

# THE DEMAND FOR ANTENATAL AND OBSTETRIC CARE SERVICES IN NAIROBI SLUMS

BY

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Research paper submitted to the Department of Economics, University of Nairobi, in partial fulfillment of the requirements for the Degree of Master of Arts in Economics

September, 2003

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**Declaration**

This is my original work and has not been presented for a degree in any other university

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## Acknowledgements

I am grateful to my supervisors Professor Germano Mwabu, Mr Urbanus Kioko and Professor Benjamin Nganda for the attention they gave to me despite their busy schedules. Their technical support in all aspects made this paper what it is now.

I am also indebted to the Department of Personnel Management (DPM) who funded entire course including this project paper. My appreciation also goes to the African Economic Research Consortium (AERC) for funding the project, and part of my studies.

Yvonne, Gitonga, Mayende and Tom deserve special mention for participating in data collection. Their diligence and patience during data collection is appreciated. I am also indebted to the respondents who agreed to be interviewed. Special thanks to my colleagues for their support during the entire course.

I would also like to express my sincere gratitude to my family for the sacrifices they made during the course of my study, especially to my young children, Mima and Pe, who had to forego motherly love when they needed it most. Thanks to my husband Mike, for his continuous encouragement and prayers throughout the course. Special thanks go to my helper Aoko, and niece Yvonne, for taking care of my children during the entire study period thus enabling me to continue with my work without disruption. To my friends, Adelaide and Theresiah, I say may the Lord reward your love and support.

I would also like to express my appreciation to my parents, Mr & Mrs. Paul Birgen, for giving me the inspiration to read. I am grateful for their continued encouragement throughout my academic life.

It is not possible to mention everyone who contributed in one way or another to the accomplishment of this paper, but I pray that the Good Lord, who knows how to bless, will do so richly.

## **Dedication**

To the King of Kings, and the Lord of Lords; be all glory and honor, for keeping me in good health and sound mind. All wisdom, knowledge, diligence and excellence come from you.

## Abstract

The general performance of Kenya's health sector has been varied, with infant mortality rate increasing from 64 per 1,000 in 1993 to 72 per 1,000 in 1998. It is estimated that 36 per cent of the children die before reaching their fifth birthday. Maternal mortality also remained high and was estimated at 590 per 100,000 births in 1998. Antenatal care provides an opportunity for a variety of preventive interventions during pregnancy. It also allows women who face a high-risk pregnancy to be identified and monitored to ensure a safe delivery. Obstetric care is an important aspect of maternal care.

The urban slums of Nairobi have poor sanitary conditions, low level of safe drinking water and lack toilet facilities. Because of the existing environmental conditions in the slums, the health status of women could be aggravated by under utilization of antenatal and delivery services. The objective of this study was to investigate the determinants of utilization of antenatal and delivery care services in Nairobi slums and to assess the relative importance of the factors affecting the choice and utilization of antenatal and delivery care services.

The decision to use or not to use antenatal care is analyzed using the logit model. The multinomial logit model is used in the analysis of choice of different places of delivery. The intensity of using the antenatal care services is analyzed using the two stage least squares method. Primary data was collected from a sample of 205 women living in four slums of Nairobi Province.

The results show that higher family income increases the demand for both antenatal and delivery care services. An increase in income also raises the intensity of using the services. Education of women increases the demand for antenatal and delivery care services. The cost per visit as well as the distance traveled to the facilities significantly reduces demand for these services. Examination time was found to affect the demand. Another important finding is that most women in the slums depend on public facilities for both antenatal and delivery care services. The policy implications of the results are briefly discussed.

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# CHAPTER 1 – INTRODUCTION

## 1.1 Background

Each year, about 430000 women in developing countries die from complications associated with childbearing (World Bank, 1993). In the absence of obstetric care, women who have a birth before age 18 are three times likely to die in childbirth as those who have a birth between ages 20-29 while for women over 34, the risk of maternal mortality is 5 times high.

The World Bank reports that approximately 990 of every 1000 pregnancies that reach the seventh month of gestation conclude with a healthy newborn and a healthy mother (World Bank, 1993). For most women in developing world, however, childbirth is unsafe. About one in fifty women in developing countries die as a consequence of complications of pregnancy and childbirth compared with only one in 2700 in established market economies (World Bank, 1993). The direct causes of maternal deaths are hemorrhage, hypertensive disorders, obstructive labor, unsafe abortion and infections. These account for eighty per cent of the deaths but poverty is the indirect underlying cause (WHO, 2000). Maternal mortality has profound consequences within the household. The chances of children under 5 dying increases by up to 50% when the mother dies (World Bank, 1993).

A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and size of pregnancy from any cause related to or aggravated by pregnancy or its management but not from accidental or incidental causes (WHO, 1989). There are direct obstetric deaths resulting from obstetric complications of pregnancy state and indirect obstetric deaths resulting from previous existing diseases worsened by physiological effects of pregnancy.

Antenatal care provides an opportunity for a variety of preventive interventions during pregnancy including tetanus toxoid injections, and educating women about nutrition, safe delivery and postpartum care. It also allows women who face a high-risk pregnancy to be

identified and monitored during pregnancy to ensure a safe delivery. Delivery care is an important aspect of maternal care. Most non-abortion maternal deaths occur around the time of labor and delivery or within a few days after delivery or birth. Access to obstetric services from qualified professionals is therefore very essential to preventing maternal deaths.

The concern about maternal mortality is mainly because practically all the deaths and sufferings are preventable. The know-how is already available to prevent or effectively manage all potential life threatening complications related to pregnancy and childbirth. Maternal mortality has a particularly devastating effect on the family. In a study of the live children born to mothers that died in rural Bangladesh, it was found that 95 per cent died within one year. (Chen et al, 1974). For every mother that dies, children are left motherless, and their chances of survival, healthy growth and development will be affected.

The commonest causes of maternal deaths are ante-partum and post-partum hemorrhage, hypertensive disorders of pregnancy, puerperal infections, malaria and HIV/AIDS related (Republic of Kenya/UNICEF, 2002). Despite the fact that over 90 per cent of the pregnant women attend antenatal clinic, more than 50 per cent of deliveries take place at home where proper care and hygiene are not guaranteed (Republic of Kenya/UNICEF, 2002). It is reported also that health care services, particularly the referral systems in Kenya are inadequate for handling obstetric emergencies and thus the high number of maternal deaths during delivery (Republic of Kenya/UNICEF, 2002).

It is worth noting that prenatal and maternal health complication account for 27 per cent of the total disease burden in Kenya as measured in terms of life years lost (Republic of Kenya, 1999). The leading causes of mortality in Kenya are related to maternal and prenatal causes, AIDS and AIDS related diseases, malaria and injury.

## **1.2 Utilization of Antenatal and Delivery Services**

According to a 1998 Kenya Demographic Health Survey (KDHS) report, utilization of antenatal services is high in Kenya. In the three years preceding the survey, mothers received antenatal care for 92 per cent of births with the median number of antenatal visits per pregnancy being 3.7. However, over a third of the women who do receive care start during the third trimester of pregnancy, too late to receive the optimum benefits of antenatal care. Nationally 42 per cent of the births take place in health facilities. It is important for the health of both the mother and child that trained medical personnel are available in cases of prolonged labor or obstructed deliveries, which are major causes of maternal morbidity and mortality. Antenatal care can be more effective in avoiding adverse pregnancy outcome when it is sought early in pregnancy and continues through to delivery. Obstetricians generally recommend 12-13 antenatal visits. Maternal care during pregnancy and delivery has therefore a significant bearing on the health of both the mother and the child and thus on the risk of early childhood mortality.

A recent study on population and health dynamics in Nairobi's informal settlements by African Population and Research Center (APHRC publication, 2000) established that there is a strong negative correlation between antenatal care and assistance during delivery with infant mortality. For children born to mothers who did not have antenatal care and who did not benefit from medical assistance at delivery, the probability of dying during the first year of life is 157/1000. When mother received either antenatal or medical assistance at delivery, this probability reduced to 60/1000.

## **1.3 The Performance of the Health Sector**

The general performance in Kenya's health sector is characterized by two main phases. The first phase ending in early 1990s show positive trends in health status.(Republic of Kenya, 2002). The second phase falling between 1993 and 2000 has seen life expectancy decline from 60 years in 1993 to 47 years in the year 2000. Infant mortality rate increased from 64 per 1000 in 1993 to 72 per 1 000 in 1998. It is estimated that 36 per cent of the

children die before reaching their fifth birthday. Maternal mortality also remained high and it was estimated at 590 per 100 000 births in 1998 (Republic of Kenya, 2002)

#### **1.4 Problem Statement**

Good health is vital to the socio-economic development of any country given that it enables people to participate in economic, social and political development. Kenya being committed to the enhancement of good health has come up with national population policy for sustainable development (Republic of Kenya, 1998). The targets and objectives that guide the implementation of this policy up to 2010 touch on infant and maternal mortality and also the utilization of antenatal and delivery care services. Some of the demographic and health service targets include; reduction of the infant mortality rate (per 1000 live birth) from 67 in 1995 to 66 by 2000 and to 63 by 2005 and to 59 by 2010. Another objective of the Kenya's population policy is to reduce maternal mortality ratio (per 100000 births) from 365 in 1995 to 230 by 2005 and to 170 by 2010. It is also targeted that professionally attended deliveries should increase from 45 per cent in 1995 to 90 percent by the year 2010.

