory argues that investment in human capital explains a large part in income differentials between different opportunities of employments. Human capital refers to any stock of knowledge or characteristics a worker has that contributes to his or her labour productivity. Human capital aims at improving an individual's working productivity. Investment in human capital involves both direct and indirect costs such as foregone earnings. Modern economists argue that education and health play a major role in improving human capital and as a result increase the economic outputs of a country (Becker, 1993).

Empirical Review

Sarah *et al. (*2016) studied the long-run impacts of child health investment through school-based deworming in Kenya. They found that children who had been dewormed were less likely to have worms, they were much taller, they were less likely to be anemic, they were less likely to miss school, and they earned more as adults. Such measures had positive effect on labour productivity and future earnings. Syed *et al.* (2010) examined the impact of micro health insurance on poverty reduction in rural areas of Bangladesh. They used household level primary data collected from the operating areas of the Grameen Bank during 2006. They consider a number of outcome measures relating to poverty status. These proxies include household income, stability of household income via food sufficiency and ownership of non-land assets, and the probability of being above or below the poverty line. They found that micro health insurance has a positive association with all the indicators and the results are also statistically significant. Ochako *et al*. (2011) analyzed the effect of maternal mortality ratio (MMR) on the GDP in Kenya. They found GDP loss in 1997 due to MMR per 100,000 live births being $234 US. This translated to an annual loss of $2240 US. This is a significant loss to the economy despite the fact that it can be avoided through investment in health infrastructure. Wedgwood (2007) in her study evaluates returns to education in Tanzania, both financial and non-financial, and considers whether these returns lead to poverty reduction.

Conceptual Framework



Methodology

The research study used causal research design in order to answer the research questions. The causal research design will help in description of events and discovering of inferences or causal relationships that may exist. The study adopted a non-probabilistic sampling technique and in particular purposive sampling technique. This sampling technique involves deliberate selection of particular units of the universe to constitute a sample which represents the universe. The study used secondary data sources for analysis. The study used time series data for the year 2005 to 2015 for WDR and HDI from World Bank and UNDP respectively for Kenya. WDR is a collection of development indicators collected by the World Bank annually. It acts as a source of the most current and accurate data at national, regional and global levels. UNDP's HDI uses life expectancy, education, and per capita income indicators to rank countries on human development.

The data collected was in soft copy because the study used the secondary data collection method. The data was extracted from data repositories of the World Bank and UNDP. The World Bank gives annual figures through The World Development Report. UNDP also gives annual estimates for human development indicators in Human Development Index report. The annual figures for Kenya from both The World Development Report and Human Development Index were gathered with specific reference to the target indicators and the period 1995 - 2015.

Data analysis involved both descriptive and causal analysis to answer the research questions. The data was analyzed using STATA econometric software. Descriptive analysis summarized data using measures of central tendency such as mean, median, mode, deviance from the mean, variation, percentage, and correlation between variables. It also involved visual presentation of the findings through use of graphs and charts to assist in understanding data distribution and the summary of results. Inferential analysis used Ordinary Least Squares (OLS) Regression model in establishing the relationship between the dependent and independent variables. OLS method was used to determine any significant relationship between the dependent variable poverty incidence and independent variables (health indicator, education indicator, access to safe water and sanitation and access to infrastructure).

In OLS estimation, the following linear regression model of the form

$\mathbf{P = \alpha + \beta_1 H + \beta_2 E + \beta_3 WS + \beta_4 I + \varepsilon}$ was used where:

$\boldsymbol{\alpha}$ - Constant term;

$\boldsymbol{\beta_i}$ - Beta coefficient of the independent variable to dependent variable.

P – Poverty Incidence;

H - Health outcome;

E - Education outcome;

WS - Access to safe water and sanitation;

I - Access to infrastructure

ε- Random error term

Results and Findings

Descriptive Statistics Results

Descriptive statistics results were used in describing the basic features of data by providing simple summaries about the independent variables adopted in the study. Mann (1995) defines a descriptive statistic as a summary statistic that quantitatively summarizes or describes a variable. Descriptive statistics summarizes information about a given sample in a study. The descriptive statistics estimated in this study include: mean, maximum, minimum, range and standard deviation of data collected.

