INCOME INEQUALITY AND PRIMARY SCHOOL ENROLMENT IN KENYA: AN EMPIRICAL ANALYSIS

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DECLARATION

I declare that this project is my original work and has not been submitted for the award of a degree in any other university or institution.

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SIGNATURE……  ……..… DATE:…01/09/2021……..

This paper is submitted for the award of the degree of Master of Arts in Economics with my approval as the university supervisor.

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17th November, 2021

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DEDICATION

To my family, classmates and friend who supported my education

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The views expressed in this paper are mine and I solely bear the responsibility for any errors and/or omissions.

LIST OF ABBREVIATIONS

KNEC- Kenya National Examinations council

FPE- Free primary Education

KCPE- Kenya Certificate of Primary Education

MOE- Ministry of Education

MoEST- Ministry of Education Science and Technology

KIHBS- Kenya Integrated Housing and Budget survey

KBS – Kenya Bureau of statistics

VIF- Variance Inflation Factor

CLRM – Classical Linear regression Model

GDP – Gross Domestic Product

KNBS – Kenya National Bureau of statistics

IMF –International Monetary fund

MDG- Millennial Development goals

SDG- Sustainable development goals

OLS- Ordinary Least Squares

2SLS- Two stage Least squares

ICC – Intraclass Correlation Coefficient

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ABSTRACT

The level of income inequality plays a vital role in determining the level of school enrollment in any particular economy, especially in the contemporary world. Enrollment is core in preparing students for the various opportunities in the country and hence key in the determination of the inequality. This has led to global education policy agendas that currently communicate concerns about education quality and access. Kenya is not unique in this, with the country working on increased levels of enrollments and complete transitions to the different levels. This study made use of the cross-sectional data of the Kenya Integrated Housing and budget survey, (KIHBS), 2015/2016, the study examines the relationship between income inequality and primary school enrollment. Using probit model we found a significant and negative relationship between the level of primary school enrolment and inequality levels in Kenya. As the level of income inequality increased in Kenya, many Kenyan children were more prone to be left out of the school enrolment. Other factors such as a good quality education, the implementation of the school feeding program and high number of children in school were found to positively and significantly increase the level of the primary school enrolment in Kenya. Further, this study found that expenditures on education and household size had a negative and significant effect on the level of primary school enrolment .The study advocated for appropriate measures to ensure that the issue of income inequality has been addressed so as to encourage more primary school enrolment, population controls to manageable household size and increase its budgetary allocation to public schools to aid in improving quality education

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Global Education policy agendas currently raise concerns about education quality and access. International organizations and countries worldwide have a growing urge to realize quality and access to education for all, in order to realize an all-inclusive development, (Kenya Vision 2030; The constitution of Kenya, 2010). The desire has made governments, especially from underdeveloped countries to increase efforts towards addressing challenges associated with achieving education for all. Various initiatives have been instituted in Kenya in the hope of grappling with issue of access to education. Strategies such as free primary education have been deliberated on. Notwithstanding, demand for education from public schools coincide with private schools. Private education is generally financed by parental or household income. The fluctuating socio economic patterns in the country over the years has created inequality among household. The demand for education in private schools have continued to grow due to quality education and the overstrained limit on public schools (Tooley, Dixon, & Stanfield, 2008).Therefore income is linked to the enrollment pattern. Parental income determines if a child will enroll to a private school or a public school

According to OXFAM International, despite consistent growth in the gross domestic product (GDP), income inequality is the biggest problem facing Kenyan economy, with most of the country's wealth owned by the rich who are a small percentage of the country's population. Over 46 percent of the citizens are living below the poverty line. The gap between the rich and the poor is huge, 10 percent of the Kenyan households constitute the rich who then control over 42 percent

of the Kenyan national income. Notably, the poor are mostly employed in the agricultural sector, whose majority are women. The top wealthy group of people are in professional careers. This has consistently deepened income disparities.

In Kenya, for instance, Wajir County that has an estimated population of 522,830 people, only 2,242 people made expenditures of more than Ksh.7, 200 while people in Nairobi County can afford to spend 10 times that amount. People living in Nairobi County are 15 times able to access education than those living in Turkana County. Despite the government's move to make primary education accessible to all using the Free Primary Education (FPE) program, 93 percent of the population in Loima Constituency in Turkana County has no education. The difference between poor and rich counties in Kenya is four times despite the new devolved governance system. (SID, 2013). These leads to educational inequality between the rich and the poor. Assuming children abilities are normally distributed, these presents a huge welfare loss (Wainaina, 2006),

Since the year 2000, the education sector has underwent major reforms. The dominant among them was the epoch of the free primary education by the then National Rainbow Coalition (NARC) under President Mwai Kibaki. With a country where the substantial number of children were not attending school on financial incapability grounds, the Free Primary Education (FPE) was to delink household income from school enrollment. The launching of the FPE in March 2003 was well in line with the Millennium Development Goal (MDG) 2, (now sustainable development goals, SDGs, 4) that aimed at achieving universal primary education through increased enrollment and at a minimum ensuring that each child of school-going age received primary school education.

The NARC government through its Economic Recovery Strategy for Wealth and Employment Creation Paper (2003-2007) had conceded that education in Kenya had been inaccessible to the poor people which brought in high levels of inequality in the education sector. Then FPE was

meant to change and ensure universal Primary Education (UPE) for all (Nashimura, Yamano, & Sasaoka, 2008). This move saw increased enrollment from 5.9 to 7.2 million pupils between 2002 and 2003. This increase in enrollment without proper planning on infrastructure and teachers later presented major challenges since the government facilities were stretched to the limit. This brought the issues on quality of education and sustainability of the move.