It is notable that the performance of the health sector has shown declining trends in terms of infant mortality and maternal mortality (Republic of Kenya, 2002). Provide International, a Non-Governmental Organization with its activities concentrated in five adjacent urban slums in Nairobi confirms this trend in the slums of Nairobi. Their report shows that morbidity and mortality rates are high with current infant mortality rates standing at 125 infant deaths per 1000 live births in the slums. It is realistic to expect that the maternal mortality in the slums is also higher than the national average of 590 per 100000 in 1998.

The urban slums of Nairobi have poor sanitary conditions, low level of safe drinking water and lack toilet facilities. Because of the existing environmental conditions in the slums, the health status of women could be aggravated by under utilization of antenatal and delivery services. Under utilization of antenatal care implies that any complications of pregnancy may remain undetected during pregnancy, or discovered late as

emergencies leading to death of mother or child or both. It may also lead to serious morbidity in the life of the mother. Given the poor sanitary conditions in the slums it is unsafe to have the baby at home with the help of untrained personnel because it increases the chances of infections leading to maternal and infant deaths.

Since it has been established that there is a strong negative correlation between antenatal care and assistance during delivery with infant and maternal mortality, there is therefore an urgent need to generate information on the factors determining the demand for these services. This information will contribute to the necessary knowledge to inform policy makers on the appropriate measures to be taken to facilitate the achievement of both the demographic and health service targets of our population policy.

### **1.5 Objectives of the Study**

- 1) To investigate the determinants of utilization of antenatal and delivery care services in Nairobi slums.
- 2) To assess the relative importance of the factors affecting choice and utilization of antenatal and delivery care services.
- 3) To provide policy recommendations based on the study findings.

### **1.6 Justification of the Study**

Africa is currently undergoing an urban population explosion (African Population and Health Research Center publication, 2002). As a result African, urban economies have been unable to meet local employment needs while central governments and city councils have failed to provide adequate basic amenities like affordable housing, water and sewage disposal. Consequently, a rapidly increasing majority of residents in Africa's large cities now live in overcrowded slums and shantytowns where health conditions and livelihood opportunities are poor. Nairobi, the capital city of Kenya has faced rapid urbanization with an annual growth rate of 7% over the last two decades. Between 1960 and 2002, Nairobi's population increased six-fold and as a result, more than half of the city's population lives in slums, which occupy only 5% of the residential land. (The increase in housing and sanitary facilities have not been proportionate to the population

growth) It is further predicted that the city will absorb another 5 million people in the next two decades, mainly migrants from the countryside (African Population and Health Research Center publication, 2002). This will pose enormous challenges in the areas of healthcare and employment, which are already bad enough. This study will attempt to generate important information that will be useful in guiding policy makers in the planning and provision of these facilities in our fast growing urban informal settlements.

## CHAPTER 2 - LITERATURE REVIEW

### 2.1 General overview

A study carried out in Uganda suggests that if all Ugandan women were to receive medical care during pregnancy or at delivery, neonatal mortality would be reduced by about 41 per cent. Post neonatal mortality would be reduced by 24 per cent and infant mortality reduced by 30 per cent (Republic of Uganda, 1995). On the other hand, if Ugandan mothers received medical care both during the antenatal period and during delivery, neonatal, postnatal and infant mortality would be cut by almost half.

A national Family Health Survey on Maternal Education and the Utilization of Maternal and Child health Services in India reveals that infant and child mortality rates are greatly reduced if mothers received antenatal and delivery care from trained health professionals (Govindasamy et al, 1997). Infant mortality rates range from 97/1000 for births with neither antenatal nor delivery care, 64/1000 for births with either type of care and 44/1000 for births with both antenatal and delivery care. From the study education emerges as a single most important determinant of maternal health care utilization in India when the influence of other intervening factors is controlled for. Educated women with middle schooling are nearly eight times as likely to receive antenatal care for their births as illiterate women.

A demonstration project on approaches to providing quality maternal care in Kenya carried out a baseline survey in western province in 2000. The survey identified a number of issues, which contribute to the high maternal and prenatal morbidity and mortality at district level. Notable were the poor referral system, the competence and skill among some health providers, a weak health information system, frequent shortages of essential equipment and supplies, weak management systems and poor access to basic essential obstetric care at the community level. During this survey, antenatal, postnatal and post abortion clients were interviewed. Out of the 230 clients who responded to the question on place of birth 106 (46 per cent) had their last delivery at the health facilities. A further breakdown of deliveries by place of occurrence at the district level shows that more than

half of the births in Lugari and Vihiga districts occur at home and a skilled provider handled 48 per cent of the deliveries. Antenatal clients were asked to state what they thought were the factors that prevent women from attending antenatal clinics in their areas. Lack of money was the most common constraint (47 per cent), 12 per cent of the clients declared that antenatal care has no benefits while 13 per cent were ignorant about them.

## **2.2 Specific Studies**

Mwabu et al (1993) empirically examined the effect of the quality of medical care on the utilization of medical facilities in Kenya. The data for this study was obtained from Meru district, which is a representative of low-income areas in rural Kenya. The survey found that shortages in particular types of drugs may be either negatively or positively related to medical care demand. The general availability of drugs is positively related to demand. Growth in incomes shifts demand from the informal health care sector, with much of this demand ending up in private and mission clinics. Although not significant in most specifications, access factors (user fees and distance) consistently reduce demand. The elasticity of medical care demand with respect to user fees and distance is greater in mission and private clinics. The results for quality variables reflecting drug scarcity show that they are significant determinants of demand.

Magadi et al (2000) carried out an Analysis of individual and community level determinants of delivery care in Kenya. Basing their study on the 1993 Kenya Demographic and Health Survey data, the study found that, though almost all pregnant women in Kenya receive some antenatal care from health personnel, less than half of the deliveries take place in a health facility. The analysis uses the multilevel logistic and multilevel multinomial regression models for place of delivery and the type of childbirth attendant respectively. The results show that delivery care in Kenya is determined by a wide range of factors namely, socio-economic and cultural factors associated with individual woman or household, her demographic status or reproductive behavior relating to specific birth, as well as availability and accessibility of health services within her community.



Njaramba (1994) carried out a study on the demand for maternal health services in Thika division of Kiambu District. The study used the third phase of National Sample Survey and Evaluation Program (NASSEP III) of the Central Bureau of Statistics where a sample of 128 households were randomly selected thereby obtaining 128 women respondents. The study found that distance and cost of health services reduced demand for antenatal care. It also indicates that experience as measured by the number of children previously reduces the number of visits a mother makes to the clinic. Insurance and quality services provided during the clinic visits positively affect the number of visits. This study also shows that as maternal education increases and as income grows overtime more women seeks antenatal care. Unemployment was also found to be an important determinant of demand for antenatal care. Women in permanent employment have a higher level of utilization than casual workers and housewives. Individual characteristics are also significant in determining demand for antenatal care. Married women tend to visit clinics more times than unmarried women. Family size and age of the women do increase the level of utilization.

Mugilwa (2002) utilized the data obtained from the third welfare monitoring survey to determine the demand for health care in Vihiga District. Using a combination of discrete and continuous regression models to analyze this data, he found that prices, income, distance, education and quality of services were the main determinants of demand for health care in the district. The results indicate that female-headed households have higher probabilities of seeking care than those of male-headed households, which is suggestive of higher morbidity incidences among female-headed households.

The Republic of South Africa declared that all care for children under the age of 6 years and pregnant women would be free (Republic of South Africa, 1994). Unfortunately, there has been no significant decrease in maternal, prenatal and infant mortality. Research was therefore carried out to determine the factors that influence the demand for antenatal services. (Kirigia, et al, 2000) The study used Ordinary Least Squares (OLS) method and the Two-stage Probit Maximum Likelihood Estimator method in estimating the model. In

this study, it was established that pregnant women who are blue-collar workers and those who are unemployed have a statistically significant lower likelihood of seeking antenatal care than their white-collar counterparts. The findings also indicated that the perceived quality of care is a significant determinant of pregnant women's decision to seek prenatal care. This result is consistent with Mwabu *et. al.* finding that under utilization of medical facilities in African countries is caused by consumer disappointment with quality care. It was also established that those women who were risk lovers or risk neutral were less likely to consume preventive and promotive healthcare including antenatal care.