Table 1 on the next page gives a summary of the descriptive statistics. Health indicators, mortality rate, under-5 and life expectancy at birth had significant variation of 9.71 and 2.90 standard deviations respectively between the period 2005 to 2015. This is in contrast with prevalence of HIV that had a standard deviation of 0.57. Education indicators experienced a slight range with expected years of schooling and mean years of schooling having a range of 1.4 and 0.5 respectively. Improved water source had a slightly higher range of 7.2 in comparison to improved sanitation facilities that had a range of 2.1. The standard deviation for improved sanitation facilities and improved water source was 0.73 and 2.5 respectively. Roads paved of total roads had both little variation and range of 0.14 and 0.46 respectively during the period 2005 and 2015.

Table 1: Descriptive Statistics

Variable	Observations	Mean	Standard deviation	Min	Max	Range
Life expectancy at birth (years)	11	58.36	2.90	53.6	62.2	8.6
Mortality rate, under-5 (per 1,000 live births)	11	63.89	9.71	51	81	30
Prevalence of HIV, total (% of population ages 15-49)	11	6.26	0.57	5.6	7.4	1.8
Expected years of schooling (years)	11	10.78	0.50	9.7	11.1	1.4
Mean years of schooling (years)	11	6.11	0.17	5.8	6.3	0.5
Improved water source (% of population with access)	11	59.94	2.50	56	63.2	7.2
Improved sanitation facilities (% of population with access)	11	29.16	0.73	28	30.1	2.1
Roads paved of total roads	11	14.35	0.14	14.13	14.59	0.46

Correlation Analysis

Correlation analysis helps in establishing the degree of the linear relationship between two variables in correlation ranges between +1 and -1. The correlation between independent

variables in the study was analyzed. The correlation analysis was to ascertain that the different indicators of the independent variables are correlated. In addition, it also looked at the correlation between the dependent and independent variables in the OLS model.

Pearson Correlation Matrix

Table 2 shows the correlation co-efficient between the dependent variable; poverty incidence and the dependent variables; prevalence of HIV, expected years of schooling, improved water source and roads paved of total roads. There was a strong positive relationship between poverty incidence and prevalence of HIV implying an increase in one variable corresponded to an increase in the other variable. Both expected years of schooling and improved water source had strong negative relationship with poverty incidence suggesting an increase in one variable corresponded with a decrease in the other variable. Roads paved of total roads were weakly negatively correlated with poverty incidence.

Table 2: Pearson Correlation Matrix

	Poverty incidence	Prevalence of HIV, total	Expected years of schooling	Improved water source	Roads paved of total roads
Poverty incidence	1				
Prevalence of HIV, total	0.9168	1			
Expected years of schooling	-0.7478	-0.9441	1		
Improved water source	-0.9689	-0.973	0.8632	1	
Roads paved of total roads	-0.5824	-0.7569	0.7173	0.6756	1

Note: Significance level: 5% (*)

Health Indicators

Figure 1 below shows the correlation plot of the health indicators. There was strong correlation coefficient between the health indicators. Life expectancy at birth was negatively correlated with mortality rate, under-5 and prevalence of HIV with values -0.9972 and -0.9838 respectively. There was a strong positive correlation of 0.9925 between Mortality rate, under-5 and Prevalence of HIV, total.

