"SUPPLIER-INDUCED DEMAND: A CASE STUDY OF CAESARIAN DELIVERY IN PRIVATE AND PUBLIC HOSPITALS IN NAIROBI"

BY

CONSOLATA OLOO NGALA

Research Paper submitted to the Department of Economics, University of Nairobi, in partial fulfillment for the requirement of the degree of Master of Arts in Economics
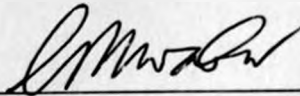
SEPTEMBER 2003

DECLARATION

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

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CONSOLATA OLOO NGALA

Date: _10|09|2003_____

This project has been submitted for examination with our approval as university supervisors

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PROF. GERMANO MWABU

Date: _10| 9| 2003_____

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PROF. BENJAMIN NGANDA

Date: _____

DEDICATION

I dedicate this piece of work, to my beloved Parents, Mzee Ngala Abok and Mom Elizabeth Ngala, for their prayers and continuous encouragement to take up a second degree in economics; my beloved husband, Mr. Obino Ong'anyi for his unfailing support, and finally to our baby, Cherise.

ACKNOWLEDGEMENTS

ABSTRACT

The study investigated supplier-induced demand for caesarian birth, relying on household and hospital data. A household survey was carried out in Nairobi city in which 189 women who had delivered during the last 10 years were interviewed.

A binary logit model to explain the probability of caesarian birth was estimated. The model was used to analyze women's choice of facilities for maternity care.

The main finding is that probability of a caesarian birth rises as a woman's income increases and with the amount paid for a caesarian delivery. In contrast, the probability of a caesarian declines with distance to the nearest health facility and with the cost of the visit to the facility.

Results suggest that there should be increase accessibility to maternity care facility and regulate costs of antenatal visits to encourage delivery at modern health facilities. There is also need to regulate cost of caesarian births to discourage unnecessary caesarians.

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1.0   INTRODUCTION

1.1   Background

Demand is jointly determined by the suppliers and the consumers in almost all the markets. In the field of health markets, the supplier acts both as an expert assessing the consumer's need for a given treatment, and as a provider of the treatment itself (provision of information and execution of care). The information provided relates to effects of certain treatments, the likelihood of success and possible side effect of treatment. Given this information, the individual makes informed choice about the type and quantity of care desired. However, individuals have little opportunity to verify the information provided, and when providers of such information stand to gain from providing misleading information, it is unlikely that correct information will be forthcoming. If consumers are subjected to purely objective information they may be induced to consume more or less care. Therefore, a patient as a consumer of a health good, does not know the quality and quantity of the good she demands and whether diagnosis and treatment performed are appropriate or not. This situation is called informational asymmetry, and has strong behavioral implications. The more complicated the product or service is, the greater the potential for undesired behaviour due to information asymmetry.

Caesarian delivery is a good example of a medical procedure, which is a life saving for mothers and infants. However it involves a major surgery, which carries serious risks of morbidity and even death. It has come to be abused by physicians. Many unnecessary caesarian operations are performed on daily basis all over the world to a degree that is not often seen in other surgical operations. Consumer advocacy organizations and women groups have been working to reduce what they see as unnecessary surgery. One of the most popular observations is that once a caesarian is performed, it is almost surely repeated. Appropriate technology is one that is scientifically sound, adapted to local needs, acceptable to those who use it or for whom it is used, and that can be maintained

and utilized with resources that the community can afford. While caesarian section continues to be a procedure that saves the lives of mothers and infants and prevents disabilities, both the medical practitioners and society must bear in mind that most births are normal and more births should progress without undue intervention.

1.2   Problem Statement

International Agency Group for the safe motherhood initiative (IAG) together with co-sponsors of the initiative, UNDP, UNFPA, UNICEF, World Bank, WHO, Population Council and International Planned Parenthood Federation (IPPF), participant researchers and scientists all agreed that the term Essential Obstetrics Care (EOC) is essential care for the management of pregnancy and delivery related complications and special neonatal care[1]. It incorporates but is not reducible to emergency obstetrics, which comprises the elements of care that are most often needed for the management of unexpected complications[2]. Essential obstetric care would only be needed for those who have difficult or problem pregnancies or those who develop complications. It is likely that 15% of all pregnancies will develop complications requiring emergency interventions (WHO, 1995).

Caesarian should be viewed as an emergency obstetric service where a woman undergoes surgical operations to deliver the baby. It is necessary when the baby's head is too big to pass through the pelvis (dystocia); when baby's feet or bottom appear first (breech birth), or when the placenta instead of being attached to the upper part of the uterus is situated down and covers the cervix. Note that if the placenta were to come out first, the baby would be deprived of oxygen, a condition known as "placenta praevia". A caesarian is also necessary in prevention of mother to child transmission of HIV type 1(vertical transmission). These and other serious complications require caesarian (Close, 1980).

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[1] This describes management of complications and problem pregnancies.
[2] This describes management of unexpected complications such as retained placenta

The caesarian procedure is on the rise in Kenya and elsewhere in Africa, a trend earlier noticed in United States and Europe, which now manifests itself worldwide. The decline in maternal, and to a lesser extent fetal mortality is mainly due to tremendous impact that delivery by caesarian section has had on obstetrics. The procedure has, however, come to be abused. Women have voiced their concern that not all of the caesarian sections done are strictly of necessity and/or based on well-informed decisions. Doctors do not inform women of its necessity until they go into labour. In some public hospitals, women have no opportunity to discuss the type of delivery they would prefer, not even that of meeting the doctor who will deliver their baby before they enter the hospital for delivery. Some have been quoted as saying, "I didn't want one surgery, but I ended up with four." Before a caesarian is done experts well-considered opinion should be sought, rather than taking the often more convenient option of exposing the mother to an unnecessary operation. Sethi (2002) found that most nursing homes concentrate primarily on providing obstetrics and gynaecological services for which there is considerable demand. At the same time, the potential for making profit is unlimited in the case of pregnancy. The use of ultra sound for testing, the use of instruments and caesarian for conducting deliveries, all provides scope for tremendous profits. This is mainly because it is the doctor who decides the number of tests required, whether to have caesarian or normal deliveries, how long a woman has to stay in the hospital before delivery, among others.