Another study was carried out in Jordan with the aim of establishing the determinants of utilization of maternal and child health services. The fertility rate in Jordan is high at 7.6 per 1000 population and infant mortality is estimated to be about 86 per 1000 live births. The outpatient MCH services of the ministry of health are free for the use of all citizens. The study showed a marked difference in certain individual characteristic of the women living in rural and urban places. A higher proportion of women living in the rural areas was illiterate and had lower levels of education. The survey also showed that many women had no antenatal care during their most recent pregnancy. This applied to the majority of women in rural areas. Overall, just under half of women (48%) delivered in hospital. Fewer women made use of postnatal services than antenatal care; that is 43% of those living in towns and 35% of those living in rural areas.

Akin *et.al.* (1986) Carried out a study to analyze the demand for primary healthcare namely outpatient, prenatal, obstetrical, well baby and immunization services using community and household data from one of the poorest regions of the Philippines. Their interest was to understand demand patterns and to analyze how this new information might modify the strategies chosen to implement PHC goals. Tobit method was used in the estimation of the demand for prenatal care; Probit was used in the estimation of demand for the well-baby and immunization services where the dependent variable was dichotomous. The choice of delivery care type was estimated using the multinomial logit. All-important direct costs of using medical services, visit prices, drug costs, transport costs, transport time and waiting time were examined. Despite the widely held

assumption that these are important impediments to using medical services, the study did not find this to be the case for the Philippino sample. The economic costs of using medical care do not seem to greatly affect demand patterns either for services that are considered by patients to be essential –outpatient or delivery care-or for services that are more optional in nature –prenatal well baby and immunization care. In their demand estimation quality was found to be statistically significant, but in quantitative terms it was not an important factor in determining whether or where medical services were purchased. This study found that it is not the people’s poverty that kept them from using modern health services – however knowledge and orientation (habit) were important factors in determining the use of modern health services.

Empirical evidence of non-monetary factors determining demand for medical services was obtained in a study carried out by Acton (1975). The demand for health care by type of provider was estimated from a simultaneous equation system using two-stage least squares. Four structural equations namely; outpatient department, private physician, hospitalization and distance equations and twenty-eight exogenous variables were used for estimation. The results of the study indicate that non-monetary factors such as travel distance discourage demand for medical services. It also revealed that travel time functions as a price in determining the demand for medical services when free care is available

### **2.3 Assessment of the Literature**

The factors frequently cited as determinants of demand for antenatal and delivery care in the above studies include cost of services, distance from the facilities and education level of the women. Incomes as well as employment status are also found to be important determinants of use and non-use of antenatal and delivery care. Women with permanent employment use both antenatal and delivery services more frequently than those with no or temporary employment. Quality of services offered in terms of availability of essential drugs and equipment also determines utilization of both antenatal and delivery care services. Individual characteristics are significant in determining utilization of pregnancy services and so were Knowledge and orientation. Non-monetary factors such as travel

and waiting time have significant influence on the demand for medical services. In the case of free medical services, time cost acts as price in determining demand for medical services.

Previous studies in developing countries including Kenya have concentrated in the rural areas where proximity of the health facilities plays a significant role in determining demand for the services. There is therefore need to carry out a study in the urban slums which have unique socio-economic characteristics as compared to the rural areas.

# CHAPTER 3 – METHODOLOGY

## 3.1 Theoretical Model

The study is based on the assumption that an expectant mother has several decisions to make concerning her health. She chooses to attend antenatal clinics or not, and afterwards she chooses to deliver in a modern health care facility or not. The mother also chooses the type of health care facility from which to seek either antenatal or delivery care. In our case, the modern health care facilities the expectant mother chooses to seek care from comprise public, mission and private hospitals.

## 3.2 Empirical Models

The decisions to use or not to use antenatal care are analyzed using the logit model. The binary logit model is also used in analyzing the decisions to deliver in a particular healthcare facility. The multinomial logit model is used in the analysis of choice of different places of delivery. The intensity of using the antenatal care services is analyzed using the least squares method.

### 3.2.1 The Binary Logit Model

We observe some variable A that takes on one of the two values 0 and 1. Define a latent variable A\* such that

$$A_i^* = \sum X_i \beta + u_i \dots \dots \dots (1)$$

Where  $\beta = [\beta_1, \beta_2 \dots \beta_k]$  and  $X = [1, X_{i2}, X_{i3} \dots X_{ik}]$

We do not observe A\* but rather a random variable which takes the values of 0 and 1 according to the following rule

$$A_i = 1 \text{ if } A > 0 \\ 0 \text{ otherwise} \dots \dots \dots (2)$$

From equation (1) and (2) we can derive the following expression:

$$\text{Prob}(a=1) = \frac{\exp(\beta_i X_i)}{1 + \exp(X_i \beta_j)} \dots \dots \dots (3)$$

In this case,  $X_i$  are characteristics of expectant mothers and  $\beta_i$  are the coefficients for respective variables in the logit regression. Equation (3) shows the probability of choosing to attend antenatal clinics.

The method used to estimate the model is the maximum likelihood method. The log likelihood function is:

$$\ln L = \sum_i \sum_j D_{ij} \ln \Pi_{ij} \dots \dots \dots (4)$$

where

$i = 1, 2, \dots, 205$  women;

$j = 1, 2$ , i.e., the decision to attend clinics or not to attend;

$D_{ij} = 1$  if the  $j$ th choice is made by mother  $i$  and 0 otherwise;

$\Pi_{ij}$  = Probability of mother  $i$  making choice  $j$ .

The same model will be used to analyze mother's decisions as to whether to deliver at a modern health facility or not.

### 3.2.2 Multinomial Logit Model

The multinomial logit model is an extension of the binary logit model. It is used when the decision maker has to make a choice from a set of more than two alternatives. It is assumed that only one alternative has to be chosen. In our case, an expectant mother is faced with three choices namely giving birth in a public, private or mission facility. Let  $y$  be the alternative chosen by the decision maker, and let  $j = 1, 2, \dots, J$  be an index for each of the  $J$  alternatives available to the individual;  $y = j$  when alternative  $j$  is chosen. The equation below gives the probability of choosing alternative  $j$  from the  $J$  alternatives available to the expectant mother,  $\text{Prob}(y=j)$  where  $j=1, 2, 3, \dots, J-1$ :

$$\text{Prob}(y=j) = \frac{\exp(\beta_{jk} X_k)}{\sum_j \exp(\beta_{jk} X_k)} \dots \dots \dots (1)$$

Parameter  $\beta$  has two subscripts in the model,  $k$  for distinguishing  $X$  explanatory variables and  $j$  for distinguishing response categories. The subscript  $j$  indicates that there are  $J-1$  sets of  $\beta$  estimates.

Equation (1) shows the probability of using facility  $j$ .

The method used to estimate the model is the maximum likelihood method. The loglikelihood function is:

$$\ln L = \sum_i \sum_j D_{ij} \ln \Pi_{ij} \dots \dots \dots (2)$$

In this case  $i = 1, 2, 3, \dots, 205$  women

While  $j = 1, 2, 3$ , that is, 3 choice alternatives

$D_{ij} = 1$  if the  $j$ th alternative is chosen and 0 otherwise;

$\Pi_{ij}$  = Probability of mother  $i$  choosing alternative  $j$ .

The choices for antenatal care are analyzed using the same model.

### 3.2.3 Two Stage Least Squares Model

The 2SLS is used to estimate continuous choice models with endogenous explanatory variables. In the first stage the endogenous variables, in this case income, is predicted using appropriate instruments. I used family monthly expenditure as the instrument for income. In the second stage the predicted explanatory variable, is used as an independent variable in estimating parameters of demand for antenatal and obstetric services

### **3.3 Data Sources**

Primary data were obtained from a sample of 205 women living in four divisions of Nairobi province, namely, Kasarani, Westlands, Dagoretti and Makadara. Four slums were then selected from the four divisions randomly. The four slums include Kahawa north (Kasarani Division), Muslim (Dagoretti Division), Sodom (Westlands Division) and Kiambiu (Makadara Division). The divisions as well as the particular slums were selected through random sampling. Systematic random sampling was applied in coming up with the households to be interviewed. To avoid callbacks, the household with absent members was replaced systematically by the neighboring household. From each selected slum, 50 women were interviewed with the help of a questionnaire. In Kiambiu however, 55 women were interviewed.



## CHAPTER 4 – RESULTS

### 4.1 Descriptive Statistics

This subsection contains a discussion on the characteristics of the study of the sample.

This is done with the use of table 1 below.