Over the years, the government has tried the best to maintain the initial move to offer FPE. This has not been without challenges. The main challenges include lack of enough infrastructure and adequate facilities, shortages of teachers, lack of enough school stationery, and increased teacher learners' ratio from 1:40 to 1:100 reducing interactions in classes and thus compromising on the quality of delivery ((Yieke, 2006).

With the onset of devolution in Kenya, education still remained the mandate of the central government. Only early childhood education has been devolved. To expand on education infrastructural facilities, the government has built more primary schools, and increased expenditure on education in general over the years. The number of public primary schools has risen from 17,623 in 1999 to 21,718 in 2014. In the financial year 2018/2019, the education sector received Ksh. 439 billion representing for 26.2 percent of the national budget which was an increase from the financial year 2017/2018 when the sector received 25.5 percent of the national budget (Global Education Financing, 2019). This indicates the government's effort to make an improvement in the sector.

Despite the increased commitment on FPE by the government, there is a considerable shrinkage in the enrolment in public primary schools. The decline in enrolment could be attributed to declining quality in the public primary school education due to high numbers, congestion in the education facilities, and also the move by many parents to take their children to private schools.

For instance, the number of private primary schools in Kenya increased from 4,377 to 7,742 between 2009 and 2014.

With the increased demand for education and mushrooming of private as an alternative, then forces of income distribution come into play ((Tooley, Dixon, & Stanfield, 2008). Before the abolition of school fees in primary education, parent's wealth significantly determined children enrollment in primary schools. Income played an important part in determining if a child will be admitted in public school, private school or study abroad.

According to (Tooley, Dixon, & Stanfield, 2008) countries in Sub-Saharan Africa (SSA) have reported that poor children are still enrolling in fee-paying institutions. Other studies conducted in Uganda, Malawi, Tanzania and Kenya shows that abolition of fee did not greatly meet the needs of the poor instead, private primary schools emerged to meet the excess demands for primary education. On account of this, the study strives to study the role played by income inequality in determining primary schools enrollments.

1.2 Statement of the Problem

According to the (Kenya Demographic and Health survey, 2015), there is a need to increase enrollment by eliminating educational barriers amongst the poorest and children living in the marginalized areas. The main barrier to a good education has been income. Those with high income are at liberty to get their children education anywhere in the country. This is because the costs of education affect enrollment in public schools by the poor (Deininger, 2003)

Quality primary education is important to any economy. This is because it goes beyond childhood development to improve other subsequent school performances, income and economic growth (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010). The commitment by the Kenyan

government to increase primary school enrollment is evident through the introduction of FPE in the year 2003 to ensure that at minimum, every Kenyan child received basic primary education. However, the main challenge has been on how to improve learning standards in public primary schools in order to ensure continued enrollment. Specifically, how to increase and improve educational infrastructures, how to increase number of qualified trained teachers and where to invest educational resources to increase enrollment. (Yieke, 2006)

(Bold, Kimenyi, Mwabu, & Sandefur, 2011), in their study, found out that after the enactment of the free primary education, net enrollment rate in government schools remained constant while increased in private schools. Pupils from rich households shifted to private schools while pupils from poor households remained in public schools. The private schools range from high fee paying to low fee paying private schools. A study in Kibra after the free primary education found out that parents still took their children to low fee paying private schools this attributable to perceived quality in the private school and as a result of congestion in the public schools which greatly reduced quality learning and strain on the resources (Tooley, Dixon, & Stanfield, 2008)

Public education is meant to benefit all but in Kenya that has not been the case. The variations in educational enrollment has been empirically linked to social differences between populations and regions, leading to a widening educational inequality between regions. (Wainaina, 2006), Limited research has been done linking income inequality and enrollment in Kenya. Therefore, this study intends to explore this gap by looking beyond social differences and free primary education, to further assess on the role of income inequality on enrollment pattern between the rich and the poor in Kenya.

1.3 Research Objectives

The general objective of this study is to empirically analyze the relationship between income inequalities and public primary school enrollment in Kenya. Distinctively, the study attempts to:

i. Examine the impact of income inequality on primary school enrolment enrollment in Kenya.
ii. Establish the impact of school quality on primary school enrollment
iii. To propose policy recommendations based on the findings of the above objectives.

1.4 Importance of the Study

It is a well-known phenomenon that quality of education is key in giving out basic education (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010) . In a country like Kenya where, there exists public and private education system, this presents a challenge. Studies have shown that private systems offer higher quality service than the public system hence lowering the support for public schools (Croix & Doepke, 2009). (Epple & Romano, 1996), shows that high-income households who prefer high-quality service will opt for private alternatives this may lead to educational inequalities, which can be perpetuated from one generation to the next. Hence there is need to increase enrollment in public schools to absorb the percentage of children who still cannot afford to join the formal education system and need to improve quality education in public schools to reduce educational inequalities between the rich and the poor. More studies have been done relating income inequality and economic development, but less is known about the impact of increasing inequality on education.

The study provided insights on enrollment patterns since FPE came into play, determine the role that income inequality has played in shaping the enrollment pattern and get to reasons of the low

enrollment rates in public primary schools in Kenya. This provided a good background for policy formulation by the government on measures that should be embraced to ensure quality education for all. The study added to existing literature on the Kenyan context on income inequality and enrollment to public education.

1.5 Organization of the Study

The next section will present chapter two which provides a comprehensive literature reviews while chapter three will discuss the research methodology employed with a key focus on the empirical model that the study adapt in analyzing the impact of income inequality on public primary school enrollment for the study period

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presents the theoretical literature review followed by the empirical literature review. The section finalizes by giving a run through of the literature review. This section outlines the studies conducted on enrollment. It looks at the existing literature relating to income inequality and enrollment.

