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Child Healthcare Seeking Behaviour in Kenya

George Kosimbei

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Social Sector Division
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Abstract

Although child healthcare receives enormous attention from governments, households and international organizations in developing countries, the economics of child healthcare in Kenya remain unexplored, denying this field the tools of analysis that could lead to optimal decision making. Good health in children requires significant amounts of resources. Healthcare providers will need to provide quality service while household will need to access health facilities to achieve maximum health benefits.

This study identifies and measures determinants of child health seeking behaviour in Kenya, using a multinomial logit model. The study analyzed four choices: public (government) hospital, mission (private not for profit) hospital, private (private for profit) hospital and other treatment facilities not in the three presented cadres. Out of a 100 children who seek advice for fever, 44 visit public health facilities, 10 visit mission hospitals or clinics, and 25 visit private health facilities. The remaining visit other facilities for healthcare, including herbalists, shops and community health workers.

The study findings reveal that distance to the health facility, sex of child, total number of siblings, mother's level of education, and mother's age determine the choice of facility for seeking advice for fever. As observed in most studies, the mother's level of education is strongly linked to child survival. Education exposes mothers to information about better nutrition, use of contraceptives to space births, and knowledge about childhood illness and treatment. Childhood mortality rates are considerably higher among children born to women in their forties, and lowest among children whose mothers are age 20-29 years at the time of birth. The length of birth interval has a significant impact on a child's chances of survival, with short birth intervals considerably reducing the chances of survival. As the birth interval gets longer, the mortality risk is reduced considerably. Children born less than two years after a prior sibling suffer substantially higher risks of death than children born after intervals of two or more years. Size of the child at birth also has a bearing on the childhood mortality rates. Children whose birth size is small or very small have a 50 percent greater risk of dying before their first birthday than those whose birth size is average or larger.

Definition of Terms

Infant mortality rate: The probability of dying between birth and exactly one year of age, expressed per 1000 live births.

Under- five mortality rate: The probability of dying between birth and exactly five years of age, expressed per 1000 live births.

Life expectancy at birth: The number of years a new born infant would live if prevailing factors of mortality at the time of birth were to stay the same throughout the child's life.

Crude birth rate: The number of births per 1000.

Child mortality: The probability of dying between the first and fifth birthdays.

Crude death rate: The number of deaths per 1000.

Total fertility rate: The number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children.

Anthropometric indices: These are summaries of nutritional status on height and weight of children, which reflect past deprivation.

Immunization rate: The percent of surviving children age 12-23 months who received measles vaccine; three doses of DPT; all vaccinations, namely BCG, three doses of DPT and oral polio, and measles.

Percent of children stunted: Percent of children whose height measurement is more than two standard deviations below the median reference standard for their age, as established by the WHO.

Percent of children underweight: Percent of children whose weight measurement is more than two standard deviations (moderately underweight) or more than three standard deviations (severely underweight) below the median reference standard for their age, as established by the WHO.

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1. Introduction

The World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Good health is both a basic right and a prerequisite for rapid economic development. Health is a priority goal in its own right as well as a central input into economic development and poverty reduction. Good health constitutes one of the basic needs and contributes significantly towards enhancing and maintaining the productive potential of the people. Improving health has positive impacts on longevity, adult productivity, earnings, quality of life and socio-economic development. It is in view of that understanding that private and the public sector should invest heavily both in healthcare delivery and the expansion of health infrastructure (Gesami, 2000).

The health sector in Kenya has not been able to expand as rapidly as the population to ensure adequate coverage, accessibility and acceptable quality of healthcare for both children and adults. From the 1999 Kenya National Population Census, infant mortality rate per 1000 live births stood at 77.3 while the under- five mortality was 166. Crude death rate was 11.7 while life expectancy at birth was 52.8 for males and 60.4 for females. Recent household and demographic surveys have indicated a decline in some of these health indicators. For example, the 2003 Human Development Report 2004 puts the average life expectancy in Kenya at about 46.4 years, with infant mortality rate being 78 in 2003.

Child healthcare services exist in the form of immunization and treatment of diseases. A child is a human being of ages one to nine years[1]. Nearly 50 percent of the population of Africa are children. Most of them are born healthy, but approximately 170 out of every 1000 children born alive die before the age of five years (under-five mortality). There are also many non-fatal diseases in this age group that lead to suffering and

[1] A child in this study is taken to be of 1 to 3 years.

permanent damage to health and development. According to the World Health Organization (WHO), a child is considered fully vaccinated if he or she has received a BCG vaccination against tuberculosis; three doses of DPT vaccine to prevent diphtheria, pertussis, and tetanus; at least three doses of polio vaccine; and one dose of measles vaccine. These vaccinations should be received during the first year of life (Kenya Demographic and Health Survey, 2003). The percentage of children with a vaccination card dropped from 69 in 1993 to 55 in 1998. This indicates a decreased access to health services. Full coverage (all vaccines) increased from 63 percent in 1989 to 79 percent in 1993 but dropped to 65 percent in 1998. Between 1993 and 1998, there was a decline in immunization across the provinces. Children of mother's with secondary education and above had the highest level of vaccination (79.2%) in 1998 while those with mothers with no education had the lowest level of 53.4 percent. Furthermore, the United Nations Development Programme estimates that 17 percent of children do not reach age five in sub-Saharan Africa. Acute respiratory illness, malaria, and dehydration caused by severe diarrhoea are major causes of childhood mortality in Kenya. Prompt medical attention when a child has the symptoms of these illnesses is, therefore crucial in reducing child deaths.

The paper is organized as follows. Section 1 presents a brief overview of the health care system in Kenya, epidemiological profile, provision of healthcare services, policy and policy shifts and healthcare demand. Section two discusses the demand for healthcare and reviews the related literature. Section three deals with the theoretical and empirical models while section four provides data analysis. Section five provides conclusions, summary and recommendations.

1.1 Healthcare System in Kenya

Despite a decline in economic performance in Kenya, cumulative gains have been made in the health sector (Government of Kenya, 1998). The

Kenyan population increased from 5.4 million in 1948 to 15.3 million in 1979, and rose to 24.5 million in 1993, and stood at 32 million by 2001. Population growth rate had declined to 3.4 percent in 1993. Results from the 1998 Demographic and Health Survey show that total fertility rate declined from 6.7 children per woman in 1984-1989 to 4.7 children per woman in 1998. Infant mortality rate declined from 104 per 1000 to 67 per 1000 over the same time period. Almost 50 percent of Kenya's population is under 15 years while 10 percent are over 50 years.

1.1.1 Epidemiological profile

Generally, preventable vector borne diseases are the most important cause of morbidity and mortality nationwide. Malaria and respiratory diseases account for almost 50 percent of all reported diagnoses, and intestinal parasitic disease plus diarrhea increase this to 60 percent of all reported diagnoses (Government of Kenya, 1998). Preventable and vector- borne diseases are responsible for the greatest burden of disease. In 1993/94 the five leading causes of morbidity were malaria (27%), respiratory diseases (25%), skin diseases (8%), diarrhoeal diseases (4%) and intestinal worms (4%). All the other conditions accounted for 32 percent. 78 percent of loss of life in Kenya is attributed to only 10 diseases, most of them being preventable (Government of Kenya, 1998).

1.1.2 Provision of health services in Kenya

Provision of health services involves various players on the supply-side of the health system. These include public and private healthcare providers, among them hospitals, dispensaries, chemists, traditional healers, and retail shops. Public (government) healthcare institutions include three (30 national and specialized hospitals, eight (8) district and sub-district hospitals, 440 health centres and 1,527 dispensaries (Government of Kenya, 2004). Dispensaries and health centres form the

lower level facilities in the health system and are supposed to refer cases they cannot treat to the first level referral hospitals (district and sub-district hospitals).

The non-governmental healthcare providers include private, mission and NGO health facilities. Majority of the latter tend to be faith-based, and are are mainly financed by donors. They charge user fees, and their charges are often lower than in private hospitals. There are about 2,042 non-governmental health facilities in Kenya, accounting for about 47.6% of the total hospitals in Kenya (Government of Kenya, 2001). Table 1 shows the distribution of health facilities in Kenya, together with the populations they are expected to cover.

1.1.3 Policy and policy shifts

Health policies and strategies in Kenya are geared towards reducing incidence of diseases, improving the health status, and therefore the quality of life of the general population, children included (Government

Table 1: Distribution of health facilities and population in 1999

Province	*Total*	*Population*	*No of *HF/100,000*	*Population/HF*
Nairobi	358	2,143,254	17	5,987
Coast	467	2,487,264	19	5,326
Eastern	842	4,631,779	18	5,501
N/Eastern	72	962,143	7	13,363
Central	470	3,724,159	13	7,924
R/Valley	1,251	6,987,036	18	5,585
Nyanza	551	4,392,196	13	7,971
Western	283	3,358,776	15	11,868
Total	4,294	28,686,607	15	6,681

*HF is health facilities in full.

