SOCIOECONOMIC DETERMINANTS OF TREATMENT CHOICE FOR CHILDHOOD FEVER IN KENYA

BY

LYDIAH JERUTO RONOH

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DECLARATION

This paper is my original work and has not been presented for the award of a degree in any other university.

SIGNATURE: _____DATE: _____

LYDIAH RONOH

APPROVAL

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

SIGNATURE: _____DATE: _____

DR. PHYLLIS MACHIO

DEDICATION

This research paper is dedicated to my dear husband Michael Kuria and children, Ibrahim Sine, Mabel Mukera and Milan Mukera.

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First, thanks to God for his abundant grace and favour which made this project a success.

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LIST OF ABBREVIATIONS

IIA	Independent of Irrelevant Alternatives
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
MDG	Millennium Development Goal
MNL	Multinomial Logit
MNP	Multinomial Probit
QALY	Quality Adjusted Life Years
SDG	Sustainable Development Goal
SSA	Sub-Sahara Africa
WHO	World Health Organization

ABSTRACT

The existence of fever, especially in young children, gives an indication of existence of an underlying health condition that would require treatment. Acute fever in most cases is caused by respiratory infections that results from a virus such as gastroenteritis; colds or flu; certain bacterial infections, particularly ear infection, urinary tract infection and pneumonia; parasitic infections such as malaria. Once fever is detected, it will prompt the mother or caregiver to seek for remedial measures through treatment, which can be buying drugs over the counter in shops, visiting health facilities or using traditional treatment. Despite gains due to concerted policy initiatives, the number of deaths in under 5 years is still extremely high. In the year 2016 alone, 5.6 million children died across the globe before celebrating their fifth birthday with new-borns representing for a rising proportion of these deaths. Children from poor families are at the highest risk of below five mortalities. Data from WHO shows that given the current trend, at least 60 nations are likely to miss the SDG target on neonatal mortality for 2030 while half of these nations will not meet the target even by 2050 (WHO, 2016).

Data from Kenya National Bureau of Statistics (KNBS) shows that in 2017, pneumonia, malaria and cancer were the top causes of death in Kenya with Pneumonia causing 22% of the deaths in 2017 (Economic Survey, 2018). These diseases mostly manifest as acute fever in children under-five as mother or caregiver can easily notice the main symptom. Once fever is detected, it will prompt the mother or caregiver to seek for remedial measures through treatment, which can be buying drugs over the counter in shops, visiting health facilities or using traditional treatment. Statistics show that only sixty-three percent (63%) of children who had fever sought treatment from a health facility. It is important for all children to be checked when they have fever. Why then are some children not presented for examination when fever manifests putting them at risk death?

This study sought to identify the socio-economic determinants of treatment choice for fever in children under five years. To accomplish the above objective, the study used a Multinomial Probit Model with data from the Kenya Demographic and Health Survey, 2014.

The study found out that age of the child, urban residence, education, religion and wealth index are significant determinants of treatment choice for childhood treatment. Policies that reduce the cost of healthcare for the children from deprived families, promote education for women (by provision of sanitary towels for girls, lowering the entry-level grades for girls and provision of bursaries and loans), and build more health facilities in the rural areas will go a long way in promoting use of health services for treatment of childhood fevers

CHAPTER:1 INTRODUCTION

1.1 Background

When one's body temperature goes beyond the normal level, such a person is deemed to be having fever. The temperature levels vary from one person to another and may vary with time. The body temperature may be lower in the morning but higher late in the afternoon and evening. In preschool children, the normal body temperature is higher and it gets to the peak at about 1.5 to 2 years of age. Despite the aforementioned variations, the World Health Organization (WHO) define fever as any temperature of 38° C or more when measured using a rectal thermometer (WHO, 2009). Other terms for a fever include pyrexia, controlled hypothermia and febrile response. Acute fever in most cases is caused by respiratory infections that results from a virus such as gastroenteritis; colds or flu; certain bacterial infections, particularly ear infection, urinary tract infection and pneumonia; parasitic infections such as malaria (Mabey & Doherty, 2004).

The existence of fever, especially in young children, gives an indication of existence of an underlying health condition that would require treatment. Fever remains as one of the most common symptom of illness in children contributing to about 30% of health care visits by children (WHO, 2016). This is explained by the immune system of new borns and young infants that is not fully developed placing them at a greater risk of infections. Such infections include sepsis, pneumonia, and meningitis among others.

For children below 3 years of age, presence of bacteria in their bloodstream sometimes causes them to have fever. These children may only have fever as the only symptom unlike the case in older children. The condition caused by the bacteremia is known as *occult bacteremia*. It has necessitated routine vaccines especially in the United States and Europe to curb against the bacteria. The vaccination has yielded positive results by nearly eliminating occult bacteremia

in children in this age group. Acute fever in children can equally result to a lesser extent from adverse effects of vaccines and some medications, septic arthritis, encephalitis, Kawasaki disease, and meningitis.

Despite the arguments presented in the preceding paragraphs, fever is commonly associated with pneumonia and malaria. The two diseases have been identified as the leading cause of illness and death in under five children worldwide. Particularly, the prevalence of malaria extends in more than one hundred countries across the globe. The WHO estimates about 20 percent (1.2 billion people) of the World's population are at a high risk of malaria of which 49 percent are in Africa (WHO, 2016). Further, a key cause of fever in children below 5 years in Sub-Saharan Africa (SSA) is malaria. Statistics show that of total deaths arising from malaria in Africa, 85 percent happen in children below 5 years of age.

In the case of Pneumonia, it is estimated that 150 million episodes are detected annually in the under 5 year's bracket across the globe. Ninety-five percent of these cases occur in developing countries including Africa. Studies have shown that acute pneumonia accounts for between 19 to 23 percent of deaths in under 5 year children in Africa (Tarimo *et al.* 2000; Malik *et al.* 2006).

Children represent the future labor force and it is important for governments to invest in this future pool of human resources. One way of achieving this is to promote the health of infants and children to reduce the number of deaths and disability caused by childhood diseases and injuries. Indeed, the importance of child health is well articulated in various programs and initiatives developed by the international community. Primary health care policies and programs formulated for most developing nations have primarily focused on improving survival of children. This has been achieved through increased use of preventive care for both mothers and children (Elo, 1992).