2.2 Theoretical Literature Review

2.2.1 Tiebout Model

Tiebout model is used to determine how the public can access public goods and how the government can utilize local spending for public goods. It reflects the taste and preferences of individuals more adequately. In this model, consumers are fully mobile and flexible. In the same degree they can move to a homogeneous community, in a location where their preference patterns are similar, set and satisfied (Tiebout, 1956).This model illustrates that consumers have choices when it comes to public good consumption, if that is the case, then choices are bound to be similar among the population. This is evident when it comes to consumption of education as public good. In Kenya, for example, parents have choices to enroll their children to public school, private school or study abroad. A considerable number of parents may choose public education. The uniformity in choice making among populations is of interest in this model. Studies by (Gramlich & Rubinfeld, 1982) among residents on Michigan illustrated that, where there are choices, there tend to be uniformity in choice making for consumption of public good. The residents that consumes

similar public good also tend to live in the same town. It is noteworthy that in the allocation of public goods, governments allocate public goods such national defense, highways and ports at state level, police protection and schools at local level. Locations are more than provinces and provinces are more than states, it is also easier and less costly to shuffle from one location to the other than from a state to another state. This alludes that, consumers have more choices in terms of locations in which they would like to consume education as public good. This is also a move to reduce the free rider problem where consumers consume what they have not paid for. For instance, if a consumer preference is high when it comes to education, then consumer choses a location that spends more on education, which means high taxes for the consumer.

Pure Public goods are non-excludable. However, in Tiebout framework the definition of local public good, is achieved if people have regrouped themselves in jurisdictions where their preference are similar and satisfied, then the local public good is excludable. This is to mean that, only the members of that location will enjoy the benefits and a member of a different location is completely excluded. In addition, unlike pure public goods that are non-rivalries, in Tiebout framework, local public good is assumed to be proportionate with the number of population consuming it in a particular district. If the number of consumers increases, the costs also increases. There are many homogeneous communities which the consumers have full knowledge of and are free to choose the one offering their preferred level of public expenditure. The income of individual also resonates with the particular location he chooses to live in. These assumptions are important to the government in planning the provision of public goods such as education and health. This is because, no one is asked to announce his tastes and preferences and the situation is Pareto optimal. This is referred to as Tiebout sorting. Location taxes and delivery of public services determine the

location of households. Therefore, households sorts themselves according to the level of income and ability to afford and access public services.

The Tiebout sorting advantage is that it encourages competition among locations hence improving on quality in public goods, it reduces cost in movement where education is sought from different location, and it may also reduce traffic congestion where children go to schools far away from their locations. However Tiebout model has its disadvantage because of equity problem. Countries such as the United States have seen success adopting Tiebout model, however, they have shifted to state provision of public education, this was a move to solve equity problem brought about by Tiebout model. Nevertheless, the move has brought problem of efficiency and support. Equity can lower level of spending and reduce support for public education in turn lead to an increase in private enrollment, (Corcoran, 2014). Strategies to solve efficiency problem has been improved through reforms such as accountability measures and inter-district sorting that were initially found in the Tiebout sorting.

2.2.2 Ends against the middle hypothesis

Amidst provision of public goods, the ends against the middle hypothesis in important in determining the support of consumers in relation to the utility they get in consuming the good. This hypothesis looks at scenario where public goods coexist with private good. Determining the level of public goods consumption might be a challenge where private alternative exists ((Epple & Romano, 1996) .In the provision of education, individual consumption is limited to either public education or private education unlike the provision of health where an individual can consume at the same time. Mainly, the private alternative has a higher quality in service provision and is based on the ability and willingness of the consumers. The high demand for Private education may reduce the demand for public education, thereby reducing its costs. The public education users will

therefore benefit as a result of excess supply. However, when individuals opt for private alternative due to the demand for quality services, the public sector may suffer from lower quality and lower support. High income as well as low-income households prefer lower expenditure for public education. The high income prefers low expenditure because they consume more private alternative, while low income prefers lower expenditure because they have less to spend. The middle income prefers higher expenditure on public goods. This brings coalition between the ends and the middle.

When governments brings reforms in public education, in a country where there is income inequality, the heterogeneous structure of income may greatly impact the support. When the United States of America wanted to expand secondary schools in the 20th century, studies found out that regions that were similar in terms of income, race and religion, supported the expansion while regions that were not similar, there was a slower expansion in secondary school this is because of ends against the middle hypotheses, (Goldin & Katz, 2009). Therefore in order for governments to increase enrollment in public schools, for instance, launching of free primary education, the problem of heterogeneity in income needs to be looked into.

2.3 Empirical Literature

(Corcoran & Evans, 2010) Studied the impact of income inequality and how it affected the support of public education in United States. The study findings indicated a strong relationship between increased income inequality and higher per-student spending and with lower state aid per student. The study indicated that a high level of income inequality skewed to top of the distribution, has a positive effect on the primary school enrolment since it reduces tax to the median voter. This makes the majority of the lower income and median income to use more of public goods. Increased

inequality that increases expenditures for the rich leads to increased enrollment to public schools. The median voter is a more rational voter hence would want to use public goods due to lower tax.

(Anyanwu, 1998)In her study finds out that primary school enrolment is positively related to key circumstances such as household wealth, career status of the parents, education of parents, religion, place of residence and availability of schools. This study also established that boys have a higher chance of enrolling to schools than female counterparts. The study used the endogenous approach and regression and specifically the binary logit model. The endogenous approach was used to ascertain which factors really determine the rural female's school enrolment. The study used children aged 6 years as the control group and those aged 11 years and above as the primary school enrolment. The study did not the address issue of income inequality more adequately, however, it focused more on individual household income.