Source: Health Management Information Systems, 2001

of Kenya, 2000). Since the attainment of independence in 1963, the government has given high priority to the improvement of health status of Kenyans. It recognizes that good health is a prerequisite to socioeconomic development, and its commitment to the provision of health services is evident from the phenomenal expansion of the network of government health facilities across the country (Government of Kenya, 1994). The government policy in relation to the health of Kenyans is clearly stipulated in the Kenya Health Policy Framework (1994). The framework contains the broad context for health reform initiatives in Kenya. The overall aim of the Kenya health policy framework is to improve the health status of the Kenyan population, with the goal of providing efficient, effective, accessible and affordable curative, promotive and preventive health services. The policies that the government has pursued over the years have had a direct impact in improving the health status of Kenyans.

Kenya's healthcare policy at present revolves around the Millennium Development Goals (MDGs) on health, namely: reduce by two thirds the mortality rate among children under five years; reduce by three quarters the maternal mortality ratio; halt and begin to reverse the spread of HIV/AIDS; and begin to reverse the incidence of malaria and other major diseases by 2015.

1.1.4 Child mortality

After independence in the early 1960s, child mortality in Kenya fell rapidly. Until around 1980, the under five-mortality rate (U5MR) fell at an annual rate of about 4 percent per annum. This rate of decline slowed in the early 1980s, to about 2 percent per annum. Data from the 1998 Kenya Demographic and Health Survey showed that far from declining, the under-five mortality rate increased by as much as 25 percent from the late 1980s to the mid 1990s. The adverse trend coincided with a

number of other adverse trends: stagnation in growth of per capita income, declining levels of immunization, falling school enrolment, and the emergence of an HIV/AIDS epidemic. However, on the contrary, fertility fell by about 30 percent from the mid 1980s to the mid 1990s (Hill, 2002). The primary causes of childhood mortality change as children age, from factors related mostly to biological conditions to factors related mostly to their environment. After the neonatal period, post-neonatal and child mortality are caused mainly by childhood diseases and accidents (Kenya Demographic and Health Survey, 2003). There is need to reverse the trend of child mortality in Kenya if the millennium development goals (MDGs) are to be achieved.

Mortality differentials by place of residence, province, educational level of the mother, and wealth index are presented in Table 2.

Differentials by place of residence show that the under-five mortality rate is 26 percent higher in rural areas than in urban areas (117 and 93 deaths per 1000 live births, respectively). The rates by province display considerable differentials. Except for neonatal mortality, all childhood mortality indicators are highest in Nyanza Province and lowest in Central Province. Under- five mortality is highest in Nyanza Province (206 deaths per 1000 live births), followed by North Eastern Province (163 per 1000), and lowest in Central Province (54 per 1000) and Rift Valley (77 per 1000) provinces. The same pattern is also observed in infant mortality rates, with the highest rate in Nyanza Province (133 deaths per 1000 live births) and the lowest in Central Province (44 deaths per 1000 live births).

Childhood mortality rates by sex of child, age of mother at birth, birth order, previous birth interval, and size are presented in Table 3.

The relationship between mother's age at birth and childhood mortality shows the expected U- shaped pattern, with children of the youngest and the oldest women experiencing the highest risk of death. Childhood mortality rates are considerably higher among children born to women

Table 2: Early childhood mortality rates by socioeconomic characteristics

Background characteristic	Neonatal mortality	Post-neonatal mortality	Infant mortality	Child mortality	Under-five mortality
Neonatal, post neonatal, infant, child, and under-five mortality rates for the ten year period preceding the survey, by background characteristics, Kenya 2003					
Residence					
Urban	26	36	61	35	93
Rural	34	44	79	41	117
Province					
Nairobi	32	35	67	30	95
Central	27	17	44	10	54
Coast	45	33	78	41	116
Eastern	32	24	56	29	84
Nyanza	27	106	133	84	206
Rift Valley	37	25	61	17	77
Western	25	54	80	70	144
North Eastern	50	41	91	79	163
Mother's education					
No education	43	37	80	51	127
Primary incomplete	35	62	97	54	145
Primary complete	29	40	69	31	98
Secondary +	25	19	44	20	63
Wealth quintile					
Lowest	38	58	96	59	149
Second	33	42	75	37	109
Middle	35	47	82	43	121
Fourth	30	23	53	26	77
Highest	26	36	62	31	91

Source: Kenya Demographic and Health Survey, 2003

in the age of around forty and lowest among children whose mothers are aged 20-29 years at the time of birth. A similar U shaped pattern occurs with the birth order of the child, but only for neonatal mortality (Kenya Demographic and Health Survey, 2003). After the neonatal period, first order births show lower mortality risks than births of order two to six. The length of birth interval has a significant impact on a child's chances of survival, with short birth intervals considerably reducing the chances of survival. As the birth interval gets longer, the mortality risk is reduced considerably. Size of the child at birth also has a bearing on

Table 3: Early childhood mortality rates by demographic characteristics

Demographic characteristics	Neonatal mortality	Post neonatal mortality	Infant mortality	Child mortality	Under- five mortality
Neonatal, post neonatal, infant, child, and under- five mortality rates for the ten year period preceding the survey, by background characteristics, Kenya 2003					
Child's sex					
Male	36	47	84	42	122
Female	29	38	67	39	103
Mother's age at birth					
<20	34	45	79	41	117
20-29	31	40	71	36	104
30-39	32	45	76	46	119
40-49	(75)	57	132	(89)	209
Birth Order					
1	35	27	62	29	90
2-3	28	42	69	34	101
4-6	28	48	77	42	116
7+	51	61	112	73	176
Previous birth interval					
<2	57	77	134	56	182
2 years	22	40	62	49	108
3 years	28	32	60	38	95
4+ years	21	38	59	25	83
Birth size					
Small/very small	63	40	103	Na	Na
Average or larger	26	43	68	Na	Na

Source: Kenya Demographic and Health Survey, 2003.

the childhood mortality rates. Children whose birth size is small or very small have a 50 percent greater risk of dying before their first birthday than those whose birth size is average or larger.

The ability to access information, make decisions, and act effectively in their own interest, or the interest of those who depend on them, is an essential aspect of empowerment of women. If women, the primary caretakers of children, are empowered, the health and survival status of their infants would be enhanced.

1.2 Motivation for the Study

Several studies have been done on the demand for healthcare in Kenya. For example, Gesami (2000) estimated the demand function for

healthcare, along with empirically examining the implementation of healthcare financing reforms in Kenya. The function estimated encompasses the whole set of healthcare demand. There is need to estimate a specific demand function for child healthcare, with reference to the choice of the facilities. This is because the existing demand function cannot be effective when utilized to make policy decisions on child healthcare. In this case two issues remain unclear, what are the determinants of the demand for child healthcare in Kenya? And how do these determinant relate to the choice of facility?

1.3 Objectives

The general objective of this study is to estimate the demand function for child healthcare services in Kenya. The specific objectives are to:

- Identify and measure the significance of the determinants of choice of a health facility for child healthcare in Kenya.
- Estimate the marginal effects of the determinants of the choice of a health facility for child healthcare.
- Suggest implications for policy.

1.4 Justification

Child healthcare is a critical area of inquiry because it involves discrete choices. The country's future depends on the current health status of children. With this in mind, estimation of a demand function for child healthcare can shed more light on the demand patterns, which may allow policymakers to target child survival goals more effectively. In Kenya, more information is required on child healthcare to assist in targeting interventions to counter escalating child mortality.

2. Review of Related Studies

Several studies have been done on healthcare demand. In this section, the studies are reviewed under two broad areas of theoretical and empirical literature.

2.1 Theoretical Literature

The literature borrows heavily from the standard utility-maximizing framework. It is assumed that individuals use their available resources to acquire health. To admit a substantive choice, individuals must have alternative uses for their resources. We bundle all of these alternative uses into a generic consumption good, denoted by c. Utility is then represented as a function u(c,h), where h is the level of health (not quantity of health consumed, but health enjoyed).