Table 1: Sample Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Age	205	26.99024	7.006992	15	48
Marital status(1=if married)	205	0.751220	0.433365	0	1
Household size	205	4.37561	1.927711	2	15
Education in years	205	7.55122	3.084363	0	13
Children (number)	205	2.404878	1.650008	1	10
Attendance ANC for all children.	205	0.931707	0.252865	0	1
Attendance of ANC for the last child.	205	0.960976	0.19413	0	1
ANC visits (number)	197	5.426396	2.430863	1	13
ANC Cost, shillings	197	139.8731	547.1376	0	6000
Transport Cost to ANC clinic, shillings	197	7.472081	21.75643	0	160
Travelling time to clinic, Minutes	197	26.5736	26.73568	2	180
Distance to ANC clinic, Kilometers	197	2.537563	4.561002	.05	30
Waiting time in ANC clinic, Minutes	197	52.68528	58.5799	0	300
Examination time at ANC clinic, Minutes	197	13.90731	12.15543	2	120
Information on pregnancy (1=if given)	197	0.756345	0.430381	0	1
Friendliness of personnel 1 ( 1=if friendly)	197	0.857868	0.350075	0	1
Distance to delivery clinic, Kilometers	136	10.45993	9.389468	.05	40
Travelling time to delivery clinic, minutes	136	54.85294	52.59538	5	360
Delivery care cost, shillings	136	1701.544	1353.876	0	8000
Friendliness of personnel 2 (1=if friendly)	136	0.7573529	0.430268	0	1
Woman's monthly income, shillings	89	3202.809	2352.493	400	15000
Man's monthly income, shillings	149	6327.503	3933.313	650	18000
Monthly Expenditure, shillings	203	6607.768	3768.418	0	26083

Note: Personnel 1=personnel at ANC clinic while personnel 2=personnel at delivery clinic.

The youngest woman was found to be 15 years while the oldest was 48 years old, resulting in a mean age of 26.99 years. Young women of 15-25 years formed 51.7 % of the sample, while 15-30 years formed 78% of the sample. Most women (75.1%) were married while 24.9% of them were unmarried. The household size in the sampled area was 4.3 while the mean number of children per woman was 2.4. Most households had 3-6 members.

With regard to educational attainment of the respondents, the mean schooling was 7.55 years. This shows that most women reached primary school. 64.4 % of the women had primary education, 26.6 % had secondary education, and 7.8 % of the women had no education while only 1% of the women had tertiary education.

The mean age of the last child is 38 months (3 years). For 84% of the women, the last child was between 1 and 5 years. The women attended antenatal care for most of the pregnancies. The women who reported to have attended antenatal care for all their pregnancies were 96.1% of the total sample. The mean visits for the last pregnancy was 5.4. 79.2% of the women made between 1 and 7 visits to the antenatal clinics. The reason for the few visits is explained by the late start of antenatal care clinics. This is indicated by the fact that 64% of the women start attending clinics during the second trimester of pregnancy (4-6 months); 24.4% do so during the last trimester (7-9 months of pregnancy). Only 11.7% of the women start the clinics when they are between 0-3 months pregnant.

Out of the 205 women interviewed, 197 of them attended antenatal care clinics during their last pregnancy. Most women (84.8%) used city council/public facilities for the antenatal care, 9.1% used private facilities and 6.1% of them received care from mission facilities. The mean cost of antenatal care was approximately Sh.140, although there were notable variations in the costs at different facilities. For 60.4 % of the women, antenatal care services were offered free of charge.

About, 81.7 % of the women walked to the clinic incurring no transport cost. Only 18.3% of the women used matatus to the clinic. The average transport cost was sh.7.50 (return trip). The mean distance to the antenatal care facility was 2.5 kilometers. Most women (75.6%) traveled between 50 meters and 2 kilometers to the clinic. The mean traveling time to the antenatal care facility was reported to be 26.57 minutes (about half an hour), with the lowest travel time being 2 minutes and the highest being 180 minutes. The mean waiting time on the other hand was 52.68 minutes (approximately one hour). On average, examination took 14 minutes. For 62.9% of the women, examination took between 5-10 minutes and for 31% of the women examination took just over 15 minutes.

Most of the respondents claimed that the nurses or doctors gave them information on the progress of their pregnancies (75.6%). Only 24.4 % did not receive any information on the pregnancy during most visits. For those who did not receive any information on the progress of their pregnancy (48 women), 81.3% did not ask any questions themselves. This seems to be due to the literacy level of most women in the study area (most of the women had no education or had attained primary level of education). Concerning the friendliness of the healthcare providers at the facilities, most women (85.8%) reported that the personnel were friendly. Like wise, 71% of the women rated the quality of antenatal care they received as good, while 29% of them rated it as poor.

Most of the women gave birth in a modern healthcare facility, with only 70 out of 205 (34.2%) giving birth at home. The most frequently cited reason for giving birth at home was lack of money. Others claimed that the labor was too quick or the hospital was too far away and that is why they could not reach there for care. The underlying reason for not delivering at a modern facility however was lack of money to meet delivery care costs. Only 8.6% of the women who gave birth at home had complications. For those who gave birth in a modern health care facility, they had to travel, on average 11 kilometers to the healthcare facility; 79.4 % of the women traveled for 5-60 minutes to the facilities. Most of them traveled to the facilities using matatus (61%) while 28.7% walked to the facilities. Most women delivered in public facilities (61.8%) while 27.9%

and 10.3% of the women delivered in private and mission facilities respectively. The mean delivery care cost was reported as sh.1700.

For 75.7% of the women, the healthcare personnel at the delivery care facilities were friendly, while delivery care quality was rated to be good by 79% of the women. Although 11% of the respondents rated the delivery care quality as poor at the facilities, 78.7 % of the women claimed that they would return to the same facility in case they needed delivery care services in the future.

Of the total women interviewed, 89 were employed. This means that 56.6% were unemployed. Most of the employed women are engaged in service industry (84.3%) like washing clothes, hairdressing and selling vegetables. The mean monthly income of the employed women is Sh.3202.8. Marital status of the respondents indicates that 154 women are married. This indicates that 75% most of the women in the sample are married. Four men are not working and therefore 149 of them are employed. The self-employed plus casual workers form 57.5% of the employed in the sample. Those working in private companies are 32.7% of the workingmen. Most of the men like the women are engaged in provision of services (68.5%) while 26.8% of them are in the industrial sector. The mean monthly income of the men is sh.6327.5 with minimum income being sh.650 and the maximum income recorded at Sh.18000. The mean monthly expenditure was recorded at Sh.6607.8

## 4.2 Econometric Analysis and Results

### 4.2.1 Logit Estimates for the Demand for Antenatal Care

Table 2 below indicates the logit estimates for the demand for antenatal care services. Each coefficient shows how the logit index behaves as the relevant variable increases or decreases.

Table 2: Probability of Using Antenatal Care in a Modern Health Facility (Dependent variable = 1 if antenatal facility was used and 0 otherwise).

Variable	Coefficient	Std. Error	z-statistic	p-value
Marital status(1=if married )	0.2091504	1.104537	0.189	0.850
Log of age	1.293855	2.56254	0.505	0.614
Log of number of children	-1.643554*	.9676697	-1.698	0.089
Log of examination time	2.490505***	.6238009	3.992	0.000
Log of monthly expenditure	0.6836712***	.2548579	2.683	0.007
Log of cost per visit	-0.7654148	.525422	-1.457	0.145
Log of the woman's income	-0.0909806	.1287646	-0.707	0.480
Constant	- 6.905816	8.398607	-0.822	0.411
Number of observation = 205				
Pseudo R2 = 0.5234				
Log likelihood = -24.345773				

\*Significant at 10%

\*\*\*Significant at 1%

As the number of children increases, the women are less likely to seek antenatal care. This is implied by the negative coefficient of the variable representing the number of children in the model. This shows that increasing the number of children that a woman has reduces the logit index and therefore the probability of seeking care declines. This

could be attributed to the experience of the woman in child bearing and so that she does not value advice from a specialist. Also, given the limited family resources increased number of children is likely to make the woman to opt out of antenatal care. This variable is important in explaining the demand for antenatal care and is only significant at the 10% level.

Examination time in the healthcare facility is a proxy for quality in this study. The variable for examination time is represented by log of examination time and has a positive coefficient. This shows that if the medical personnel spent an extra minute in examining the women at the facility, the logit index increases by 2.49. Examination time has a positive effect on the demand for antenatal care services and therefore increasing it would result in greater use of the facilities by the women.

The income of the family is proxied by the family monthly expenditure. The probability of attending antenatal care clinics increases with income. As expenditure increases, the logit index increases implying that the probability of using antenatal care services by the women moves in the same direction. This could be because as family income increases more resources are available for healthcare, including maternal care. The statistical significance of the variable is the evidence of its importance in explaining the demand for the implied services.

The variable capturing the price of antenatal care is represented by log of cost per visit. The coefficient on log of cost per visit is -0.765. This shows that increasing the cost of antenatal care by one shilling decreases the logit index by 0.765. In other words, an increase in this variable reduces the probability of making a visit to the antenatal care facility. However, even though it has the expected sign, the effect of this variable is not statistically significant, perhaps because of the small sample size.