According to the study by (Gurmu & Etana, 2013), socio-economic factors affect primary school enrolment in Ethiopia. The study employed using binary logistics model. The study results showed that if a household has many children, there is less chances of children between the ages of 7-10 years enrolling to schools, but increases at later ages. On the other hand, low socioeconomic status of households, lack of the mother, place of residence and education status of the parents. Further, they noted that those whose parents were educated had a higher probability of being taken to school. This is because the parents were able to finance the education of their children. Income therefore played a role in the education n outcome. The study however, does not show the pattern of enrollment for the primary school in relation to the income.

The study by (Naito & Nishida, 2012) established that high-income inequality reduces expenditure on public education in Japan. The study adopts the median voter model, where the public vote via majority voting rule to determine the level of public expenditure. The study assumes that

household's pays a fixed tuition fee even though education is provided freely by the government and also that return to education is connected to the level of education of parents. When income inequality is high, the earnings of the median voter is low, he or she will not want to spend higher tax to acquire education. High inequality therefore reduces human capital development and therefore low economic growth. High income inequality reduces support for public education.

The study by (Deininger, 2003) carried out in Uganda after the UPE established that before the launch of the universal primary education, direct and indirect expenses to education hindered children from enrolling especially from the poor households. Using probit model, when the universal primary education came into play, there was an increased level of enrolment in public primary school, this led to congestion in the resources in public schools hence lowered quality. Pupils therefore started to shift to private schools.

According to (Bold, Kimeny, Mwabu, & Sandefur, 2009) using the probit model, cost of education and in this case school fees was key to determining the level of enrolment in Kenya. The study used a panel data. The study discovered that enrollment in Kenya was affected by the quality, child characteristics, and parental education in addition to other factors. This study was further supplemented by subsequent research by ((Bold, Kimenyi, Mwabu, & Sandefur, 2011)

Contrary to the previous studies by other researchers Mwabu et al. (2011) found out that doing away with the fee in primary schools was negatively related to the enrolment in the public primary but instead it leads to increased fees and enrollment in private schools. They noted that, wealth of households still played a role in determining primary school enrolment after the initiation of free primary education. They used a panel data of 1997 before the introduction of free primary education and 2006 after the initiation of free primary education. They used a mixed logit model to analyze their findings. Later on after three years, similar findings were confirmed by

(Zuilkowski, Piper, Ong'ele, & Kiminza, 2018) that abolishing of fees led to increased enrolment in private schools. The Private schools mushroomed in Kibera slam areas offering lower fees hence the poor who are the main users of public still took their children to private schools. It recommended that FPE should be reviewed to cover non formal schools in the informal settlement. This study, did not directly look at the role played by income disparities in determining the enrollment pattern, however it focused more on free primary education and enrollment.

Recent study by (Zuilkowski, Piper, Ong'ele, & Kiminza, 2018). Conducted in Nairobi to determine why parents enroll their children to low fee paying private schools over public schools amidst the free primary education. They used a survey from 93 schools, where 20 were public schools and 73 were low paying private schools mainly in the informal settlement of Nairobi. It was evident that school cost was linked to parent's school choice for their children. Parents were willing to pay more in order to have quality education. Parents earning between ksh 60,000 to 120,000 spent almost 40% of their income on education. In addition, most parents tasked the government with the responsibility of providing quality education through compensating teachers, improving school facilities and teachers supervision. The study recommended the government, researchers and non-governmental organizations to embrace the low paying private schools as it aimed to bridge the gap between the supply and demand for education just as the government's goal. Secondly, the government should register the low fee paying private schools and enable their eligibility for FPE funds. The government should also examine factors leading to low fee paying private school enrollment and use it to improve public schools

2.4 Overview of Literature

It is noted that despite the efforts that the Kenyan government continue to establish in order to increase enrollment in public schools, quality and access still remains a challenge.

Kenya being a country with high-income inequality, high-income households will opt for private education. This will further increase educational inequality and reduce growth and development. From the literature, little research has been done in Kenya relating income inequality and public primary enrollment after the FPE. It is however evident that income inequality may explain the enrollment pattern and educational attainment. Therefore this study will address this gap by investigating the impact of income inequality on primary school enrolment in Kenya. The study will be done at county level.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section gives the methodological approach used in analyzing the link between income inequality and primary school enrolment. The section begins by giving the theoretical basement of the study, followed by the empirical model, and later the definition of variables and expected sign. The last sections of the model give the diagnostic tests and data, data types and sources.

3.2 Theoretical Model

The goal of the study is to examine how income inequality affects primary school enrollment. Income inequality may affect public enrollment in many ways. Several theories have been used to determine if income inequality either reduces, increase or has no effect on public education. Among these theories is the traditional demand theory. Which relates consumer demand for goods and services for their prices. In this case we look at the demand for public education and cost of this service. This brings an analysis for demand of public goods whose roots are traced to the work of ((Borcherding & Deacon, 1972); (Bergstrom & Goodman, 1973). These scholars observed that demand for public goods is a function of income, tax price and tastes for public goods. The expenditure on these public goods depends on the expenditure of the median voter. This is true to scholars who proceeded the study thereafter.

Given these choices and preferences, households will therefore choose what maximizes their utility. This brings in the theory of utility maximization. (Borcherding & Deacon, 1972)

(Bergstrom & Goodman, 1973) Analyzed this and came up with a model of demand function from utility maximization.

$$y_{ij} = H_{ij}\beta * \alpha + G_{ij} + Q_{ij} + \mu_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(1)}$$

Where $y_{ij}$the demand for public education is, $H_{ij}\beta$ is the household characteristic, G_{ij} is the cost of public education, Q_{ij} and is the quality of public education. Therefore, this model aptly describes our intentions for this study.