Households and especially mothers make choices about their children's healthcare, for example, whether to immunize their children and how often to have check-ups. The process of making such decisions can be complicated, because it may involve accumulated advice from friends, physicians, and others, weighing potential risks and benefits, and foregoing other types of consumption. Health can be treated as a commodity, which individuals have well defined individual preferences. In this case, consumer theory can be used to investigate the determinants of demand for child healthcare. The existence of insurance may suggest that many healthcare services are provided at zero or low monetary prices, and so the standard model would suggest that demand should be infinite, or at least extremely high. Indeed, excess demand by some insured individuals is seen as a problem in many industrial economies, but in the developing country context, underutilization is generally more of a concern. The main reason for this is lack of supply, especially in rural areas. But even when clinics and services are available, utilization rates can be low, due to both significant non-pecuniary costs of

consuming medical services and poor quality. Travel costs together with quality considerations may be introduced into the model of demand. Individuals may be forced to walk for long distances to seek medical attention. This may limit demand in some instances. Quality considerations may play a major role in the demand for child healthcare. Households consider the quality of facilities and the healthcare their children receive. They are willing to pay more for services like laboratory testing than just having a prescription.

Several reasons have been fronted for not using medical care facilities in Kenya. For example, 40 percent of the poor did not seek medical care because it was too expensive, 26.9 percent did not seek care because they considered illness to be minor, and 22.2 percent treated themselves. Among the non-poor, about half of them did not use medical care because they had only minor illnesses. Only 16.4 percent did not seek medical care because it was too expensive, which was much higher in the rural areas (19.5 percent) than urban areas (1.8 percent). Religious beliefs as a reason for not using medical care were only significant for the poor in the rural Coast areas where it was 9.6 percent. Among the non-poor, this was highest in rural Central (4.3 per cent) (Government of Kenya, 2000a).

More of the poor in Kenya take over one hour to reach the nearest qualified doctor. The majority of the non-poor prefer private treatment (51.4 percent utilize private doctors/dispensaries, private hospital and pharmacies). Although this may not be an option for the poor, a considerable proportion (47.7 percent) do choose these actions first (Government of Kenya, 2000b). In most rural areas in Africa, one in three women live more than five kilometers from the nearest health facility (Mekonnen and Mekonnon, 2002). The worsening of child health outcomes due to the AIDS epidemic reaches beyond the effects of mother-to-child transmission. Children not infected with HIV may have higher morbidity and lower nutritional status in a household with an AIDS

patient because they are exposed to other infectious agents (Ainsworth and Semali, 2000). The increased mortality of prime aged adults may also have important consequences for the health of orphaned children and other co-resident young stars, through its economic impact. Producing healthy and well-nourished children requires key inputs, such as food and nutrients, healthcare, and the time of caretakers. The loss of productive adults reduces household income, indirectly reducing the ability to purchase or produce these inputs and directly reducing the adult time available to transform them into improved child health. Adults and parent's deaths worsen child health through their negative impact on household income and availability of adult time for production of child health. Educated parents should have healthier children, since they are more likely to be able to marshal information and other inputs that affect child health. Higher prices of medical care and food are expected to worsen child health by reducing the demand for healthcare and nutrients/purchased food, while better access to medical care, and child health services in particular, should be associated with better health outcomes. Higher wage rates for adults and children in the community are posited to raise the opportunity cost of time of caregivers, prompting them to reduce the time spent ensuring child health. Higher wages could also have a net positive effect on child health. Household wealth or assets is associated with better health through the ability to buy more medical care and to purchase more and better quality food.

2.2 Empirical Literature

Sarma (2003) employed a nested multinomial logit model to study the demand for outpatient healthcare in rural India. The study treats healthcare as only one of the several commodities over which economic agents have well-defined preferences. The study analyses the effect of price, income and health status on the demand for healthcare. The results reveal that price and income play a pivotal role in the demand for

outpatient care. The overall effect of price on demand is relatively inelastic, which indicates that there is a potential increase in revenue if user fees are imposed for publicly-provided outpatient care. The coefficients on distance variables are all negatively significant, implying that the higher the distance to a formal healthcare facility the lower the demand for healthcare. Quality of provider choice, proxied by the number of treatments, is positive and statistically significant determinant of choosing a private hospital, whereas this coefficient is negatively significant for private doctors and statistically insignificant for government facility. As an alternative interpretation, the higher number of treatments in private hospitals could be possible evidence of induced demand. Age has a positive effect on the use of government facility type and private hospital. The effect of age on doctor's clinic is negative. The effect of age squared is negative for all types of formal healthcare alternatives. This suggests that older patients prefer government facilities and private hospitals. Females are less likely to use formal care than males, suggesting possible gender bias in healthcare utilization. Educated individuals use more formal care of all types. Education increases the expected productivity of formal healthcare alternatives relative to self-care. The effect of household size on demand for healthcare is positive and significant. More members of the household may imply less attention to members of the household in terms of their appropriate nutritional intakes thereby contacting illnesses and utilization of more formal care. Lack of access to safe drinking water at the household level has a negative effect on the demand for healthcare. The number of bad habits also has negative effects on the demand for healthcare.

Gesami (2000) focused on understanding the determinants of demand based on factors specific to a facility and to a catchment area. The conceptual basis of the model is an abbreviated welfare function, which assumes that other welfare determinants, apart from health services are given. The medical care demand function has utilization of healthcare

services at the facility as the dependent variable, and the explanatory variables include: vector of own price, per capita income, vector of socio-economic characteristics, characteristics of facility, distance between facilities, and other factors affecting health service utilization, for example climate. The demand model is estimated using OLS, random effects, and robust regression results. The dataset used was derived from records of a sample of government and non-government health facilities. The facilities covered by the study were selected from an urban district, purposively selected, and from three rural districts (Kiambu, Kajiado and Machakos) contiguous to the urban district (Nairobi). The utilization of health services relates negatively to user fees, and positively to: real per capita income, availability of drugs, doctors and facilities was associated with increased demand. Closeness or high density of health facilities in a catchment area increases the rate of utilization of services. The study also finds that fee and policy changes in one area can have large spill- over consequences in adjacent areas. The study further establishes that the introduction of cost sharing is associated with outward shifts in health services demand.

Ainsworth and Semali (2000) studied the impact of adult deaths on children's health in Northwestern Tanzania. The study stresses the fact that there is very little evidence about the magnitude of the impact of adult deaths on child health through channels other than mother-to-child transmission of HIV. The study uses longitudinal socioeconomic data collected from households in the Kagera region of Northwestern Tanzania to assess the impact of the loss of adults and parents on the health of young children. An economic model of the demand for child health, which guides the choice of exogenous explanatory variables that are included as determinants, is estimated. The methodology assumes that households maximize the utility of their members over consumption, leisure, and child health, subject to a budget constraint and to the production function for child nutrition, solving for a reduced form

equation of the demand for child health in which all of the explanatory variables are exogenous:

$$H_{it} = H(E_i^{fm}, C_{it}, C_{ht}, C_{jt}, P_{jt}, W_{jt}, I_{ht}, D_{ht}, error_{it}) \quad \ldots\ldots\ldots\ldots\ldots\ldots 1$$

where P_{jt} and W_{jt} are community-level prices and wages, I_{ht} is exogenous household unread income, and D_{ht} is a measure of recent adult death in the household. A child's "orphan status" (the survival of his/her parents) is part of C_{it}, his/her individual endowment.

Equation 1 is estimated for three related dimensions of child health: morbidity on the day of the interview; height for age; and weight for height. Using morbidity, the impact of adult mortality on reported morbidity is critically linked with the household's wealth. The poorest children, who are patenal orphans or who live in households with a recent adult death, are significantly more likely to be reported ill, but the negative signs on most of the death-asset interactions indicate that the impact is less severe among households with greater wealth. Reported morbidity is strongly affected by community disease vectors. Children were more likely to be ill in communities where there had been an epidemic and where AIDS was cited as the major cause of adult death. Higher market prices and greater distance to the nearest market are also associated with higher child morbidity. A protected source of drinking water for the household is also associated with lower morbidity. The coefficient for height for age was interpreted as the marginal effect of a one-unit increase in the explanatory variable on the height- for- age- z-score, holding other explanatory variables at their means. Both parents' survival and recent adult deaths are associated with large deficits in height for age among children in the poorest households. The impact of maternal orphanhood is equally severe regardless of the household's assets, while the impact for paternal orphans is felt only among those in poorer households. A recent adult death is associated with a lower height for age in the poorest households (with a dirt floor) and the effect is

even greater in households with better housing. Orphans whose mothers were unschooled are the hardest hit in terms of age. The availability of health inputs and community disease vectors show strong effects on height for age. The further away the nearest health facility is, the lower the height, and the negative impact of distance on height for age is even greater for maternal orphans and children in households with recent adult deaths. However, maternal education and availability of healthcare are substitutes; that is, the more educated the child's mother is/was, the less important is the distance to a health facility in determining height. Neither orphanhood nor recent adult deaths have any statistically significant relation with weight for height. Mother's schooling is correlated with higher weight for height, but not at conventional levels of statistical significance. Better housing (having a concrete, tiled, or wooden floor, compared to a dirt floor) is the only household level socioeconomic variable with strongly significant positive relation to weight for height. Children in communities with more rainfall than the previous year have higher weight for height, and those in urban areas or in locations that are cut off from transport at certain times of the year have lower weight for height. The negative effect of urban residence may seem counter-intuitive, since urban children had lower, not higher morbidity.