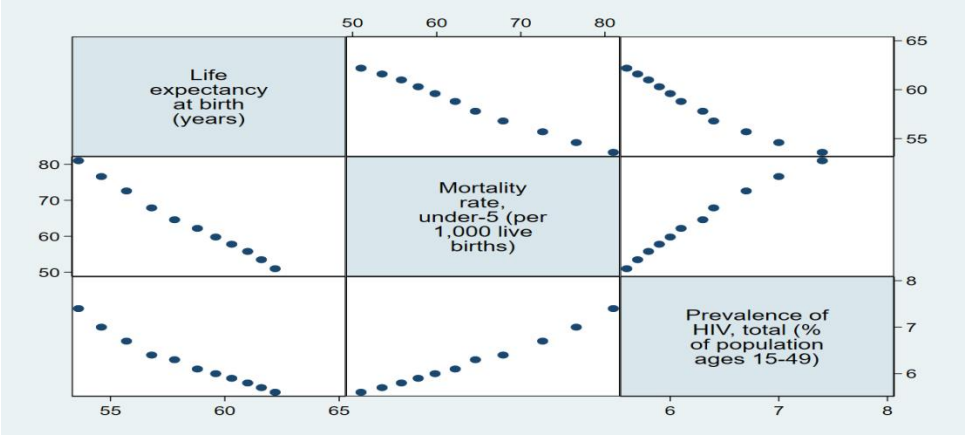


Figure 1: Correlation of health indicators

Education Indicators

Figure 2 below shows the correlation plot of the education indicators. Expected years of schooling and Mean years of schooling had a correlation coefficient of 0.8968. This shows a

strong positive relationship between the two education outcomes. The strong correlation implies that the two indicators moved in the same direction over the period 2005 to 2015.

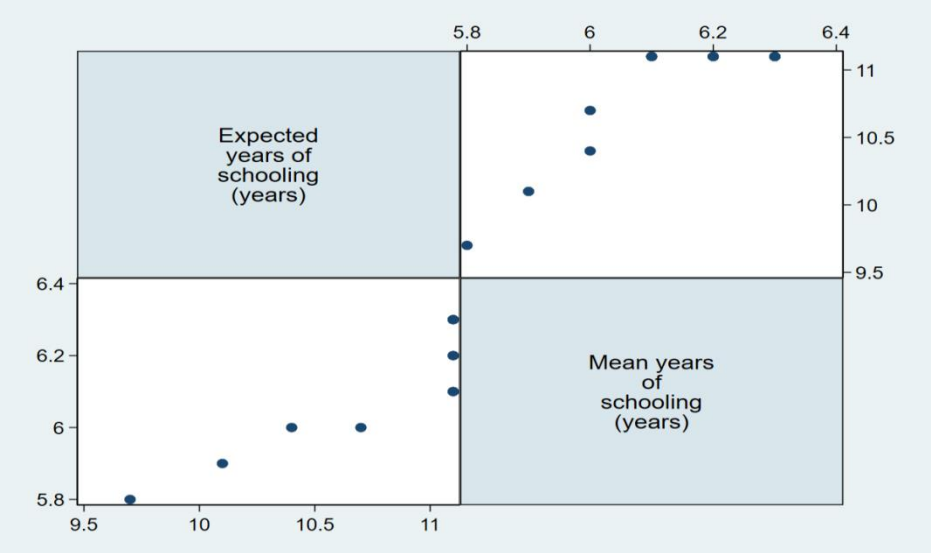


Figure 2: Correlation of education indicators

Access to water and sanitation

Figure 3 shows the correlation plot of the access to water and sanitation outcomes. The correlation coefficient between access to water and sanitation outcomes was 0.999. This shows a strong positive relationship between the two indicators. In other words, the two indicators changed in a similar direction over the period 2005 to 2015.