Marital status is one of the socioeconomic factors that determines the demand for antenatal care. In this model, being married has a positive effect on demand. Likewise, increasing the woman's age increases demand for antenatal care as indicated in the logit

estimates above. The effects of marital status and age on the demand are however not statistically significant

The woman's income is negatively associated with the demand for antenatal care, meaning that an increase in the woman's income will decrease her demand for this particular care. With increased incomes, women in the slums may consider antenatal care at present as an inferior good thereby abandoning it for other alternatives of care, such as high cost private hospitals.

#### 4.2.2 Logit Estimates for the Demand for Obstetric Care

Table 3 below shows the changes in the logit index as a result of changing the magnitude of the various variables affecting demand for delivery care.

Table 3: The probability of Using Delivery Care in a Modern Health Facility (Dependent variable=1 if modern delivery care facility was used and 0 otherwise.

Variable	Coefficient	Std. Error	z-statistic	p-value
Age	0.0407814	0.030758	1.326	0.185
Marital status (1=if married )	-1.067068**	0.4968536	-2.148	0.032
Education(Years)	0.0785566	0.0515411	1.524	0.127
Children	-0.3651202***	0.1357543	-2.690	0.007
Income of husband	0.0001292**	0.0000594	2.174	0.030
Constant	0.1072801	0.8419165	0.127	0.899
Number of observations		= 205		
Log likelihood		= -120.64558		
Pseudo R2		= 0.0833		

\*\*Significant at 5%

\*\*\*Significant at 1%

As in the case of the antenatal care, children have a negative effect on the demand for delivery care. This implies that as the number of children that a woman has increases, the chances of choosing to deliver in a modern health care facility decreases. Given the limited resources in the slums, women with large families likely to sacrifice the demand for essential services such as delivery care.

The marital status variable has a negative coefficient, which is statistically significant at the 5% level. The negative sign implies that if a woman is married, she is less likely to deliver in a modern healthcare facility. It is possible that most married women had many



children as compared to the unmarried and therefore because of experience in child bearing, they considered obstetric care unnecessary.

Monthly income of the husband is a key determinant of the use of delivery care services. The coefficient on this variable is 0.00001292. Increasing the husband's income increases the woman's chances of seeking modern delivery care when pregnant. This variable is important in explaining the choice of modern delivery care services and is statistically significant at the 5% level.

The age variable bears a positive coefficient, which indicates that older women are more likely to seek delivery care in a modern health care facility. In the slums, we have very young mothers who may have had unplanned pregnancies. This situation contributes largely to the nonuse of the services either because the young mothers are concealing their pregnancies or they do not have the financial ability to meet delivery costs at the hospitals. The coefficient on the education variable is positive. This implies that an increase in the years of schooling increases the logit index and therefore, the probability of choosing delivery care in a modern health care facility. This behavior can be explained by the fact that education increases the health awareness of the woman as well as her job and income opportunities. As a result, the educated woman is able to understand the importance of seeking obstetric care and also has the ability to purchase the care.

### 4.2.3 Logit Estimates for the Demand for Antenatal care in public facilities

Most women (84.8% of those who attended antenatal clinics) in the area of study used public facilities for antenatal care. Logit regression is to find out how the different variables influence the probability of choosing these facilities.

Table 4: The probability of using public facilities for antenatal care  
(Dependent variable=1 if public facility is chosen 0 otherwise)

Variable	Coefficient	Std. Error	z-statistic	p-value
Marital status(1=if married)	-.2459194	.5246473	-0.47	0.639
Log of age	-.3089702	1.051371	-0.29	0.769
Log of education in years	-.0620645	.318704	-0.19	0.846
Log of household size	-.0566561	.6283499	-0.09	0.928
Log of cost per visit	-2.11502 ***	.5134707	-4.12	0.000
Log of distance	-.2230506	.266706	-0.84	0.403
Log of examination time	.5579856**	.2818161	1.98	0.048
Log of monthly expenditure	0.2149746	.1920081	1.12	0.263
Constant	9.451275 **	3.898924	2.42	0.015

  

Number of observations =	205
Log likelihood	= -77.423317
Pseudo R2	=0.2122

\*\*Significant at 5%

\*\*\*Significant at 1%

Table 4 contains the logit results showing the probability of choosing public facilities for antenatal care with respect to selected variables. The results may be summarized as follows;

The probability of choosing a public facility for antenatal care services decreases with the cost per visit. This is indicated by the negative coefficient against the cost per visit variable, which is very significant in explaining the choices in this model. Increasing examination time at the public facilities would also increase the probability of seeking care in these facilities. The logit index increases by 0.558 when examination time is increased by one minute. Likewise, an increase in monthly expenditure increases the woman's likelihood of choosing a public facility for antenatal care. Distance and household size however reduce the probability of choosing public hospitals for antenatal care.

#### 4.2.4 Logit estimates for the Demand for Obstetric Care in public facilities

The rationale for estimating the choice probability for public facilities is that most of women (61.8%) in the study area used public facilities for delivery care during their last birth. The results obtained from the estimation are shown in table 5 below. The effect of each variable on the choice of women is briefly discussed.

Table 5: The probability of using public facilities for delivery care  
(Dependent variable=1 if public facility is chosen 0 otherwise)

Variable	Coefficient	Std. Error	z-statistic	p-value
Marital status(1=if married)	-1.883107	1.228053	-1.53	0.125
Log of age	1.474746*	.8214198	1.80	0.073
Log of education in years	.1041492	.2486285	0.42	0.675
Log of number of children	-.5888443*	.3299331	-1.78	0.074
Log of visits	.6276042**	.320392	1.96	0.050
Log of husband's income	.1765812	.1393481	1.27	0.205
Constant	-5.794488**	2.673557	-2.17	0.030

  

Number of observations	=	205
Log likelihood	=	-132.18558
Pseudo R <sup>2</sup>	=	0.0472

\*Significant at 10%

\*\*Significant at 5%

The effect of antenatal care visits on the use of public facilities for obstetric care is statistically significant at the 5% level. This means that if women make many visits to facilities for antenatal care, the chances of giving birth in a public facility increases. This applies to age of the woman, her years of schooling and the husband's income. All these variables raise the logit index and consequently increase the probability of using public facilities for delivery care. The number of children that a woman has however reduces the probability of seeking delivery care at a public facility.

#### 4.2.5 Multinomial Logit Results for the Choice of Antenatal Care

The table below indicates the multinomial logit estimates regarding the choice of facilities for antenatal care.

Table 6: Choice probabilities for antenatal care (Dependent variable=1 if mission facility is used and =2 if a private facility is used; public hospital is the reference facility)

Variable and facility type	Coefficient	Std. Error	z-statistic	p-value
<b>Mission</b>				
Age	0.060546	.0705908	0.858	0.391
Marital status (1=if married)	-0.705647	.9116026	-0.774	0.439
Education in years	-.0783301	.1551015	0.505	0.614
Number of children	-0.7733092**	.3933901	-1.966	0.049
Waiting time	-0.0319329**	.0139688	-2.286	0.022
Examination time	0.0527296**	.0242205	2.177	0.029
Travel time	0.0076161	.0122381	0.622	0.534
Monthly expenditure	-0.0000208	.0000979	-0.212	0.832
Log of antenatal cost	1.242114***	.3196956	3.885	0.000
Constant	-6.318289***	2.273384	-2.779	0.005
<b>Private</b>				
Age	-0.0327078	.0858762	-0.381	0.703
Marital status(1=if married)	0.7188243	1.047971	0.686	0.493
Education in years	-0.2416023	.1501203	-1.609	0.108
Number of children	-0.3876337	.5170669	-0.750	0.453
Waiting time	-0.045263***	.0163485	-2.769	0.006
Examination time	0.0792961*	.0336163	2.359	0.018
Travel time	-0.084069**	.0424061	-1.982	0.047
Monthly expenditure	0.0001123	.0001157	-0.970	0.332
Log of antenatal cost	2.06603***	.4589396	4.502	0.000
constant	-5.997499**	2.77939	2.158	0.031
Number of observations = 197				
Log likelihood = -52.677752				
Pseudo R <sup>2</sup> = 0.4947				

\*Significant at 10%

\*\*Significant at 5%

\*\*\*Significant at 1%

Several factors determine the choice that women make between a public, mission and a private facility. These factors are captured by various variables in the model namely;

antenatal care cost, travel time to the clinic, waiting time at the clinic, examination time at the clinic, age, marital status of the woman, education level of the woman, the number of children per woman and the family monthly expenditure. Each of these variables shall be discussed as follows;

The coefficient on the log of antenatal cost is positive in mission facilities. If antenatal cost at both facilities were increased by the same amount a woman is likely to seek care from a mission instead of a public facility. This is quite reasonable in the study area since the woman may equate the increased cost with better quality at the mission facility and would therefore not mind meeting the extra cost there. This variable is quite important in explaining the facility choice for it is significant at the 1% level.

Children are a deterrent to seeking antenatal care as indicated by the negative sign on the coefficient of the number of children. The more the children the woman has the less likely she will seek antenatal care from a mission facility relative to a public hospital. In absolute terms, a unit increase in the number of children reduces the logit index at the mission hospital by 0.77 implying that the woman is likely to seek care from a public facility rather than from a mission facility. The variable is quite important in determining obstetric care choices of women.