Hallman (1999) examined how quality, price, and access to curative healthcare influence use of modern public, modern private, and traditional providers among 3,000 children aged 0 to 2 years in Cebu, Philippines. Lack of resources may the quantity and quality of services to suffer, which may contribute in part to observed low rates of utilization of public facilities, especially in rural areas. Using discrete choice models, factors affecting demand for services for children from modern public, modern private, as well as traditional health practitioners are investigated. The study further looks at the impacts of provider attributes, user fees, and distance to service. Poorly trained or insufficient levels of

staff and inadequate drug supplies may inhibit use of care even if services are affordable and geographically accessible. Additionally, if prices are raised when quality is already poor, utilization may drop off even more. The impact of reducing public subsidies depends not only on own-price effects, but also on cross-price influences. With a government fee hike, individuals may opt out of the healthcare market altogether. Alternatively, they may switch to other types of care such as private or traditional. The study also adds to our knowledge of the factors affecting utilization of health services for infants, since the first three years of life are the most crucial in terms of physical and mental growth and development. The model employed is developed from a household production model for health inputs and outcomes. It is assumed that the household maximizes a utility function, the arguments of which consist of health of the infant (H) and consumption of a composite good (G), conditional on (Z), a set of taste and preference shifters:

$$U = U(H,G;Z). \quad \text{.....2}$$

Health of the index child is produced by combining inputs in the manner implied by the health production function. The production function is written:

$$H = H(C,F;S,M,E,\mathcal{R}), \quad \text{.....3}$$

where the first two arguments are endogenous inputs into health, C is the quantity and quality of healthcare chosen and F consists of other health inputs, such as food and nutrient intakes and health related behaviors such as cooking, food storage, sanitation, and excreta disposal practices. S, M, and E are exogenous characteristics influencing infant health. S is the set of individual child attributes such as age and gender. M consists of household characteristics, including age, education, and family background of the child's parents.

The results indicate that healthcare choices for infants are influenced by access and quality, as well as by parental human capital, and household

socioeconomic status and composition. Distance to care substantially reduces demand. After controlling for distance, however, user fees at modern public and private facilities do not have significant impacts. Results for public fees are quite sensitive, though, to how community characteristics other than those describing health facilities are accounted for. Public fee parameters are close to zero and insignificant when detailed data on community influences are in the regression. However, when municipality-level dummies replace these attributes, public user fees have noticeable negative impacts on demand for public care. With municipality dummies, it could be concluded that demand is somewhat price sensitive, whereas with the detailed community variables, it could be assumed it is not. Oral rehydration therapy (ORT), vaccines, and family planning, as well as the composition of staff, have important positive effects on demand for public care, while availability of intravenous diarrhea treatments raises the chances of private care visits.

Use of traditional providers is increased if the practioner has recently attended a health training session. Higher socioeconomic status and parent human capital increases the likelihood of a child's visit to higher-quality modern private healthcare providers. Evidence of differential health investments between older and younger children and between boys and also girls is found. Demand for modern curative services rises up to the age of six months and declines sharply thereafter. Utilization is greater for male children despite the fact that their morbidity rates do not differ statistically from those of girls for the two-year period. Boys are more likely to be taken to more expensive care.

In a study on child health and the 1988-1992 economic crisis in Peru by Paxson and Schady (2004) the impact of the economic crisis on infant mortality and anthropometrics is investigated. The study shows that there was an increase in infant mortality rate of about 2.5 percent for children born in late 1989 and 1990, implying that about 17,000 more

children died than would have in the absence of the crisis. The crisis also affected the child's nutritional status in that those exposed were shorter compared to the same-aged children in 1996 and 2000. Since height reflects cumulative nutritional status, four year old children in 1992 who were born at the very beginning of the economic crisis displayed the lowest heights relative to their same aged peers from the 1996 and 2000 surveys, who were not exposed to the crisis. The results indicate that education was more protective of children's health in the earlier periods. The 1988-92 crisis in Peru was a profound shock to household income. Between 1985-86 and 1991, mean household income per capita dropped by 24 percent in urban areas, and by 27 percent in rural Sierra. This contraction in household income affected households of all characteristics. The crisis also led to reductions in public expenditures on health. Reductions in real wages for health sector workers led to labour unrest, forcing closures of public hospitals and clinics. There was an increase in home deliveries and a decrease in hospital deliveries between 1988 and 1990. Regressions of infant mortality on the place of delivery, including no controls for materials characteristics, indicate that infants born at home are 3.7 percentage points more likely to die than those born in hospitals. A change in the place of the delivery may be an indication that the quality of publicly-provided medical care had deteriorated, in which case the health effects could be larger. The movement to home births could also be a symptom of the decline in resources experienced by households during the economic crisis. The economic crisis coincided with a cholera epidemic, and this could have caused large increases in infant mortality and deterioration in the growth prospects of surviving children.

Chaudhuri *et al* (2003) estimated the reduced form demand for healthcare as a function of programme eligibility and individual, household and regional characteristics. Besides controlling for latent health status, more detailed community infrastructure factors and prices of medical services

for particular services are also controlled. In addition, the programme eligibility indicator is included. The structural equation underlying the observed behavior is given as:

$$P_i^* = \lambda'_i E_i + \alpha' I_i + \beta'_i H_i + \phi'_j R_j + \varepsilon_i \quad \ldots\ldots 4$$

where P_i^* is the individual's net benefit from seeking healthcare, E_i is a binary indicator variable, which takes on the value of 1 if the individual is eligible for subsidized/free healthcare, I_i is a vector of own characteristics, H_i is a vector of household characteristics, R_j is a vector of regional characteristics, and ε_i is a normally-distributed error term with zero mean and variance σ. The latent variable P_i^* is not observable. The results are seen on the individual's evaluation of (2), which is manifest in the choice made by the individual to seek healthcare or not to seek healthcare:

$$P_i = 1 \text{ if } P_i^* > 0 \quad \ldots\ldots 5$$

$$P_i = 0 \text{ if } P_i^* \leq 0 \quad \ldots\ldots 6$$

5 and 6 is estimated as a probit model. The dependent variable is " Sought healthcare if sick" (value of one if the individual sought healthcare if sick, zero otherwise). The key eligibility variables for the analysis are a set of categorical dummies that take value of one when the individual belongs to one of the eligible categories. Other control variables include: household income quintile indicators, age group dummies, gender, level of education, education of household head, urban rural indicators and regional dummies, and month fixed- effects.

Sahn, Younger and Genicot (2002) examined the pattern of healthcare demand in rural Tanzania. Besides price and quality effects, they also examined how education, age, marital status, duration of illness and household demographics affect healthcare choices. The paper employs a nested multinomial logit model with five options: no care (or self- care), care at a public hospital, care at a private hospital, care at a public clinic,

and care at a private clinic. Nesting the logit choices allows for the estimation of at least some of the covariances between ej's, which in turn allows cross-price elasticities to vary between options. Findings reveal price elasticities being far greater than unity for private clinics, private hospitals, and public hospitals. An uncompensated elasticity of demand for private services with respect to price of public clinics and dispensaries is high. There are also high cross price elasticities, implying that a price increase for any one service mostly causes substitution into other care services rather than a lack of care. Another finding is that the poor are far more responsive to prices than the non-poor. This implies that policies such as user fees and subsidies will have a much greater impact on service utilization by the low income, although actual changes in the probability of care are small for everyone, except for the case when prices rise.

There is greater demand for public clinics and dispensaries in those clusters with higher quality ratings for drug availability and the health clinic environment. The doctor-nurse quality variable yields a negative coefficient for public hospitals, revealing moonlighting. The education dummy variables, indexed on choice of provider, generally show the same pattern of increasing demand as education increases across all options. The rate of increase in demand with more education is greatest for public hospitals, and next for private hospitals, while the rate of increase in demand as education rises is lowest in the case of public non-hospital services. The gender variable has a negative sign, which indicates that for all treatment options, men are less likely to seek out available treatment. The tendency seems more pronounced for public clinics and hospitals. The revelations are that quality and price of healthcare are important determinants of health.