For instance, the Millennium Development Goals (MDG's) sought to advance maternal health as well as reduce mortality among infants and children below age five. These targets were supposed to be realized through improvements in health services provided to mothers as well as children. Similar policy initiatives have also been incorporated in the Sustainable Development Goals (SDGs) that succeeded the MDGs. Particularly, goal number 3 whose focus is on promoting healthy lives and wellbeing for all. Goal 3.c. "calls for a substantial reduction in the global maternal, neonatal and under-five mortality rate as well as substantially increase health financing" (WHO, 2016)

These efforts by the International Community as well as the National Governments have seen the reduction of malaria burden in several SSA countries Kenya included. However, the number of deaths in under 5 years is still extremely high. In the year 2016 alone, 5.6 million children died across the globe before celebrating their fifth birthday with new-borns representing for a rising proportion of these deaths. Children from poor families are at the highest risk of below five mortalities due to a number of reasons. Data from WHO shows that given the current trend, at least 60 nations are likely to miss the SDG target on neonatal mortality for 2030 while half of these nations will not meet the target even by 2050 (WHO, 2016). Data from Kenya National Bureau of Statistics (KNBS) shows that in 2017, pneumonia, malaria and cancer were the top causes of death in Kenya with Pneumonia causing 22% of the deaths in 2017 (Economic Survey, 2018).

In Kenya Demographic and Health Survey (KDHS) of 2014, acute respiratory infection was witnessed in children under age 5 (KNBS, 2014). These illnesses, as shown by evidence from existing studies, predominantly manifest as acute fever in children under age five as the main symptom that can easily be noticed by a caregiver or the mother who is in constant contact with the child. Once fever is detected, it will prompt the mother or caregiver to seek for remedial

measures through treatment, which can be buying drugs over the counter in shops, visiting health facilities or using traditional treatment. According to KDHS, 2014 sixty-three percent (63%) of children with fever sought treatment from a health facility.

Children under age five are very dependent on their family, particularly the parents or caregivers, for survival and protection. Evidence from previous studies have shown that poor health outcomes witnessed in children under age five is mainly as a result of the socioeconomic status of the families where the children reside. For instance, the likelihood that a child taken ill due to fever received care or treatment increased with increase in mother's education and wealth (KNBS, 2014).

Socioeconomic status is a comprehensive and complex assessment of social, economic and individual's effort as compared to other people's standing. It is a composite measure of social and economic standing of an individual, which is based on education, once occupation, level of income and residence. Socioeconomic status has been applied as a powerful health determinant owing to the fact that wealthy people in most instance are likely to be healthier than their counterparts who are not well off (Erreygers, 2013).

The proxy for socioeconomic status is mother's level of education, occupation, level of mother's income and the total income for the household. The choice of income as a proxy is majorly because it is easy to estimate the income for most individuals, which includes salary and wages, profits, income from rents and other earnings.

Families in the low-income quartile are likely to remain in low socioeconomic quartile as their earnings are channelled to their daily needs leaving them with little or no room for wealth accumulation. However, for families in higher-income quartile, they are able to meet their day-to-day needs and have the resources needed to make wealth as well as to consume luxury goods.

The role of education in equipping people with the relevant skill set for securing gainful employment as well as specific qualities that stratify people with higher socioeconomic status from lower socioeconomic status is key. Higher levels of education are associated with better economic and psychological outcomes. Existing studies show that lower socioeconomic students not only have lower but also have slower achievements in academic when compared to those of higher socioeconomic position.

This study examined the extent to which the socioeconomic determinants influences the fever treatment choice in children below 5 years in Kenya. The result of this study is expected to inform policy that focuses on reducing illness and death in children below five years.

1.2 Statement of the problem

Despite gains due to concerted policy initiatives, the number of deaths in under 5 years is still extremely high. In the year 2016 alone, 5.6 million children died across the globe before celebrating their fifth birthday with new-borns representing for a rising proportion of these deaths. Children from poor families are at the highest risk of below five mortalities. Data from WHO shows that given the current trend, at least 60 nations are likely to miss the SDG target on neonatal mortality for 2030 while half of these nations will not meet the target even by 2050 (WHO, 2016).

Data from Kenya National Bureau of Statistics (KNBS) shows that in 2017, pneumonia, malaria and cancer were the top causes of death in Kenya with Pneumonia causing 22% of the deaths in 2017 (Economic Survey, 2018). These diseases mostly manifest as acute fever in children under-five as mother or caregiver can easily notice the main symptom. Once fever is detected, it will prompt the mother or caregiver to seek for remedial measures through treatment, which can be buying drugs over the counter in shops, visiting health facilities or

using traditional treatment. Statistics show that only sixty-three percent (63%) of children who had fever sought treatment from a health facility. It is important for all children to be checked when they have fever. Why then are some children not presented for examination when fever manifests putting them at risk death?

1.3 Research Questions

i) What are the socioeconomic factors influencing treatment choice for childhood fever?
ii) What policy recommendations can be derived from the study?

1.4 Objective of the study

The broad objective was to examine how socioeconomic factors influence the treatment choice for childhood fever in Kenya. In particular, the study sought:

i) To identify socioeconomic factors influencing the treatment choice for childhood.
ii) To derive policy recommendations from the study findings.

1.5 Significance of the study

Results from this inquiry can beneficial to both scholars in the academia and policy makers in government and non-governmental organizations.

To the scholars, the study adds to the existing knowledge on the socio-economic determinants of treatment choice for childhood fever in Kenya. Policy makers will use the findings of this study to evaluate the impact of the government interventions on childhood health.

The study therefore is useful for evaluating existing policies that assists in developing clear and relevant policies aimed at reducing childhood fevers and related diseases in Kenya. This

study can be useful in allocating resources in health programs especially in the below five treatment programs.

CHAPTER:2 LITERATURE REVIEW

2.1 Introduction

Theoretical and empirical literature on government expenditure and private investment towards treatment of childhood fever was reviewed in this chapter. The chapter further offers a critique on the existing literature reviewed.

2.2 Theoretical Literature Review

The study of influence of socioeconomic determinants on treatment choice for childhood fever in under-five children can be studied in the context of existing theoretical frameworks on child wellbeing, healthcare services utilization behavior and the demand for healthcare services for children by caregivers/mothers.

One of such frameworks is that of Mosley and Chen (1984) which provides highlights on various determinants of child mortality based on exogenous and endogenous factors. The exogenous factors include; the level of mother's education, household income and wealth among others. On the other hand, endogenous factors are because of nutritional status, maternal factors, health seeking behaviour among other factors.

Behrman and Rosenzweig (1999) model postulates that child health outcome depends both on maternal and paternal education as well as unobserved characteristics of both parents. Another model by Preston's (1989) on mortality decline suggests that education is very crucial as it enhances child survival. The model associates maternal schooling with child survival in various ways, which include; literacy, proper understanding of health information as well as health practices. The author believes that mothers who are educated are able to obtain information regarding health through various ways such as interacting with medical personnel, reading health articles among others. These enable them to take part in several health practices, which

decreases risks of their children since all women play a key role in saving life of the young ones in the family. It is also evident that mothers who are educated embrace the use of preventive care measures as compared to those with little or no education. The model also highlights that educated mothers have higher ability of interacting with the health system.