3.3 Empirical Model

Enrollment in primary schools is complex process and it is determined by numerous factors. Given household's income and preferences, a household i will choose to enroll children at a certain primary school which maximizes its utility. Tastes for school are a reflection of a vector of population and households' characteristics that are associated with the demand for these public services (Hoxby, 2001). These include, education, and distance to school, composition of family, location, wealth characteristics amongst other factors.

To determine the impact of income inequality on enrollment for primary school, the study uses the traditional model for demand for public goods, with income inequality inclusive. The model including income inequality in the demand equation has also been used by other scholars like (Hoxby, 2001), (Corcoran & Evans, 2010) to determine how school enrollment is affected by income disparities. The demand equation therefore is;

$$y_{ij} = H_{ij}\beta + Inequality_{ij} * \alpha + G_{ij} + Q_{ij} + \mu_{ij} \dots\dots\dots\dots\dots\dots \text{(2)}$$

The equation shows the demand for public school enrollment for household i in county j Where $H_{ij}\beta$ is a vector of population and housing characteristics $Inequality_{ij}$ is the income

inequality, G_{ij} cost of public education, Q_{ij} school quality and μ_{ij} is error term representing other variables affecting enrollment.

To determine this relationship, the study adopts probit model analysis, where by the probability of a household enrolling the children in a certain school is dependent on various factors among them being income inequality. Among these distinct possible choices of enrolling the children to a specified primary school (J), household i must decide on enrolment j, ($j \in J$). Holding other things constant, the main interest lies in how changes in the enrollment pattern which is the control variable denoted as (X) affects the response probabilities, ie.

$$P(y = j \mid X), j = 0, 1, \ldots J \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Owing to the fact that the probability sums to one, $P(y = 0 /x)$ is found through calculating the probabilities of j= 1,2…J. The probit model probability is illustrated as follows:

$$P(y = j \mid X) = \exp(X\beta_j) /[1 + \sum_{h=1}^{J} \exp(X\beta_h)] \qquad j = 1, \ldots J \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where, β_j is Kx1, j=1,…J. Owing to the assumption that the probability must sum up to one, this is modeled as follows:

$$P(y = 0/x\ ) = 1/[1 + \sum_{h=1}^{J} \exp(X\beta_h)] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

When estimating the model, maximum likelihood is used. For each i the conditional log likelihood can be defined as follows:

$$l_i(\beta) = \sum_{j=0}^{J} 1[y_i = j] \log[p_j(X_i, \beta)] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 7$$

Where the indicator function selects out the appropriate response probability for each observation i. The study predicates the following linear model when analyzing the influence of different variable on choice of enrolling children in a primary school in Kenya:

$$Y_i = \beta_0 + \sum_{n}^{i} \beta_i X_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..8$$

Where, Y is the dependent variable, defined as 1 and 0, for primary school enrolment or not respectively. X represents all the explanatory variables which income inequality, expenditure on primary school education, quality of education in primary school, household size, school feeding program, number of students in a school and location of the school. β_0 is the intercept, while β_i is the coefficient associated with explanatory variables, respectively. The error term is represented by ε

3.4 Data sources

The study used secondary cross-sectional data from the Kenya National Bureau of Statistics (KNBS). The Kenya Integrated Household Budget Survey (KIHBS), 2015/2016 was used in this study. The survey targeted 24,000 household under 2400 clusters 988 in urban areas and 1412 in rural areas. The data was conducted in 47 counties. To further get a better representation on inequality, the study separated urban areas from rural areas since both surveys were conducted at rural and urban level. The data provided various variables measuring school quality characteristics, school enrolment characteristics in addition to government policy data.

3.5 Definition of Variables

Table 1: Variable Definition and Measurement

Variable Name	Measurement	Expected Sign
Primary school Enrolment	Data on Primary School enrolment measured 1 and 0 for enrolled or not for primary school going children was obtained from KIHBS 2015/2016. This is the dependent variable.	
Income Inequality	The ratio of mean to median household income or the inverse tax share as primary measure was calculated. These are straightforward to calculate given the estimated parameters of Dagum distribution. The study used the Gini coefficient for comparability purposes. Computed Gini coefficient are available from the KIHBS	± Ve ((Corcoran & Evans, 2010)
Expenditure public Education	Spending on social programs is expected to be progressively targeted and thus to reduce inequality. This variable was measured in Kenya shillings, annual expenditure on primary school.	± Ve (Mwabu et al., 2011)
Quality education	This is a categorical variable where the respondents were asked on the level of quality of education. It is coded as 0, 1 and 2, which represents bad quality, same quality and good	± Ve (Mwabu et al,.2011)

	quality of education respectively. This data was obtained from KIHBS 2015/2016.	
Household Size	This variable captured the household characteristics affecting primary school enrolment. It is measured as the number of people in a household.	± Ve (Mwabu et al.,2011), ((Corcoran & Evans, 2010)
School Feeding Program	This variable captured the school effect characteristics which influences enrolment rate. The school feeding program was measured as 1 and 0, which represented if a school has a feeding program or not.	± Ve (Bosker, Kremers, & Lugthart, 1990); (Van, 2001), 2001)
Number of Students in a School	This variable also captured school characteristics which affects enrolment rate. It is a continuous variable measured as the total number of students in the primary school at a particular time.	± Ve
School location	This includes the geographical location of a school within the county. It's measured as 1 and 0 for urban and rural location respectively.	± Ve ((Coulton & Pandey, 1992), (Byrnes &