Howlader *et al* (2000) estimated the demand function for healthcare by rural households in Bangladesh. The study objectives were to obtain

adequate knowledge of the extent, determinants and elasticities of healthcare demand at the household level. The study follows Hicks' value and capital, where the function was broadened to include as explanatory variables, in addition to price, income of the consumer, prices of other commodities, tastes of the consumers among others. The demand function estimated in the study is of the form:

$$q_1 = f(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}, Y, \alpha_1, \alpha_2, \alpha_3) \ldots\ldots\ldots\ldots\ldots 7$$

The explanatory variables are (in the order of appearance) price of healthcare, price of consumption goods, cost of traveling to health facilities, cost of traveling to the market for consumption goods, value of time lost due to travel to the health facility, value of time lost due to travel to the market, cost of maintaining attendance for a sick person, value of time lost due to waiting at the health facility, value of time lost due to marketing, monetary gain accrued due to reduction of duration of disease effected by receipt of healthcare, permanent income, severity of disease, quality of care, and the level of education and motivation. The results revealed that most people were willing to pay for child immunization, tetanus toxoid, healthcare for children and women's healthcare. The price elasticity of demand is low, meaning increases in user fees led to insignificant declines in quantity demanded. Income elasticity was considerably high. However, the study did not estimate the logit regression due to paucity of relevant data.

Bedi *et al* (2004) studied the effects of user charges and quality of medical treatment on health service utilization patterns in Kenya, controlling for education, wealth, gender and the environment in which households live. The study uses a standard multinomial discrete choice model. The findings reveal that government health facilities provide healthcare of poorer quality than do private and missionary facilities, but they are also much cheaper and more readily available. The magnitude and signs of the price and quality elasticities of demand computed in this study

suggest that the negative demand effect of user charges is offset by the positive effect of improved service quality. A price increase in government health facilities has the effect of diverting demand to non-government clinics, but it increases demand for self-treatment by a negligible amount.

Govindasamy and Ramesh (1997) investigated the impact of maternal education on the utilization of maternal and child health services in India. The study shows that education in general and female education in particular exert a very strong influence in reducing child morbidity and mortality. Educated women are better able to break away from traditions to utilize modern means of safeguarding their own health and that of their children. Variables included in the analysis include: Mother's education, place of residence, employment status, caste, religion, child's sex, birth order, and age. The dichotomous dependent variables for child healthcare indicators are: whether or not sick children suffering from symptoms of acute respiratory infection and/or diarrhoea were taken to a health facility or health provider for treatment; whether children sick with diarrhoea were treated with oral rehydration salts and/or rehydration fluids; and whether children age 12-23 months at the time of interview are fully vaccinated. A logistic regression is run for each of the nine dependent dichotomous variables. The results reveal that education by itself has the strongest impact on maternal healthcare utilization. More so, mothers education is positively related to utilization of child healthcare services, and this relationship is consistent for all four types of child healthcare analyzed. When background variables such as residence, mother's work status, caste and religion, sex of the child, birth order, and age of the child are taken into account, mother's education continues to be a powerful, positive, and significant predictor of the utilization of child healthcare services in India.

Wagstaff (2001) studied the socioeconomic gradient of child mortality by cause of death in Cebu, Philippines. The study is motivated by the existing empirical evidence that poor children have a higher risk of dying

in childhood than better off children. It is known that inequalities in adult mortality in industrialized countries vary by cause of death, and it seems likely that the same is true of child mortality in the developing world. The study uses retrospective survey data from Cebu, and measures inequality using an index that is closely related to the index used in the measurement of inequalities in health and mortality.

Awiti (2002) estimated health-seeking behaviour of patients in Vihiga District of Kenya with an aim of establishing the factors that influence a patient's decision to seek outpatient medical treatment from a particular health facility and not another one. The paper uses a multinomial logit model to analyze patients' choice of a healthcare facility from which to seek treatment. The use is justified by the fact that the model estimates the effects of explanatory variables on a dependent variable with unordered response categories. The results reveal that the choice of a facility by a patient is dependent on the patient's age, gender, marital status, and highest level of education. The study recommends that health facilities should be prepared to deal with older patients as opposed to children.

3. Methodology

The study is based on the assumption that a sick child's parent has already decided to seek treatment from a public hospital[2], mission hospital[3], private hospital[4], and others[5]. A multinomial logit model is used to analyze the parent's choice[6] for a health facility. In this study, the dependent variable is the choice of the facility from which to seek treatment for the sick child. The explanatory variables are the parent and child characteristics, while the response categories are public hospital, mission hospital, private hospitals and others (coded as 1,2,3, and 4). The parent is considered as choosing only one.

3.1 Theoretical Model

Let C be the universal choice set that includes all possible choices for some population. For a particular individual, $n \in N$, $N = \{1,2,.....,N,\}$, the relevant choice set is $C_n \subseteq C$. This is because the nature of the illness may be such that some providers will not be chosen by some individuals or some providers may not be accessible to some individuals. Also, some providers may not be accessible to some individuals or a particular choice set may not be feasible in terms of affordability. Let J be the number of elements in C, and $J \leq J$ be the number of elements in C_n. When individuals need medical attention, they are faced with the above alternatives and choose the one that yields the highest utility. The observed attributes of alternative $j \in J_n$ faced by the patient $n \in N$ as the vector $z_{jn} \forall_j \in J_n$. Different patients might possibly make different choices when confronted with the same alternatives, because the subjective valuation that they

[2] Government hospital, health center, and dispensary.
[3] Mission hospital and clinic.
[4] Private hospital and clinic, Pharmacy, and private doctor.
[5] Includes herbalist, Community health worker and shop.
[6] A parent makes a choice on where to take the ill child.

place on possible alternative may depend on the specific characteristics of the decision maker, Some of those are observed and others are unobserved. Let the observed characteristics of the patient n as the vector X_n. The probability that patient n chooses alternative $j \in J_n$ then depends on the observed attributes of alternative j and the observed characteristics of the decision maker. Let us denote this probability as π_{jn}.

Modeling discrete choice situation essentially involves specifying π_{jn} as a parametric function of the general form $\pi_{jn} = f(z_{jn}, x_n, \beta)$. Let U_{jn} be the utility of choosing alternative j by patient n, which depends on the observed attributes of alternative j, Zjn; the observed characteristics of the patient x_n; and some unobserved characteristics that are not known. If everything is known, then the deterministic utility function can be specified as:

$$U_{jn} = U(z^*_{jn}, x^*_n) \forall_j \in J_n \quad \ldots\ldots 8$$

where z^*_{jn} is the all relevant attributes of alternative j faced by patient n and x^*_n is all relevant characteristics of the patient n. The patient n chooses the alternative from which s/he derives the maximum utility. Alternative $j \geq i$ *if* $U_{jn} \geq U_{in} \forall_i \in J_n, i \neq j$. In this deterministic setting, the probability that the patient n chooses alternative j is either one or zero depending on whether the alternative j gives the maximum utility or not. What we observe is only $Z_{jn} \subset Z^*_{jn}$ and $x_n \subset x^*_{jn}$, the relevant sub-vectors of the alternative-specific and individual-specific variables, respectively. We can therefore bifurcate the utility function into two sub-functions, one that is known up to a vector of parameters β to be estimated denoted as $V(z_{jn}, x_n, \beta)$, and the other that represents all factors and aspects of utility and alternative characteristics that are unknown, denoted as ε_{jn}. We can now specify the patient's utility function as:

$$V_{jn} = V(z_{jn}, x_n, \beta) + \varepsilon_{jn} \quad \ldots\ldots 9$$

We assume that the deterministic part of the utility function is known

and we want to predict patient's choice based on this limited information. If $U_{jn} \geq Uin \ \forall_i \in J_n$ then alternative j is chosen, otherwise some other alternative is chosen. Therefore, the probability of choosing alternative by individual is

$$\pi_{jn} = pr\left[V_{jn} + \varepsilon_{jn} \geq \max_{\substack{i \in J_n \\ i \neq j}} \{V_{in} + \varepsilon_{in}\}\right] \quad \ldots\ldots 10$$

Let the deterministic utility conditional on receiving care from alternative $j \in J_n$ be given by

$$V_{jn} = V(h_{jn}, c_{jn}) \quad \ldots\ldots 11$$

Where h_{jn} is the expected improvement in health after receiving care from alternative j and c_{jn} is consumption net of cost of healthcare. Let h_{on} be the expected health from a reference alternative (for example self care). Therefore, the change in expected improvement in health from choosing alternative j rather than the reference alternative is h_{jn}-h_{on} . If h_{jn}-h_{on} is positive then alternative j is supposed to have a positive impact on health of patient n. Let us denote this change in expected improvement in health from choosing alternative j is E_{jn}, that is, expected effectiveness or quality measure of alternative j. Therefore, the expected health production function is given by:

$$h_{jn} = E_{jn} + h_{on} \quad \ldots\ldots 12$$

In fact, E_{jn} depends on x_{jn}, which includes educational status, health status, severity of illness, and other patient characteristics, and z_{jn}

That is:

$$E_{jn} = E(x_{jn}, z_{jn}) \quad \ldots\ldots 13$$

Thus, the conditional utility function can be specified as

$$U_{jn} = V(E(x_{jn}, z_{jn}) + h_{on}) + \varepsilon_{jn} \quad \ldots\ldots 14$$

The unconditional utility maximization problem for patient n is therefore specified as $U_n^* = \max_{i \in c_n} \{U_{in}\}$, where U_n^* is the highest utility that patient n can obtain. The solution to this problem yields a probability choice systems, i.e., a system of demand functions for alternatives.