In such cases, a woman who is hospitalized has very little say on her treatment process. In the end, the gynecologist's personal ethics are the deciding factor. An obstetrician who for obvious reasons has more information than the women clients, will for financial reasons, induce such women to undergo an expensive delivery (caesarian delivery). Yet very often, not enough attention is paid to the economic, human and infrastructure implications of this procedure to women. Supplier-induced demand suggests that policies that promote competition among physicians lead to unnecessary caesarian services. A comprehensive study of this issue has not been done in Kenya. The aim of this research was to provide insights into the phenomenon of caesarians in public and private hospitals in Kenya.

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1.3   Objectives of the Study.

The study has the following objectives:

i) To investigate determinants of caesarian deliveries in private and public hospitals with a particular focus on provider–induced caesarian deliveries;

ii) To examine reasons for variations in obstetric health care services in public and private sector;

iii) To make policy recommendations based on findings of the study.

1.4   Significance of the Study

This study is important, as there is no study that has been done specifically on correlates of caesarian delivery, apart from related ones, which have focused among other things on factors associated with unfavourable birth outcomes. This paper sheds light on the extent to which this procedure has been abused by those who perform it. Also, the study provides policy recommendations that would complement and strengthen women and government's efforts that are geared towards provision of proper maternal health care.

1.5   Scope of the Study

Though patients are completely free to choose the treating hospital, they are constrained by their economic status and the information they posses about potential treatment. This choice is affected by the hospital specializations, waiting list, and perceived quality. However, there are some special cases where employers recommend that employees be treated in only some specific hospitals.   The different financing schemes they are subjected to gives private hospitals incentives to supplier-induce demand, a situation that is likely to be absent in public hospitals.

In Kenya, private hospitals are well endowed, while public ones tend to be less equipped. Health care production is largely by both public and licensed private hospitals, the public hospitals being financed by the government. The study focused on two main private and

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public hospitals in Nairobi that differed in terms of service quality and their infrastructural capacity.

2.0 Introduction

The ability of physicians, (obstetricians and gynecologists in this case) to generate demand in response to large number of physicians in the market (reducing market shares and size of their practices) or to a large number of patients in the market. To save time, and deal with as many patients as possible, physicians opt for a convenient mode of delivery. In that case physicians do not act as perfect agents for patients because of financial incentives for providing extra services. Self-interest, coupled with asymmetry of information (resulting from consumer ignorance) begets market failure, and inappropriate servicing (Stano, 1985).

Physicians supply information and advice to consumers who are relatively uninformed on technical medical matters. The advice could result in consumers demanding more medical care than optimal, given their preferences and insurance coverage. The abuse of the agency relationship between the patient and the physician is called supplier-induced demand. To induce in this context means to mislead.

The World Health Organization Technical Working Group (TWG) describes normal delivery as "spontaneous in onset, low risk at the start of labour, and remaining so throughout labour and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy. After birth, mother and infant are in good condition". According to TWG, about 70-80 percent of births should be normal, "unless there is a valid reason to interfere with the natural process" (WHO, 1996).

Caesarian delivery is the delivery of the baby through an abdominal incision. Surgery is done while the woman is awake but anesthetized from the chest to the legs by epidural or spinal anesthesia. An incision is made across the abdomen just above the pubic area. The uterus is opened, the amniotic fluid is drained off, and the baby is delivered (Chen, 2002).

2.1   Brief history of caesarians

Caesarian is commonly believed to be derived from the surgical birth of Julius Caesar, the great emperor of Rome. At that time, the procedure was performed only when the mother was dying or dead, as an attempt to save the child for a state wishing to increase its population. Roman law under Caesar decreed that all women who died at childbirth, must be cut open, hence the term caesarian; or as required by religious edict, so that the infant might be buried separately from the mother. It was a measure of last resort, and the operation was not intended to preserve the mother's life. It was not until the nineteenth century, that such a possibility came within the grasp of the medical profession.

The Greek, Hindus, Egyptians, Roman and other European folklore indicate that caesarians were performed in many remote areas lacking in medical staff and facilities. The operation was performed in kitchen tables and beds. Women were barred from carrying out caesarians. A woman however conducted the first recorded successful caesarian in British Empire. In 1815 and 1821, James Miranda Stuart Barry performed the operation while masquerading as a man, and serving as a physician to the British army in South Africa.

As a serious abdominal operation, the development of caesarian section both sustained and reflected changes within general surgery. The medical application of anesthesia rapidly spread to Europe. In obstetrics, though, there was opposition to its use, based on the biblical injunction that women should sorrow to bring forth children in atonement for Eve's sin. However, the argument was substantially demolished when the head of the church of England, Queen Victoria, had chloroform administered for the birth of her two

children; subsequently, anesthesia in child birth became popular among the wealthy and practical in cesarean section.