		Miller, 2007)

3.6 Diagnostic tests

3.6.1 Multicollinearity

When there exist an exact relation or near exact relationship between the dependent variables ((Greene, 2000), this dictates the presence of Multicollinearity. This results to inefficient estimators, the variance becomes too big. When the estimators are inefficient, it may bring a scenario where we reject the null hypothesis instead of accepting it. We can test for Multicollinearity using the Variance Inflation Factor (VIF). If the VIF is below 10 then there is no Multicollinearity

3.6.2 Heteroscedasticity

This happens when there is no constant variance in the error term (Greene, 2000).Therefore violating the classical linear regression model, (CLRM). Heteroscedasticity is a problem because it results into unbiased estimators. There are three tests for this, first, we will use the Goldfeld-Quandt test, and secondly, the White's General Test and lastly Breusch-Pagan-Godfrey Test. If the calculated value of the ½ sum of squares is more than the critical chi square value, we conclude there is heteroscedasticity. To solve, we run robust regression model.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter outlays the results of the study from the empirical analysis and confers about their economic interpretation. It starts with the description of all variables used in the model followed by diagnostic tests of a cross-sectional data and finally a probit regression, marginal effects and the discussion of results.

4.2 Descriptive statistics and Correlation Matrix

Table 2 below describes the various statistical properties of the study variables in this study comprising of the mean, standard deviation, minima and maxima. The average of the mean is a measure of central point the study values, that shows the average value for the variables. Standard deviation indicates how the variable observations are dispersed from the mean of the study variables. Minima is the lowest achievable value of the observations of the variable while the maxima indicate the highest attainable values of the observations.

Table 2: Descriptive Statistics (N = 21437)

	Variable	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8
1	**Primary School Enrolment**	0.52	0.50	0.00	1.00	1.00							
2	Income inequality	2.41	0.19	2.06	2.69	-0.02	1.00						
3	Primary school expenditure	16102.69	40642.23	100.00	3250000.00	-0.14	0.02	1.00					
4	**Quality of Education**	1.35	0.90	0.00	2.00	0.01	0.02	-0.01	1.00				
5	Household Size	4.26	2.53	1.00	28.00	-0.02	0.00	0.02	0.02	1.00			
6	**School Feeding Program**	0.76	0.42	0.00	1.00	0.01	0.00	-0.02	0.01	-0.01	1.00		
7	Number of students in school	593.36	435.48	2.00	4230.00	0.01	-0.01	0.00	-0.06	-0.01	0.00	1.00	
8	**School Location**	0.60	0.49	0.00	1.00	0.00	-0.01	-0.02	0.01	0.19	0.00	0.01	1.00

Given the study was based on the same dataset, all the variables had same number of observations totaling to 21,437.Some variables had mean values greater than one especially the Expenditure Primary School which was a measure of the cost incurred on education during that time. Which was on average Ksh 16102.69 an indication that parents incurred this amount of expense in that particular period in educating their children. The variable with the second largest mean value was the no of students, with the mean of 593.356 which was the measure of the level of enrolment. Other variables with the means greater than one were the household size and income inequality with 4.259225 and 2.413778 respectively. The mean value of the quality of education had the least mean value with 0.0728465 as the value.

Standard deviation showed that expenditure in primary school had a higher value of 40642.23 which is greater than its mean. This was an indication on the variation between the expenditures on education by the various individuals in Kenya. The second largest was the number of the students who enrolled with a standard deviation of 435.4802 while the household size had 2.526926 as the variation from the mean. Income inequality had the least standard deviation value of 0.1948964 followed by the quality of education classified as same with the standard deviation value of 0.2598901.

The income inequality was measured by the ratio of mean to median household income or the inverse tax share as primary measure was calculated. It has a mean value of 2.41, with the general values ranging from 2.06 to 2.69. School location was measured as geographical in the county, as either urban or rural and thus enrolment was compared between the urban and rural areas. The variable was found to have a mean of 0.60 which does not have a clear statistical meaning. The mean of the quality of education was found to be 1.35. Being a categorical variable, the values of 0, 1 and 2 represented bad quality, same quality and good quality of education respectively. Thus, the mean value of the quality was close to average in the range 1-2 which was fair.

Measure of the extreme values indicated that expenditure on education had the highest maximum value of Ksh 3,250,000 an indication on to the extent that parents went to spend on the education of their children. Some expenditures on education were as low as Ksh 100 which could perhaps be associated with the poor in the society. This was followed by the number of students in school with a maximum level of enrollment with 4230.Some of the variables were measured in terms of the probability and thus their highest maximum value was 1 while the least was zero.

The correlation coefficient is a statistical measure of both the strength and direction of the linear relationship between two continuous variables. Complete correlation has the value of -1 or +1.Absence of correlation in a linear relationship is 0. The calculated coefficient greater than one, shows that when the value of one variable increases, the value of the other variable also tends to increase. The calculated coefficient that is less than one, represent an inverse relationship. Negative relationships produce a downward slope.

Multicollinearity occurs when the independent variables can be predicted by another during multiple regression, with some degree of accuracy, which has effect of inefficient estimators, the variance becomes too big. The test is carried out by the use of the variance inflation factor (VIF). The decision rule is that the mean VIF value below 10 then there is no Multicollinearity (appendix II). The mean value is found to be 1.01 which was way much below the 10 and thus this indicated the absence of the multicollinearity .This confirm that the output will lead to the output coefficients that are efficient.