3.2 Empirical Model

Beginning with a linear function of the form

$$U_{jn} = \alpha_1 c_{jn} + \alpha_2 h_{jn} + \varepsilon_{jn} \quad \text{.....15}$$

the individual faces a budget constraint such that consumption plus the price of healthcare must be less than equal to income, which implies that $cjn = Y - Pjn$. Choice is also constrained by the health production function, which is ideally a function of both quality and set of individual characteristics. Therefore, the underlying indirect utility function can be written as:

$$V_j = \beta_{oj} + \beta_{1j} Y + \beta_{2j} P_j + \beta_{3j} X_j + \varepsilon_j \quad \text{.....16}$$

where $\beta_{1j} = \beta_{1k}$ and $\beta_{1j} = \beta_{2k} \forall_j, k \in C$. Since income does not vary across choices, $\beta_1 Y$ can be dropped from the estimation, or we need to impose the restriction that $\beta_{1j} = -\beta_2$. However, these implicit restrictions are often violated in empirical studies. The functional form adopted in this study is the parsimonious approach as used in Sarma (2003) and others, where prices and income is quadratic in the logs of net income.

$$V_j = \beta_{0j} + \beta_1 \ln(Y - P_j) + \beta_2 \left[\ln(Y - P_j)\right] + \beta_{3j} X_j + \varepsilon_j \quad \text{.....17}$$

The functional form relaxes the restrictions that income has no effect on provider choice, any assumption about the marginal rate of substitution, and inconsistency with the axioms of utility maximization.

Estimation of a choice model depends on the underlying distribution assumptions about the stochastic term. If each $\varepsilon_{jn}, \forall j \in j_n$ is distributed independently with an extreme value distribution, then the probability that patient $n \in N$ will choose j $\in j_n$ is $\frac{e^{V_{jn}}}{\sum_{k \in J_n} e^{V_{kn}}}$

This is known as the multinomial logit specification[7]. One of the underlying assumptions of the multinomial logit model is that the ratio of the probabilities of the two alternatives, j and k depends only on alternatives j and k, and not on the presence of any other alternatives. This is known as the independence of irrelevance alternatives property. The independence assumption implies that the observed component $\varepsilon_{jn}, \forall j \in j_n$ and any $\varepsilon_{in}, \forall j \in j_n$ i ≠ j are assumed to have the same distribution, with the same mean and variance, and they are uncorrelated with each other. That the random variables are uncorrected with each other means that any factor that we do not observe and affects the utility of every other alternative j does not affect the utility of every other alternative $i \in j_n, i \neq j$. The assumption that the random variables have the same variance means the unobservable variables that affect the utility of alternative j have the same variation as the different unobserved factors that affect the utility of alternative i (because of the zero correlation).

The model was estimated using Intercooled Stata Version 7 software.

[7] If $V_{jn}(\bullet)$ consists of both alternative-specific and individual specific variables, then this is also known as mixed-logit model.

4. Data Analysis

4.1 Descriptive Analysis

The study utilizes the Kenya Demographic and Health Survey 1998 and the Welfare Monitoring Survey 1997 datasets. There are 2,712 households with children between the ages of one and three years. Out of the 2,712 children, 752 seek advice or treatment for fever in public hospitals, mission hospitals, private hospitals and others[8]. The dataset captures data from 35 districts in Kenya.

This study is aimed at investigating the demand for child healthcare in Kenya. Analysis was carried out on where the parents seek healthcare in cases where their children suffered fever. Table 4 presents the frequency of visits to points where parents seek healthcare for their children.

Table 4: Place of assistance for fever

Facility	Percent
Health center	18
Government hospital	12
Shop	14
Dispensary	14
Mission hospital	10
Private clinic	12
Pharmacy	6
Private doctor	6
Other[9]	8

Source: Kenya Demographic and Health Survey 1998

[8] Includes herbalists and commercial health workers.
[9] Implies a mixture of the named facility including herbalists.

Most of the children seek treatment or advice for fever from the health center (18%), dispensary (14%), shop (14%), government hospital and private clinic (12%), pharmacy and private doctor (6%) and others (8%). Data from the Kenya Demographic and Health Survey reveals that 14 percent of parents seek advice in the shop for their children suffering from fever.

The place of residence of the respondents in the sample ranges from small city to the countryside. Table 5 presents this information.

Table 5: Place of residence

Place of residence	Percent
Nairobi	8
Small city	3
Town	3
Countryside	86

Source: Kenya Demographic and Health Survey 1998.

Majority of the respondents (86%) reside in the countryside. The other 14 percent reside in the urban areas, namely Nairobi, small cities, and towns.

The material used in the house floor has implications on the health of children[10]. Mud and dung may affect the lungs of the children, exposing them to risks of acute respiratory infections. From Table 6 below, 72 percent of children live in houses whose floors are made of mud and dung. Floor made of cement takes 26 percent.

In most cases, the source of water determines its purity. Majority of the respondents (42%) obtain their water from the river or stream. Piped water into residence accounts for 16 percent, well on residence 10 percent, public well 14 percent, and public tap 10 percent. Drinking water from

[10] See Ainsworth and Semali (2000).

Table 6: Main floor material

Main floor material	Percent
Wood	0.74
Mud and dung	72
Polished	0.81
Cement	26
Other	0.4

Source: Kenya Demographic and Health Survey 1998.

Table 7: Source of drinking water

Source of drinking water	Percent
Public tap	10
Piped into residence	16
Public well	14
Well on residence	10
River or stream	42
Pond or lake	4
Rainwater	1.25
Other	2

Source: Kenya Demographic and Health Survey 1998.

Table 8: Highest educational level of mothers

Highest educational level	Percent
No education	12
Primary	64
Secondary	23
Higher education	1

Source: Kenya Demographic and Health Survey 1998.

the river or stream should be boiled to kill disease-causing organisms, and therefore reduce the prevalence of water borne diseases.

The level of education of the mother determines the child health condition as established in several studies, for example Hallman (1999). Mother's level of education correlates positively with child health outcomes.

From Table 8, 88 percent of the mothers have primary education and above. Mothers with at least primary education are deemed to understand the importance of better nutrition and immunization of their

children. In case of child morbidity, a mother with education easily understands where to seek treatment.

The sample is composed of children between the ages of one to three years. Children aged one year are 48.4 percent, two years 33.12 percent and three years 18.5 percent. The sample is composed of 49 percent female and 51 percent male. Majority of the children in the sample are from households located in the rural areas. 85 percent of the households reside in the rural areas whereas the remaining 15 percent are from urban areas.

Table 12 shows that approximately 72 percent of the households are headed by males. The remaining 28 percent are women headed households.

Births in the last five years are presented in Table 13. 42 percent and 45 percent of births occurred in the first and second years, respectively. Children with average birth size at birth were 65 percent. Children with very small birth size account for 3.85 percent.

Table 14 shows that 54 percent of patients take one hour to reach a doctor while 8 percent of patients take more than thirty minutes. About 31 percent of the patients take one hour to reach a dispensary or a health center. 72 percent take more than half an hour to reach the same facility. Majority of the patients (68%) take one hour to reach the hospital. This reveals that hospitals act as referral destinations.

Table 9: Age of children

Current age of child	Percent
1	48.4
2	33.1
3	18.5

Source: Kenya Demographic and Health Survey 1998.

Table 10: Sex of children

Sex of child	Percent
Female	48.86
Male	51.14

Source: Kenya Demographic and Health Survey 1998.

Table 11: Type of place of residence

Type of place of residence	Percent
Urban	14.26
Rural	85.74

Source: Kenya Demographic and Health Survey 1998.