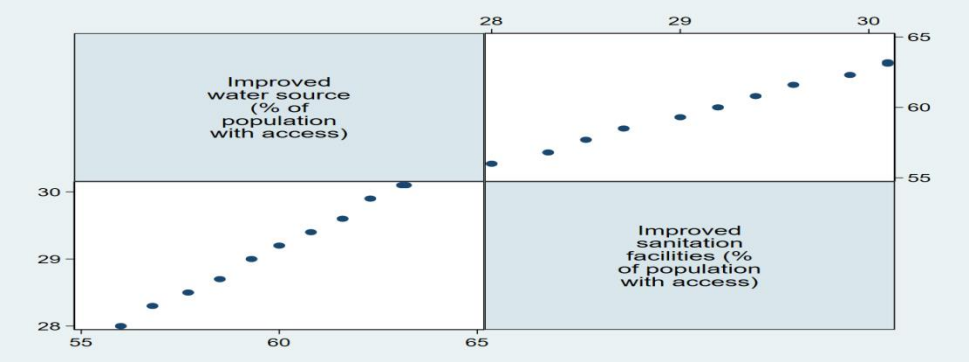


Figure 3: Correlation between access to water and sanitation

Multiple Linear Regression Analysis

Linear multiple regression was used in analyzing the relationship between human capital development and poverty in Kenya. Table 3 below gives a summary of the results of the linear multiple regression models. The R-squared and Adjusted R-squared were 99.6% and 99.3% respectively. This implies that 99.6% of the variation in the dependent variable can be explained by the independent variables included in the model.

The results from the multiple regression model shows that improved water source was the only independent variable that was statistically insignificant in affecting poverty incidence. Both prevalence of HIV and expected years of schooling were statistically significant at 1% level whereas roads paved of total roads was statistically significant at 5% level. Prevalence of HIV increases the likelihood of poverty incidence by 9.59%. Expected years of schooling and roads paved of total roads reduces poverty incidence by 5.68 and 4.75 percent

respectively. While the results suggest that improved water source reduces poverty incidence, they were not statistically significant at either 1% or 5% or 10% significance level.

Table 3: Multiple Linear Regression Model

Source	SS	df	MS
Model	75.4968	4	18.8742
Residual	0.30367	6	0.05061
Total	75.8005	10	7.58005

Number of obs = 11
F(4, 6) = 372.92
Prob > F = 0.0000
R-squared = 0.9960
Adj R-squared = 0.9933
Root MSE = 0.22497

Poverty incidence	Coefficient	Standard Error	t	P>|t|	95% Confidence Interval	
Prevalence of HIV	9.5882	1.5644	6.1300	0.0010	5.7602	13.4162
Expected years of schooling	-5.6814	0.7082	-8.0200	0.0000	-7.4143	-3.9485
Improved water source	-0.1008	0.2210	-0.4600	0.6640	-0.6416	0.4400
Roads paved of total roads	-4.7491	0.9524	-4.9900	0.0020	-7.0796	-2.4187
Constant	-153.8142	39.1882	-3.9300	0.0080	-249.7044	-57.9241

The null hypothesis that beta coefficient of prevalence of HIV was equal to 0 (zero) was rejected at 5% level and the research hypothesis that prevalence of HIV had an effect on poverty in Kenya was supported. The positive sign of the coefficient implies a positive relationship between prevalence of HIV and poverty incidence i.e. prevalence of HIV increases the likelihood of poverty incidence by 9.59%. This result arrives at the same conclusion with previous studies such as Miguel and Kremer (2004), Sarah *et al.* (2016), Gallup and Sachs (2001), Bleakly (2006), Syed *et al.* (2006), Ochako *et al* (2011) among other studies that health outcomes impact poverty. The studies find that reduction in poverty is achieved through improvement of health outcomes by reducing morbidity and mortality rates. In addition, the benefits are spilled over to education outcomes.

The null hypothesis that beta coefficient of expected years of schooling was equal to 0 (zero) was rejected at 1% level since the results were statistically significant at this level. The coefficient had a negative sign hence implying a negative relationship between expected years of schooling and poverty incidence. The model implies expected years of schooling increases the likelihood of poverty incidence by 5.68%. Past studies such as Angrist and Acemoglu (2000), Wedgwood (2007), Munir *et al.* (2009), Duflo (2001), Ozturk (2011), Darby (1996) among others conclude that education outcomes have both direct and indirect effect on poverty. This can be through increase in wages or improvement in health outcomes.

