INEQUALITY OF OPPORTUNITY IN MATERNAL HEALTH AMONG ADOLESCENT IN KENYA

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DECLARATION

I declare that this research project is my original work and has not been presented to any other institution for examination purposes.

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LIST OF ABBREVIATION AND ACRYNOMS

ANC   : Antenatal Care

ASRH   : Adolescent and Sexual Reproductive Health

CI   : Cumulative Interval

DALYS   : Disability Adjusted Life Years

IOPs   : Inequality of Opportunity

HH   : Household

HOI   : Human Opportunity Index

KDHS   : Kenya Demographic Health Survey

KNBS   : Kenya National Bureau of Statistics

MDG   : Millennium Development Goals

MMR   : Maternal Mortality Ratio

MOH   : Ministry of Health

NHIF   : National Health Insurance Fund

PNC   : Post-natal Care

SDG   : Sustainable Development Goals

UHC   : Universal Health Coverage

UN   : United Nations

UNFPA   : United Nations Population Fund

UNHCR   : United Nations High Commission for Refugees

USAID   : United State Agency for Aid and Development

WBG   : World Bank Group

WHO   : World Health Organisation

ABSTRACT

Maternal health is both a public health and socio-economic burden. Adolescent mothers face higher maternal mortality and morbidity rates compared to older women in the reproductive age. Pregnancy complications are the second driving reason for deaths among 15-19-year-old adolescents globally. Stigma and discrimination are associated negatively with demand for maternal health care among adolescents and they often lead to societal rejection of teenage pregnancy contributing to more complications like suicide, mental illness, unsafe abortion and ultimately death. Like in many nations, the sustainable development goals (SDG) target 3.8 on achieving universal health coverage and SDG target 3.1.1 on maternal mortality ratio, has not yet been accomplished for the greater part of the health service. Kenya is determined at improving maternal health by decreasing inequalities in adolescent health care through creating access to the government funded maternity health services. However, access and utilization of this health services among adolescents is very low due to the inequalities that is beyond their control. Therefore, this study assessed the degree to which inequalities of opportunity are associated with access and utilisation of maternal health services among the adolescents. Three waves of pooled Kenya Demographic Health Survey (KDHS) data for 2003, 2008/09 and 2014 were used in the study. The study applied the Human Opportunity Index (HOI) methodology to estimate the coverage rate of this opportunities that is discounted as a result of the unequal allocations while the shapely decomposition was used to determine the contribution of each circumstance to the imbalances. The result coverage rate for ever pregnant, antenatal care, facility delivery and post-natal care among adolescents are 17.5%, 52.6.%, 70.6% and 59.8% respectively. The inequality measured by dissimilarity index (D) is lowest among adolescent facility delivery (11.1%) and highest among ever pregnant (20.24%). At the same time, opportunities for access to these maternal health opportunities also vary ranging from 14% for ever pregnant to only to 62.4% for facility delivery. Wealth Status, education and location were the major contributors to inequalities among this age group. These finding provides valuable evidence on inequalities of opportunities in maternal health to support legislation when developing policies to actualize compensatory measures planned to diminish opportunity gaps. There is also the need for equitable resource allocation for maternal health services among adolescents to ensure that such opportunities are not correlated with individual or society's background. Moreover, there is need to have a multisectoral approach in addressing some of the imbalances that contribute to this inequality such as having socio-economic empowerment programs.

CHAPTER ONE
INTRODUCTION

1.0 Background

1.1 Adolescent Maternal Health in Kenya

Maternal health is both a public health and socio-economic burden for the nation (Conde-Agudelo et al., 2015). It is reported that 800 women die every day while 10-15 million women experience the ill effects of morbidity brought about by preventable conditions identified with pregnancy and childbirth. In 2010, around 287,000 deaths were reported worldwide associated with pregnancy complications (WHO, 2013). This translated to a 47% decrease from the 1990 level; however, it was not near the 2015 Millennium Development Goals (MDG) on improving maternal health that required a decrease in the maternal deaths by 75% by 2015.

Adolescent mothers face higher maternal mortality and morbidity rates as compared to older women in the reproductive age. It is assessed that 13 million adolescent women aged between 15-19 years conceive an offspring every year representing 11 percent of global deliveries which translates to 95% of deliveries in developing nations (United Nations, 2013). Adolescent pregnancy complications are the second driving reason for deaths among 15-19-year-old globally (WHO, 2014). It is estimated that 70,000 maternal deaths are reported as a result of early child bearing among 15-19-year-old adolescent women (United Nations, 2013).

Kenya still has not met the MDG target to decrease the maternal mortality rate (MMR) below 147 mortalities for every 100,000 live births. The 2014 Kenya Demographic Health Survey announced 362 mortalities for every 100,000 live births an improvement from 488 recorded in KDHS 2008. In addition, teen pregnancy in Kenya, has remained unchanged for the last five years at 18%, with 3% of adolescents being pregnant with their first child. the adolescent birth rate is at 96 per 1000 women while the percentage of adolescent having already given birth is at 15 percent (KNBS, 2015).

The 1946 World Health Organisation (WHO) constitution and different international bidding customs guarantee that benefits to maternal health are key human rights. Countries that ensure that all its citizens have an equal chance to accessing and utilising maternal health care without any discrimination are on the right path towards economic growth and development (UNHCR, 2015). The Kenyan constitution also guarantees

access to maternal health for all women as stipulated in Article 43 (1) (a) of the constitution that says every citizen is entitled to the highest attainable quality of health services that includes maternal health.

1.2 Inequalities in Adolescent Maternal Health

In spite of improvements in maternal health outcomes, there are still critical disparities globally on access to maternal health benefits (Ettarh, 2012). For instance, the maternal mortality proportion in low income nations is 240 deaths per 100,000 live births, while that of high-income nations is 16 per 100,000 live births (WHO, 2014). This imbalance is even more noticeable among individuals from different geographical locations and wealth quintiles within nations (Pandit et al., 2011).

In Kenya this disparity is significantly progressively clear among the diverse counties as indicated by KDHS 2014. The MMR ranges between 187 per 100,000 live births in Elgeyo Mara wet Province to 3,795 per 100,000 live births in Mandera County.

Stigma, discrimination and socio-economic status affect demand for maternal health care among adolescents. Societal rejection of teenage pregnancy often leads to more complications like suicide, mental illness, unsafe abortion and ultimately death. It is for these reasons that adolescent pregnancy is a noteworthy general health issue, especially in Africa (Conde-Agudelo et al., 2015).

As indicated by the KDHS 2014, under 18 years' pregnancy rate in Kenya remains at 18 percent. This suggests that one in every five 15-19-year-old adolescent woman has conceived or is expecting a child. The risk of maternal mortalities is not evenly distributed, for example, the WHO (2016) says that a 15-19-year-old adolescent woman will more probably suffer complications in labour leading to death unlike an older woman and a younger woman aged 14 and below is even at a greater risk. Furthermore, an adolescent woman is more likely to bring forth preterm and underweight babies who are in danger of malnourishment, under developed nervous system, or may even suffer mortality as compared to that of an older woman past the age of adolescent (WHO, 2004).

The high maternal morbidity and mortality for this cohort compared to other older women of reproductive age have an adverse influence on the socio-economic development of a nation due to the loss of human capital (WHO, 2014). There is a

strong positive link between fiscal growth and an equitable utilisation of essential services in the early years of young adolescents; this is attributed to the human capital accumulation outcome (Galor and Zeira, 1993).

Furthermore, presence or absence of vital basic service for younger adolescents has been known to determine their education and future income earning potential. Research show that when we invest in the poor and vulnerable children then we are in the right direction of ending the poverty cycle (UNFPA, 2013). It is therefore for this reason that any intervention touching on childhood development cannot have the traditional trade off on equity-efficiency. Therefore, any child policy should ensure equal opportunity regardless of the social economic background (Heckman and Masterov, 2007).

1.3 Statement of the Problem

According to the World Bank Group (WBG) report 2016, whenever there is scarcity of services an individual's chance to access for instance health services is dependent on circumstances, which are the social economic characteristics of the person and his community. This is what leads to disparities in access to services among groups differentiated by characteristics such as gender, family origin, education levels or ethnicity, depending on the outcome. Dabalen et al., 2015 says that these characteristics influence the physical environment and behavioural traits on services utilisation and accessibility.