As the caesarian section became safer, obstetricians increasingly argued against delaying surgery rather than waiting for many hours of unsuccessful labour. Doctors in Italy, England, U.S.A. and Germany opted for an early resort to the operation in order to improve the birth outcome. This was an argument sweeping through the general surgical community and one that resulted in greater numbers of operations on an expanded patient population.

2.2   Specific Literature Review

According to the 1998 Kenya Demographic and Health Survey, 7 percent of babies born in Kenya are delivered by a caesarian section. A caesarian section is less common amongst rural women, older women, women with a large number of children, and those with little or no education. Provincial estimates of caesarian section prevalence vary from 2 percent of deliveries in Nyanza to 11 percent in central province and 13 percent in Nairobi. (As shown in appendix 1).

The same survey showed that 5 percent of births in Kenya was by caesarian section. Women having a first birth were again at greater risk than those who had given birth earlier. Women of high socio-economic status and those aged between (30-34) years, those who had earlier used contraceptives (as opposed to those who had never practiced family planning) and shorter ones whose heights were below 150 cm were also at great risk of delivering through caesarian. Provincial estimates as per 1993 KDHS data showed that caesarian delivery was less frequent in Nyanza, western and coast province and more frequent than expected in Nairobi and central province (KDHS, 1993, 1998).

These findings show that caesarian section prevalence has increased by 2 percent in the five years interval between the two surveys. Women's socio-economic status, modern use

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of contraceptives, high level of education and residence in urban cities (Nairobi) are major associated factors.

WHO (2002) observed that when user fee was introduced in Senegal and Zambia, it led to the increased cost for consumers and decreased utilization. The introduction of user fee for reproductive health services might lead to more discrete and fragmented forms of financial management, program separation and hence priority being given to activities yielding comparatively high monetary returns. In Brazil, for example, fee for service led to an increased in unnecessary caesarian section and a depletion of reproductive health resources that would have been used elsewhere.

Hopkins (2002) in her study "Do women choose cesarean freely in Brazil" found out that more than 36 percent of all births in Brazil occurred by cesarean section. With many private hospitals[3] reporting rates in the 80 percent range among the highest cesarean rates in the world. Hopkins found that women often do not seek to deliver surgically and that doctors frequently use their medical authority to persuade them to choose a cesarean section.

The 1996 Brazil demographic and health survey show that while only 13 percent of uneducated women deliver by cesarean. Women who had completed primary education had a cesarean rate of 37 percent; those completed secondary had a cesarean rate of 55 percent and those with more than secondary education had 81 percent. Similarly, the same survey showed that 20 percent of women in rural delivered surgically, compared to 42 percent of urban women. Reasons being that, physicians in Brazil prefer cesarean because they make more money and work shorter hours by operating. Doctors on the other hand, say that women prefer cesarean because it allows them to avoid the vaginal delivery, they recover their figures/shapes more quickly, they do not jeopardize future sexual functioning and they believe it is safer for the baby.

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To examine these contentions, Hopkins studied childbirth in public and private hospitals and observed that in private hospitals nearly three-quarters of first time mothers who delivered surgically initially wanted to deliver normally. In public the figure reached 80 percent. On her witness to delivery she observed that doctors in public hospitals[4] could survive women's pressure when crying while those in private can't. She blamed physicians for having not given women adequate psychological preparation for the rigors of labour and delivery. Hopkins witnessed physicians willfully ignoring or misinterpreting the medical situation in the labour room in order to suggest a cesarean. In some case a doctor cited a woman's need to empty her bowel, as a sign that the baby was too large to pass through the birth canal and that therefore a cesarean was necessary. Additionally many physicians did not wait for labour to occur naturally, and told patient relatively early in the process that cesarean will be performed because labour was not progressing. Hopkins found that Brazilian obstetricians are not in fact responding to an overwhelming wish of the patients for cesarean. Her results imply that women are less interested in cesarean section than popular perception and medical opinion suggests. In conclusion she asserts that doctors are actively participating in the ongoing construction of the culture of cesarean in Brazil

Gregory et al (1999) on their study on variations in management of childbirth and patient outcome, found that private non-teaching hospitals (which care for the largest proportion of Medicaid –insured women) have a higher cesarean delivery rates as compared with other types of hospitals. This was because a large number of obstetrics Medicaid were being systematically transferred from public to private non-teaching hospitals. Medicaid insured women who gave birth in private non-teaching hospitals had a lower prevalence of clinical conditions that are typically associated with cesarean deliveries when compared with women who delivered their children in public, private teaching hospitals. After adjusting for women's clinical and socio-demographic characteristics they found that the Medicaid insured women who delivered in private non teaching hospitals had an

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[3] Profit motivated institution licensed by the government. Religious and non-governmental organizations and groups of physicians run most of these private institutions.

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overall cesarean delivery that was 2 to 2.5 times as great as that of similar women who delivered at public hospitals (24.5% Vs 9%). Based on the 1995 mean per diem hospital reimbursement rate of Medicaid patients ($821) and the mean three- days hospitals stay for cesarean delivery versus the one day for normal delivery, the differences in the calculated cesarean rates by hospital type translated into about $13.6 million in additional health care expenses for obstetrics service in Los Angeles County.

Gonen and Al-mufti et al (1997) carried out a survey in Britain and found that even among obstetricians who believe normal delivery to be preferable to cesarean. Thirty one percent reported that they personally opted for a cesarean section to minimize the long-term risks associated with normal deliveries. For example, sagging pelvic organ that may protrude through the vagina and require surgery, sexual disfunctioning, among others. Some also believed that cesarean ease the obstetrics job by decreasing the length of time spent attending to the patients i n l abour (one hour v ersus t welve h ours) a nd e liminate many middle -of -the night deliveries.

