

Quality and Demand for Health Care in Rural Uganda: Evidence from 2002/03 Household Survey

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Abstract

Good health, as people know from experience, is a crucial part of well-being and socioeconomic development. From an economic viewpoint, improved health contributes to growth in many ways. It reduces production losses caused by worker illness; it permits the use of natural resources that were inaccessible due to diseases; it frees resources for alternative use, other than being spent on treating illness; and it promotes child development through increased school enrolment and better learning. This report provides quantitative evidence on the importance of individual, household, and community characteristics on individual care seeking decisions during periods of illness. The report uses a “flexible” multinomial choice model to determine the key factors behind the decisions to seek a particular type of treatment using data from the 2002/03 National Household Survey for Uganda. This kind of analysis is premised on a basic theoretical framework of utility maximization and household production of health. In addition, complementary data on quality of facilities and costs were collected from sampled health facilities in the four regions (Central, Northern, Western and Eastern) of Uganda. The results show the importance of age, gender, per capita consumption (income) and number of days sick as individual determinants of health seeking behaviour. Surprisingly, education does not appear important in choice of health care in rural Uganda. The quality characteristics measured by structural indicators such as electricity and price characteristics stand out as important determinants of choice. Location also has an effect on choice of the type of health care provider. From a policy perspective, policies aimed at providing energy from gas and generators to improve quality, increasing incomes and price/cost reduction will have substantial outcomes on the demand for health care.

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1. Introduction

Good health is a crucial part of well-being and a key component of social and economic development. In contrast, poor health and the inability to cope with illness can be detrimental to welfare and development. The impact of poor health on households is considerable. Households must face the direct costs of treatment, the value of lost work time from illness or lower productivity while working, and the loss of income earners. The direct costs of treatment mean a reallocation of household resources, and fewer resources for other household needs. This report therefore explores issues of supply and demand for health services in rural Uganda. This analysis provides useful information on the importance of individual, community and household level characteristics on health seeking behaviour of individuals during episodes of illness and it is therefore a useful guide to policy. We adopt a notion of access used by Baker and van der Gaag (1993), who define access as the actual use of health services in the event of illness.

Despite the above, this is not the first study on health care issues in Uganda. There have been other studies (see for example Hutchinson, 1999) with particular emphasis on some regions and using old data sets from 1992/93 and 1996/97. Deininger and Mpuga (2005) investigate the impact of abolition of health user's fees on the ability of different groups to access health services and morbidity outcomes. These studies independently establish certain commonalities that determine household demand for health services in Uganda and distinguish households that have encountered disease. However, they did not include the aspect of quality and were specific on particular locations, groups or aspects that are not readily representative of the whole country or even other regions and economic sectors.

Therefore, the principal objective of this study was to examine the quality and determinants of health care demand in Uganda. More specifically, the study aimed to establish the health care-seeking behaviour of households in Uganda, to investigate and quantify the determinants of access to publicly provided health services, and of health seeking behaviour. This report differs from previous ones in that it uses the 2002/03 household survey data, covers the rural areas of the whole country and also uses an econometric-based approach to analyse quality and demand for health services.

Although the household survey data used was national, it did not capture the quality aspects of demand for health care. We therefore complemented the household survey data with district level information on quality of health services obtained from the planning department of the Ministry of Health and the survey that was carried out by the researchers. The study investigated and quantified the determinants of access to privately and publicly provided health care and of health-seeking behaviour more broadly. We also

analysed how the quality of services provided affects health care demand. This report provides descriptive evidence on illness incidence, quality and care-seeking behaviour for households. A behavioural model of health care demand is estimated. In this report, demand is defined as the probability of seeking different types of health care conditional on illness, given the relevant characteristics of the individual, the household and the community.