The beta coefficient of roads paved of total roads was statistically significant at 5% level i.e. the study rejected the null hypothesis that beta coefficient of roads paved of total roads was equal to 0 (zero). The negative sign of the beta coefficient of roads paved of total roads was positive. This suggests that roads paved of total roads reduces poverty incidence by 4.75 percent. This result that access to infrastructure impact positively on poverty is similar to that of past studies such as Ogun (2010), Duncan (2007), Seetanah *et al. (*2009), Kwon (2000), Varun and Rao (2015), World Bank (2002). The results from the multiple regression model shows that improved water source was the only independent variable that was statistically insignificant in affecting poverty incidence. Therefore the study failed to reject the null that beta coefficient for improved water source was equal to 0 (zero). While the results suggest

that improved water source reduces poverty incidence, they were not statistically significant at either 1% or 5% or 10% significance level.

Normality

Normality is not a condition for unbiasedness of the regression co-efficient estimates. However, OLS requires that the residuals be identically and independently distributed. The normality assumption ensures that the p-values for the t-tests and F-tests are valid. The analysis used the kernel density plot to test for normality assumption. Figure 4.5 shows the kernel density plot of the multiple linear regression model. The plot is approximately normal hence the normality assumption was valid.

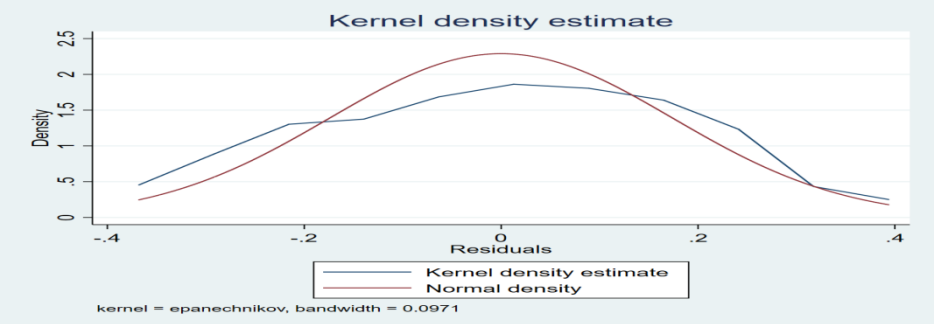


Figure 5: Kernel density plot

Multicollinearity

Table 4 gives a summary of Variance Inflation Factor (VIF) of the variables in the model. There exists multicollinearity in the model since the VIF for prevalence of HIV, expected years of schooling and improved water source had values greater than 10 to suggest multicollinearity in the OLS model. Roads paved of total roads was the only independent variable with VIF value less than 10. Table 1 on descriptive statistics clearly shows the little variation in the independent variables with prevalence of HIV, expected years of schooling, improved water source and roads paved of total roads having standard deviations of 0.57, 0.5, 2.5 and 0.14 respectively. The little variation in the independent variables is the possible cause of multicollinearity in the model. The OLS estimators are still BLUE in spite of the presence of multicollinearity in the OLS model.

Table 4: Variance Inflation Factor

Independent Variable	VIF	Tolerance
Prevalence of HIV, total	156.93	0.0064
Expected years of schooling	60.39	0.0166
Improved water source	24.74	0.0404
Roads paved of total roads	3.52	0.2841

Autocorrelation

The study used Breusch-Godfrey Test to test for autocorrelation in the OLS model. The null hypothesis is H_0: no serial correlation. Table 4.5 below shows the results of Breusch-Godfrey Test with Prob > chi2 = 0.0115 leading to rejecting the null hypothesis that there's no serial correlation. This implies that there was serial correlation in the model. The human development indicators are expected to have autocorrelation since there change over time is really small.

Table 5: Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	6.389	1	0.0115

Heteroscedasticity

The study used Breusch-Pagan test for heteroscedasticity. Table 4.6 below gives the summary of the Breusch-Pagan test with chi2(1) = 0.17 and Prob > chi2 = 0.6792 hence we fail to reject the null hypothesis that the error terms have a constant variance. The study therefore concludes there was no heteroscedasticity in the OLS model.