David et al (1999) in their study on the awaited rates of cesarean adapt to the level of recruitment found that cesarean rates has not ceased increasing in France. It was 6.1 percent in 1972,10.9 percent in1981, 15.9 percent in 1995 and 17.5 percent in 1998.The increase in cesarean section was not directly related to the increase in frequency of its principle indicators but on certain intrinsic characteristics of the establishment or obstetrician. These include: the legal status of the establishment, the size of the city or maternity, the university of origin of obstetrician or the experiment of surgeon were factors influencing mode of childbirth.

2.3   Previous Empirical Studies

Daniele Fabbri and Chiara Monfardini (2001) in University of Bologna carried out a natural experiment on delivery to find out whether physicians induce demand. This was

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[4] Government institution that provides medical care services at a subsidized fee. It is funded and managed by the government

done both in private and public hospitals. They used a probit model explaining the cesarean section delivery, a hospital type dummy and price as the variable capturing the inducement. They found out that the risk adverse providers overuse caesarian delivery for all profiles of individuals risk considered, relative to the level that would be chosen by a financially disinterested provider. They were of the opinion that the magnitude of the effect has never been so clearly spotted in the literature before.

Ingemar Eckerlund and Ulf-G Gerdtham (1996) carried out a study on "variation in cesarean section rates in Sweden –causes and economic consequences" to explain variation in cesarean section rates among obstetrical department in Sweden. and to discuss its economic consequences. They present a cross sectional study of caesarian section rates in 1991 and used logistic regression with a dichotomous dependent variable. They focused on the clinical department level and consequently used multiple linear regressions. They found large variations in caesarian section rates among departments. This indicated that the decision on mode of delivery to a large extent is governed by what they call practice style i.e. the attitude or belief of the responsible obstetricians.

From the literature, it is evident that few empirical studies have been done on supply-induced demand in caesarian section deliveries. However there are various descriptive studies. It is therefore, from these descriptive studies that explanatory variables used in this study has been identified. There is still need for further research in the field of health economics.

2.4   Overview of Literature

From the literature survey, it has been found that repeat operation is positively associated with a caesarian. Many physicians believe that once a caesarian has been performed, another caesarian is necessary to avoid the possibility of rupturing the uterus. This belief led to stricter policies on how to handle women who have already had caesarian in the United States, and to increased rates of caesarian. For physicians, the procedure is

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convenient, easy, time-saving and financially lucrative. On the other hand, women who would not want to go through the labour pain also find a caesarian convenient. There is thus an element of patient's choice (Gonen and Al- Mufti et al, 1997) in caesarian delivaries. Another factor contributing to the growing epidemic of caesarians is insurance malpractice whereby women feel that such insurance does not cover normal birth, and so opt for a low cost caesarian section so that they can be covered. Physicians tend to take advantage of this form of insurance coverage. Looking at the demographics of the population and socio-economic status of the women in Kenya, women between the age of 30-34, and those of high economic status, had the highest rate of caesarian as per the 1998 data. The level of education and size of the city are also contributing factors. It is evident, therefore, that all these factors resulting in caesarian births rotate around financial incentives for physicians in caesarian operations.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.0   Introduction

To achieve the objectives of this study, we used a research design that incorporated both the provider and consumer of this particular medical service. This study focused on two categories of hospitals (public and private) in Nairobi. This was because these hospitals differ in service quality, capacity, style of practice and financing schemes.

The most powerful argument to explain the increase in cesarean deliveries is the physician-induced hypothesis. The hypothesis asserts that when there is an increase of physicians in the market, the demand for medical service because of physician discretionary power would increase. This is because the doctor obviously has more professional information than the patient (in this case the woman) and holds the safety of the baby and the mother.

According to Fuchs (1978) the physician who faces a decline in income due to an increase in physician population's ratio raise the demand for their services through their influence on patients. Supply induced demand model for example that of McGuire and Pauly (1991), states that in the face of income shocks, physicians may exploit their agency relationship with patients by providing excessive care. The underlying hypothesis of this model is that physicians derive utility from income, and disutility from inducing demand for unnecessary services. The disutility may arise from ethical considerations or from reputation effect. In this context, when income is tailored to specific procedures, physicians will induce demand to perform more remunerative procedure if the marginal benefit of a specific procedure outweighs the associated marginal costs (Fabbri and Monfardini, 2001). This is presumably what happens in hospitals that provide maternal and child health care in Nairobi.

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Assumptions

The model adopted for this study has the following assumptions:

- Medical delivery charges are not fixed and that price of delivery differs from one hospital to the other and from obstetrician to another; otherwise no mode will be more remunerative than the other.
- Women do not choose the caesarian section. Obstetricians decide for women whether they should have a caesarian or not after consulting with them.

3.1 Model Specification

This study uses a probabilistic demand model in which the dependent variable (caesarian) is a binary random variable that takes on only the values zero and one. The model is relevant here because the actual decision is based on unobservable factors, but there is a threshold level or critical condition at which caesarian becomes necessary. The linear version of this model is as follows:

$$C_i = \sum x_i \beta + \mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where

$$\beta' = [\beta_1, \beta_2, \dots\dots\beta_K] \text{ and } x' = [1, x_{i2}, x_{i3}\dots\dots\dots x_{ik}] \text{ and}$$

μ is a disturbance term that follows a logistic distribution

x_1 is a vector that captures the cost of a caesarian delivery, including the time cost;

x_2 is a vector that captures socio-economic status of the mother, e.g. insurance cover, occupation and level of education;

x_3 is a vector that captures other non-risk factors, e.g. parity, age, marital status;

x_4 is a vector that captures risk factors that influence a caesarian, e.g. placenta praevia, breech birth, HIV type 1, among others.