Anderson and Newman developed a behavioural framework for health access and utilization first in 1960's. This framework has since undergone through a series of modifications with latest one being that done in1995, which has been widely applied in a number of existing studies. The argument in the behavioural model is that an individual's health-seeking behaviour is influenced by three factors. Enabling factors include aspects household disposable income and precautionary actions such as insurance in health. Predisposing factors include social structure such as education, occupation, culture among others and health beliefs. The other factors are classified as need factors.

Grossman (1972) developed a demand for health model on health capital and demand for healthcare. Arthur (2014) studied choice of health care for children before their fifth birthday in Ghana using this model and found out that it is primarily dependent on the decisions of the parents. It is therefore imperative to treat the demand decision for health as a decision that is made by parent or caregiver. The theoretical model considers economic, social, and environmental factors as ingredients of the production system. The ultimate heath output of the production system is health output being life expectancy at birth.

This study follows the random utility theory as applied in health economics studies. The theory postulates that the decision for treatment choice is based on the quality-adjusted life years (QALYs) associated with each treatment choice. The model assumes that an individual chooses one treatment option over the other based on utility derived from the chosen option. This theory has been implemented through multinomial probit models.

2.3 Empirical Literature Review

There exists a remarked difference in understanding disease causes between sub-Saharan Africa and the western countries. Studies show that a majority of populations from sub-Saharan African countries, which is malaria endemic, consider non-biomedical explanations like superstition, (witchcraft), causes from within the body (teething), and causes from the environment like overexposure to the sun or alcohol use (Winch *et al*. 1996; Sabuni 2007).

Other studies show that people's standards of life and their demand for health services is influenced by social and economic factors. Wagstaff (1986) positively linked demand for health services and the level of education. Higher education levels place health services seekers in higher socioeconomic status and will demand better quality health services, as they are likely to have higher income levels. They are likely to exercise, eat healthy, take vaccinations and thus are healthier. In addition, they are predisposed to make informed choices in matters related to health. This scenario is contrasted to individuals with low incomes who will most likely resort to self-diagnosis, traditional healers and community health workers.

The existing relationship between socioeconomic status and fever is complex. However, little attention is paid to comprehensive analysis of this relationship. Existing studies established a correlation between lower incidence of fever and higher socioeconomic status. Besides, socioeconomic status influences fever prevalence through choice of treatment, hygienic conditions at home, malnutrition and awareness levels about proper health care according to Nonvignon *et al* (2010).

Wealth is an important factor influencing the treatment choice as it is an indicator for economic power and demonstrates the ability to pay for health care. Wealthy families are inclined to using government and private health facilities, as whereas their poorer counterparts opt for self-

medication or traditional health care since it is cheaper. Evidence from existing studies indicate a positive coefficient of wealth for private medication and a negative coefficient of wealth for traditional/ self-medication. This implies that wealthy guardians are predisposed to seek children's healthcare from private or government hospitals (Filmer, 2005; Arif, 2007). Using a multi-level random effect logistic model, Nonvignon and Nonvignon (2012) found out that children from wealthier families reported low prevalence of fever from a study in four Sub—Saharan countries. Malarj (2010) found that prevalence of fever in children increased with poverty levels of households in Nigeria from their two-level random effects logistic model.

Further studies conclude that geographical location influences health-seeking behaviour. Guardians based in the rural areas are less likely to seek child health care from a government or private health facility due to non-affordability of charges or unavailability of health care facilities in the communities. Their only resort is traditional health service providers.

Distances that people have to travel to access health facilities also affect health-seeking behaviour especially in rural areas. This is particularly common with government facilities owing to their relative affordability compared to private health facilities that may be close but not affordable. Consequently, the poor rural population may resort to using the services of traditional healers since they are readily available in villages.

Using a multinomial probit model, Nonvignon *et al* (2010) demonstrated that self-medication as well as over-the-counter medication was preferred in rural Ghanaian districts where travel and waiting time was longer. These findings are consistent with findings of Arthur (2014) who found a significant positive relationship between choice of treatment of childhood fever and household wealth, health insurance status and residence in Ghana. From their study in Dodoma region, central Tanzania Kasile *et al* (2014) found that delays in seeking health care is

influenced by among others: absence of one or both biological parents, size of the nuclear family, and distance to the nearest health facility.

Other studies have concluded that age is a determinant for treatment choice for a child. Kazembe *et al* (2007) reported that age of the mother/care-giver influence the treatment choices and that working mothers are more likely to use the government health facilities for the sick child. Parent's level of education also determines health-care choices for their children. Grossman's (1972) health capital model observed that parents with higher levels of education give their children better health care, as they are more likely to be aware of the existence and importance of health insurance and better health facilities.

2.4 Overview of the Literature

The empirical literature reviewed focused mostly on the prevalence of fever among children under age five and how it's influenced by socioeconomic factors. The studies reviewed have looked at the effect of socioeconomic factors on the choice of treatment for fever among under five children. Previously conducted studies indicate that place of residence, age of the mother, order of birth, income, occupation and marital status influence the choice of treatment for fever in under-five. The studies carried out used data from the previous demographic and health surveys from various countries in Sub-Saharan Africa countries. This study aims to use the 2014 Demographic and Health Survey data from Kenya to study the relationship between socioeconomic determinants and how they influence the treatment choice for childhood fever.

CHAPTER:3 METHODOLOGY

3.1 Introduction

This chapter highlights the conceptual framework, specifies empirical model and the estimation procedure adopted by the study. It also gives the pre and post estimation test applied. The chapter concludes by defining the variables, giving their measurements and describing the data sources.