The remainder of this paper is structured as follows. Section 2 provides an overview of the trend of health provision and policy framework in Uganda. Section 3 summarizes the review of existing literature on health demand. Section 4 sets out the theoretical framework and methodology that underpin the analysis of the data, drawing extensively on the reviewed literature. It also describes the data that form the basis of the research reported in this paper. Section 5 provides the descriptive statistics, empirical results and investigation of policy implications through policy simulation analysis, and lastly Section 6 draws conclusions.

2. Health and health care in Uganda

Health status

Over the past decade, Uganda has registered some progress in improving the health of its citizens as reflected in the key health outcome indicators. These indicators include infant mortality rate (IMR), under-five mortality rate (U5 MR), maternal mortality rate (MMR), total fertility rate (TFR), and chronic malnutrition (Table 1). However, these improvements fell far short of the Poverty Eradication Action Plan and Millennium Development Goal (MDG) targets for reducing MMR and IMR (Government of Uganda, 2004; UNDP (Uganda), 2007). In addition, at 6.5, Uganda's TFR remains the third highest in the world.

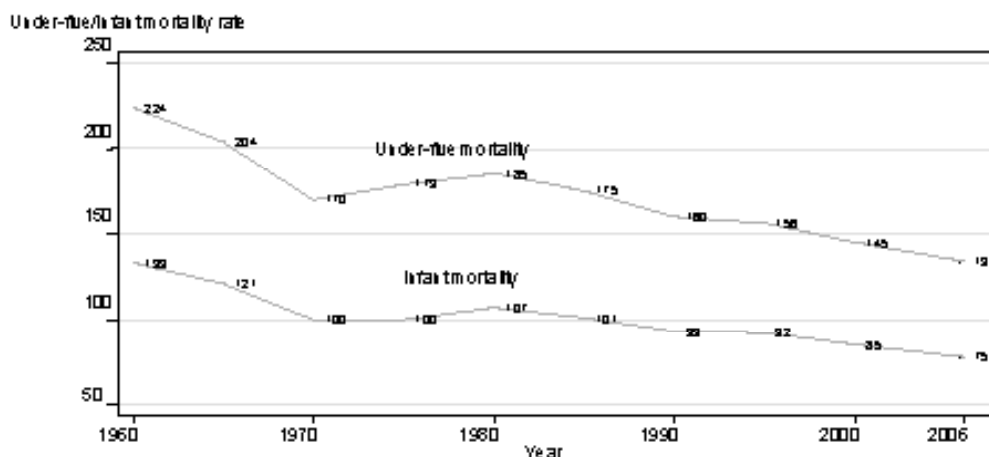
Table 1: UDHS Health-related outcomes 1995, 2001 and 2006

Indicator	1995	2001	2006'	PEAP target (2008)	MDG target (2015/2016)
Infant mortality rate (per 1,000 live births)	85	89	75	68	34
Under-5 mortality rate (per 1,000 live births)	156	158	137		121
Maternal mortality ratio (per 100,000 live births)	527	505	435	354	60
Total fertility rate	6.9	6.9	6.5	5.0	
Contraceptive prevalence rate (%)	15.4	18.6	24.4		

Source: Ministry of Health (2008).

Uganda's U5 MR and IMR have been improving, albeit more slowly than the change in Uganda's economic performance and health funding would predict. In 2006 Uganda's U5 MR was 137 and its IMR was 75 per 1000 live births. At the rate of change shown in Figure 1, Uganda might not meet its 2015 MDG target for U5 MR of 121 per 1,000. Several countries with comparable and even lower per capita health expenditures than Uganda have child mortality rates that are significantly lower, suggesting that Uganda's health system could be performing worse in reducing infant mortality (Table 2).