Efforts to remove inequalities associated with access and usage of essential healthcare services have been underscored as key to better health outcomes in developing nations (Das Gupta, 2004). In many nations, universal health coverage (UHC) has not been accomplished for the greater part of the health service provision, maternal health included (WHO, 2015). Developing nations like Kenya are determined to improve maternal health by decreasing inequalities in health care service provision (MOH, 2009). For instance, the government funded maternity policy of 2013 aims at making maternal service accessible for all, however, access of these services among the adolescents is still very low.

In spite of the progress made in Kenya, substantial imbalances remain in the allocation of this opportunity among adolescents. Consequentially, the weak who include the adolescents are denied full opportunity in access to this basic service therefore would undergo childbirths outside the health system. This is explained by the KDHS 2014

report, showing that 20 percent of 15-19 years' women already have a child with the cohort having an MMR twice as high as that of women from older reproductive age group (Ministry of Health, 2018). Therefore, this study sought to assess the degree to which inequalities of opportunities that are associated with maternal health among the adolescent.

1.4. Research Question

1. What is the coverage rate of maternal health opportunity among adolescents?
2. What is the inequality of opportunity in maternal health among adolescent in Kenya?
3. What are the determinants of inequality of opportunity in maternal health among the adolescents?

1.5 Study Objective

The focus of this study was to analyse the extent to which inequalities of opportunities are related with access and utilisation for maternal health among the adolescent.

1.5.1 Specific Objectives

1. To estimate the coverage and utilization rate of maternal health among adolescents.
2. To estimate inequality of opportunity in maternal health among adolescent in Kenya.
3. To determine the contribution of the determinants of inequality of opportunity in maternal health among the adolescents.

1.6 Study Justification

The justification of the study was to find evidence of inequalities of opportunities in maternal health among the adolescents which will guide policymakers when seeking to actualize compensatory measures planned to diminish opportunity gaps. Furthermore, this study added to literature by portraying the use of the inequalities of opportunities as a way to deal with adolescent's maternal health in a developing nation.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introductions

This section reviews literature relevant to the study objectives, Roemer's theory to inequality of opportunity and circumstances that are beyond adolescent control in access to maternal health.

2.1 Theoretical Framework

2.2 Inequality of Opportunity - Roemer's Theory

Opportunities are characterized as the basic access of vital services and goods that empower people to attain their human potential (Dabalen, et.al. 2015). Whenever we have an increase in basic services among the poor and vulnerable group, we are reducing inequality in opportunities (Barros et al. 2009).

As per Roemer (2016), the idea of equality necessitates that people's access to basic services should be beyond their life circumstances, and should not depend on their background like religion or parent's education, that are beyond their control.

The study draws heavily on Roemer's (1998) theory that stresses the distinction between disparity of outcome and disparity of opportunity. As per Roemer, the disparity of outcome that is as a result of people's effort is ethically satisfactory, while disparity as a result of circumstances beyond an individual's control is ethically unsuitable. It's this sort of imbalance that has been named in the writing as the disparity of opportunity or inequality of opportunity.

John Roemer (2008) contends that circumstances are individual traits that he or she has a no direct control over, while efforts are situations in which they have direct control and therefore they should be held accountable for their actions. The set of circumstances considered in accordance with different papers incorporate factors that catch parental and family foundation, guardian's job-type, region of upbringing and a proportion of parent's life span. Therefore, to determine the general effect of circumstance on health we find the relative effort by removing the impact of circumstances on effort (Trannoy et al., 2010).

As per Cohen (1989), inequality of opportunities, and not that of outcomes, ought to advise the structure of public policy formulation. Therefore, disparity in opportunities is the fitting currency of egalitarian justice (Cohen, 1989). Government projects cannot

remove all inequalities associated with outcomes however, they should be designed in a manner that enables them to address disparity associated with individual circumstances that are beyond the control of the populace. Significantly, compensation of disadvantaged groups as a result of economic inequalities due to circumstances beyond their individual control ought to be considered (Peragine, 2004).

In accordance with Alesina and Angeletos (2005), inequality of opportunity influences persistent social beliefs and political decisions within a nation which ultimately affect policy outcomes. These convictions and dispositions may thus influence the degree of redistributive policies, actualized in the public eye, and in this way the level of investment and output yield created.

Inequality of opportunity provides a more solid idea in understanding economic performance within a country. Economic growth is more progressive in an equal society as compared to an unequal society. Notwithstanding the role of convictions and dispositions to redistribution, it is conceivable that the sorts of disparities that are inconvenient to development are all the more intently connected with the concept of opportunities, while different parts of outcome inequality, for example, those emerging from returns to various dimensions of effort may actually positively affect development (Bourguignon et al., 2007).

In another study done by Marrero and Rodríguez (2009), it was found that if one breaks down inequality into effort and opportunity, the two terms under the economic regression have statistically significant coefficients. Moreover, imbalances in opportunity as a result of factors beyond an individual's control had a negative coefficient while the inverse is true for effort.

2.3 Structural Model

This study had four binary maternal health outcomes which are (i) an adolescent having a child (S_1), (ii) antenatal care visits attended by skilled provider (S_2), (iii) birth took place at a health facility done by a skilled attendant (S_3), (iv) post-natal check-up was done within two months of delivery (S_4).

If the adolescent has a child then $S_1 = 1$ otherwise $S_1 = 0$, if an adolescent attended the four antenatal care visits then $S_2 = 1$ otherwise $S_2 = 0$, if the delivery by an adolescent took place within a health facility by a skilled attendant then $S_3 = 1$ otherwise $S_3 = 0$ and

if an adolescent attended the post-natal care visits two months after delivery then $S_4 = 1$ otherwise $S_4 = 0$.

We therefore write the health production function as:

$$(S_{ij}) = f (C_i, E (C_i), u) \text{ and}$$

$$(S_{ij}) = \begin{cases} 1, & adolescent\ accessed\ comprehensive\ maternal\ health\ care \\ 0, & adolescent\ did\ not\ accessed\ comprehensive\ maternal\ health\ care \end{cases}$$

Comprehensive maternal health care means that the adolescent got pregnant, attended four antenatal care (ANC) visits, delivery occurred in a health facility and post-natal care was done two months after delivery.

Where: - S_{ij} is a binary health outcome for an adolescent mother i.

C_i is the magnitude of adolescent circumstances.

$E (C_i)$, is the vector of effort factor associated with adolescent maternal health. Effort factors are endogenous and hence may be depend on C_i

u is the vector of luck and other unobservable factors in the health production function.

2.4 Empirical Literature

The way that adolescent women in developing nations face legal, social and support inequalities of opportunities to acquiring maternal health services has been all around documented (Chandra-Mouli et al., (2014). These inequalities of opportunities can be categorised into social-economic circumstances, social cultural circumstances and circumstances due to geographical locations. Understanding these circumstances is necessary in improving maternal health outcomes among young adolescent women.

2.5 Circumstances Associated with Maternal Health among Adolescents
2.5.1 Socio-economic Circumstances

Parent education can assume a vital job in diminishing inequality, as it affects decision and access level to the health service. Mincer (1958) proposes that while there is an unambiguously positive relationship among education and inequality, the impact of expanded educational accomplishment on inequality could be either positive or negative contingent upon the advancement of rates of returns to education. Dimension of education is a factor that is related maternal health utilisation. In a study conducted

in an Ethiopia health facility, a delivery rate 12% was reported, the low access rate was attributed to the absence of basic information on maternal health care. (Teferra et al., 2012).

A multivariate logistic regression methodology study in Bangladesh analysed disparity in use of maternal healthcare and found significant disparities due property ownership, region and mother or fathers' education. In a similar study in Thailand, Limwattananon et al., (2012) found significant maternal and infant health outcome differences between the different wealth quintiles and among mothers or caregivers of different levels of education.

Dias (2009) utilized two elective ways to measure the differences in health outcomes in India by utilizing National Central Data System cohort member parental background. The study demonstrated that introduction to financial related challenges amid adolescence, parental wealth, and mother's education are noteworthy circumstances in use to maternal health services.

A study done by World Bank (2016) revealed that a major share of inequality for adolescent girls was attribute to the difference in their marital status which was higher than inequality associated with wealth and education.