To test for Heteroscedasticity this study applied Breusch-Pagan-Godfrey Test (See Appendix II). The decision rule is that if the calculated value of the ½ sum of squares is more than the critical chi square and p-value is small, we conclude there is heteroscedasticity. Since the p value is 0.000 which is less than 0.05 this means that variance is not changing in the residual hence we reject the null hypothesis and conclude that heteroscedasticity is present in the data. This implies that we will run robust regression model to solve this problem.

4.3 Gini Decomposition by income

The following table 3 shows the use of descogini and further presents an interpretation of the results. Total income can be broken down in multiple ways which depends on the characteristics

of the data applied in this study .In this case the income is decomposed to incomes by Primary School, School location and quality of education. The Gini coefficient on 1 shows the highest levels of inequality. Table 3 has three main aspects of the coefficients; first is how important the income source is with respect to total income (Sk); secondly, is how equally or unequally distributed the income source is (Gk); and finally how the income source and the distribution of total income are correlated (Rk).

Table 3: Gini Decomposition by Income

Source	Sk	Gk	Rk	Share	% Change
Primary School Enrolment	0.0000	0.4540	-0.0314	-0.000221	-0.000132
School Location	0.0000	0.4337	0.0403	0.00432	-0.000145
Quality of Education	0.0000	0.2992	-0.0094	-0.0000	-0.000315
Total income	0.6487				

Ceteris paribus, the results of primary school income show that a 1 percent increase in that income source, causes an increases the Gini coefficient of total income by -0.000132.The primary school income was unequally distributed but with low level of inequality -0.0314, indicating that primary school income favors the poor more .Similarly, the contribution of the school location income is -0.000145 with relative low levels of inequality indicated by 0.4337.The secondary school location income is fairly distributed with the inequality level of 0.0403 which was an indication of the close level to equal distribution. The contribution of the quality education income to the total income share is -0.000315 and the correlation between quality of education income and total income is 0.2992 and thus the poor are favored than the rich. The total income Gini decomposition coefficient was 0.6487 which is an indication of fairly unequal distribution of the incomes hence the inequality.

4.4 Probit Estimates of the impact of income inequality on primary school enrolment enrollment in Kenya

Table 4: Probit Estimates Results

Variable	Probit coefficients		Marginal effects	
Income Inequality	-0.112*	(0.0675)	-0.008*	(0.005)
Expenditure Primary School	-0.246***	(0.008)	-0.017***	(0.001)
Quality Education				
Same (1/0)	0.021	(0.050)	0.002	(0.004)
Good (1/0)	0.062**	(0.027)	0.005 **	(0.002)
Household Size	-0.025***	(0.005)	-0.002***	(0.003)
School Feeding Program				
Yes (1/0)	0.100***	(0.028)	0.007***	(0.002)
No Student in School	6.81e-05**	(2.80e-05)	4.71e-06**	(1.94e-06)
School Location				
Urban (1/0)	0.002	(0.026)	0.002	(0.002)
Constant	4.244***	(0.187)		
N	21,437			
LR chi2(8)	1116.60			
Prob > chi2	0.0000			
Pseudo R2	0.0873			
Log likelihood	-5837.5405			

Notes: Standard errors robust for clustering at industry level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

To address the objectives of the study, a probit model was carried out with the primary school enrollment being the binary dependent variable against the independent variables and the results are summarized in table 7 above .The constant indicates that the probability of school enrollment when no other variables were included was 0.465 .

These marginal effects measure the change in the probability of school enrollment with a unit change in a given independent variable, ceteris paribus. The variables of the interest in this case were mainly the inequality levels (primary variable) and other variables, which included the expenditure primary school, quality education, household size, school feeding program, number of student in School and school Location.

The findings indicated that the relationship between the level of inequality and primary school enrolment in Kenya was negative. A unit change in the level of inequality between the poor and the rich led to the reduction in the level of primary school enrollment by 0.77percent .This effect was found to be statistically significant at 10 percent level of significance. The indication here is that, whenever there is income inequalities between the poor and the rich in Kenya the level of primary school enrolments tends to reduce because the income disparity disadvantages the poor with the shift skewed towards the rich. This findings was in line with the empirical investigation by (Naito & Nishida, 2012) who established that high-income inequality reduces expenditure on public education in Japan.

The level of expenditures which is associated with the entrance to the primary school in Kenya was found to have a negative effect on the enrolment rates in Kenya. A unit change in the level of primary school expenditure significantly reduces the level of enrolment by 0.0170329 at 1percent level of significance. This is equivalent to 1.703 percent in terms of the reduction effect in on enrolment. The implication is that the cost of education proxied by the expenditures reduces the affordability by the parents and thus this reduces the level of enrolments. This is in line with the previous study in Kenya by (Mariara & Mwabu, 2007) who reached to a conclusion that cost of education and particularly school fees was key to determining the level of enrolment in Kenya.

Another factor in this case, the quality of education measured in to categories; whether it had improved or had remained the same and its effect on the level of enrolment. The quality of education remaining the same was found to positive and insignificantly increase the enrolment levels by .0014951 which was equivalent to 0.15 percent. Further, we sought to find out if the improvement on the quality of education caused the changes in the level of enrolment. Improvement in the quality of education significantly led to the increase in the level of enrolment by 0.0043953 which was significant at 5 percent level of significance. This effect was equal to 0.439 percent .This is an indication that quality of education plays an important role in the level of enrolment in Kenya and this may explain why the private primary schools are experiencing increase in the level of enrolment in Kenya.