Figure 1: Trends in under-five and infant mortality rates for Uganda, 1960–2006



Source: World Bank (2008)

Table 2: Health expenditure and outcomes — Comparisons across countries

Country	Total health expenditure per capita (US\$)	Government health expenditure per capita (US\$)	Under-five mortality (per 1000)	Infant mortality (per 1000)
Bangladesh	13	5	69	52
Cambodia	30	8	82	65
Ethiopia	7	4	123	77
Ghana	35	13	120	76
India	39	8	76	57
Kenya	29	14	121	79
Lao PDR	22	5	75	59
Madagascar	9	6	115	72
Nepal	17	5	59	46
Senegal	40	13	116	60
Tanzania	18	11	118	74
Uganda*	25	7	134	78
Vietnam	46	15	17	15
Zambia	49	23	182	102
Sub-Saharan Africa	28	13	156	93
Low-income	30	8	98	67

* The data came from the World Development Indicators (World Bank, 2008). This is why the under-5 mortality and Infant Mortality Rates are different from the figures in Table 1.

Source: World Bank (2009).

With 435 deaths per 100,000 live births, Uganda has one of the highest rates of maternal mortality in the world.² Things have improved slightly since the 1990s when maternal mortality exceeded 500 per 100,000 births. If Uganda is to attain the MDG target of a three-fourths reduction over the period 1990–2015, the country must reduce its maternal mortality to 60 per 100,000 live births by 2015. Poor access to quality maternal care services,³ particularly emergency obstetric care, blocks attainment of improvements in maternal mortality in Uganda. High fertility, teenage pregnancy and the lack of birth spacing are also challenges to reducing maternal mortality.

Uganda's life expectancy was about 51 years in 2006, which is slightly below average. Life expectancy — which had been declining since the 1970s as a result of civil strife and the impact of HIV/AIDS — has been improving steadily since the late 1990s and is now about the sub-Saharan African average.⁴

With these levels of health outcomes, Uganda is still one of the most seriously affected nations in the world in terms of poor quality of health services. Poverty, corruption, insecurity and infrastructural problems have exacerbated the effect of poor health services in Uganda. The HIV/AIDS pandemic has continued to reverse some of the economic and social gains such as the gains in infant and child mortality, adult longevity and general health. Many of the patterns of recent social and economic development in Uganda have created conditions that have allowed the spread of diseases, including male migration, underemployment of women, civil strife, urbanization, structural adjustment and increasing poverty. Diseases cause fundamental social and economic changes that affect the demand for labour, availability of social services, access to health care and its demand, educational opportunities, and the rates of poverty at the household level. Health insurance is almost non-existent in Uganda, even though there are a few pilot schemes based on individual health facilities or high-end plans for wealthier individuals.

The institutional and policy framework in Uganda

The health system in Uganda comprises public, private-not-for-profit (PNFP) and private-for-profit (PFP) providers as well as traditional and complementary practitioners. Delivery of public health services is organized into three major levels: national referral, regional referral and district/rural hospitals. The public facilities are further graded as health centre II (parish), III (sub-county) or IV (county or sub-district), depending on the administrative zone served by the facility. National and regional referral hospitals report to the central government; general hospitals and health centres (Types II–IV) report to the local governments. Health centres (II) provide only basic preventive and curative services. They are usually managed by an enrolled nurse, midwife and nursing assistants. The dispensaries or health unit IIIs are managed by one clinical officer, an enrolled nurse, midwives and nursing assistants. Health centre IIIs offer inpatient health services. The sub-district health centres (IV) are better equipped with a medical officer, clinical officers, nurses, midwives, nursing assistants, laboratory technicians and assistant health inspector, dentist, accounts assistant and support staff. This facility provides surgical services in addition to other general services. Health centre IVs constitute the first level referral and usually have emergency care facilities. Patients in need of more specialized care are sometimes referred to district or regional hospitals. The private-for-profit and not-for-profit health services include missionary or church-run (non-governmental organization—NGO) health care centres and simple clinics operated by private doctors and nurses in small towns around the country.

The 2006 health facility inventory conducted by the Ministry of Health reported 3,237 health facilities countrywide, 71% public, 21% PNFP and 9% PFP. Public and PNFP facilities almost doubled between 2000 and 2006,⁵ increasing from 1,630 to 2,960; the increase was principally driven by the construction of new health centres by government in its drive to improve access to health services. Over 90% of PFP facilities are clinics

that provide outpatient curative services. Although health infrastructure has expanded, most facilities are not fully functional because they lack equipment and staff and are poorly maintained. However, there are traditional health units run by traditional health practitioners. These constitute an important source of health services, especially in rural Uganda.