The coefficient on waiting time, which is a cost of seeking care, is -1.032. The longer the waiting time, the less the demand for antenatal care at a mission facility as compared to seeking the said care at a public facility. In fact the logit index decreases by 1.032 when waiting time increases by one minute. The woman would rather wait for the service for a longer time at a public than at a mission facility. This is probably because the money cost of care at the mission facility is higher than that at a public hospital, and therefore the woman may not be ready to sacrifice both her time and money at the mission facility.

Examination time is a measure of quality at the healthcare facility. In this model, the examination time variable carries a positive coefficient that is significant at 5%. This implies that a unit increase in the time spent on examining the women raises the logit

index by 0.053. If examination time at both public and mission facilities were increased by the same amount, the demand for antenatal care at the mission hospital will increase by a higher magnitude than at a public hospital.

The age variable has a positive effect on the choice of a mission rather than a public facility. The positive coefficient on the age variable implies that as the age of the woman increases, the chances of choosing a mission instead of a public hospital increases. Holding all other factors constant, a unit increase in age raises the logit index by 0.061. On the other hand, if the woman is married, she is less likely to seek antenatal care from mission facility. Just like in the case of the age variable, the effect of marital status is not statistically significant.

Family monthly expenditure is a proxy for permanent family income and is captured here as one of the factors influencing the choice of facility for antenatal care. The coefficient for monthly expenditure is -0.0000208. This indicates the negative relationship between family income and the choice of mission facilities. Thus, an increase in the family income reduce the choice probability for a mission facility in comparison with that for a public facility. This implies that as the income increases, the women would shift from mission to public hospitals.

Higher antenatal cost increases the chances of choosing a private rather than a public facility. The positive coefficient on the log of antenatal cost indicates that if antenatal cost was increased in both public and private facilities by the same proportion, women are likely to increase demand for care more at private than at public facilities. The logit index in this case will go up by 2.07 following a unit increases in the cost of antenatal care. This could be because the women are associating the high cost in the private facilities with quality. This variable is quite important in determining the choice of facilities.

Waiting time is a cost to the woman seeking care in this study. This variable has a negative coefficient that is statistically significant at 1% level. Increasing waiting time by

the same amount in both private and public facilities reduces the demand for care at the private facility by a greater magnitude than that at a public one. Since the woman is paying less money at the public compared to what she pays at the private facility she would not mind waiting longer to receive the required service at the public hospital.

The coefficient for examination time is 0.079. Spending more time when examining women increases their use of private rather than public facilities for antenatal care. This means that when examination time is increased by the same amount in both facilities, the use of private facilities increases more proportionately than at public facilities. The effect of this variable is positive and is significant at the 5% level.

Travel time is a deterrent to choosing facilities. The negative sign against the travel time coefficient implies that if travel time to both public and private facilities were increased by the same amount, the women are likely to reduce the use of private facilities by a higher magnitude than at a public facility. Since the cost of antenatal care is higher in private than in public facilities, increased travel time to private facilities will increase the cost of seeking care even further, and therefore will discourage women from using the desired care there.

A married woman is likely to choose a private rather than a public facility compared to an unmarried woman. This is indicated by the positive coefficient of the marital status variable. It is possible that a married woman has more resources at her disposal and therefore can afford to meet the costs in a private facility. On the other hand, the more the number of children that a woman has, the smaller the probability of choosing a private hospital relative to a public one.

#### 4.2.6 Multinomial Logit Results for the Choice of Obstetric Care

Table 7: Choice probabilities for obstetric care (Dependent variable =1 if mission facility is used and =2 if a private facility is used; public hospital is the comparison mode)

Variable and facility type	Coefficient	Std. Error	z-statistic	p-value
<b>Mission</b>				
Marital status (1=if married)	-3.878073	6.111669	-0.635	0.526
Log of age	0.0600115	1.606231	0.037	0.970
Log of number of children	-0.616091	.6621051	-0.931	0.352
Log of distance	-0.795593**	.3105554	-2.562	0.010
Log of delivery cost	-0.3646811	.3326193	-1.096	0.273
Log of husband's income	0.462117	.6953897	0.665	0.506
Constant	2.48526	6.038789	0.412	0.681
<b>Private</b>				
Marital status (1=if married)	-0.2215555	2.689783	-0.082	0.934
Log of age	-1.48097	1.545268	-0.958	0.338
Log of number of children	-0.1442344	.6295972	-0.229	0.819
Log of distance	-1.739427***	.3195337	-5.444	0.000
Log of delivery cost	1.165279***	.4450046	2.619	0.009
Log of husband's income	0.0883025	.3011009	0.293	0.769
Constant	-2.009044	5.846632	-0.344	0.731
Number of observations = 136 Log likelihood = -83.81997 Pseudo R <sup>2</sup> = 0.3059				

\*\* Significant at 5%

\*\*\* Significant at 1%

Table 7 above contains the multinomial logit estimates for the choice of facilities for delivery care. Several factors influencing the choices made by women are discussed below.



Distance to the delivery care facility is negatively related to choosing a mission facility rather than a public facility. This variable is quite important in determining the choices that women make for obstetric care. As the distance to the facility increases, both time and financial costs to the individual seeking care increases and as a result it discourages the demand for this service. The money costs at the mission facility are higher than those at public facilities. Distance therefore increases the total cost of using a mission facility much further. This explains why the probability of using private hospitals decreases with the increase in distance in this case.

Delivery cost is also a discouraging factor in the utilization of delivery care services. As indicated in the estimates in table 7, increasing delivery cost in both public and mission facilities by one unit holding all other factors constant will reduce the logit index by 0.365. It follows that an increase in the cost of obstetric care in both facilities will reduce the probability of using mission facilities more than it does for public facilities. The effect of delivery cost on women's choice between mission and public facilities is statistically significant at 5% level.

The children variable is represented by log of children and has a negative coefficient. This indicates that if the number of children increases, the chance that a woman will seek delivery care from a mission facility decreases by a greater proportion than delivering at a public hospital. Increasing the husband's income however increases the woman's probability of choosing a mission facility relative to a mission facility.

Increasing the distance to private and public facilities by the same magnitude decreases the use of private facilities more than it does that for public facilities. The coefficient on distance is negative and is statistically significant at the 1% level. As indicated, a unit increase in distance to the facilities reduces the logit index by 1.739 and by extension, the probability of choosing private facilities for obstetric care.

A unit increase in the cost of delivery increases the logit index by 1.165 and therefore raises the probability of choosing private rather than public facilities for delivery care. It

is possible for women to equate high costs at the private facilities with quality and therefore may not mind meeting the extra cost here rather than in a public facility. The effect of this variable on the choices of women is quite important.

Older women are less likely to use private facilities for delivery care. The age variable bears a negative coefficient though its impact on the choices of women between private and public facilities is not statistically significant in this study. Women who are married are also less likely to choose private facilities for delivery care relative to the public hospitals. Actually, most women in the study claimed that they were married and also most of them used public facilities for delivery care. Just like in the case of choosing between mission and public facilities, children are a discouraging factor in choosing a private facility for delivery care. Owing to the limited resources and the many needs, women in the slums are likely to choose public facilities as pressure on household resources increases.

The likelihood of using private rather than public facility also increases with the income of the husband. This probably has to do with increased resources at the disposal of the family and hence the ability to purchase delivery care at a private facility.

#### 4.2.7 – Two Stage Regression Analysis of Demand for Antenatal Care

Determinants of the number of antenatal care visits are shown on the table below. The effect of each factor on the intensity of using antenatal care services is discussed.

Table 8: Determinants of antenatal care visits

Variable	Coefficient	Std. Error	t-statistic	p-value
Predicted income	-.6926138	.8485662	-0.82	0.417
Log of age	0.3386901*	.1903289	1.78	0.079
Marital status(1=if married)	-.2479176***	.08879	-2.79	0.007
Log of household size	-0.0778981	.1074016	-0.73	0.471
Log of education (years)	0.029892	.0737746	0.41	0.687
Log of cost per visit	-0.041682*	.0240737	-1.73	0.088
Log of distance	-.0198374	.0253453	-0.78	0.436
Log of examination time	0.0107593	.0477378	0.23	0.822
Constant	5.338421	5.145509	1.04	0.303
Number of observations = 79				
R-squared = 0.2751				
Adjusted R-squared = 0.1922				

\*Significant at 10%

\*\*\* Significant at 1%

Being married has a negative effect on the number of visits to the clinics. Most women in the study area are married (75%). This indicates that many of them made very few visits to the clinics. In fact the average visits was 5.4 far below the recommended 12-13visits. Married women are likely to be having many children and also large households, both of which are deterrents to the use of antenatal care services. Marital status is very important in determining the number of visits and is significant at the1 %level.