C_i is a latent variable, random variable which takes a value of one if a caesarian birth is observed and a value of zero otherwise.

In this form of the model, C_i is the linear probability of a caesarian birth. Assuming a cumulative distribution of the error term in F, expression (1) the probability of a caesarian birth can be expressed as:

$$1-F\ (-\textstyle\sum x_i\ \beta) = e^{\sum xi\ \beta}\ /\ 1+ e^{\sum xi\ \beta} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

$$F\ (-\textstyle\sum x_i\ \beta) = e^{-\sum xi\ \beta}\ /\ 1+ e^{-\sum xi\ \beta} = 1/1+ e^{-\sum xi\ \beta} \dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

The relevant likelihood function is given by

$$L=X_{Ci=0}\ [\ F\ (-\textstyle\sum x_i\ \beta)]\ \Pi_{Ci=1}\ [1-F\ (-\textstyle\sum x_i\ \beta)] \dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Equation (4) can be written as:

$$L = \Pi[\ F\ (-\textstyle\sum x_i\ \beta)][1-F\ (-\textstyle\sum x_i\ \beta)] \dots\dots\dots\dots\dots\dots\dots\dots (5)$$

The same model was used to analyze women's choice of source of maternity care. As before, the linear form of the model is as shown in equation (6).

$$H_i=\textstyle\sum x_i\ \beta+\mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Where

H_i takes a value of 1 if a private hospital is chosen for maternity care and a value of zero if a public hospital is chosen.

The logit version of the model is formulated identically as in equations (2) through (5). The logit version of the binary model is preferred because in both cases probabilities of a caesarian and of choice of maternity care are well defined. As is well known, in the linear probability model can yield meaningless predicted probabilities, i.e., probabilities greater than one or less than zero.

3.2 Data Source

The data used in this study was obtained through a household survey. A questionnaire containing open and closed ended questions was developed and administered to women who had had a child or children born between 1993 and May 2003. The women respondents were asked to state what mode of delivery they went through, and how much they paid for the delivery. This generated both qualitative and quantitative data, which

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were supplemented by secondary information. The study was particularly designed to generate data on caesarian and non-caesarian deliveries conditional on mother's socioeconomic characteristics.

3.3   The Area of Study

Data for this study was collected in Nairobi where supply induced is expected to be rampant. This is due to the fact that Nairobi being the capital city of Kenya, is a cosmopolitan town with vast expanse of hospitals and medical practitioners of different specialities. It has an estimated population of 2.2 million and covers an area of approximately 696 square kilometers. It is divided into eight administrative divisions with inhabitants drawn from different socio-economic,ethnic and racial groups.

The major hospitals (both public and private) in Kenya are located in Nairobi. These hospitals provide both maternal and child healthcare services among other services. The two main public hospitals are Kenyatta National Hospital, which is also a referral hospital, and Pumwani Maternity Hospital, which specializes in maternal and child healthcare only. The major private hospitals in Nairobi include Mater Misericordaire, MP Shah, Agha Khan and Nairobi hospitals.

3.4   Sampling Method

In this study, simple random probability sampling was used. Questionnaires were administered, face-to-face interviews to women who had had a child or children between 1993 and May 2003. The sample had two hundred households but only 189 respondents were successfully interviewed. Questions capturing household characteristics such as monthly household income, health insurance coverage, age, education level, type of health facility chosen for both delivery and antenatal care were asked. Information on health facility attributes, such as type and distance to the nearest health facility and on cost of child delivery services in terms of amount of money paid for such services was captured by the questionnaires.

EMPIRICAL RESULTS

4.0   Introduction

Logit regression analysis was used in this study to measure the effect of the independent variables on the dependent variables. The study applied this model due to the fact that the dependent variable in the two areas of interest is dichotomous. Thus, delivery could only occur either through a caesarian section or naturally. This variable took a value of 1 if the respondent delivered through a caesarian section and value of 0 if otherwise. Similarly, a woman chose a private hospital or a public hospital for delivery. Nevertheless, the explanatory variables used in this study are either discrete or continuous.

4.1   Descriptive statistics

In this section we present and discuss sample statistics. The means and standard deviations of all the variables of interest are summarized in table 4.1

Table 4.1: Sample statistics

Variables	Mean	Standard Deviation
Age in years	31.57	5.77
Primary education or less (%)	12%	32%
Secondary education and above (%)	68%	32%
Chose public health facility	36%	48%
Chose private health facility	64%	48%
Proportion of women not employed	68%	47%
Proportion of women employed	32%	47%
Resident in Nairobi	85%	36%
Resident outside Nairobi	15%	36%
Women with complication	36%	48%
Women without complication	64%	48%
Women Insured	32%	47%
Women not insured	68%	47%
Log of cost per visit	5.30	0.62
Log of distance	1.60	1.05
Log of cost of delivery	9.40	1.52
Log of age	3.43	0.17
Log of age squared	11.83	1.27
Log of monthly income	10.01	0.77
Sample size 189		

The sample statistics shown in Table 4.1 reveal that among the 189 women in the study, about 85 percent live in Nairobi. Their average age falls at about 32 years with only 32 percent reporting access to some kind of health insurance cover. The table also shows that 68 percent of the women had at least a secondary level education. About 68 percent of women interviewed reported to have delivered in private health facility, compared to

32 percent of their counterparts who delivered in a public health facility. Of the interviewed women, 36 percent had complications at birth. Sample statistics in table 4.1 also show that at least 68 percent of the women in the study area were employed.