The quality of many public health facilities is still poor: They are characterized by underpaid and demoralized staff, and shortages of trained personnel and medical equipment (Deininger and Mpuga, 2005). For every 100,000 people there are eight physicians, 55 nurses and 16 midwives.⁶ This situation is further compounded by maldistribution with a predominant urban bias in favour of the central region: Though hosting only 27% of the total population, 64% of nurses and 71% of physicians work in this region.⁷ Private providers, including clinics, health centres and hospitals that are operated on a cost recovery basis, have sprung up to partly make up for the shortfall in the public health facilities.

Achievement of health outcomes can be influenced by several factors outside the health sector, which include household income, education, access to water and sanitation, access to food, effective law enforcement and road safety. The Ministry of Health is only one of the sectors that contribute to achievement of health outcomes. It faces several challenges in promoting and providing technical leadership for multi-sectoral action for health. Several of the multi-sectoral initiatives that were started have stalled. Notably the 2003 task force on infant and maternal mortality that highlighted the major risk factors associated with high mortality and identified roles for each of the key sectors (Government of Uganda, 2003b), and the 1997 Kampala declaration on sanitation followed by the 2000 memorandum of understanding between three ministries: Ministry of Health, Ministry of Education and Sports, and Ministry of Water, Lands and Environment (Government of Uganda, 2007). Other inter-sectoral efforts include establishment of the Food and Nutrition Council under the Ministry of Agriculture, Animal Industry and Fisheries and the inter-Ministerial Committee on the training of health workers under the Ministry of Education and Sports (Government of Uganda, 2007).

On policy, legal and regulatory framework, the Ministry of Health has faced two major challenges. First, the restructuring of the ministry to respond to the changing environment has been erratic. Second, several government bills to promote and regulate health services have either taken long or stalled. For example, the principles for the revision of the National Drug Policy and Authority (NDP/A) Act of 1993 that started in 2003 have not yet been presented to Cabinet for approval. Other bills that have stalled include: pharmacy profession and practice, Uganda national health research, health services, national health insurance, traditional and complementary medicine, mental health, food safety, and health tertiary institutions.

Given the background to Uganda's health sector, recent government policy has focused on expanding and improving the health network. The Government of Uganda in partnership with donors introduced the health sector reform programme mainly to improve the performance of the public health system and restore the functional capacity of the health sector, reactivate disease control programmes and reorient services to preventive and primary care rather than curative interventions. Other reforms included decentralization, imposition of user fees and finally abolition of such charges. Uganda has

operated under a decentralized health framework since 1997. Ownership of public health facilities (health centres and general hospitals) and responsibility for delivering health services was transferred to the local governments. However, the impact of these reforms on health and health service delivery is unclear. Decentralization was expected to bring major changes in terms of administration and efficiency in the delivery of health services with a goal of increasing coverage and equity. Much as decentralization has reportedly increased public participation in the health sector, many problems have also arisen. For example, since 1997 there has been a dramatic decline in routine immunization coverage, largely because funding from the centre for vaccinators was stopped (Hutchinson, 1999). Few instances of user fees revenue going to improve the availability and quality of services are apparent. Several studies (see for example Mwesigye, 2002) have examined the extent of usefulness of user fees and find that they present another inhibiting factor to use of government health services. Complaints regarding user fees led to their abolition in March 2001.

The health sector reforms have been implemented with limited success. The pace of reform in the health sector has slowed. The health sub-district concept, which underpinned the reform agenda, is partially implemented. The majority of health centre IV units remain incomplete. Implementation of key programmes such as reproductive health, environmental health and sanitation, and village health teams is lagging behind. Therefore, there is a need to investigate the supply and demand of health services in Uganda and as much as possible refocus the policies in the health sector.