Age is an important factor in determining the visits made by the women to the clinics. This variable is positive and its effect is statistically significant at the 10%. As the age of the woman increases she is likely to make more visits to the clinics for antenatal care

during her pregnancy. The sample comprises of a large number of young mothers (more than 50% of the women are 15-25 years). The possible explanation for few or no visits is that these young mothers did not have financial resources to meet antenatal care costs or they had early-unplanned pregnancies and were therefore concealing them.

Cost per visit is a proxy for the price of antenatal care and is statistically significant at 10% in this study. The price for the implied care has a negative effect on the number of visits as indicated on the estimates in table 8. When the cost per visit increases by 10%, the visits will decrease by 4.2%.

Education also determines the number of visits to the antenatal care facilities. An increase in the years of schooling increases the number of visits. With more education a woman will be able to understand the importance of the visits and also more education means more income opportunities. The woman's ability to purchase the care therefore improves.

Time spent by the nurses or doctors in examining women at the facility is a measure of quality of service. This variable has a positive effect on the number of visits implying that when it is increased, women will be encouraged to make more visits to the clinics for care.

Household size has a negative coefficient in the estimated regression indicating that the bigger the household the less the visits that a woman will make to the clinics. Infact when the household increases by 10%, the visits to the clinic decreases by 7.8%. This has to do with the limited resources with many needs in the household. The woman is therefore likely to forego antenatal care services.

Distance to the clinic is important in determining the number of visits that the women will make to obtain antenatal care services. Distance traveled has both time and price

costs. The longer the distance to be traveled the less the visits. Since women have some other work to do (most of those who are working are involved in the provision of services such as hairdressing, selling vegetables and washing clothes for pay) and their incomes are also low, they are likely to make few visits to the clinics.

Predicted income of the family that was derived from the family's monthly expenditure has a negative sign in the model. This shows that as family income increases in the slums, the number of visits to the facilities decreases. A ten percent increase in family income reduces antenatal care visits by 6.9%. With growth in income, the woman may consider antenatal care as an inferior good and this may shift her preferences towards better nutrition. The effect of income on visits is however not statistically significant.

## 4.3 Policy Simulations

### 4.3.1 Policy effects on probability of using public facilities for Antenatal Care

Using table 4, the changes in probabilities of using public facilities are calculated while considering different policy interventions. The changes in probabilities are indicated in table 9 below.

Table 9: Policy simulations for antenatal care

<b>Policy interventions</b>	<b>Base probability</b>	<b>0.884</b>
1. Reducing cost per visit by 20%	New probability	0.997
	Absolute change	0.113
	<i>Relative change</i>	<i>12.8%</i>
2. Reducing distance by 25%	New probability	0.897
	Absolute change	0.013
	<i>Relative change</i>	<i>1.5%</i>
3. Increasing examination time by 40%	New probability	0.928
	Absolute change	0.044
	<i>Relative change</i>	<i>5.0%</i>
4. Raising household incomes by 30%	New probability	0.930
	Absolute change	0.046
	<i>Relative change</i>	<i>5.2%</i>
5. All policies	New probability	0.993
	Absolute change	0.109
	<i>Relative change</i>	<i>12.3%</i>

Note: The sample means of the target variables are raised or reduced by the implied percentages.

Upon implementation of the first policy, that is, reducing the cost per visit to the facility by 20%, the probability of choosing public facility for antenatal care would increase by 11.3 percentage points. Holding all other factors constant, a decrease in cost per visit by 1% increases the probability of using these facilities by 12.8% in relative terms. This translates to an elasticity of demand for public facilities with respect to cost per visit equivalent to 0.640. It therefore means demand for antenatal care at the facilities is not responsive to changes in cost thus; antenatal care is a necessity good.

The second policy of reducing distance to public facilities by 25% will increase demand for the facilities by 0.013 in absolute terms. This change translates to a 1.5 % increase in the demand for public facilities in a relative sense. Demand for antenatal care in public facilities with respect to distance is also inelastic. This confirms further that maternal services in the slums are necessary services.

Increasing time spent in examining the mothers in the clinics increases the rate at which public facilities are used. Specifically, a 40% increase in examination time increases the relative probability of using public facilities by 5%. This leads to an increase in the proportion of women using the facilities from 88.4% to 92.8%. The increase in the proportion of women using the facilities is however less than proportionate to the increase in the examination time implying an inelastic demand for antenatal care.

Raising household incomes by 30% on the other hand, increases the probability of using public facilities for antenatal care by 5.0% in absolute terms. The proportion of women using public facilities for antenatal care would therefore increase from 88.4% to 93.0%.

The composite policy on the other hand leads to an absolute increase in the use of public facilities by 4.6 percentage points. In relative terms the choice of this facility type for antenatal care increases by 12.3%. Implementing the first policy on its own has a greater impact on the demand for the facilities than implementing all the policies. Notice that increasing examination time by 40% and raising household incomes increases the demand for the facilities by almost the same magnitude. Based on the simulations above,

cutting down the cost per visit would be the most appropriate policy to be pursued in raising the utilization of public facilities for antenatal care.

#### **4.3.2 Policy effects on probability of using public facilities for Obstetric Care**

Using Table 5, the changes in probabilities of using public facilities for delivery care are calculated while considering the effect of different policies. The changes in probabilities are shown in table 10 below.



Table 10: Policy simulations for Obstetric care

<b>Policy interventions</b>	<b>Base probability</b>	<b>0.456</b>
1. Increasing years of schooling by 20%	New probability	0.457
	Absolute change	0.001
	<i>Relative change</i>	<i>0.2%</i>
2. Increasing husband's income by 30%	New probability	0.569
	Absolute change	0.113
	<i>Relative change</i>	<i>24.8%</i>
3. Increasing antenatal visits by 30%	New probability	0.536
	Absolute change	0.080
	<i>Relative change</i>	<i>17.5%</i>
4. Reducing children per woman by 15%	New probability	0.471
	Absolute change	0.015
	<i>Relative change</i>	<i>3.3%</i>
5. All policies	New probability	0.661
	Absolute change	0.205
	<i>Relative change</i>	<i>45%</i>

Note: The sample means of the target variables are raised or reduced by the implied percentages.

From the base probability, we notice that only 45.6% of the expectant mothers choose to deliver in public facilities, the rest of them choose private, mission or give birth at home. When the years of schooling are increased by 20%, the probability of selecting the facility type for delivery care increases by 0.001 percentage points in absolute terms. This implies that the increase in the years of schooling will lead to a marginal increase in the possibility of using public facilities of 0.2 % in relative terms.

Increasing the husband's income by 30% however causes an increase in the probability of using public facilities by 24.8 %. In other words, when the husband's income is increased by 1%, the proportion of women using public facilities for delivery care increases by 0.827. The demand for delivery care in relation to change in the husband's income is inelastic implying that a change in income leads to a less than proportionate change in demand for delivery care at a public facility. This shows that obstetric care is a necessity good in the slums.

The probability of using public facilities for delivery care increases with the reduction of children per woman. If the children per woman in the slums are reduced from 2.4 to 2.0 (by 15%), then the chances of giving birth in a public facility will increase by 3.3%. In other words, the elasticity of demand for obstetric care with respect to the number of children is 0.220. The elasticity of demand with respect to the number of children is low.

Increasing antenatal care visits by 30% increases the chances of giving birth in public facilities by 17.5% in relative terms. This means that the proportion of women using public facilities for obstetric care would increase from 45.6% to 53.6% if antenatal visits were increased by 30%. This translates into an elasticity of demand equal to 0.583.

Implementing the four policies would result in the change of probability of choosing the public facilities by 45%. This implies that the use of public facilities increases by 20.5 percentage points in absolute terms. A combination of policy 3 and 4 however increases the use of public facilities by 42.3% in relative terms. The use of two policies seems to be more effective in comparison with the other policy interventions.

## CHAPTER 5 –CONCLUSIONS

### 5.1 Summary and Conclusions

This paper has empirically examined the factors influencing demand for antenatal and obstetric care in Nairobi slums. We find that as the number of children per woman increases the demand for maternal service decreases. Household size also decreases the probability of using modern health care facilities for delivery care. This perhaps has to do with the limited family resources such that as children per woman and household size increases, women may opt out essential services including maternal care. An increase in household and the husband's income increase the probability of using antenatal and obstetric care services respectively. Increasing examination time at the facilities as well as raising the level of education of the women impacts positively on the demand for antenatal care. The number of visits to antenatal care clinics is a significant factor in determining the use of delivery care services in the slums.

Cost per visit to the clinics not only influences the decision to use antenatal services but also the intensity of use. The higher the cost per visit the lower the probability of using the antenatal care services and as a result, fewer visits are made to the facilities. Marital status and age also influence the use of maternal services in the study area. Older women are more likely to deliver in hospital and they are likely to make more visits to the clinics than their younger counterparts. Being married however reduces the number of antenatal care visits as well as the probability of giving birth in hospital. It is possible that married women have many children and also larger households both of which are deterrents to the use of maternal care services. Education in years increases chances of using modern obstetric care. Increasing the years of schooling of the women also raises the number of visits to the clinics for antenatal care.