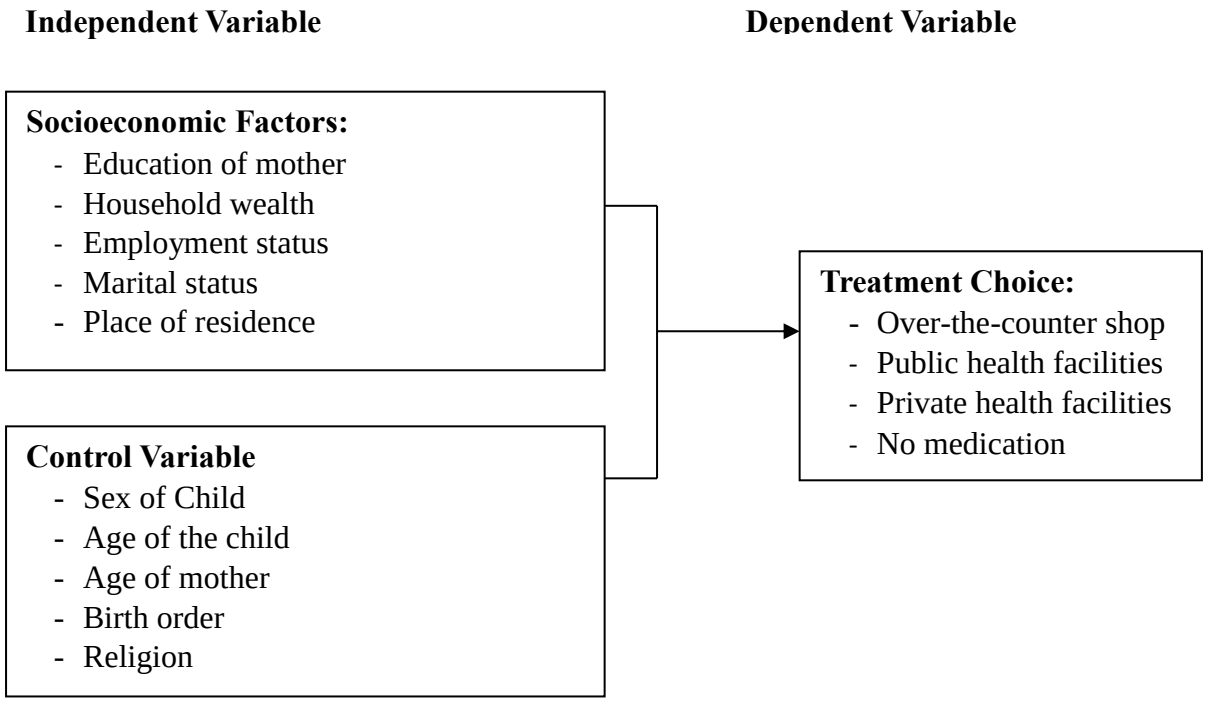
3.2 Conceptual Framework

The random utility framework as applied in health economics studies postulates that an individual makes treatment choice for an ailment basing on the utility derived from the chosen treatment option. A side from the utility derived from the treatment choice and the cost of treatment, there are other factors also believed to influence this choice as established by studies that have applied the random utility framework (Kazembe *et al*, 2007; Nonvignon *et al*, 2010).

The interaction between the variables of this study was derived from the random utility framework and its application in existing studies. In making treatment choices for childhood fever, caregiver or mothers are assumed to be influenced by socioeconomic factors. The treatment choices considered in the study include over-the-counter shops, care from public and private health facilities and no medication. The socioeconomic factors considered on the other hand include education, household wealth, employment status, marital status and place of residence. It is believed that a child below five years is not in a position to make choices for himself hence rely entirely on the family particularly the mother or caregiver to make choices. Therefore, in an instance where a child under five experiences fever, the caregiver or mother will make treatment choices based not only on the satisfaction derived from the treatment choice but also on aforementioned socioeconomic factors.

This relationship was presented diagrammatically with the inclusion of some control variables established from previous studies to influence treatment choice such as sex of the child,age of the child, age of the mother, birth order and the caregiver's or mother's religion.

Figure 3-1: Conceptual Framework



Source: Author

3.3 Econometric Model Specification

This study derived from the theory of random utility framework as applied in existing studies through multinomial probit model (Kazembe *et al*, 2007; Nonvignon *et al*, 2010). The caregiver or mother makes a selection of treatment choice conditional to the child having fever. The decision was considered a discrete choice since there are various choice alternatives for the caregiver or mother. This therefore makes multinomial choice model response the most appropriate for the study. The model presupposes that there are decision-making units who can be individuals, households or firms. The decision-making unit was presented with alternatives being the choice set. The model was specified as:

$\mu_{ij} = Z_i\alpha_j + \varepsilon_{ij}$……. (1)

Where;

μ_{ij} is the alternative choices for treatment available for fever in children under five years of age

Z_i is the caregiver or mother of the child under age five

$\alpha_j$are the vector of regression coefficients that are associated with Z_i

$\varepsilon_{ij}$are the error terms

As per the specified model, the caregiver chooses the alternative k if $\mu_{ik} \geq \mu_{im}$for $m \neq k$.

Suppose individual i selects alternative k. Taking the difference between $\mu_{ik}$and the $J-1$, the following is derived;

$$V_{ij} = \mu_{ij} - \mu_{ik}$$

$$= Z_i(\alpha_j - \alpha_k) + \varepsilon_{ij} - \varepsilon_{ik} \qquad (2)$$

$$= Z_i Y_j + \epsilon_{ij}'$$

Where $j' = j$ if $j < k$ and $j' - 1$ if $j > k$ so that $j' = 1, \dots, j-1$

This equation can be used to specify both Multinomial logit (MNL) as well as Multinomial Probit (MNP) model. The Multinomial Probit (MNP) model assumes that $i = (i_1, \dots, i_{j-1})$ follow a Multivariate normal distribution.

The probability that the mother or caregiver of a child under age of five i chooses outcome $k$is given as;

$$\Pr(Y_i = k) = \Pr(V_{i1} \leq 0, \dots, V_{i'j-1} \leq 0)$$

$$= \Pr\left(\epsilon_{il} \leq -\lambda_{il}, \ldots, \epsilon_{i'j-1} \leq -\lambda_{j-1}\right)$$

$$= (2\pi)^{-(j-1)/2} |\sum|^{-1/2} \int_{-\bowtie}^{-\lambda_{ij}} \ldots \int_{-\bowtie}^{-\lambda_{i,j-1}} ex(-\frac{1}{2} Z' \sum$$

Where $\lambda_{ij} = Z_i \gamma_j$

The above equation was solved to give K – point quadrature formula.

$$\Pr(\gamma_i = \hbar) = {}^{1}/_{2} \sum_{k=1}^{k} w_k \left\{ \prod_{j=1}^{j-1} \phi\left(-x_{\hbar}\sqrt{2} - \lambda_{ij}\right) + \prod_{j=1}^{j-1} \phi\left(x_{\hbar}\sqrt{2}\right) \right\}$$

MNP model was adopted due to an Independence of Irrelevant Alternatives (IIA) property in the Multinomial Logit Model (MNL). The IIA implies that the ratio of choosing any two alternatives is independent of the attributes of all other alternatives and of the availability of a third alternative. In other words, the property assumes that the error terms in equations (1) and (2) are independent and random.

The assumption of the IIA property is not always true in reality, as the probability of choosing one healthcare option will always depend on the absence or presence of other options that are close substitutes.