2.5.2 Socio-cultural Circumstances

Beliefs and religious practices are known to be an impediment towards access and utilisation in malaria prevention during pregnancy. The link between religion and maternal indicators is very significant, geographical and distribution of religious groups in endemic countries overlapped with the health indicators cross the regions (Hill et al., 2013). Cheptum (2014) conducted a study on social cultural factors on maternal and new-born health and found that religion was linked to the imbalances in maternal health service utilisation.

According to Hill et al. (2013) a few religions don't put stock in contemporary medication and this may deny their supporters in seeking for this consideration. The study likewise revealed that social convictions and practices influenced utilisation of obstetric services. Additionally, the research found that men couldn't be allowed to the delivery room inferable from the social convictions. Furthermore, literature review shows that social convictions and thoughts on a woman gestation has an effect on equitability in antenatal care (ANC) utilisation (Simkhada et al., 2008).

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In a study conducted by Baxter and Moodley (2015), the deficient in physical development of young adolescent women, inadequate information and arrangement as to pregnancy and labour all add to an expanded risk of adolescent's maternal mortality. Societal disapproval, pressure and stigma have been reported by expectant adolescents in their association with the families and accomplices. This has made them not look for proper advice amid pregnancy. In Nigeria, Asuquo et al. (2000) found out that negative staff attitude was an obstruction to use of maternal health services.

2.5.3 Geographical Location

Area of residence of an adolescent is firmly connected to the adolescent's circumstances in access to maternal health. Ferreira et al. (2011) utilized three datasets so as to appraise inequality of opportunity in Turkey. The study utilized Turkey data health overview dataset of 2003 and estimated inequality of opportunity. Results discovered area of birth as primary conditions of inequality of opportunity. In addition, the women who conceived in rural areas suffered more inequality as a result of their geographical setting than urban women.

2.6 Economic impact of adolescent pregnancy

Teenage pregnancy has both an impact on micro economic and macro-economic level of a country.

2.6.1 Micro-economic Impact

Adolescent pregnancy is known to lead to loss of educational and conversely employment opportunity which ultimately contributes to an increased dependency ratio within the family and overall to the society (WHO, 2014).The discontinuation in education is a loss of investment in human capital and future productivity within the society hence the beginning of the intergenerational poverty cycle and poor health outcomes that is transferred to the enfant (Patel V., 2007). Additionally, the United Nations Population Fund (UNFPA) 2013 report states that there is correlation between a mother having no education and her child not having any education.

In addition to the stigmatisation and discrimination faced by adolescents from the health workers, financial related problem is common among adolescents due to school dropout hence they are not well equipped to provide for their children which may ultimate lead to conflict among partners and families (Fischer, 2012).

2.6.2 Macro-economic Impact

Teenage pregnancy presents a series of concerns to the national economy of a country due to the increased population. The increase in population of an uncompetitive workforce as results of school dropouts leads to an increase in national consumption level contributing to a decrease in economic growth as more people save and invest less. If not well controlled this pile more pressure to the limited public resource of a country (Conde-Agudelo, 2015). Moreover, the high prevalence rate of adolescent pregnancy is known to add to the disability adjusted living years (DALYS) and the burden of diseases of the country (Odejimi et al., 2011).

Research has shown that the absence of family supporting structure and unstable family ties tend to increase mental and psychological health related morbidities with poor health outcomes for both the adolescent mother and the baby. This put a strain to the primary health care facilities who take the burden of handling mental related disorders like depression hence the resource allocated to these facilities is not primary used for the intended purposes (Patel et al., 2017).

2.7 Policies to addressing inequalities in adolescent maternal health

The 1978 Declaration of Alma-Ata policy was the first document that distinguished perceived health disparities within and among nations (WHO, 1978). Sustainable Development Goals (SDGs) 3.1 and 3.8, offer another chance to address these inequalities as they incorporate a new and goal-oriented focus on maternal and reproductive health including eradicating avoidable maternal mortality by lessening the worldwide MMR to under 70 for every 100,000 live births by 2030 and accomplishing universal health of basic maternal care (United Nations, 2015).

The National policy on adolescence sexual and reproductive health (ASRH) was launched in 2015 with the aim of reducing socio-economic disparities and the associated consequences of teenage pregnancy (NCPD,2013). Other policy initiatives that aim at reducing maternal health inequalities by increasing resource allocation to the adolescent age group include the Population Policy for National Development, 2012-2030, Kenya Vision 2030 and the African youth Chapter.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter includes the data source, outcome variables, circumstance variables and empirical methodology which include the Human Opportunity Index (HOI), Dissimilarity index, trend analysis in HOI and degree of IOP each circumstance.

3.1 Data Source

Three waves of pooled KDHS data, 2003, 2008/09 and 2014 for the adolescents of the age-group 15-19 years of age were used in this research. These surveys were supported by the Kenyan Government in collaboration with United State Agency for Aid and Development (USAID) and ICF International staff who provided technical assistance. The Kenya National Bureau of Statistics (KNBS) was in charge of the planning, analysis and dissemination of the survey findings.

3.1 Opportunities Variables

The following outcome variables were treated as maternal health opportunities for adolescents.

Table 3.1: Opportunity variables associated with adolescent access to maternal health services

Opportunity Variable	Description
Four antenatal care visits administered by skilled provider.	Women attended four antenatal care visits administered by a skilled health
Birth took place at a health facility.	Women place of delivery was within a facility
Post-natal check-up was done within two months of delivery.	Women attended a post-natal check-up within two months of delivery.
Ever pregnant	Women who have never conceived or had a live nor still birth

3.2 Circumstance Variables

These are variables beyond the control of adolescent that are related to the socio-cultural, socio-economic and geographical characteristics affecting access and use in

maternal health opportunity. This study identified eight circumstances variables that included: -

Table 3.2: List of Circumstance variables

Circumstances Variables	Categorisation
Woman age	Continuous variable
Cluster parity	Continuous variable
Cluster average age of delivery	Continuous variable
Family religion.	Roman Catholic
	Protestant
	Muslims
	No Religion
	Others
Average distance to the health facility	Not a big problem
	Big problem
Cluster wealth status (Poor and Rich)	Poorest
	Poorer
	Middle
	Richer
	Richest
Household wealth status	Poorest
	Poorer
	Middle
	Richer
	Richest
Female education level	No education
	Primary education
	Secondary education
	Higher education
Sex of the household head	Male
	Female

3.3 Empirical Methodology

World Health Organisation defines adolescents as the age between 10 -19years (WHO, 2000). It categorises younger adolescents between 10 – 14years while older adolescents between 15 -19yrs. This paper focusses on older adolescents between 15-19 years of

age. It is inappropriate to speak about inequality of effort for this age group as they are considered children hence; they are too young to exert relevant effort to influence their outcome. Therefore, all difference in inequalities is attributed to circumstances beyond their control. This research used HOI to estimate the extent of inequalities in maternal health among adolescents.

The HOI is an empirical methodology that determines the extent and distribution of inequality of opportunity across circumstances groups (Barros et.al., 2010). We first began by conducting binary regression to find the association between the variable of outcome and circumstances. Secondly, using the estimated coefficient of regression we calculated the predicted probability *(p)* of access to maternal health opportunity, which we used to determine Dissimilarity index (D), coverage rate (C) and HOI. Finally, by using the Shapley value decomposition we estimated the relative contribution of each individual circumstance.

3.3.1 Human Opportunity Index

The HOI is a determinant of the prevalence rate of an opportunity taking into account inequitably of services spread across groups defined by their circumstances. It is a discounted coverage rate which ranges from 100 percent, which signifies universal access, to 0 percent which signifies very high inequality.

The formula for HOI is:

$$HOI = (1-D) * C \qquad (1)$$

In which: -

HOI - Human opportunity index

C - is the Coverage rate associated with percentage of adolescents who have access to the maternal health opportunity

D - is the dissimilarity index or the inequality of opportunity. It measures the disparity associated with access to maternal health among adolescent that is defined by their circumstances. If (1-D) is equal to one, then we say that we do not have inequality of opportunities because C is equal to HOI.

Equity is achieved when HOI is close or equal to the Coverage rate and vice versa. Therefore, in this study, HOI is the adjusted coverage in access to maternal health among adolescents (Barros et al. 2009).

3.3.2 Dissimilarity Index

Dissimilarity Index is the measure of the proportion of inequalities to be compensated to ensure equality in access to maternal health service given life circumstances (Barros et al., 2010).