The mean log of average costs per visit was 5.30 (Ksh 200) and the mean log of distance to the nearest health facility was 1.60 (4.95km). The mean log of cost of delivery was 9.40 (Ksh.22, 248) the mean log of monthly income was 10.01 (Ksh. 120,088)

Out of the 68 (36 %) of the women in the sample who reported to have experienced complications at delivery, 67 (98.5%) delivered through the caesarian section and only one woman (1.5%) delivered naturally. On the other hand, among the 121 (64%) in the sample who did not report any complications, 22 (18.2%) delivered through a caesarian section. These caesarians might have been necessitated by high exposure to health risks caused by either serious illness, or poor diet.

Reportedly, 62 of the interviewed women who accounted for (32%) were covered by health insurance out of whom 38 (61.3%) had delivered through a caesarian section, and only 24 (38.7%) had delivered naturally. In Table 4.1, it is evident that among the 167 women who had attained at least a secondary level of education, 78 (46.7%) delivered their babies through a caesarian section. On the other hand only a small number (11) of their counter parts who had primary level of education had a caesarian birth. Most of the women 160 (85%) reside in Nairobi, (which is due sampling bias). Out of this proportion, 73 (45.6%) had delivered through a caesarian section. Even though most of these women chose private hospitals for their delivery, few of them delivered through a caesarian section. When the rates of caesarian section in public and private facility are compared, the rate at public facility emerges to be higher than that at the private facility. In overall terms, 47 percent of the women delivered through caesarian section while 53 percent delivered normally.

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4.2 Regression Results

In this section we report estimation results of a logit model of determinants of a caesarian birth. The results are as shown in the table 4.2.

Table 4.2: **Binary Logit Results - Probability of Delivering through a Caesarian Section**

Independent variables	Coefficient	Standard error	z	p-value|
Constant	124.175	1.460	1.460	0.144
Post secondary (1= at least secondary education)	-0.601	1.103	-0.545	0.586
Employed (1= employed)	-0.081	0.645	-0.125	0.900
Nairobi (1= lives in Nairobi)	-1.911**	0.688	-2.779	0.005
Health facility (1=private)	-4.386**	1.283	-3.419	0.001
Log of cost per visit	-2.806**	0.969	-2.895	0.004
Log of distance	-0.135	0.239	-0.563	0.574
Log of cost of a caesarian	3.247**	0.457	7.101	0.000
Log of monthly income	0.929**	0.359	2.585	0.010
Log of age	-86.027	50.182	-1.714	0.086
Log of age squared	12.804	7.321	1.749	0.080
Number of observations 189				
Log of likelihood function = -56.944				
R^2 =0.564				

** Statistically significant at 5 percent level.

4.2 Logit Regression Results: Caesarian Births

It is evident from Table 4.2 that the logit index for a choice of caesarian section declines as a woman's level of education rises. This implies that the probability that those women with primary level of education would deliver their children through caesarian section was greater than that of women with at least a secondary level of education.

The signs on the coefficient for cost per visit to the antenatal clinic and that of distance to the nearest health facility were negative as expected though the coefficient on distance was not statistically significant. These key access variables determine whether one attends clinic or not. Distance was probably the most important price-like factor from the perspective of households that affected demand for a caesarian birth. Distance is directly related to the magnitude of the out- of- pocket and time costs for traveling to a health facility to obtain antenatal care and even to deliver a child. Therefore, the probability that a woman would deliver through a caesarian section should decline when the cost per visit to antenatal clinic and distance from the health facility increases.

Age, a variable that captures biological characteristics of a woman, shows that the probability of a woman delivering through a caesarian section increases with age. This implies that the probability of younger women delivering through a caesarian section is smaller than that for older women. The effect of this variable on a caesarian section delivery is, however, not statistically significant.

The logit index for a choice of a caesarian section delivery however is lower for women with wage employment relative to those without employment. That is, the probability that women who are not employed would deliver their children through a caesarian section is greater than of the women who are employed.

The probability of a woman delivering through a caesarian section is greater among non-Nairobi residents than women who reside in Nairobi. Monthly household income is found

to have a positive effect on the probability of a caesarian birth. This means that probability of a woman delivering through caesarian section increases with her income.

The probability of a woman going through caesarian delivery increases with the cost of a caesarian. The results suggest that physicians are likely to perform caesarian section operations for financial reasons. This variable captures income to physicians for caesarian deliveries. As is evident the effect of this variable is statistically different from zero.

It can be seen from table 4.2 that the logit index for a choice of a caesarian section delivery is lower at private health facilities than at public hospitals. This implies that the probability o f w omen d elivering t hrough a caesarian section is greater at public health facilities t han a t p rivate facilities. The effect of this variable is statistically significant. The results show that 56.4 percent of the variation in the probability of a caesarian section delivery is explained by variations in the independent variables included in the logit model.

Table 4.3: Binary Logit Results - Probability of delivering in a private health facility (Public hospital is the reference facility).