3. Literature review

Poor health affects household welfare in several ways, some of which have long-term effects. Despite the direct costs of treatment and funeral expenses leading to a depletion of household assets, and the loss of productivity due to illness and eventual death, child development is greatly impeded, with long-term effects on their future schooling and productivity. Compared with other socioeconomic problems, the impact of sickness is much greater in the income-earning age group with additional consequences to the household, and the country. The sickness or loss of a principal income-earner in a household causes a significant change in the welfare of the household and behavioural change (World Bank, 1993). For example, non-working household members must now work, household structures must shift, and households may have to draw on savings or sell assets in order to survive.

As a result of poor living conditions and public services, the presence of endemic diseases in Uganda are among the highest in sub-Saharan Africa. The most vulnerable people to endemic diseases are children and women, while the main causes of death among children are malaria, respiratory and diarrhoeal diseases (Walt, 1983). For women, the main causes of death are related to pregnancy or complications during childbirth. During the period 1999–2001 malaria was the most prevalent outpatient illness recorded in Uganda (Government of Uganda, 2003). In the same period immunization rates for all antigens, except for tetanus toxoid for non-pregnant women have been on the increase. There were improvements in outpatient attendance (by 40%) between 2000 and 2002. This improvement is attributed to the abolition of user fees, increased inputs and availability of better trained health workers (Government of Uganda, 2002).

A few studies have analysed the determinants of demand for health care in Uganda. A study using data from the household and community surveys 1992–1997/98 collected by the Uganda Bureau of Statistics (UBOS) highlights the importance of quality of service for household demand for health care (Hutchinson, 1999). In this study, quality is found to be the single most important characteristic, followed by household income and price of service and distance. According to the study, if all facilities had vaccines for basic childhood illnesses, utilization would increase by 3.7%. However, this study used old data and the situation in Uganda may have changed since 1997. This work combines survey and facility level data and confirms that facility related characteristics rather than household specific factors have the greatest influence on utilization. Therefore, it is important to examine in more detail what factors determine quality of service and demand for health care using more recent data, at a time when there have been major changes in service delivery in the health sector.

Sahn et al. (2003) analyse the demand for health care in rural areas of Tanzania. They use a nested multinomial logit model unlike prior studies which have used single level

nest models. The authors also analyse the impact of quality of medical care on health demand. Own price elasticities of demand for all health care options were found to be high, although less so for public clinics and dispensaries than other choices. The study also shows that there is a high degree of substitution between public and private care and that the quality of medical care has large effects on health demand. Our study is different in several ways. First, the social and economic conditions in the two countries (Uganda and Tanzania) are different. Second, our study included various health service providers such as clinics, hospitals, pharmacies, and traditional healers unlike that of Sahn et al. (2003), which focused more on private versus public health care services. Lastly, Uganda, unlike Tanzania, abolished user fees in the health sector.

In another study carried out in Mozambique, Lindelow (2002) shows that a number of individual and household level characteristics, e.g., age, education and reported symptoms stand out as highly significant determinants of health seeking behaviour. In addition, prices (user fees and times costs) are found to be important determinants of choice. The study uses a behavioural model of health care demand, and it assumes demand is the probability of seeking different types of care conditional on illness, given the relevant characteristics of the individual, the household and the wider community. The results of this study are quite different from those in Tanzania, another developing country. This perhaps justifies the need to analyse the situation in Uganda since it has a socioeconomic and political background different from that of these two countries.

Benefo and Schultz (1994) show that distance to clinics and price of drugs are negatively correlated with health outcomes in Cote d'Ivoire and Ghana. This implies that there is a tenuous link between the provision of health care and health outcomes (see also Filmer et al., 1998). Recently, some studies (Akin et al., 1986) have shown that supply of health care services is not sufficient to meet the demand. They also show that the actual consumption of health care will differ based on demand factors such as income, cost of care, education, social norms and traditions and the quality and appropriateness of the health services provided.