3.4 Definition and Measurement of Variables

Variables included in this model were identified from the existing literature reviewed (Kazembe *et al*, 2007; Nonvignon *et al,* 2010). Four health care options from which the caregiver or mother to the child can chose to go for treatment of childhood fever were considered for this study.

The health care option for fever treatment is the dependent variable. The first healthcare option is No medication that includes traditional medication, sponging, use of painkillers and doing nothing. The second option is over the counter providers that include non-prescribed drugs

purchase from shops and pharmacies. The third option is public health facilities that are government owned hospitals, health centres and clinics. The fourth and final option is private health facilities that include privately owned hospitals.

The independent variables are the socioeconomic factors of the parent/mother. Therefore, the socioeconomic variables considered in the study are those of the mother of the child who in most instances is the primary caregiver of the child and makes treatment decisions on behalf of the child. The variables include household wealth, education status, employment status, residence and marriage status of the mother. The control variables are mother's age, religion, age, gender, and birth order of the child. The following is a description on how the variables were measured which was derived from the KDHS, 2014:

Table 3.1: Variable Measurement

Variable	Measurement	Expected sign
Dependent Variable		
Treatment Choice	Categorical variable taking 0-No treatment 1-Public Health Facilities 2-Private Health Facilities 3-Over the Counter	
Independent Variables		
Household wealth	Categorical variable taking 1-Poorest 2-Poorer 3-Middle 4-Richer 5-Richest	+
Education status	Categorical variable 0-No Education 1-Primary 2-Secondary 3-Higher	+
Marital status of the mother	Categorical variable 0-Never in union 1-Married 2-Living with partner 3-Widowed 4-Divorced 5-Separated	+
Residence	Dummy variable 0-Rural 1-Urban	+
Control Variables		
Age of the mother	Continuous variable, in years	-
Gender of the child	Dummy variable, 0-Female 1-Male	-
Age of the child	Continuous variable, in months	+
Birth order	Discrete variable	-
Religion	Categorical variable 0-No Religion 1-Christian 2-Muslim	-

3.5 Data Source

Cross-sectional data from the Kenya Demographic and Health Survey (KDHS) undertaken by the Kenya National Bureau of Statistics (KNBS) and published in 2014 was used. This data set was preferred for the study since it had all the variables of the study and was collected at household level. Equally, this data set was preferred due to the constraints of time and resources. STATA version 14 was used to analyze this data.

CHAPTER:4 RESULTS AND DISCUSSION

4.1 Introduction

Empirical results from data analysis, interpretation and discussion of results are presented in this section. It begins by giving summary statistics of the variables of the study then proceeds to present the results of the Multinomial-Probit regression analysis showing the preference for treatment of fever in children under five.

4.2 Summary Statistics

To establish the characteristics of the data, minimum and maximum values, mean, variance, and standard deviation were studied. The results of the summary statistics are presented below.

Table 4.1: Summary Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Treatment choice	8,570	0.919	0.9232	0	3
Age of mother	20,964	28.728	6.5604	15	49
Age of child	19,344	29.1046	17.0886	0	59
Residence					
Urban	20,964	0.3257	0.4686	0	1
Sex of child					
Male	20,964	0.5072	0.5	0	1
Birth order	20,964	3.4213	2.2936	1	15
level of education(Base-No education)					
Primary	20,964	0.5273	0.4993	0	1
Secondary	20,964	0.1909	0.3931	0	1
Higher	20,964	0.0630	0.2430	0	1
Marital status(Base-Single)					
Married	20,964	0.7935	0.4048	0	1
Living with partner	20,964	0.0542	0.2264	0	1
Widowed	20,964	0.0237	0.1521	0	1
Divorced	20,964	0.0187	0.1353	0	1
Separated	20,964	0.0479	0.2136	0	1
Wealth level(Base-Poorest)					
Poorer	20,964	0.2074	0.4055	0	1
Middle	20,964	0.1668	0.3728	0	1
Richer	20,964	0.1494	0.3564	0	1
Richest	20,964	0.134	0.3407	0	1
Religion(Base-No Religion)					
Christian	20,926	0.8030	0.3978	0	1
Muslims	20,926	0.1682	0.3741	0	1

Table 4.1 presents the descriptive statistics. The figures indicate that 8,570 children below 5 years had fever two weeks before the KDHS 2014 and about 92 percent of the mothers reported that they sought treatment for childhood fever from public health facilities, private health facilities and over the counter shop while about 8 percent chose no treatment. The mothers had an average age of 29 years (aged between 15 and 49 years). The standard deviation of their ages was 6.5604. The mean birth order of the child in the study was found to be 3.4213 implying that most of the mothers interviewed were not first time mothers. The household with the most children had 15 children. Majority of the mothers were Christians (80 percent) with

very few reporting that they are not inclined to any religion (3 percent). On the wealth index, majority of the mothers came from the poorest households (34 percent) and also from the rural areas (67 percent). About 50 percent of the sampled children were male. Considerably more than half of the mothers had primary education (53 percent) with few reporting to have higher education (6 percent). 22 percent of mothers reported to have no kind of formal education.

Table 4.2: Frequency of Outcomes

Treatment Choice for Fever in Children Under age 5	Freq.	Percent	Cum.
No treatment	3,189	37.21	37.21
Public health facilities	3,724	43.45	80.67
Private health facilities	819	9.56	90.22
Over the counter	838	9.78	100
Total	8,570	100	

The results displayed in table 4.2 give the frequency of treatment choices as mentioned by the respondents. The treatment choice with the highest frequency recorded was public health facilities which recorded 44 per cent followed by the choice of no treatment which recorded 37 per cent. Private health facilities and over the counter treatment each recorded about 10 percent.

4.3 Regression results

Regression analysis was therefore undertaken to demonstrate how socio-economic factors affected the choice of fever treatment. This analysis was undertaken using a multinomial probit model and marginal effect results explained. The results are discussed below.

4.3.1 Marginal Effects Results

Marginal effects were computed for each of the outcomes. For continuous variables, the change is calculated from a threshold, usually the mean while discrete variables treated as dummy variables. Table 4.3, 4.4, 4.5 and 4.6 gives the marginal effects results.