Independent variables	Coefficient	Standard Error	z	p- value
Constant	-44.690**	19.550	-2.286	0.022
Employed (1= if employed)	0.260	0.972	0.267	0.788
Nairobi (1= if resides in Nairobi)	-3.909**	1.252	-3.122	0.002
Post secondary (1= at least secondary education)	2.111	1.438	1.468	0.142
Log of distance	-0.140	0.351	-0.399	0.691
Log of cost of delivery	3.983**	0.806	4.942	0.000
Complication (1= if mother had complication)	-8.016**	1.841	-4.354	0.000
Insurance (1=if has insurance)	0.745	1.121	0.665	0.506
Log of cost per visit	-0.133	3.625	-0.037	0.971
Log of monthly income	1.504**	0.767	1.961	0.050
Number of observations 189				
Log of likelihood function $= -22.882$				
R^2 $= 0.815$				

** Statistically significant at 5 percent level.

4.3 Logit Regression Results: Choice of Private Health Facility

The logit index for a choice of private health facility is sensitive to a woman's employment status. The probability that women who are not employed would choose to deliver in a private health facility, rather than at a public facility is smaller than that of the woman with wage employment.

Distance to the nearest health facility and cost per visit to antenatal clinic, as expected, are found to be negatively correlated with the probability of using a modern health facility. However, the effect of distance on attendance at a private health facility is

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greater than at a public facility. The probability of a woman choosing to attend a private health facility when distance is great is low, and when the element of cost per visit is factored in, it is even lower. Going to a far away private health facility means additional cost. Therefore, one would rather attend a public health facility because service costs are lower compared to those of a private health facility. However, These effects are not found to be statistically significant.

The signs on the coefficient for a woman's education and on monthly household income are both positive. This means that the choice of a private health facility increase with the woman's education, and with her monthly income. The probability that those women with primary level of education and low income would choose a private health facility for their delivery is smaller than women with higher level of education and higher income.

Women reside in Nairobi have a lower probability of delivering in a private health facility than those who stay outside of Nairobi.

Cost of delivery is positively correlated with the choice of a private health facility, the higher the cost of delivery, the higher the probability of delivering in private hospital compared to a public hospital. This is probably because cost of delivery is a proxy for quality of service.

Women with insurance cover are more likely to deliver in a private health facility. However the effect of insurance is statistically insignificant.

Probability that those women with complication would choose to deliver their babies in a private health facility, rather than in a public is low. This gives the impression that complications do not play a major role in determining the choice of type of health facility from which to seek delivery services. A woman would still attend a public health facility when she knows that she has a complication that might necessitate caesarian section delivery. The effect of this variable is statistically significant. About 81.5 percent of the

variation in the probability in choice for a private health facility is accounted for by the variables included in the logit index.

4.4 Simulation

In this section we simulate the effect of cost per visit to the clinic, monthly income of the household and distance to the nearest health facility on the probability of a caesarian birth and of a visiting a private health facility for delivery. We changed the sample mean of each of these variables by 100 percent and simulated its effects on the probability of a caesarian, and of a visit to a private clinic. In other words, sample means were changed and the resultant probabilities compared with the probabilities estimated when all variables were at their sample means.

Table 4.4: Simulated Probability of a Caesarian birth and of visiting Private Health Facilities.

Policy intervention: doubling the following	Probability of a caesarian birth	Probability of visiting a private health facility.
Log of cost per visit	$5.09e^{-07}$	0.90
Log of distance	0.55	0.94
Log of monthly household income	0.99	0.99
Base probabilities	0.60	0.95

The one variable that overshadowed all others in explaining the probability of caesarian birth is monthly household income. When the sample mean of monthly household income was doubled (increased by 100%) it raised probability of caesarian section delivery by 65, percent that is, from 0.60 to 0.99. The Probability of choosing private health facility on the other hand was increased by 4.2 percent, that is, from 0.95 to 0.99. This implies that as a household's income increases, demand for both caesarian birth at private health facility increases.

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Changing sample means of distance by 100 percent, however, lowered probability of choosing caesarian section delivery by 8.3 percent that is form 0.60 to 0.55; while that of choosing private health facility for delivery was lowered by 1.1 percent that from 0.95 to 0.94. Since the impact is not big, lowering distance will as well not have a significant difference on the probability.

Changing sample means of cost per visit (price) lowers probability of choice of caesarian by a bigger margin of almost 100 percent; that is from 0.60 to $5.09e^{-07}$. It also reduced probability of choice of private health facility by 5.3 percent; that is from 0.95 to 0.90. This implies that as cost per visit to clinic rose, demand for caesarian section and private health facility declined ceteris paribus.

4.6   Elasticities of Demand

Table 4.5 shows elasticity of demand with respect to price (cost per visit), distance and monthly household income.

Table 4.5: Elasticities of Demand

A unit % change in:	Percentage change in probability of a Caesarian birth	Percentage change in probability of a visit to a private health facility
Cost per visit to clinic	-1.00	-0.05
Distance to the nearest health facility	-0.083	-0.01
Monthly household income	0.65	0.04

It is evident that the probability of a caesarian birth is most sensitive to changes in monthly household income. A 100 percent increase in sample mean of monthly household income would lead to a 65 percent increase in the probability of choosing a caesarian section delivery. It would also lead to a 4 percent increase in the probability of

choosing a private health facility for delivery over a public hospital. However, the demand for caesarian births is income inelastic, a finding that suggests that it is a necessary good.

In contrast, the probability of a caesarian birth would decline by 100 percent following a doubling of the cost of the to maternity clinics. Thus is price elasticity of demand for this service is unitary. However, the probability of a visit to the private health facility for delivery is price inelastic. Furthermore, the probability of a caesarian and of a visit to a private clinic responds inelastically to changes in distance.

CHAPTER FIVE

CONCLUDING REMARKS

5.0   Policy Implications

In this study we looked at supplier-induced demand for caesarian delivery in both private and public hospitals in Nairobi using survey data from 189 women.