There is extensive literature in economics that seeks to estimate the elasticity of demand for health care and education services. The seminal studies in this area were produced during the 1970s and have generally stood the test of time. To analyse the demand for health, several methodologies have been used and these can be classified into three categories (Ringel et al., 2002): Experimental, quasi-experimental (Cook and Campbell, 1979) and observational. All three categories have advantages and disadvantages. For example, the experimental type is difficult to design and implement in addition to being expensive and time consuming. Due to the shortcomings of the experimental and quasi-experimental methods, most recent studies have focused on observational methods using survey or administrative data. However, this approach has several advantages, although like the others, it has some shortcomings such as the difficulty in identifying the causal effects of treatments. Due to some of these shortcomings, more complicated but efficient models have been developed.

In their study on rural Madagascar, Glick and Sahn (2006) estimate a discrete choice model of primary schooling and simulate policy alternatives. The results highlight the negative impacts on the demand for schooling of poor quality facilities and the use of multi-grade teaching (several grades being taught simultaneously by one teacher) in

public schools. The simulation analysis of policy alternatives show that given the much higher price elasticities for poorer households, raising school fees to cover some of the additional costs would strongly counteract these favourable distributional outcomes. The authors suggest that an alternative policy of consolidation of primary schools combined with multi-grade reduction or other quality improvements is likely to be ineffective because of the strongly negative impact of distance to school.

Despite the wide variety of empirical methods and data sources, the estimates of demand from health care in most studies are found to be price-inelastic (Ringel et al., 2002). The range of price elasticity estimates is relatively wide; it tends to centre on -0.17. The price induced changes can in large part be attributed to the changes in probability of accessing any care rather than to changes in the number of visits once care has been accessed. In addition, the studies also find lower levels of demand elasticity at lower levels of cost-sharing. The demand for health is also found to be income inelastic. The positive sign for the income elasticity measure in most studies (see for example Feldstein, 1971; Holmer, 1984) indicates that as income increases, the demand for health care services also increases. Studies based on long-time series data (Janssen, 1992) tend to report higher income elasticities. However, most of these studies have been conducted in developed countries where the conditions are very different from those in developing countries.

This report is innovative in several aspects and distinguishes itself from previous studies in several ways. First, previous studies in Uganda have used old data, 1992/93 and 1996/97; none has used the more recent data. Recently, the health sector has undergone major changes, especially in terms of the development of a new resource allocation formula, the move towards improving the quality of care and the decentralization policy. These changes are probably significant enough to influence health care demand factors. Second, in addition to analysing the demand side factors, this study analysed the supply side issues in public health facilities. Third, the report analysed the demand for health care with a view to informing budgeting decision making and household allocation of resources. Finally, this report focused on a combination of quantitative information, a clear departure from performance evaluation studies which are based on survey of perceptions. This strategy is important because there is a wealth of recent information about Ugandan's health issues such as inputs, outputs and quality of services and this has not been analysed. These data provide a rich foundation for a detailed analysis of the health sector, an activity which has not been previously done. The value added therefore of this study lies in applying quantitative and qualitative analyses to new data which has not hitherto been subject to this type of analysis.

4. Theoretical framework and

methodology

Theoretical framework

The theoretical framework is underpinned by a basic concept of utility maximization and household production of health. This framework is similar to that used in previous health care demand studies (Gertler and van der Gaag, 1990; Mwabu et al., 1993;⁸ Sahn et al., 2003). In this framework, we modelled the selection of a health care provider, given that a person is sick. This model is specified as a discrete choice, so the estimates were for the probability that a person selects a given option.