Table 4.3: Marginal effect: Dependent Variable-No Treatment

Variable	Marginal Effect	Robust Std Error	z
Age of mother	0.0002	0.0013	0.14
Child's age	0.0015***	0.0003	4.29
Residence			
Urban	0.0052	0.0135	0.38
Sex of child			
Male	-0.0136	0.0107	-1.27
Birth order	0.0032	0.0039	0.81
Level of education(Base-No education)			
Primary	-0.1078***	0.0185	-5.84
Secondary	-0.1177***	0.0227	-5.18
Higher	-0.1478***	0.0306	-4.82
Marital status(Base-Single)			
Married	-0.0147	0.0238	-0.62
Living with partner	0.0223	0.0331	0.67
Widowed	-0.0377	0.0415	-0.91
Divorced	-0.1136**	0.0475	-2.39
Separated	0.0178	0.0329	0.54
Wealth(Base-Poorest)			
Poorer	-0.0350**	0.0158	-2.21
Middle	-0.0314*	0.0173	-1.82
Richer	-0.0409**	0.0191	-2.14
Richest	-0.0460**	0.0232	-1.98
Religion(Base-No Religion)			
Christian	-0.0500	0.0323	-1.55
Muslims	-0.0739**	0.0346	-2.13
Number of observation	8,406		
Wald chi2(45)	581.89		
Log likelihood	-9641.78		
Prob > chi2	0.0000		

*Significance at: * 10%, ** 5% and *** 1%*

The marginal effect result show that child's age, level of education, marital status (divorced), wealth and religion (Muslims) are significant in explaining No treatment as the choice of treatment for childhood fever. An increase in the age of the child by one month increases the chances of a mother choosing no treatment as the choice of treatment for childhood fever by 0.2 percentage points. Mothers with primary, secondary and higher education levels have lower

chances of choosing no treatment for childhood fever by 10.8 percent, 11.8 percent and 14.8 percent respectively.

Moreover, being divorced reduces the chances of a mother choosing no treatment for childhood fever by about 11 percentage points. Mothers from poorer, middle, richer and richest families' chances of choosing no treatment for childhood fever reduces by 3.5 percent, 3.1 percent, 4.1 percent and 4.6 percent respectively. Finally, the likelihood of a Muslim mother choosing no treatment for childhood fever reduces by 7.4 percent compared to the other religions.

Table 4.4: Marginal effect: Dependent Variable-Public Health Facilities

Variable	Marginal Effect	Robust Std Error	z
Age of mother	-0.0005	0.0014	-0.34
Child's age	-0.0023***	0.0004	-6.68
Residence			
Urban	-0.0668***	0.0136	-4.9
Sex of child			
Male	0.0183*	0.0109	1.67
Birth order	-0.0064	0.0041	-1.57
Level of education(Base-No education)			
Primary	0.0845***	0.0180	4.71
Secondary	0.0815***	0.0225	3.63
Higher	0.0679**	0.0314	2.16
Marital status(Base-Single)			
Married	-0.0229	0.0240	-0.96
Living with partner	-0.0410	0.0333	-1.23
Widowed	0.0291	0.0432	0.67
Divorced	0.0207	0.0516	0.4
Separated	-0.0304	0.0330	-0.92
Wealth(Base-Poorest)			
Poorer	0.0245	0.0162	1.51
Middle	-0.0019	0.0177	-0.11
Richer	-0.0427**	0.0195	-2.19
Richest	-0.0916***	0.0235	-3.9
Religion(Base-No Religion)			
Christian	0.0824**	0.0314	2.62
Muslims	0.0883**	0.0343	2.58
Number of observation	8,406		
Wald chi2(45)	581.89		
Log likelihood	-9641.78		
Prob > chi2	0.0000		

*Significance at: * 10%, ** 5% and *** 1%*

Regarding public health facilities as the dependent variable, child's age, residence, sex of the child, level of education, wealth and religion were statistically significant in determining the choice of treatment for childhood fever. A one-month increase in the age of the child reduces the probability of the mother choosing public health facility by 0.2 percentage points. Living in urban as opposed to rural reduces the chances of a mother choosing public health facility as a preferred treatment choice of a childhood fever by 6.7 percent. Mothers with male children have 1.8 percentage point chances of choosing public health facilities as opposed to those with female children.

Mothers with primary, secondary and higher education levels have higher chances of choosing public health facility for childhood fever by 8.5 percent, 8.2 percent and 6.8 percent respectively. Similarly, the chances of mothers from richer and richest households choosing public health facility reduces by 4.3 percent and 9.2 percent respectively. The likelihood of mothers from the Christian and Muslim religions choosing public health facility as the choice of treatment for childhood fever increases by 8.2 percent and 8.8 percent respectively.

Table 4.5: Marginal effect: Dependent Variable-Private Health Facilities

	Marginal Effect	Robust Std Error	z
Age of mother	0.0010	0.0007	1.35
Child's age	0.0001	0.0002	0.71
Residence			
Urban	0.0223**	0.0078	2.85
Sex of child			
Male	-0.0030	0.0061	-0.5
Birth order	-0.0033	0.0023	-1.47
Level of education(Base-No education)			
Primary	-0.0182	0.0117	-1.56
Secondary	-0.0056	0.0139	-0.4
Higher	0.0284	0.0190	1.49
Marital status(Base-Single)			
Married	0.0192	0.0120	1.59
Living with partner	-0.0045	0.0164	-0.28
Widowed	0.0160	0.0236	0.68
Divorced	0.0323	0.0306	1.06
Separated	0.0051	0.0168	0.3
Wealth(Base-Poorest)			
Poorer	-0.0080	0.0079	-1.01
Middle	0.0101	0.0093	1.08
Richer	0.0635***	0.0121	5.24
Richest	0.1358***	0.0176	7.71
Religion(Base-No Religion)			
Christian	0.0159	0.0176	0.9
Muslims	0.0119	0.0187	0.64
Number of observation	8,406		
Wald chi2(45)	581.89		
Log likelihood	-9641.78		
Prob > chi2	0.0000		

*Significance at: * 10%, ** 5% and *** 1%*

Only place of residence of the mother and the wealth status significantly explained the mother's choice of choosing private health facility as the choice of treatment for childhood fever. The probability of mothers living in urban areas choosing private health facility as the choice of treatment for childhood fever increases by 2.2 percent as opposed to those living in the rural areas. Moreover, the chances of mothers from richer and richest households choosing private

health facilities as their choice of treatment for childhood fever increases by 6.4 and 13.6 percentage points respectively.