To determine coverage rate C and dissimilarity index D was used by first conducting a binary logistic regression to determine the association between the outcome variables and the circumstance variables. We used the maximum likelihood method, to finding out whether an adolescent i has both access and uses to maternal health considering her circumstances m.

$$Ln\left(\frac{P(I=1\,|X_{i\ldots\ldots,}\,X_m|)}{1-P(I=1\,|X_{i\ldots\ldots,}\,X_m|)}\right) = \sum_{k=1}^{m} \beta_k(X_K) \qquad (3)$$

Where $I_i = 1$ if the adolescent has access to maternal health and $I_i = 0$ if the adolescent doesn't have access to maternal health and $Xi = X_1, X_2, X_3 ...., X_m$ being the vector variable indicating his or her circumstances.

The regression produce estimated coefficient β_k was used to ascertain the probability p_i of maternal health opportunity among adolescents as per the formula below: -

$$p_i = \frac{\exp(\beta_0 + \sum_{k=1}^{m} \beta_k X_{ki})}{1+\exp(\beta_0 + \sum_{k=1}^{m} \beta_k X_{ki})} \qquad (4)$$

Thereafter the coverage rate and dissimilarity index for each circumstance group, D was computed using the formula below:

$$C = \sum_{i=1}^{n} w_i p_i \qquad (5)$$

w_i is determined by the formula $w_i = \frac{1}{n}$ with n being the study population and i is a group with specific set of circumstances. Therefore, wi becomes the weight of the group in the study population $n.$

Dissimilarity index was then computed as follows: -

$$D = \frac{1}{2C} \sum_{I=1}^{n} w_i \, |p_{i-} \, C| \qquad\qquad (6)$$

Where *C* predicted overall coverage for a specific opportunity.

The inequality of opportunity, ***iop*** module in Strata Version 12 was used to give this estimation as follows Azevedo et.al. (2010).

3.3.3 Trend Analysis in HOI and D-index

We conducted a trend analysis to estimate the variation of coverage rate and inequality of opportunity (IOP) by determining the scale effect through decomposing the disparity in coverage and also determining the distribution effect which is the differences in IOP as follows Paes de Barros (2009).

Change in HOI: $\text{HOI}^{2014} - \text{HOI}^{2003} = \Delta\delta + \Delta D$

Scale Effect: $\Delta\delta = \delta^{2014} (1 - D^{2003}) - \delta^{2003} (1 - D^{2003})$

Distribution Effect: $\Delta D = \delta^{2014} (1 - D^{2003}) - \delta^{2003} (1 - D^{2003})$

3.3.4 Contribution of each Circumstances to IOP

We used the Shorrocks (2012) decomposition procedure to quantify the marginal contribution of the different circumstance variables to IOP. This procedure measures how individual circumstances such as religion, family background and parent's education, contribute to inequality in accessing maternal health among adolescents. This involved calculating the marginal effect of each predictor variable as they are removed sequentially, and then getting the mean of the marginal effect.

The impact of each circumstance b to IOP was determined as follows: -

$$D_b = \sum_{s \leq N(b)} \frac{|s|!(n-|s|-1)!}{n!} [D(S \cup \{b\}) - D(S)] \qquad\qquad (7)$$

The marginal effect of the impact of each predictor variable c_j to IOP, was determined using the Shapley value with the formula above.

In which: -

N represent the set of all circumstances and **s** is a subset of total circumstances **(N)** with circumstances b excluded.

D(S) is the marginal effect of the circumstances with a subset **S**.

D (S ∪ {B}) is the dissimilarity index determined with the subset S and circumstance **b**.

The marginal effect of circumstances **b** to IOP index is thus defined as: -

$$M_b = \frac{D_b}{D_N} \ where \ \sum_{i=N} M_i = 1$$

The *hoishapley* module in Stata version 12 was used to compute the decomposition index.

3.4 Ethical Consideration

This study did not need to be reviewed and affirmed by an ethical approval board this was because the study used secondary data from the KDHS which is an open data site.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.0 Introduction

This chapter presents the findings of the four adolescent maternal health opportunities ever pregnant, antenatal care use, postnatal care use and facility delivery. The descriptive statistics, coverage rate, utilisation rate, inequality of opportunity and HOI findings are presented in line with study objective. In addition, the contribution of each determinants to inequality are also presented.

4.1 Sample Population

The total number of adolescence ages 15-19 in the three Kenya Demographic Surveys are 9,334 as shown in Table 4.1.

Table 4.1: Sample population of adolescent women aged 15-19years

Year of interview	Frequency	Percent (%)
2003	1738	18.62
2008/09	1716	18.38
2014	5880	63.00
Total	**9334**	**100.00**

In Table 4.2 we see that majority of adolescent women interviewed 70.22% were loving in rural areas and more than two-thirds (61.83%) being predominantly protestants and or from other Christian religions. The level of education was important to evaluate its influence as a circumstance in access to maternity services among adolescents. In this regard, most of the respondents (63.52%) had no education or were at primary level while 36.48% were at secondary or higher level. About slightly more than half (51.18%) of those interviewed came from poorer clusters while 48.15% came from the richer clusters. A significant proportion of the respondents (77.59%) said that distance to the health was not a major barrier towards accessibility maternal health.

Table 4.2: Individual characteristics of the respondent

Circumstance variable	Category	Frequency	Percent (%)
	Urban	2780	29.78
Location	Rural	6554	70.22
	Total	9334	100.00
Respondent religion	Roman Catholic	2024	21.72
	Protestants/ Other Christians	5761	61.83
	Muslims	1427	15.31
	No religion	99	1.06
	Others	7	0.08
	Total	9318	100.01
Household wealth Status	Poorest	2154	23.08
	Poorer	1954	20.52
	Middle	1926	20.63
	Richer	1719	18.42
	Richest	1620	17.36
	Total	9334	100
Cluster wealth status	No	786	51.85
	Yes	730	48.15
	Total	1516	100
Educational level	no education or primary	5929	63.52
	secondary or higher	3405	36.48
	Total	9334	100
Facility distance	Big Problem	619	22.41
	Not a big Problem	2143	77.59
	Total	2762	100

## 4.2 Maternal utilisation among the adolescents

Figure 4.1 shows a reduction in the trend of utilization of maternal services among adolescent women in Kenya. For example, in 2003, 47.4% adolescents receive antenatal care (at least four visits), this reduced to 44.1% and 26.4% in 2008/09 and 2014 respectively. For facility delivery, in 2003, 52.6% of the adolescences reported delivering their last children in a health care facility, this increased slightly to 55.9% in 2008/09 and reduced to 39.5% in 2014. The postnatal data was not collected in 2003 and 2008/09.