Table 12: Sex of household head

Sex of household head	Percent
Female	28.21
Male	71.79

Source: Kenya Demographic and Health Survey 1998

Table 13: Births in the last five years

Births in the last five years	Percent
0	3.03
1	42.22
2	45.38
3	8.71
4	0.66

Source: Kenya Demographic and Health Survey 1998.

Table 14: Size of child at birth

Size at birth	Percent
Very large	3.61
Larger than average	16.70
Average	65.32
Smaller than average	9.98
Very small	3.85

Source: Kenya Demographic and Health Survey 1998.

Table 15: Time taken to reach a doctor

Time taken	Percent
Near the dwelling	1.81
10 minutes	7.10
20 minutes	9.48
30 minutes	10.97
40 minutes	8.2
50 minutes	7.97
60 minutes	54.46

Source: Welfare Monitoring Survey, 1997.

Table 16: Time taken to reach dispensary/health center

Time taken	Percent
Near the dwelling	2.14
10 minutes	9.5
20 minutes	15.81
30 minutes	18.69
40 minutes	12.32
50 minutes	10.03
60 minutes	31.52

Source: Welfare Monitoring Survey, 1997.

Table 17: Time taken to reach hospital

Time taken	Percent
Near the dwelling	0.72
10 minutes	2.7
20 minutes	4.98
30 minutes	8.7
40 minutes	7.13
50 minutes	7.68
60 minutes	68.08

Source: Welfare Monitoring Survey, 1997.

4.2 Econometric Analysis

The data from the Kenya Demographic and Health Survey 1998 was used to estimate a multinomial logit model using Intercooled Stata 7. Table 18 shows the definitions of the variables. The strength of the relationship between variables is revealed using the correlation matrix presented in Table 19. The variable child's visit has a negative association

Table 18: Definition of variables

Variable	Definition
CHV	The child's visit to the facility to seek advice for fever
TSD	Time taken to see a doctor in minutes
TRHC	Time taken to reach a health center in minutes
TRHO	Time taken to reach a hospital in minutes
SOX	Child's sex, 1 if female, 0 otherwise
AOC	Child's age in years
TNC	Total number of siblings of the child under consideration
TPR	Type of place of residence, 0 for urban and 1 for rural
MFM	Material used to cover the floor of the house
MED	Mother's highest level of education (0 no education, 1 primary, 2 secondary, 3 higher)
MAG	Mother's age
SOW	Source of water
BIFY	Total number of birth's in five year
DOB	Duration of breast-feeding in months

with mother's level of education (13%), mother's age (3%), and the duration of breastfeeding (15%). On the other hand, child's visit has a positive association with time taken to see a doctor (5%), time taken to reach a health center (7%), time taken to reach a hospital (13%), size of the child at birth (6%), source of water (38%), number of births in five years (8%), main floor material (10%), type of place of residence (1%), total number of children (2%), age of child (5%), and the sex of the child (12%).

Regression results

The estimated results are presented in Table 20. The multinomial logit model estimates a series of logit models for the odds of visiting the mission, private and other hospitals over public hospitals. Public hospital is chosen to be the comparison group, since it is the most common (44.28%).

Table 19: Correlations

	CHV	TSD	TRHC	TRHO	SOX	AOC	TNC	TPR	MFM	SOW	BIFY	DOB	SAB	MAG	MED
CHV	1														
TSD	0.05	1													
TRHC	0.07	0.90	1												
TRHO	0.13	0.90	0.93	1											
SOX	0.12	0.08	0.10	0.07	1										
AOC	0.04	0.01	-0.01	-0.03	0.07	1									
TNC	0.02	0.05	-0.01	-0.01	-0.15	-0.01	1								
TPR	0.01	0.71	0.65	0.61	0.02	-0.03	0.14	1							
MFM	0.104	-0.46	-0.41	-0.35	0.11	-0.01	-0.21	-0.50	1						
SOW	0.00	0.37	0.35	0.32	-0.02	0.14	0.1	0.39	-0.43	1					
BIFY	0.08	0.03	0.07	0.06	0.04	-0.21	0.27	0.10	-0.06	0.02	1				
DOB	-0.15	-0.05	-0.01	-0.04	-0.16	-0.66	0.10	-0.06	-0.13	-0.15	0.16	1			
SAB	0.06	-0.11	-0.09	-0.1	0.15	-0.02	0.05	-0.08	0.05	-0.05	0.033	-0.09	1		
MAG	-0.03	-0.10	-0.07	-0.13	-0.27	0.05	0.42	0.02	-0.07	0.04	0.04	0.02	0.03	1	
MED	-0.13	0.14	0.13	0.06	-0.03	-0.15	-0.03	0.20	-0.18	0.00	0.19	0.19	-0.04	-0.11	1

Table 20: Multinorminal logit results for place of advice for fever

Facility type	Variable	Coefficient	Std. Err	Z	P>|z|	[95% conf. inter]
Mission hospital						
	TSD	-0.05	0.092	-0.55	0.585	-0.2293 0.129
	TRHC	-0.370**	0.175	-2.12	0.034	-0.7132 -0.0276
	TRHO	0.39**	0.182	2.11	0.035	0.028 0.743
	SOX	1.27*	0.711	1.78	0.075	-0.127 2.658
	AOC	0.017	0.853	0.02	0.984	-1,657 1.690
	TNC	0.463**	0.157	2.94	0.003	0.155 0.770
	TPR	0.508	1.611	0.32	0.753	-2.65 3.665
	MFM	-0.026	0.044	-0.59	0.56	-0.111 0.0598
	MED	0.029*	0.17	1.71	0.124	-0.08 0.66
	MAG	0.091*	0.05	1.82	0.127	-0.0259 0.2069
	SOW	-0.058	0.046	-1.26	0.206	-0.147 0.0317
	BIFY	-0.289	0.548	-0.53	0.598	-1.364 0.785
	SAB	-0.153	0.411	-0.37	0.709	-0.959 0.653
	DOB	-0.012	0.011	-1.09	0.276	-0.034 0.0097
	Constant	-10.21	6.88	-1.48	0.138	-23.702 3.273
Private hospital						
	TSD	-0.07	0.066	-1.06	0.291	-0.200 0.060
	TRHC	-0.03	0.109	-0.25	0.802	-0.2414 0.1865
	TRHO	0.147	0.141	1.04	0.297	-0.13 0.424
	SOX	0.931*	0.496	1.88	0.060	-0.041 1.903
	AOC	0.336	0.63	0.53	0.594	-0.898 1.571
	TNC	0.11	0.137	0.77	0.444	-0.164 0.375
	TPR	-0.109	1.973	-0.11	0.911	–2.016 1.797
	MFM	-0.01	0.302	-0.29	0.771	-0.068 0.0505
	MED	-0.024	0.111	-0.22	0.828	-0.242 0.193
	MAG	0.004	0.048	0.09	0.928	-0.089 0.0979
	SOW	-0.001	0.019	-0.04	0.964	-0.039 0.0372
	BIFY	0.302	0.409	0.74	0.458	-0.497 1.104
	SAB	-0.191	0.288	-0.66	0.507	-0.756 0.374
	DOB	-0.011	0.0085	-1.3	0.195	-0.028 0.005
	Constant	-5.125	4.64	-1.10	0.270	-14.234 3.984
Other						
	TSD	-0.053	0.0697	-0.75	0.451	-0.189 0.084
	TRHC	-0.139	0.1138	-1.22	0.223	-0.362 0.084
	TRHO	0.346*	0.1607	2.15	0.031	-1.956 0.953
	SOX	-0.025	0.559	-0.05	0.964	-0.288 0.306
	AOC	-0.50	0.742	-068	0.500	-0.898 1.571
	TNC	0.01	0.152	0.06	0.951	-1.957 2.448
	TPR	0.245	1.123	0.22	0.827	-2.016 1.797
	MFM	0.029	0.031	0.96	0.335	-0.031 0.091
	MED	-0.139	0.122	-1.14	0.255	-0.38 0.101
	MAG	0.004	0.051	0.08	0.936	-0.096 0.104
	SOW	-0.007	0.027	0.28	0.777	-0.061 0.046
	BIFY	0.516	0.462	1.12	0.264	-0.39 1.423
	SAB	0.249	0.292	0.86	0.392	-0.322 0.822
	DOB	-0.007	0.01	-0.72	0.471	-0.027 0.012
	Constant	-11.46**	5.525	-2.07	0.038	-122.29 -0.634

(Comparison group = Public hospitals)
No. of observations =147; LR chi2 (33) = 52.82; Prob.chi2 = 0.12; Pseudo R2 = 0.15; Log likelihood = -155.99

Interpretation of the results

Estimated results are interpreted by looking at the marginal effect on the odds or transformed odds. Marginal effects on the odds for the multinomial logit model refers to the partial effect on the odds of falling into a category as opposed to a user-chosen reference category. The only variables that are significant in Table 19 are TRHO (total time taken to reach a hospital), TNC (total number of children), MED (mother's education), MAG (mother's age) and SOX (sex of child).