The factors that are significant in the choice of facilities for antenatal care in the study are antenatal care cost, the number of children, waiting time, travel time and examination time. Distance and delivery care costs are important in determining the choice of facilities for obstetric care.

Use of public facilities for obstetric care would increase with an increase in the number of antenatal care visits while the number of children discourages their use. The examination time in the public facilities and the cost per visit are significant in determining the use of antenatal care services.

The policy simulations indicate that the elasticities of demand for antenatal care services in public facilities with respect to cost, income, distance, and examination time are inelastic. This shows that antenatal care in the slums is a necessity good. Demand for obstetric care is also inelastic with respect to education, husband's income, antenatal care visits and the number of children. This shows that obstetric care just like antenatal care is a necessity in this area of study.

## **5.2 Policy Recommendations**

From the study, most women in the slums depend on public facilities for both antenatal and delivery care. It is also evident that the maternal care is a necessity in this area of study. Based on these findings, policies that will make these essential services affordable should be pursued.

With reference to the policy simulations, demand for antenatal and delivery care seems to be responsive to certain policies. To increase the use of public facilities for antenatal care, increasing examination time at the facilities, reducing cost per visit could be used as appropriate instruments to achieve this goal. Since the cost per visit as well as the distance traveled to the facilities seems to affect demand significantly, policies should be tailored to counter this negative effect on the use of the essential services. Examination time should also be increased in the clinics as well as improvement of other quality factors in the facilities.

The probability of using public facilities for delivery care decreases significantly with an increase in the number of children that a woman has. This probability however increases

with the husband's income and the number of antenatal care visits. Policies to reduce the number children per woman in the slums should be used for example using Family Planning Association of Kenya and other community based organizations to sensitize women on the advantages of smaller families and also provide family planning services at subsidized costs. This can also be complimented with increasing the years of schooling for girls in this area of study, which not only delay their marriage but also reduce their chances of having many children. Increasing the literacy levels of slum women would contribute in increasing their income opportunities as well as increasing the awareness of the importance of obstetric services.

An increase in income also increases the intensity of using the services. To encourage the use of these services, policies geared towards raising husbands and also the total family income should be pursued. More employment opportunities and income generating activities should be encouraged through provision of cheaper sources of credit and the promotion of Jua kali sector in the slums.

To increase antenatal care visits, more time should be allocated in examining the women at the clinics while the cost per visit should be reduced. This would increase the chances of women in giving birth in public facilities. Since distance to the delivery care facilities is a significant deterrent to their use, the government should equip the facilities within or near the slums to be able to provide delivery care. This would reduce the number of home births.

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# APPENDIX 1

## SURVEY QUESTIONNAIRE

The interviewer should introduce herself/himself and explain the purpose of the study to the respondent.

### A. PERSONAL CHARACTERISTICS

1. Age.....Years
2. Marital status
  - a. Married
  - b. Single/Never married
  - c. Divorced/Separated
  - d. Widowed
3. Family Size (Total number of persons in the household).....
4. How many years of formal schooling did you complete?.....years
5. What is your highest level of education?
  - a. Primary
  - b. Secondary
  - c. University/college
  - c. None
  - e. Other (specify)
6. Do you have a medical insurance cover?
  1. yes
  2. No
7. If yes, does the insurance cater for
  - a. Antenatal care? 1. yes 2. No
  - b. Delivery care? 1. Yes 2. No

## **B. INFORMATION ON ANTENATAL CARE**

8. How many children do you have?.....

9. Did you attend antenatal care for all the children?

1. Yes

2. No

**Lets now talk about your most recent pregnancy**

10. How old is your last child?.....months/years

11. Did you attend antenatal care for this child?

1. yes

2. No

12. If no, give reasons for not attending the clinics

- a. Did not have money
- b. The hospital/modern healthcare facility was too far
- c. The health personnel are unfriendly/harsh/arrogant
- d. I have never had problems in my pregnancies before
- e. Did not have problems with the pregnancy
- f. Other reasons (specify)

13. If yes how many times?.....visits/Times

14. At what month of pregnancy did you start attending the clinics?

- a. In the first three months
- b. Between 4-6months
- c. Last three months

15. From which hospital type did you receive antenatal care?

- a. Public/City council
- b. Mission/Religious
- c. Private
- d. Traditional Healer

16. How much money did you pay for antenatal care services for the entire pregnancy period?.....Ksh.

17. What mode of transport did you use to the clinic/hospital?

- a. Matatu/Bus
- b. Train
- c. Taxi
- d. Personal car
- e. Bicycle
- f. Walking/Footing

18. How much money did you spend on transport to the clinic and back?.....Ksh.

19. On average, how long did you take to travel from home to the clinic/hospital?.....Hrs/Mins.

20. What is the distance between your home and the clinic?.....Kms/Metres

21. On average, how long did you wait (in the queue) before being attended to at the clinic during the last visit?

.....mins/hours

22. How long did the nurse/doctor take while examining you?.....Minutes

23. Did you receive any information about the progress of your pregnancy during the visits? 1.yes

2.No

24. If no, did you yourself ask any questions?

1.yes

2.No

25. Were the nurses/doctors friendly?

1.yes

2.No

26. How would you rate the quality of antenatal care you received during this last pregnancy?

- a. Good
- b. Very good
- c. Excellent
- d. Fair
- e. Poor

### **C.INFORMATION ON DELIVERY/OBSTETRIC CARE**

27. During your last pregnancy, did you deliver the baby in hospital?

1.Yes

2.No

28. If no, give reasons for not delivering in hospital

a. Did not have money

b. The hospital/modern health facility was too far

c. The health personnel are unfriendly/harsh/arrogant

d. I have never had problems giving birth before

e. Other reasons (specify)

29. Where did you deliver the baby?

30. Did you experience any complication/problem/emergency during delivery?

1. Yes

2. No.

31. If yes, what was the problem? Specify

32. Did the baby experience any complication/infection immediately or even afterwards?

1. Yes

2. No

33. If yes, what was the problem? Specify

**(If no to Q27, skip to section D)**

**Note: If yes to Q27, continue with the questionnaire to the end**

34. If you delivered in hospital, which hospital type did you receive the delivery care?

a. Public/City council

b. Mission/Religious

c. Private

d. Traditional Healer

35. What is the distance between your home and the hospital where you delivered?....Kms

36. What mode of transport did you use to the hospital?
- Matatu/Bus
  - Train
  - Taxi
  - Personal car
  - Bicycle
  - Walking/Footing
37. How long did you take to reach the hospital?.....hrs/mins
38. How much money did you pay for delivery care services at this facility.....Ksh.
39. Were the doctors/nurses friendly?
- Yes
  - No
40. How would you rate the quality of delivery care you received in this facility?
- Good
  - Very good
  - .Excellent
  - Fair
  - Poor
41. If you were to have another baby, would you visit the same facility for delivery care?
- Yes
  - No

**D. INFORMATION ON THE SOURCES OF INCOME**

42. What is your occupation (where do you work and which job do you do?)
- Unemployed
  - Self employed
  - Casual employment
  - Civil servant
  - Private company
  - Other (specify)

43. Which sector do you work in?

- a. Agriculture
- b. Industry
- c. Services
- d. Government

44. What is your monthly income?.....Kshs.

45. If married, what is your husband's occupation? (Where does he work and which is his job?)

- a. Unemployed
- b. Self employed
- c. Casual employment
- d. Civil servant
- e. Private company
- f. Other (specify)

46. Which sector does he work in?

- a. Agriculture
- b. Industry
- c. Services
- d. Government

47. What is his monthly income?.....Kshs.

48. What are other sources of family income?

Amount

- a. Business.....Kshs
- b. Remittances (Transfers).....Kshs
- c. Other (Specify).....Kshs

49. Indicate which household items you own by ticking appropriately

Value

Make and attributes

- a. Radio.....Kshs
- b. Television.....Kshs
- c. Bicycle.....Kshs
- d. Gas/Electric cooker.....Kshs

- e. Refrigerator.....Kshs
- f. Vehicle.....Kshs
- g. Computer.....Kshs

50. Indicate which assets you own whether here in Nairobi or at home ( in the village).

Value

- a. Herds of cows (number) .....Kshs
- b. Land: Acres.....Kshs
- c. Rent from 1. Houses.....Kshs.per month/year
- 2.Land.....Kshs.per month/year

51. Breakdown of monthly/annual family expenditures

- a. Food and beverages.....Kshs
- b. Rent.....Kshs
- c. Clothing.....Kshs
- d. Transport.....Kshs
- e. Entertainment.....Kshs
- f. Health .....Kshs
- g. Education/fees.....Kshs
- h. Transfers(e.g to old parents).....Kshs
- i. Other.....Kshs
- j. Savings.....Kshs

**(Thank the respondent for her time)**