Figure 4.1: Trend of Maternal Health Service Utilization among Adolescence 15-19 years
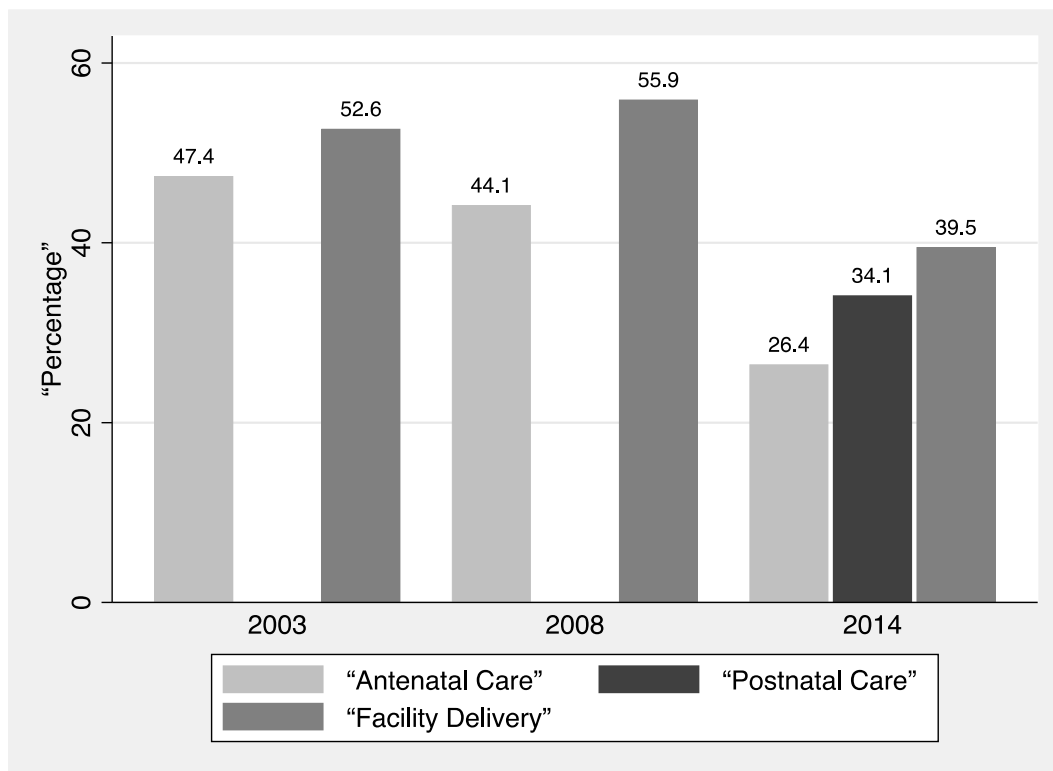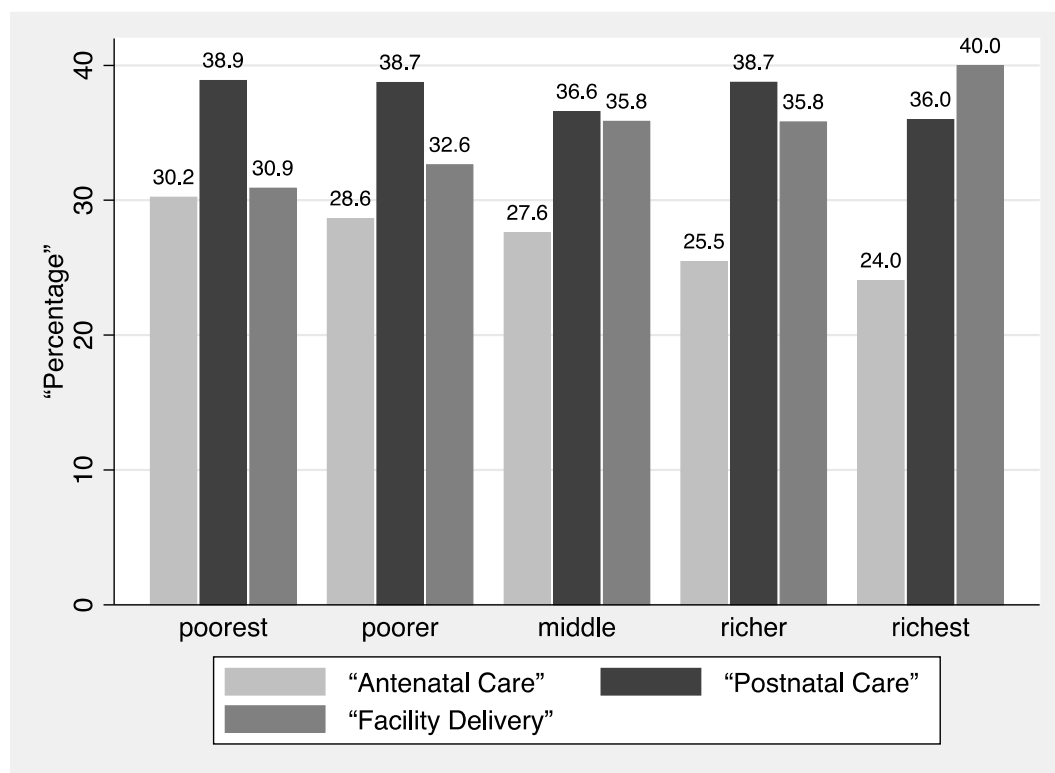

As shown in Figure 4. 2 below the utilisation rate for different opportunity variables varies trajectory as one acquires more education. The antenatal utilisation rate decrease from 36. 1% for those with no education to 22.1 %, those with higher education while post-natal care increases from 33.3% of those with no education to 38.9 % of those having higher education. For delivery within facility the utilisation rate increases also in trajectory from 30.6 % those with no education to 38.9% of those with higher education.

**Figure 4.2: Maternal service utilization among Adolescence by Level of education**
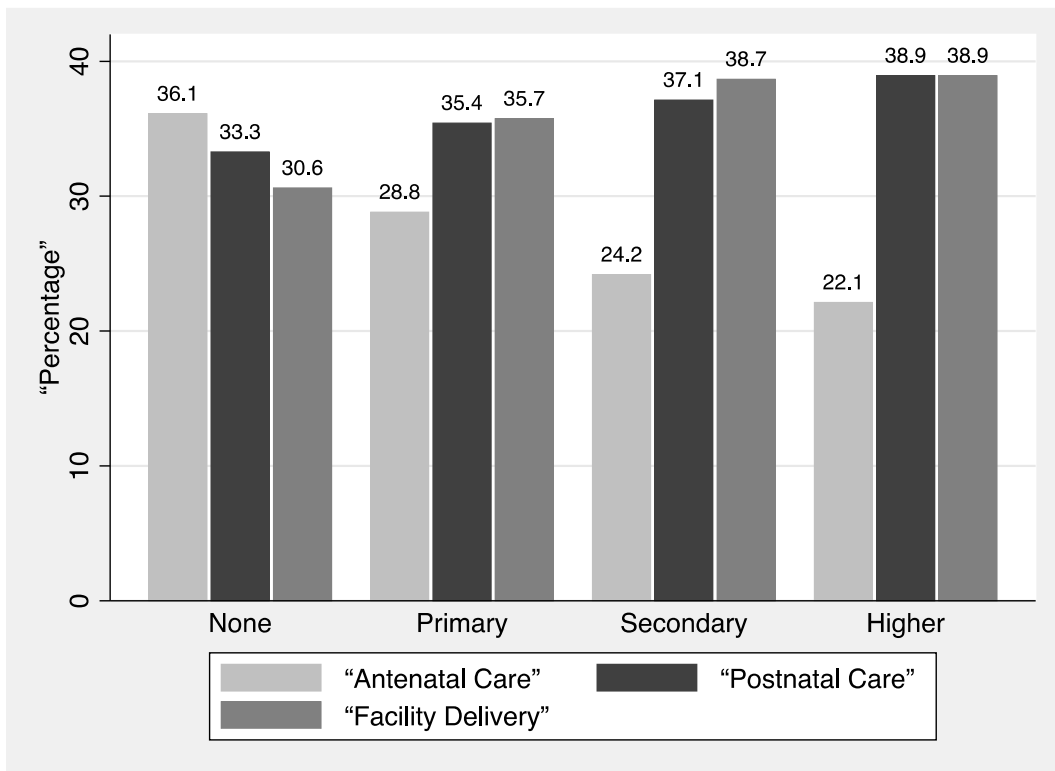
Study finding shown in Figure 4.3 below, shows that utilisation of antenatal care services is higher (30.2%) in the lowest wealth quintiles and deceases as one progress higher towards the richest wealth quintiles at 24.0%, this is similar to access postnatal care services where the utilisation decreases from 38.9% in the poor quintile to 36% in the richest wealth quintile. However, with regards to facility delivery there is more utilisation by the richer wealth quintile (40.0%) as compared to the poorest wealth quintile (30.9%).

Figure 4.3: Maternal service utilization among Adolescence by Household wealth

As shown in Figure 4.4 below there is more utilisation (38.8%) of facility delivery services in urban areas than in rural areas (34.0%). In contrast, women in rural areas are utilising more antenatal care services and post-natal care services than women in urban areas at an average utilisation rate of 28.2% and 37.8% respectively when compared with urban areas at an average utilisation rate 25.3% and 35.9% respectively.