Table 4.6: Marginal effect: Dependent Variable-Over the Counter Shop

	Marginal Effect	Robust Std Error	z
Age of mother	-0.0007	0.0008	-0.92
Child's age	0.0007***	0.0002	3.67
Residence			
Urban	0.0393***	0.0087	4.54
Sex of child			
Male	-0.0017	0.0065	-0.26
Birth order	0.0065**	0.0023	2.79
Level of education(Base-No education)			
Primary	0.0415***	0.0090	4.61
Secondary	0.0418***	0.0119	3.5
Higher	0.0515**	0.0188	2.74
Marital status (Base-Single)			
Married	0.0185	0.0132	1.4
Living with partner	0.0233	0.0194	1.2
Widowed	-0.0073	0.0224	-0.33
Divorced	0.0606*	0.0339	1.79
Separated	0.0075	0.0183	0.41
Wealth(Base-Poorest)			
Poorer	0.0186*	0.0096	1.94
Middle	0.0233**	0.0106	2.19
Richer	0.0201*	0.0116	1.74
Richest	0.0019	0.0130	0.14
Religion(Base-No Religion)			
Christian	-0.0482**	0.0241	-2
Muslims	-0.0264	0.0260	-1.01
Number of observation	8,406		
Wald chi2(45)	581.89		
Log likelihood	-9641.78		
Prob > chi2	0.0000		

*Significance at: * 10%, ** 5% and *** 1%*

Table 4.6 shows that child's age, residence, birth order, level of education, wealth status and religion were the factors that affected the choice over the counter shop as a choice for child hood fever. A one-month increase in the age of the child increases the likelihood of the mother choosing over the counter shop by 0.1 percent. Urban residents were more likely to choose

over the counter shop as a treatment choice for childhood fever for their under five children by 3.9 percentage points compared with their counterparts in the rural areas.

The study found out that with an additional birth, mothers were more likely to choose over the counter shop as a form of treatment for childhood fever by 0.7 percent. The likelihood of mothers utilizing over the counter shop as treatment choice for childhood fever increased with the level of education. Mothers with primary, secondary and higher levels of education were 4.15, 4.18 and 5.2 percentage points respectively more likely to choose over the counter shop compared with those with no education.

The likelihood of divorced mothers choosing over the counter shops as treatment choice for childhood fever increased by 6.1 percentage points. Similarly, mothers from the poorer, middle and richer wealth status were 1.7 percent, 2.3 percent and 2 percent respectively more likely to utilize over the counter shop for treatment of childhood fever. Finally, being a Christian reduces the likelihood of a mother choosing over the counter shop as a form of childhood fever treatment by 4.8 percentage points.

4.4 Discussion of findings

The result show that a number of variables were statistically significant in explaining the treatment choice for childhood fever.

The findings show that wealth level of the household significantly influences the choice of facility for treatment of childhood fever. Wealth status of a household implies the ability by the household to pay for the healthcare of the sick child. Mothers tend to use the private health facilities and over the counter shop with increasing wealth compared to no treatment or public health facilities than those in the poorest category. The coefficient of wealth in the result for over the counter and private health facilities is positive and negative in no treatment and public

health facilities. Therefore, mothers from wealthier families tend to choose private health facilities and over the counter for their sick children. The results are in line with works of Filmer, (2005); Arif, (2007) and Novignon et al, (2010) who found out that wealthier mothers are more likely to use private health facilities.

The findings show that place of residence is significant in explaining the treatment choice for childhood fever. Mothers in the urban areas are more likely to seek care for their sick children from private health facilities and over the counter shops. The results might imply that in urban areas, private health facilities and over the counter shops are available to most of the residents unlike in the rural areas where private health facilities are not available or could be that one has to travel over a distance to be able to access modern health facilities. Moreover, most of the private health facilities within the reach of most of the residents in the rural areas are not affordable to them. Findings of this study are consistent with those of Arthur (2014) in Ghana.

Similarly, religion equally played a crucial role in determining the choice of treatment for childhood fever. Muslims mothers have low chance of utilizing the treatment choices for childhood fevers. This implies that they opt for other ways of treating childhood fevers.

Lastly, level of education is a significant determinant in treatment of childhood fever. The utilization of treatment choices for treatment of childhood fever increased with the level of education of the mother. These results support the works of Wagstaff (1986) and Grossman's (1972) who established people with higher levels of education make better choices when it comes to matters related to health.

CHAPTER:5 SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

Key findings, conclusion and policy recommendations from this enquiry are presented in this chapter. Finally, areas for further enquiry are suggested.

5.2 Summary and Conclusion

The study sought to examine how socioeconomic determinants influence the treatment choice for childhood fever in Kenya. In doing so, it sought to identify the socioeconomic determinants influencing the treatment choice for childhood with a view of proposing policy recommendations. The study considered public health facilities, private health facilities, over the counter shop and no treatment as treatment choices for fever treatment. Evidence from previous studies have shown that a number of factors such as socioeconomic, geographical location and cultural beliefs considerably influences treatment choice for childhood fever. Conventionally, mothers living in urban areas as opposed to those living in the rural have higher chances of choosing over the counter shops or private health facility as the choice of treatment, those with higher education levels tend to choose over the counter as a treatment choice than choosing no treatment at all.

The study findings have shown that age of the child, residence of the mother, mother's level of education, religion of the mother as well as wealth status of a household significantly influenced the mother's choice of childhood fever treatment. Mothers living in urban areas as opposed to rural areas have higher chances of choosing over the counter shop and private health facilities as their treatment choice for childhood fever. Educated mothers have higher chances of choosing over the counter shop and public health facilities as the choice of treatment. Further the findings revealed that mothers from richer and richest families tend to prefer over the

counter shops and private health facilities as their preferred choice for childhood fever treatment, mothers of faith have higher chances of choosing public health facility as the choice of treatment than the private health facilities. As the child's age increases the chances of choosing public health facilities and no treatment increases.

Therefore, given these findings, the wealthier the household the higher the chances of purchasing drugs and going to private health facilities and the more educated the mother is the more likely they are to take their children to public health facilities and buy drugs over the counter. The findings also reveal that mothers living in urban prefer to take their children to health facilities than fail to treat them.

5.3 Policy Recommendations

Based on the study findings, a number of recommendations are suggested including: -

Mothers from wealthier households have been found to utilize healthcare services for their sick children. This could be attributed to the cost associated with obtaining services from such facilities. Though the impact might not be felt in the short run, the government should put in place long-term policies aimed at improving the income levels of households, while at the same time making efforts to reduce the cost of healthcare for the children from deprived families. Such policies like the affirmative action should be implemented to bridge this gap.

Education of the mother had a significant effect on the choice of treatment for childhood fever. The government should promote women's education. This could be done through provision of sanitary towels for girls, lowering the entry level grades for girls and provision of bursaries and loans among others. The introduction of free primary and subsidized secondary and higher education will significantly improve the utilization of health facilities for treatment of childhood fever in Kenya.

Urban women were more likely to seek treatment for childhood fevers unlike their counter parts in the rural areas. Mechanism to promote rural women to seek treatment for childhood fever should be promoted. This could be done by building more health facilities, use of media to educate women in the rural areas, construction of accessible roads and offering of free medical services to children below the age of five years.