The analysis of the caesarian utilization lends considerable support to the demand induced hypotheses. Income has a positive and significant effect on the probability of caesarian birth. Increase in the probability of selective caesarian as income increases could be a contributing factor.

Cost of caesarian delivery has a positive and significant effect on caesarian births. This cost captures the potential income physicians can gain from caesarian. If the cost of a caesarian delivery is high physicians are likely to induce more demand for caesarian for financial reasons. Also, it is clear from the study that as age of the mother increases, the probability of delivering through caesarian rises.

Distance and cost per visit to the clinic are negatively related to probability of a caesarian section, and that of visiting of private health facility for delivery. They both reduce demand for these services as expected.

However, some unexpected results were obtained. Though a higher probability of caesarian cases is expected at private hospitals (being profit motivated and business-like), than at public hospitals, results show a different picture. The probability of a caesarian is higher at public hospitals. Education level and other socio-economic factors had negative but insignificant effects on the probability of caesarian birth. These results were not expected and do not conform to those reported in the literature.

5.1   Policy Recommendations

From the findings of this study, some elements of supplier-induced demand have been detected, though the magnitudes are generally not statistically significant due to the study's small sample size. Both descriptive and regression results show that women of all calibres are affected by physicians' decisions. As a matter of necessity, therefore, women in Kenya and Nairobi in particular, should be exposed to reproductive health and particularly safe motherhood information and education. Such information and education would empower them and help inform their decision-making on an array of reproductive health issues. Moreover, it is their right to have children naturally, not unless a caesarian is mandatory. The government and the private sector practitioners should introduce antenatal classes in all hospitals where trained nurses should offer lessons to expectant mothers who attend clinics about their health and rights in pregnancy, so that physicians do not take advantage of their situation.

The government should also regulate cost of delivery in all hospitals - private and public alike, as health issues are too crucial to be left entirely to the market. This would also help prepare such expectant mothers to know beforehand, the amount of money they would be required to pay for delivery services, and not be surprise with exorbitant bills upon delivery, as is the current situation in most hospitals. Differences in the costs caesarian and normal delivery should be minimal to deter the wayward and unprofessional physicians who are bent on misleading mothers for a financial gain.

The government should also build more health facilities that specialize in maternal and child health c are so that women can easily reach these centers because distance deters demand for maternal and child health services, as we have seen in this study.

5.2   Limitations of the Study

The results from this study should be interpreted with caution because of the strong assumptions underlying its analytical models. For example if assumed that women do not choose what mode of delivery they want. Physicians decide for them whether they should have a normal or a caesarian birth. This assumption may not be realistic because we have cases were a woman would want to maintain her sexual function and or fears labour pain because of the length of time that it takes and so chooses caesarian birth.

The quality of data collected for the study may not provide a complete picture of supplier-induced demand. A hospital survey would have been the best for the study, but due to time and financial constraint, and long procedures that have to be followed before a hospital survey is carried out, this was not possible. These constraints are the reason as to w hy the study dealt with the demand side of child delivery and did not incorporate supply side factors.

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APPENDICES

Appendix 1:Selected socioeconomic characteristics of Mothers with caesarians

Background Characteristics	Percentage Delivery By Caesarian
Mother's Age at Birth	
<20 years	5.8
20-34 years	7.6
35 years plus	3.0
Birth Order	
1	9.5
2-3	6.9
4-5	5.6
6+	4.5
Place of Residence	
Urban	10.5
Rural	6.0
Province of Origin	
Nairobi	12.6
Central	10.9
Coast	6.9
Eastern	8.0
Nyanza	1.9
Rift valley	8.8
Western	3.9
Mother's Level of Education	
No education	3.6
Incomplete Primary education	4.4
Primary complete	7.4
Secondary education and above	11.2
Total	**6.8**

Source: Kenya Demographic and Health Survey (1998)

Appendix 2: Sample of the questionnaire used in the study

Questionnaire no._____

1.Age in years _____

2.Marital status?

a) Married　　　　　b) single　　　c) divorced/separated　　　　d) widowed

3. Highest level of education?

a) Non and primary　　　　　　　　　　b) secondary and above

4. What is your occupation (main activity for a living)? _____

5. Under what category would you classify your total monthly income (in KSh.)?

a) Less than 3000　　　b) 3001-6000　　　c) 6001-10000　　　d) 10001-15000

e) 15001-20000　　　f) 20001-30000　　　g) over 3000

6.If married, what is your husband's occupation (main activity for a living)?_____

7. Under what category would you classify his total monthly income (in KSh.)?

a) Less than 3000　　　b) 3001-6000　　　c) 6001-10000　　　d) 10001-15000

e) 15001-20000　　　f) 20001-30000　　　g) over 30000

8. Where do you stay? Which estate in Nairobi? _____

　　　　　　　　　　If outside Nairobi, (where)? _____

9.Do you have any child born between the year 1993-2003 may? a) Yes　　b) No

10. How many do you have? _____

11. Name of child　　　mode of delivery　　　hospital type　　cost　of　delivery

i)_____　　　_____　　　_____　　　_____

ii)_____　　　_____　　　_____　　　_____

iii)_____　　　_____　　　_____　　　_____

iv)_____　　　_____　　　_____　　　_____

v)_____　　　_____　　　_____　　　_____

12. Were you aware that you had a complication that needed caesarian?

a) Yes　　　b) No

13. If yes what was the complication? _____

14. Who paid for your medical /hospital expenses?

a) Family and other resources.   b) Company and family health insurance cover

15. What is the approximate distance from your home to the nearest hospital?
_____

(Thank you very much for your time)