Figure 4.4: Maternal service utilization among Adolescence by Area of residence
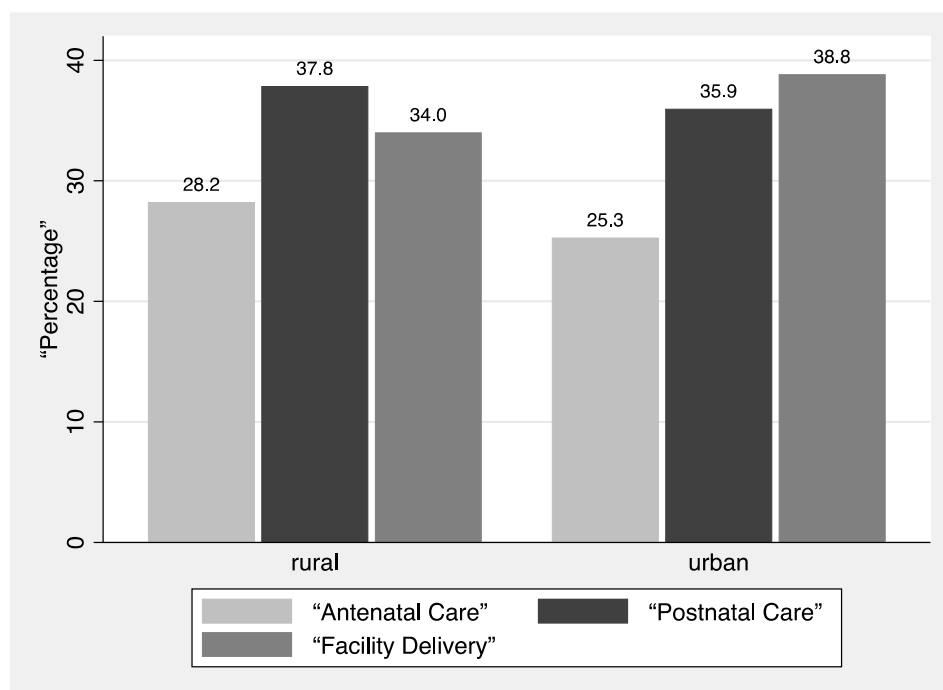
4.3 Coverage rate (C), HOI and Dissimilarity Index (D)

The average coverage rate, the inequality of opportunity and HOI values for use of various interventions maternal health services among adolescence in Kenya are shown in Table 4.4. To interpret these results and those in the tables that follows, it's important to recall that HOI is the inequality adjusted coverage rate of each maternal health opportunity, and that inequality is measured between groups of differentiated by both cluster and individual characteristics. The difference between coverage and HOI for each of the interventions represents the penalty due to inequality between groups and that penalty is equal to D-index multiplied by the coverage. In addition, D-index or the inequality of opportunity is the share of total opportunities (e.g. use of antenatal care service) that would need to be redistributed from the circumstance with a higher that average coverage to those with lower than average coverage to achieve equal opportunities. This implies that as the overall coverage rate increases the dissimilarity index (D-index) decreases.

The coverage for ever pregnant, antenatal care, facility delivery and post-natal care among adolescents are 17.5%, 52.6.%, 70.6% and 59.8% respectively. The inequality measured by dissimilarity index (D) is lowest among adolescent facility delivery (11.1%) and highest among ever pregnant (20.24%). At the same time, opportunities

for access to these maternal health opportunities also vary ranging from 14% for ever pregnant to only to 62.4% for facility delivery. Inequality of utilization of these services exists as shown by dissimilarity

Table 4.3: Human opportunity index, coverage rate and Dissimilarity index

Adolescent health Opportunities	Coverage (C) (%)	Dissimilarity (D) (%)	Human Opportunity Index (HOI) (%)
Ever Pregnant			
15 – 19 years	17.51	20.24	13.96
20 – 49 years	89.09	4.24	85.31
Antenatal care			
15 – 19 years	51.58	12.21	45.28
20 – 49 years	58.58	8.79	53.43
Facility Delivery			
15 – 19 years	70.56	11.08	62.74
20 – 49 years	65.98	15.65	55.66
Postnatal care			
15 – 19 years	59.82	11.45	52.97
20 – 49 years	60.12	12.81	52.42

Note: Ever pregnant: women who have never conceived or had a live nor still birth; Antenatal care: at least four antenatal care visits; Postnatal care: care to mother two months after delivery; Facility deliver
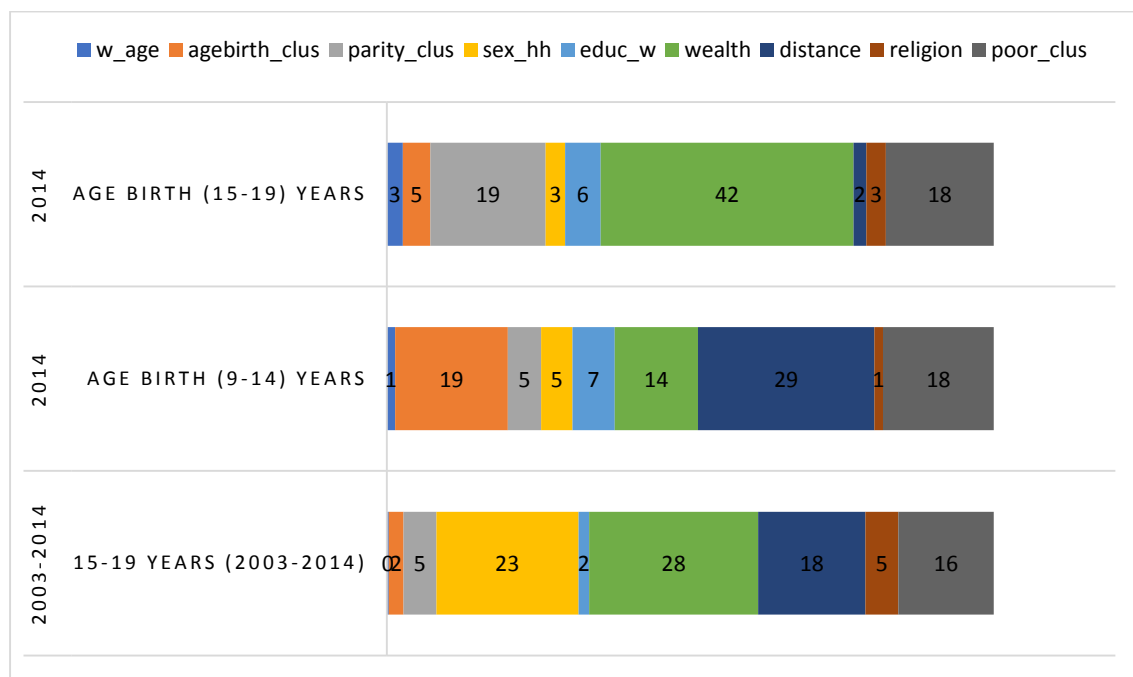
4.4 Determinants of Inequality of Opportunity in maternal health among adolescent

In this section we present the determinants of inequality of opportunity in maternal health among adolescence in Kenya for 2003, 2008/09 and 2014. The leading cause of inequality in adolescence use of antenatal care when the poor clusters and rich clusters contributions are factored in separately are household wealth, distance to health facility, and sex of the household head.

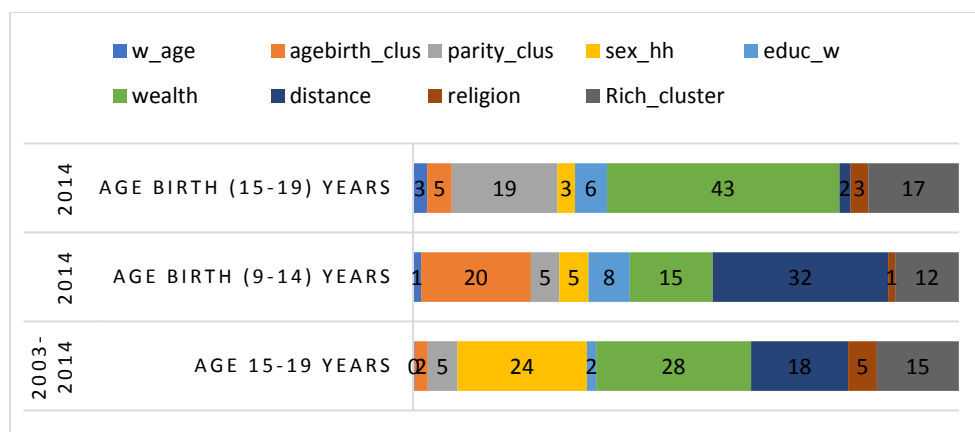### 4.4.1 The role of poor clusters in determining IOP in Antenatal care use

As shown in Figure 4.5 and 4.6 below, the major inequality of opportunity for the pooled antenatal care data was household wealth status at an average of cumulative rate of 28 % irrespective of the cluster wealth index of the adolescent.