One of the household characteristics used in this study was the household size to measure the effect on the level of enrolment .Increase in the household size significantly reduces the level of enrolment by 0.0017473 at 10 percent level of significance which equivalent to 0.175 percent .The implication by these findings is that a large household sizes constrains the available resources and this will severely affect the level of primary enrolment in Kenya because such takes away resources available for schooling leading to re-allocation to other competing needs. These findings concurred with the study by (Gurmu & Etana, 2013), who showed that if a household has many children, there is less chances of children between the ages of 7-10 years enrolling to schools, but increases at later ages.

Over time there has been measures in Kenya to improve the level of school including the implementation of the school feeding programs. The findings showed that the availability of the school feeding program in primary schools lured more pupils to enroll, significantly leading to the

increase in the level of school enrolment by 0069019 at 1 percent level of significance .This was equivalent to the increase in the level of enrolment by 0.690 percent.

The number of students in a given school played an important role in the level of primary school enrolment in Kenya. The study shows that a pupil change in the number of pupils enrolled in a school was associated with positive and significant increase in the level of enrolment by 0.011674 which was equivalent by to 1.167 percent .The possibility for this is the fact enrolment in a given school could be an indication that the many are enrolling due to performance of the pupils in that school or due to low costs of schooling which are some of the pull-factors for the pupils towards the school. The net effect is the increase in the level of enrolment. The study by (Deininger, 2003) provides this insight, that an increase in the level of enrolment in public primary school, this led to congestion in the resources in public schools hence lowered quality.

School location was found to be a negligible factor in the level of enrolment in primary schools in Kenya. The findings indicated that the location of the primary school in urban areas positively and insignificantly increased the level of enrolment by 0.0001256 which was 0.0126 percent by but insignificant at all levels of significance. This was an indication that the location of the school is not an insignificant factor in the changes in the level of insignificant. This was contrary to the findings by (Anyanwu, 1998) who found out that primary school enrolment is positively related to key circumstances such as household wealth, career status of the parents, education of parents, religion, place of residence and availability of schools.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter consists of the summary of the study findings, policy recommendations, and proposes further areas of research based on the findings of the study.

5.2 Summary and Conclusion

This study sought to investigate the impact of income inequality on primary school enrollment in Kenya using data from the 2015/2016 Kenya Integrated Budget and Household Survey conducted for 12 month period. Using the probit model and marginal effects, the study arrived to a conclusion that the level of income inequality has a significant and negative effect on the level of primary school enrolment in Kenya. As the level of income inequality increased in Kenya, many children of school going age were more prone to be left out of the school enrolment. Given the redistributive nature of the education system in Kenya, our results suggest that there is potentially negative consequences of rising income inequality on school enrollment in Kenya

This study also ascertained that good quality education, increased the level of enrollment in schools. For public good such as education, where private alternative exists, quality of education plays an important role. An intriguing example was provided by (Epple & Romano, 1996) who argued that high income households will choose private education due to quality and low income households will opt for public education because they have less to spend. This could explain the shift in enrollment pattern in public schools. The estimated positive coefficient on school quality

on enrollment may in part be a response to mushrooming of low fee paying private schools in Kenya.

In addition, the implementation of the school feeding program and high number of children in school positively and significantly led to the increment in the level of the primary school enrolment in Kenya. On the other hand the location of the primary did not play any significant role on the primary school enrolment in Kenya either in urban or rural areas.

Other two factors in this study that have a negative and significant effect on the level of primary school enrolment included the expenditures on education and household size .The findings indicated that the level of expenditure on primary school and the household size decreased the level of primary school enrolment in Kenya. The indication that having high number of children drained parents of the resources to educate their children. The more the expenses associated with schooling in Kenya the more the parents are discouraged from enrolling their children to school.

5.3 Policy Recommendation

One of the notable findings in this study was that the level of inequality resulted in significant reduction in the level of primary school enrolment. On this basis, the study first proposes that the government of Kenya should put appropriate policy measures to ensure that the issue of income inequality has been addressed so as to encourage the level of primary school enrolment by increasing financial allocations to the ministry of education and scholarships to the needy and deserving. The government may counteract the possible negative impact of income inequality through raising additional funds to support the FPE from the growing earnings at the top of income distribution

The government, in conjunction with the Ministry of Education, should ensure accountability measures are put in place to ensure increased quality and increased enrollment within the counties. Researchers, governments and non-governmental organizations should examine the factors leading to increased quality in private schools and implement the same in public schools. The government could use targeted financing to poor underperforming schools to improve the schools outcome

Large family sizes and increased levels of expenditures are found to have a negative effect on the primary school enrolment because high number of the children leads to the resources constraints while the increased expenditures make the cost of enrolling children high .The study proposes for subsidies on school fees so as to make the cost of education feasible .Similarly, there is need for the government to educate the population on the measures of the birth controls so as to reduce the population sizes and thus make it possible for parents to educate their children to the required levels.

5.4 Further areas of research

This study was carried out in Kenya and it was a general study for the entire country. The idea is that, there are various dynamics which are associated with the school enrolment occasioned by devolution in Kenya. This study proposes other studies focusing on specific areas in Kenya given the devolution and the dynamics in different counties. Other studies could take the form of panel data, to study the impact of income inequality on school enrollment

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APPENDICES

Appendix I: Multicollinearity results

Variable	VIF	1/VIF
Household Size	1.04	0.961085
School Location	1.04	0.961146
Quality of Education	1.01	0.994972
No Student in School	1.00	0.995575
Expenditure Primary School	1.00	0.998178
Income Inequality	1.00	0.999165
School Feeding Program	1.00	0.999307
Mean VIF	1.01	

Appendix II: Heteroscedasticity test results

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of Prim_School_Enrol

         chi2(1)      =  2599.71
         Prob > chi2  =   0.0000
```