Table 6: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

H_o: Constant variance
H_a: Heteroskedasticity
Variables: fitted values of poverty
chi2(1) = 0.17
Prob > chi2 = 0.6792

Conclusions and Recommendations

Conclusion

The study aimed at establishing the effect of human capital development on poverty in Kenya. This study focused on health, education, access to improved water and sanitation and access to infrastructure as ways to improve human welfare through reduced poverty incidence. Most of the variables were statistically significantly related to poverty incidence in Kenya with an exception of improved water and sanitation source. This suggests that development of human capital can lead to decrease in poverty incidence in Kenya. Therefore government and its development partners need to design policies that help in improvement of human capital outcomes as a means of reducing poverty in Kenya.

Recommendations

The study focused on an eleven-year period between 2005 and 2015 in establishing the effect of human capital development on poverty in Kenya. The study recommends increase of time period. Large time period captures more variation in variables and hence robust generalizability of results. Further studies should be undertaken with a large time period in order to establish if same results are found or there is difference. These will enforce the argument that there's strong effect of human capital development on poverty in Kenya. In addition, the violations in OLS assumptions mat be dealt with when a longer time period is considered.

Based on the findings of this study, the government and its development partners should design interventions that aim at improving human capital. Such interventions will help reduce poverty incidence in the country with significant improvement in welfare of the Kenyan population. Most poor people can come out of poverty subject to effective policies being designed. Such policies can target sectors such as health, education, access to improved water and sanitation source and access to infrastructure. Two out of the four Big Four agenda can be informed by the results of this study. These are achieving universal health coverage and enhancing food and nutrition security. Universal health coverage targets improvement of health outcomes and would positively impact on the welfare of the Kenyan population. Food and nutrition security have positive effect on health and education outcomes hence an indirect effect on poverty incidence in Kenya. These agenda can find a solid basis on the results of this study.

References

Acemoglu, D., & Angrist, J. (2000). How large are human-capital externalities? Evidence from compulsory schooling laws. *NBER macroeconomics annual*, *15*, 9-59.

Adams, R. H. (2003). *Economic growth, inequality and poverty: Findings from a new data set* (Vol. 2972). World Bank Publications.

Alkire, S., Roche, J. M., Santos, M. E., & Seth, S. (2011). *Multidimensional Poverty Index*

2011: Brief Methodological Note. Oxford Poverty and Human Development Initiative Publication, (November), 1–14.

Barro, R. J. (1996). *Determinants of economic growth: a cross-country empirical study*. Cambridge (Mass.): National Bureau of Economic Research.

Costa, D., & Steckel, R. H. (1995). Long-term trends in health, welfare, and economic growth in

Currie, J., & Moretti, E. (2003). Mother's education and the intergenerational transmission of human capital: Evidence from college openings. *The Quarterly Journal of Economics*,

Hall, R. E., & Jones, C. I. (1999). Why do some countries produce so much more output per worker than others?. *The quarterly journal of economics*, *114*(1), 83-116.

Hamid, S. A., Roberts, J., & Mosley, P. (2011). Can micro health insurance reduce poverty? Evidence from Bangladesh. *Journal of Risk and Insurance*, *78*(1), 57-82.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, *22*(1), 3-42.

Rainwater, L. (1966). Crucible of identity: The Negro lower-class family. In Parsons, T., & Clark, K. B. (Eds.). (1966). *The Negro American* (Vol. 7). Boston: Houghton, Mifflin, 160-204.

Ravallion, M., & Chen, S. (1997). What can new survey data tell us about recent changes in distribution and poverty?. *The World Bank Economic Review*, *11*(2), 357-382.

Rosenstein-Rodan, P. N. (1943). Problems of industrialization of eastern and south-eastern Europe. *The economic journal*, *53*(210/211), 202-211.

Strauss, J., & Thomas, D. (1998). Health, nutrition, and economic development. *Journal of economic literature*, *36*(2), 766-817.

Wedgwood, R. (2007). Education and poverty reduction in Tanzania. *International Journal of Educational Development*, *27*(4), 383-396.

World Bank Group. (2017). *Learning to realize education's promise*. Washington, D.C. : International Bank for Reconstruction and Development/The World Bank.

World Health Organization (2014). *Global status report on alcohol and health, 2014*. Geneva, Switzerland: World Health Organization.