From Table 21, the variable THRO has an estimated coefficient of 0.39 (the exponent becomes 1.477) for the contrast of mission hospital versus public hospital. This suggests that the odds for reaching a mission hospital instead of a public hospital will be as high as 1.477.

The variable TNC has an estimated coefficient of 0.463 with an exponent of 1.589. The odds for a household to take a child to a mission hospital instead of a public hospital is increased 1.589 times with an additional increase in the number of children.

The variable SOX has an estimated coefficient 1.27 with an exponent of 3.56. Since the variable is coded 1 for female and 0 otherwise, this implies

Table 21: Contrasts for mission hospital, private hospital and other care facilities versus public hospitals

Variable	Contrasts		
	Mission hospital versus public hospital	Private hospital versus public hospital	Other facilities versus public hospital
Total time taken to reach a hospital (TRHO)	0.39**(1.476)	0.147*(1.158)	0.346 (1.413)
Total number of children (TNC)	0.463**(1.589)	0.11 (1.116)	0.01 (1.01)
Mother's age (MAG)	0.091*(1.095)	0.004 (1.004)	0.004 (1.004)
Mothers' Education (MED)	0.29*(1.336)	-0.024 (0.976)	-0.139 (0.87)
Sex of child (SOX)	1.27*(3.56)	0.931*(1.88)	-0.025 (-0.05)

***(**) * Significant at 1%, (5%), and 10% respectively

that the odds for female children seeking treatment from a mission hospital instead of a public hospital are about 3.56 times as the same odds for male patients.

The variable MAG, has an estimated coefficient of 0.091(1.095 on exponentiation) for the contrast of mission hospital versus public hospital. This suggests that the odds for a mother taking her child to a mission hospital instead of a public hospital will be increased by 1.095 times with one year increase in the mother's age.

The variable MED has an estimated coefficient of 0.29 (1.336 on exponentiation) for the contrast of hospital versus health center. The variable is coded 0 for no education, 1 for primary, 2 for secondary, 3 for higher education. This suggests that the odds for a mother taking a child to a mission hospital instead of a public hospital will be increased 1.336 times with an increase in the mother's level of education.

For the contrast of private hospital versus public hospital, the variable TRHO has an estimated coefficient of 0.147 (the exponent becomes 1.158) for the contrast of private hospital versus public hospital. This suggests that the odds for reaching a mission hospital instead of a public hospital will be as high as 1.158.

The variable SOX has an estimated coefficient 0.931 with an exponent of 1.88. Since the variable is coded 1 for female and 0 otherwise, this implies that the odds for female children seeking treatment from private hospital instead of a public hospital are about 1.88 times as the same odds for male child patients.

4.3 Discussion

Child healthcare in Kenya remains an important area of inquiry given the increasing child mortality rates in developing countries, Kenya included. Mortality levels among Kenya's young children population have been declining as revealed in the Kenya Demographic and Health

Survey 2003. The descriptive statistics reveal that 14 percent of mothers seek assistance for fever from the shop, which is more than those seeking help from pharmacy (6%) or private doctors (6%). This posses danger of misadvise in a case where poor diagnostics are given by both the parent and the shopkeeper. Childhood diseases require special attention from qualified medical personnel because disease symptoms may be under-estimated for simple ailments, only to turn out to be some serious ailment.

Majority of the households in the survey reside in the countryside (86%). In the introduction part of this paper, some degree of unequal distribution of health facilities is revealed, with some areas of North Eastern and Western provinces having one facility serving more than 10,000 people. This puts patients and especially children in a precarious condition as far as access to healthcare is concerned. Transport and road infrastructure may have a role to play in the time taken to reach a doctor (majority of the patients take one hour). Majority of the roads in the rural areas are impassable, especially during the rainy season, making access to health facilities very difficult. Even with proper distribution of health facilities, proper road infrastructure is required to reduce the time taken to reach a doctor.

The main floor material has been of concern, as revealed in several studies[11]. There is a higher frequency of ARIs in households with mud and dung floors. Given that a large percentage of households (72%) live in houses with floors made of mud and dung, a high incidence of ARIs is expected in the rural areas. However, this has to do with low incomes in the rural areas and culture.

The source of water determines its purity. River and stream water is a common source of water (42%). River or stream water poses the danger of water borne diseases, including acute dehydrating diarrhoea (cholera), prolonged febrile illness with abdominal symptoms (typhoid fever),

[11] See for example Sahn, Younger and Genicot ((2002).

acute bloody diarrhoea (dysentery), and chronic diarrhoea (Brainerd diarrhea) and bilhazia.

Education in general, and female education in particular, exerts a very strong influence in reducing child morbidity and mortality[12]. Educated mothers are better able to break away from traditions and utilize modern means of safeguarding their own health and that of their children. According to Kenya Demographic and Health Survey 1998, 64 percent of mothers have primary education as opposed to 12 percent with no education. Mothers with higher education only account for 2 percent.

The study used children of ages between one and three years, of whom 48 percent are a year old, 33 percent are two years old and 19 percent are three years old. 49 percent and 51 percent of children are male and female, respectively. Seventy two percent of households are male headed while the remaining 28 percent are female headed. In the last five years, 42 and 45 percent of the households in the sample had one to two children. This reveals that birth spacing is on average two and half years. The evidence on child mortality suggests that very short intervals (conceptions less than six months after a birth) are detrimental to survival of the second child.

The size of the child at birth may reflect on the health condition of the child. Children born with low birth weight often have a low survival rate. In the survey, 65 percent of the children were born with an average birth weight. The extremes, very large and very small birth weights, take 4 percent each.

The distance to the health facility affects healthcare utilization. This factor coupled with poor roads may discourage a parent from taking a child to hospital, especially where the costs incurred are high. Most roads in the rural areas are in poor condition, precipitating high fares, which discourage traveling to hospital.

[12] See Govindasamy and Ramesh (1997).

5. Summary, Conclusions and Recommendations

5.1 Summary and Conclusions

The study aimed at establishing the determinants of child healthcare in Kenya, using a multinomial logit model. The study analyzed four choices: 1 for public hospital, 2 for mission hospital, 3 for private hospital, and 4 for other treatment facilities. Out of the 100 percent children who seek advise for fever, 44.28 percent visit public health facilities[13], 9.71 percent visit mission hospitals or clinics, and 25 percent visit private health facilities[14]. The remaining 21.01 percent visit other facilities for healthcare, such as herbalists, traditional medicine practitioners, shops and community health workers.

The study findings reveal that distance to the health facility, sex of child, total number of siblings, mother's level of education, and mother's age determine the choice of facility for seeking advise for fever. As observed in most studies, the mother's level of education is strongly linked to child survival (Kenya Demographic and Health Survey, 2003). Education exposes mothers to information about better nutrition, use of contraceptives to space births, and knowledge about childhood illness and treatment.

Childhood mortality rates are considerably higher among children born to women in their forties and lowest among children whose mothers are age 20-29 years at the time of birth.

The length of birth interval has a significant impact on a child's chances of survival, with short birth intervals considerably reducing the chances of survival. As the birth interval gets longer, the mortality risk is reduced considerably. Children born less than two years after a prior sibling suffer substantially higher risks of death than children born after intervals of

[13] Government hospital, health center, and dispensary.
[14] Private hospitals and clinics, private doctor, pharmacy, private doctor.

two or more years. Size of the child at birth also has a bearing on the childhood mortality rates. Children whose birth size is small or very small have a 50 percent greater risk of dying before their first birthday than those whose birth size is average or larger.

5.2 Policy Implications

The policy implications from the study are as follows:

- A clear policy on sale of drugs over the counter should be developed to reduce the risks of mis-diagnosis.
- Distribution of health facilities should be in such a way that rural areas have more facilities because majority of the people reside in the rural areas. This would reduce the time taken to reach the hospital and consequently the doctor.
- The maternal and child health clinics at health facilities should be strengthened and more staff posted to ensure that the time taken to see a doctor is reduced.
- Since majority of the respondents reside in the rural areas, capacity building for community health workers should be strengthened so as to ensure sustainable primary healthcare programmes.
- Improving enrolment of girls in school will have implications on maternal education in future. Otherwise, mothers who have not attended school can be enrolled in adult education classes.

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