Figure 4.5: Determinants of inequality of opportunity in Antenatal care use (%) in poor clusters

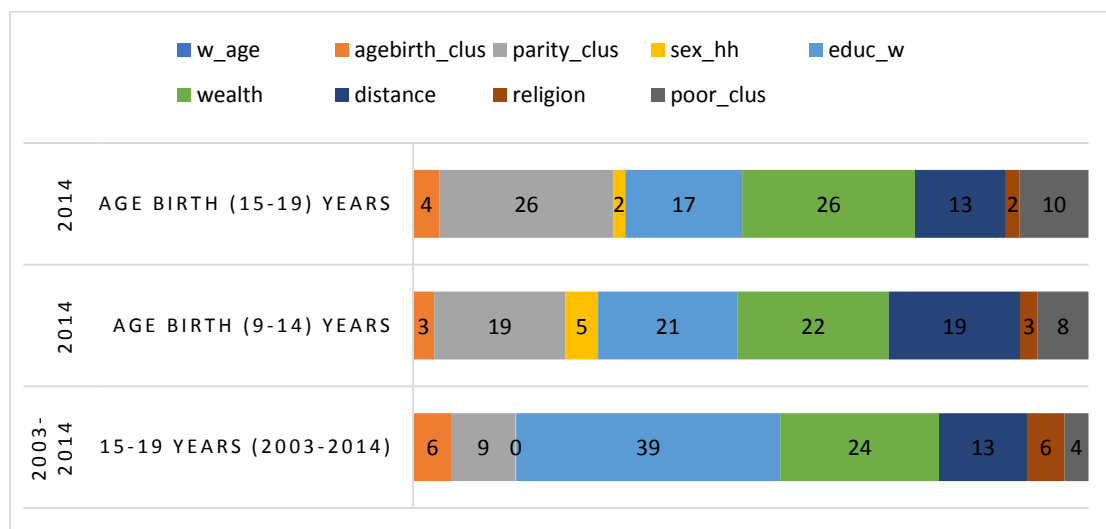### 4.4.2 The role of rich clusters in determining IOP in Antenatal care us

Figure 4.6: Determinants of inequality of opportunity in Antenatal care use (%) in rich clusters

4.4.3 The role of poor clusters in determining IOP in postnatal care use.

Study finding as shown in Figure 4.7 and 4.8 below on postnatal care services, provides education level of the respondent as the major contributor to inequality at a cumulative average of 39% irrespective of the cluster wealth index of the adolescent.

Figure 4.7: Determinants of inequality of opportunity in postnatal care use (%) in poor clusters

4.4.4 The role of rich clusters in determining IOP in postnatal care use.

Figure 4.8: Determinants of inequality of opportunity in postnatal care use (%) in rich clusters

4.4.5 The role of poor clusters in determining IOP in facility delivery.
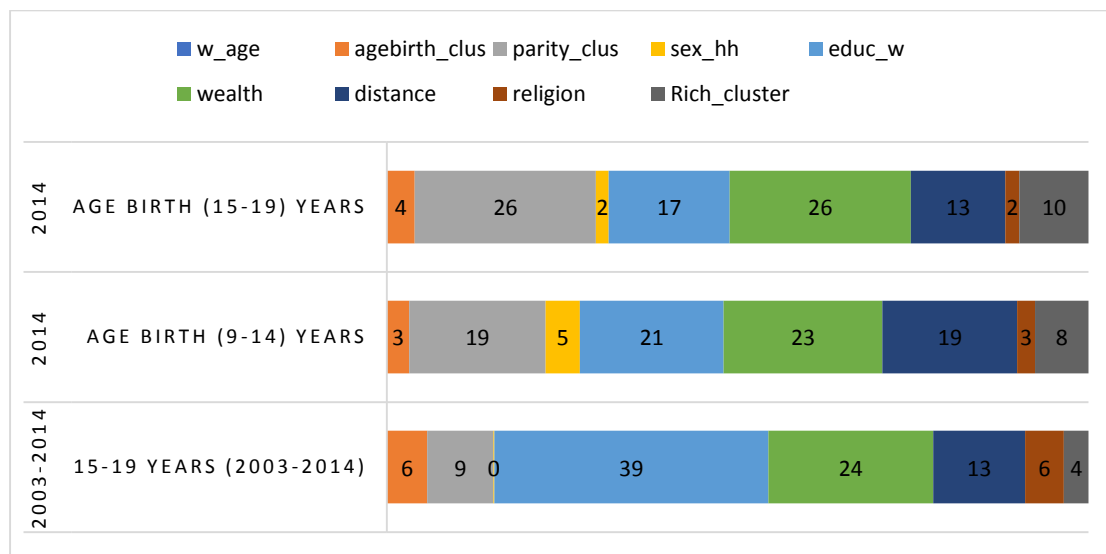
As shown in Figure 4.9 and 5.0 on facility delivery opportunity, wealth status was the major contributor to in equality at a pooled cumulative average of 38% irrespective of the cluster wealth status of the adolescent.

Figure 4:9:Determinants of inequality of opportunity in facility delivery (%) in poor clusters
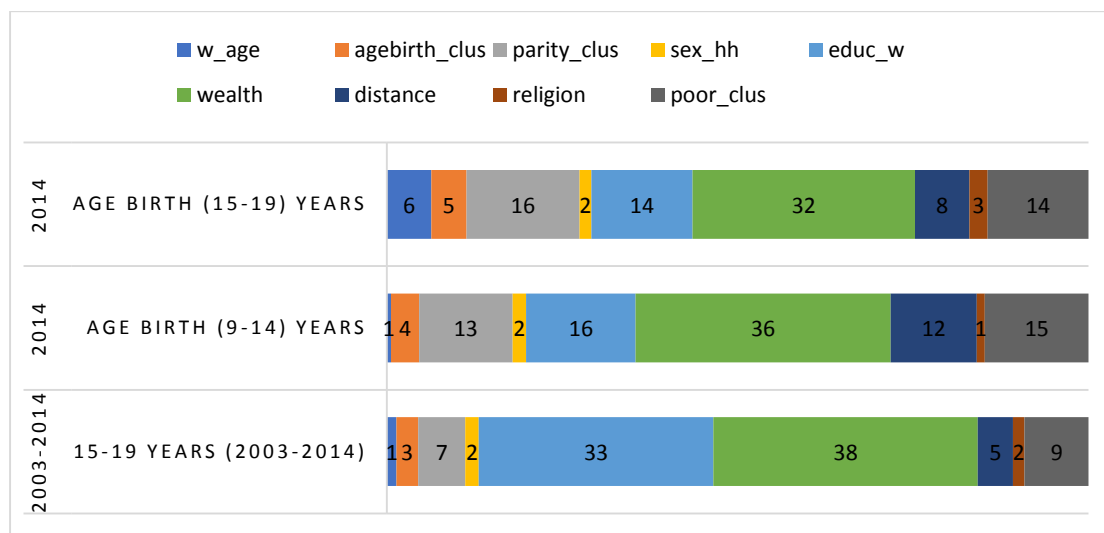
4.4.6 The role of rich clusters in determining IOP in facility delivery.

Figure 5:0: Determinants of inequality of opportunity in facility delivery (%) in rich clusters
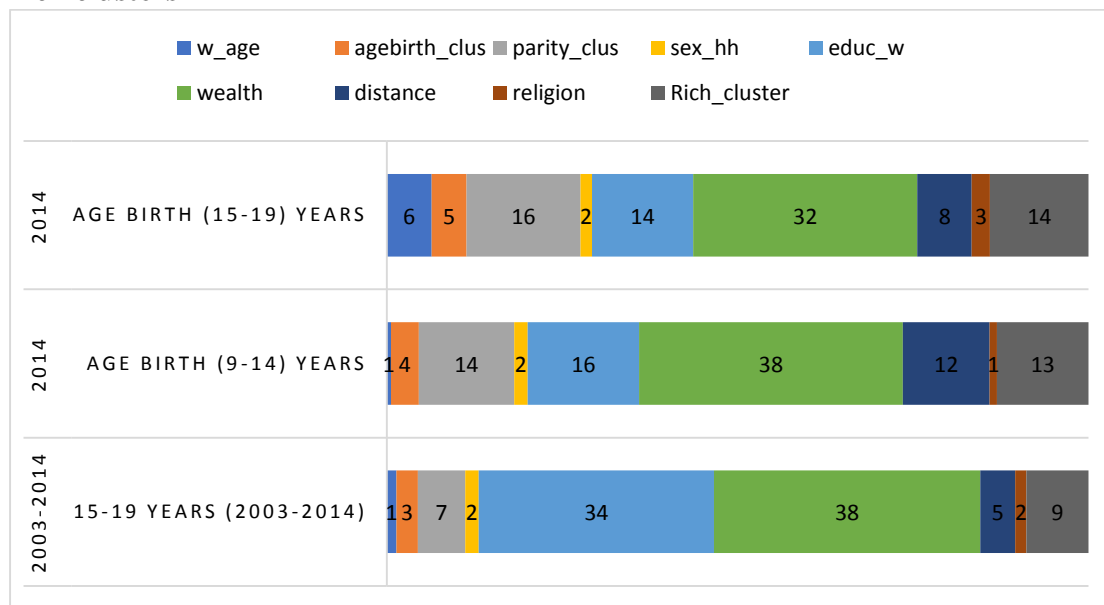
As shown in Figure 4.4 individual wealth status was the most significant contributor (42.04 %) to the outcome opportunity of currently pregnant with the least significant (1.95%) contributor being location of the adolescent.