Lastly, religion was found to influence the choice of childhood fever in Kenya. More women should be encourage to be affiliated to any religion. Churches and mosques could be encouraged to educate mothers on child welfare and also offer free medical services to mothers with below five years children.

5.4 Areas for Further Research

This study used solely the secondary data obtained from the KDHS 2014 data sets. The results of this study would vary depending on multiple factors such as perception of the mother/caregiver. It is proposed that future studies can be conducted using primary data where various qualitative factors can be taken into consideration. Also, a study can be carried out to determine the impact of government funding on childhood programs.

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APPENDICES

Appendix 1: Multinomial probit with base outcome alternative 0

Treatment choice	Coef.	Std. Err	z	P>z	Conf. Interval]	
No treatment (Base outcome)						
Public_health_facilities						
age_mother	-0.0012674	0.0050083	-0.25	0.8	-0.0110835	0.0085487
child_age	-0.0076431	0.0012973	-5.89	0	-0.0101858	-0.0051005
residence						
Urban	-0.1424703	0.0512745	-2.78	0.005	-0.2429664	-0.0419741
sex_child						
Male	0.0639884	0.0403211	1.59	0.113	-0.0150395	0.1430162
birth_order	-0.0191065	0.0149513	-1.28	0.201	-0.0484104	0.0101975
level_education						
Primary	0.3843755	0.0672784	5.71	0	0.2525123	0.5162387
Secondary	0.4003972	0.0840887	4.76	0	0.2355863	0.565208
Higher	0.4429574	0.1185717	3.74	0	0.2105611	0.6753537
marital_status						
Married	-0.0126765	0.087974	-0.14	0.885	-0.1851025	0.1597494
Living with partner	-0.1243419	0.1225336	-1.01	0.31	-0.3645034	0.1158196
Widowed	0.1343551	0.1571572	0.85	0.393	-0.1736673	0.4423775
Divorced	0.3041171	0.1941375	1.57	0.117	-0.0763854	0.6846197
Separated	-0.0944361	0.1214185	-0.78	0.437	-0.3324119	0.1435397
wealth						
Poorer	0.119236	0.059005	2.02	0.043	0.0035883	0.2348838
Middle	0.0623181	0.0646211	0.96	0.335	-0.0643369	0.1889731
Richer	0.0026615	0.0724305	0.04	0.971	-0.1392998	0.1446227
Richest	-0.0901618	0.0902383	-1	0.318	-0.2670256	0.086702
Religion						
Christian	0.2712326	0.1191445	2.28	0.023	0.0377136	0.5047515
Muslims	0.3342162	0.1287783	2.6	0.009	0.0818153	0.586617
_cons	-0.1704358	0.1701372	-1	0.316	-0.5038986	0.163027
Private_health_facilities						
age_mother	0.0068253	0.0066373	1.03	0.304	-0.0061836	0.0198342
child_age	-0.002079	0.0017007	-1.22	0.222	-0.0054123	0.0012543
residence						
Urban	0.1466782	0.0653701	2.24	0.025	0.0185552	0.2748013
sex_child						
Male	0.0066493	0.0539297	0.12	0.902	-0.0990509	0.1123495
birth_order	-0.0303084	0.0200342	-1.51	0.13	-0.0695747	0.0089579
level_education						
Primary	0.0869136	0.0959258	0.91	0.365	-0.1010974	0.2749246
Secondary	0.2015254	0.1142366	1.76	0.078	-0.0223741	0.425425

Higher	0.4738088	0.1423546	3.33	0.001	0.1947988	0.7528187
marital_status						
Married	0.1813079	0.1234061	1.47	0.142	-0.0605636	0.4231794
Living with partner	-0.0830023	0.1736256	-0.48	0.633	-0.4233022	0.2572976
Widowed	0.206259	0.2185433	0.94	0.345	-0.222078	0.634596
Divorced	0.5052294	0.258176	1.96	0.05	-0.0007862	1.011245
Separated	0.007287	0.1692156	0.04	0.966	-0.3243694	0.3389434
wealth						
Poorer	-0.0007209	0.0886323	-0.01	0.994	-0.1744371	0.1729953
Middle	0.1531465	0.0931302	1.64	0.1	-0.0293853	0.3356784
Richer	0.5072918	0.0953715	5.32	0	0.320367	0.6942166
Richest	0.8192563	0.1083691	7.56	0	0.6068569	1.031656
Religion						
Christian	0.2209431	0.1733787	1.27	0.203	-0.118873	0.5607592
Muslims	0.245468	0.1822897	1.35	0.178	-0.1118132	0.6027493
_cons	-1.822296	0.2430624	-7.5	0	-2.29869	-1.345903
Over_the_counter						
age_mother	-0.0049542	0.0063734	-0.78	0.437	-0.0174458	0.0075374
child_age	0.0016086	0.0016307	0.99	0.324	-0.0015874	0.0048046
residence						
Urban	0.2262532	0.0632026	3.58	0	0.1023784	0.350128
sex_child						
Male	0.0176483	0.0521433	0.34	0.735	-0.0845506	0.1198472
birth_order	0.0345703	0.0188463	1.83	0.067	-0.0023678	0.0715085
level_education						
Primary	0.5191012	0.0917061	5.66	0	0.3393606	0.6988419
Secondary	0.5436359	0.1120493	4.85	0	0.3240234	0.7632485
Higher	0.6708183	0.152924	4.39	0	0.3710929	0.9705438
marital_status						
Married	0.1591792	0.1198465	1.33	0.184	-0.0757156	0.394074
Living with partner	0.1106379	0.1612777	0.69	0.493	-0.2054606	0.4267365
Widowed	0.025804	0.2150061	0.12	0.904	-0.3956001	0.4472081
Divorced	0.6219276	0.2353711	2.64	0.008	0.1606088	1.083246
Separated	0.0182644	0.1624101	0.11	0.91	-0.3000535	0.3365822
wealth						
Poorer	0.1948997	0.0782227	2.49	0.013	0.0415861	0.3482133
Middle	0.2170425	0.0845664	2.57	0.01	0.0512955	0.3827896
Richer	0.2224545	0.0930628	2.39	0.017	0.0400547	0.4048543
Richest	0.1199559	0.1135371	1.06	0.291	-0.1025728	0.3424846
Religion						
Christian	-0.1622711	0.1490552	-1.09	0.276	-0.454414	0.1298718
Muslims	0.0204189	0.163349	0.13	0.901	-0.2997393	0.3405771
_cons	-1.655849	0.2260566	-7.32	0	-2.098912	-1.212786