4.4.7 The role of poor/ rich a cluster in determining IOP in adolescent Pregnancy.

The Shapley value decomposition as shown in Figure 5.1 revealed that for the opportunity variable of having ever been pregnant respondents' level of education was the most important contributor to inequality at pooled average of 45 %.

Figure 5:1: Determinants of inequality of opportunity in adolescent pregnancy (%) in both poor and rich clusters
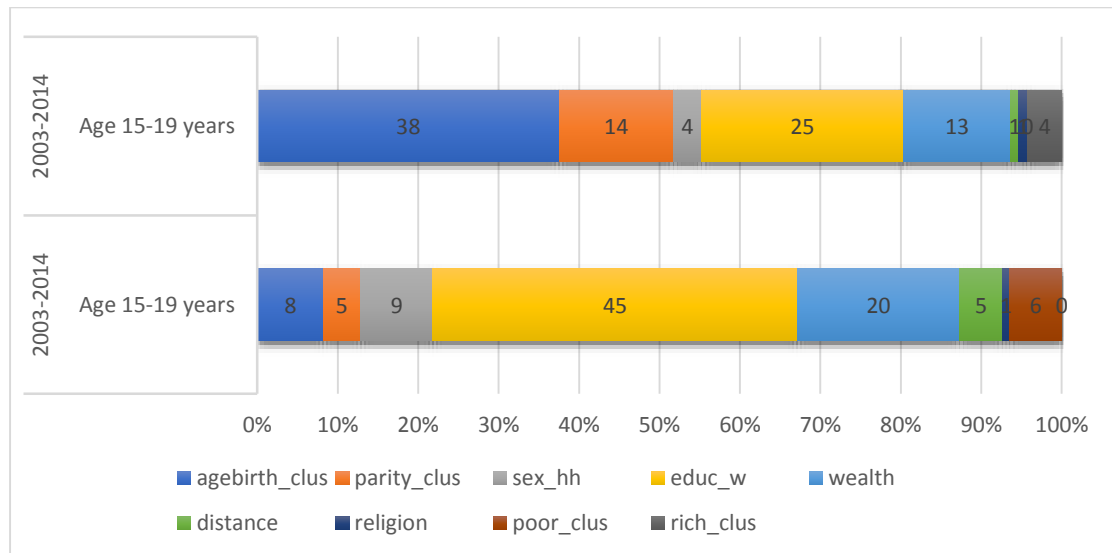
CHAPTER FIVE

DISCCUSIONS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussions of the empirical finding conclusion, recommendations and Areas for further research.

5.1 Discussions of Empirical Findings

These study highlights the need to address disparities in resource allocation to maternal health services in order to attain the global SDG goal of eradicating maternal mortality. The study postulates that allocation of maternal health services across populations should follow the egalitarian principle of ensuring that opportunities in access and use of these services is not correlated to individual, family and community background which are beyond one's control. This can be done by recognising the predetermined inequalities that affect allocation of these services among the pregnant, delivering and postpartum adolescents (Rahman et. al., 2010). The study further provides the possible contributing factors to these disparities which include education level, cluster wealth status, household wealth status, facility distance, religion, sex of the household and location.

The study provides literature on the risk that these younger women are exposed to as a result of this inequalities. Nove et.al., (2014) mark out this problem by stating that the MMR risk is one third higher than that of women aged 20-24 years, with younger adolescents aged 10-15 years old at a much higher risk. Mbonye et al., (2015) further highlights that adolescents are less likely to recognise these risks and hence will continue to suffer under these circumstances.

Despite the public awareness of the potential impact of these risks, it is evident from the pooled Human Opportunity Index (HOI) results that slightly more than a half of the adolescence population do not have equal access and use to maternal opportunities. This signifies that these opportunities are not equally allocated across women of the reproductive age hence fewer 15-19-year-old adolescents are able to access and use these services because of these predetermined circumstances that are beyond adolescent control.

It is therefore imperative for the government to mitigate against these health inequalities that have an impact on both the micro and macro-economic levels of the country.

These findings are consistent with other studies that show that adolescents use less of antenatal and skilled delivery services (Atuyambe, 2015). Additionally, according to the United Nation 2015 report, the utilization rate has remained low at 47% to 49% for the recommended four ANC visits. In another study by Owolabi et al., 2017 it was found out that adolescents are less likely to start ANC within the first trimester, or to attend more than four ANC visits.

The Shapley value of decomposition reveals that individual wealth status still remains a major obstacle in access to maternal health services among the adolescents even though these services are officially free of charge like in the case of the government funded free maternity services. Hidden cost within the system due to lack of accountability, efficiency and transparency may make the adolescent woman to opt out the system. This leads to them opting to seek health care from a traditional attendant as culturally they may view delivery as not an illness that requires medical attention In addition, well-educated and richer women are more likely to use the modern health care system as they are more informed and have greater confidence in dealing with the system bottlenecks and hence are able to get quality services unlike the poor and the uneducated (Nahar and Costello, 1998).

The study also finds high inequality associated with the opportunity variable currently pregnant and delivery within a facility. The high inequality in delivery can be explained by Bourbonnais, 2013, in which he states that lack or the insufficient number of facilities, poor transport infrastructure and distance to the facility are the main critical barriers to maternal health care in Kenya. In another study done in Mongolia and Tajikistan revealed that the decline in delivery services was due to the inequality between the poor and rich (Falkingham, 2003).

The education level was also a major contributor to the inequality across all the opportunity variables. This IOP can be attributed to the fact that education is strongly linked to the current and future reproductive health practices of an adolescent. Therefore, implementing programs outside the health system that focuses on

educational achievements is critical in reducing maternal health inequalities (Global Daily, 2016).

5.2 Conclusion

The ultimate goal of sustainable development agenda is to leave no one behind through ensuring inclusive and equitable access to opportunities (UN, 2015). Equality of opportunity is based on the idea of giving people equal opportunity early in life, whatever their socioeconomic background, so that everybody has the same chance to be successful (Roemer, 1998). This study attempted to explain the extent of dissimilarity in access and use of maternal healthcare services as a result of an adolescent girl background circumstances.

The Government of Kenya has made efforts to ensure that there is fairness in allocation of maternity health care services through the introduction of the free maternity program in 2013 however disparities still remain among adolescents accessing maternal care as results of circumstances beyond their control. The central rule is that in a world of equal opportunities socio-economic or socio-cultural background of an individual should not determine future opportunities.

5.3 Recommendations for Policy Development

This study provides valuable insights to policy makers on areas where the government funded free maternity policy can be improved to ensure adolescents have equal opportunity in use of these services. Some suggested recommendation from this study include: -

1. There is need to strengthen multi-sectorial collaboration among the ministry of health and other sectors for example the ministry of education at the primary healthcare level to build on access.
2. Advocating for laws and policies that uphold adolescent maternal health rights is paramount to reducing the unequal opportunity. These policies should extend to their guardians and family members who are often their decision makers.
3. There is need for the government to invest in providing quality access points operating for twenty-four hours throughout to address the gaps in facility delivery especially in the rural settings.

4. The government need to expand economic opportunities for these young mothers to ensure that this age group realise their full potential.

5.4 Areas for Further Research

There is need to conduct further research on the health outcomes as a result of these disparities in opportunity in access and utilisation of maternal health services so that we are able to understand the magnitude of the problem.

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