We estimated a behavioural model of health care demand. Demand in this report is defined as the probability of seeking different types of care conditional on illness, given the relevant characteristics of the individual, household and community. We used the flexible discrete choice model (Dow, 1999) with health services divided into four options: Home care (no consultation/self care, pharmacy/drug shop and traditional healers); hospital (both private and public hospital); public clinic (includes government clinics, dispensaries and health centres); and private clinic (purely privately-owned clinics dispensaries or health centres). The functional form for the indirect utility function of this general framework is the linear model (Akin et al., 1984; Mwabu et al., 1993). Sahn et al., (2003) summarize this model following the work of Gertler et al. (1987). In this formulation, the utility that a person derives from choosing a particular health option is given as:

$$V_j = f(y - p_j) + Q(X, Z_j) + \epsilon_j \quad (1)$$

In this formulation, utility is a function of net income ($y - p_j$) after paying for health care option j , and X represents a set of individual or household characteristics that do not vary with the discrete choice. Z_j is a set of choice specific variables. In this specification, $Q(X, Z_j)$ refers to the quality option j and is a function of the characteristics of that choice, as well as individual and household characteristics of the demander.

Also note that the quality function $Q(X, Z_j)$ is linear in the X and Z variables. The variables in X include individual and household specific characteristics such as age, marital status, education, household size, duration of illness and other household demographics. The coefficients of these variables are allowed to vary across the health service options. The Z_j variables are option specific variables, which are meant to measure quality of each service option (Sahn et al., 2003).

As mentioned before, non-health consumption is the difference between exogenous

income, y , and the unit cost of care (where a unit refers to a visit, and it is assumed that an individual only has one consultation) from provider j , at cost p_j . Thus, we assume that utility depends on the quality of health care received and consumption of all other goods (net income). This empirical specification assumes that responsiveness to prices is independent of income (Gertler and van der Gaag, 1990). This is one of the major weaknesses of this specification.

In the data, no questions were asked about the quality of service provided. The only question asked was related to the distance to the hospital or clinic. As noted in Sahn et al. (2003), this poses a left out variable problem, which may be important for the estimate of the price parameter, as one would expect price and quality to be positively correlated. We adopt the functional form used in Sahn et al. (2003) in which the empirical specification is based on a semi-quadratic utility function that is linear in health but quadratic in consumption of non-health goods (see also Gertler and van der Gaag, 1990).

Here,

$$f(y - p_j) = \delta_1 \ln(y - p_j) + \delta_2 [\ln(y - p_j)]^2 \quad (2)$$

The d_s are assumed to be equal across the provider options, thus constraining the marginal utility of income to be the same across options. Like in other discrete choice models, the logit model is then applied since we attempt to identify the difference in utilities, $V_j - V_0$, where V_0 is the base category associated with private health facility. As in Sahn et al. (2003), we normalize the quality of health care to zero and approximate the function:

$$\begin{aligned} f(y - p_j) &= d_1 \ln(y - p_j) + d_2 [\ln(y - p_j)]^2 \\ &= d_1 [\ln(y) + \ln(1 - p_j/y)] + d_2 [\ln(y) + \ln(1 - p_j/y)]^2 \\ &= d_1 [\ln(y) - p_j/y] + d_2 [\ln(y)^2 - 2\ln(y)(p_j/y)] \end{aligned} \quad (3)$$

In this estimation, $\ln(y)$ and its square are assumed to be constant across the various provider options. This therefore implies that if we take the difference in utilities, the functional form becomes:

$$V_j - V_0 = d_1(-p_j/y) - d_2[2\ln(y)(p_j/y)] \quad (4)$$

Dow (1996a) raises a number of concerns in respect of this specification and proposes a “flexible behavioural model” as an alternative. This model is specified as:

$$V^*_j = \alpha_{0j} + \alpha_{1j}N + \alpha_{2j}M + \alpha_{3j}I + \alpha_{4j}Z + \alpha_{5j}p_j + \alpha_{6j}p_j^2 \quad (5)$$

$$+ \alpha_{7j} p_j y + \alpha_{8j} y + \alpha_{9j} p_k + \alpha_{10j} t_j + \alpha_{11j} w + \epsilon_j$$

Akin et al. (1998) use this specification in favour of the previous model because the coefficients on price and price/income variables are allowed to vary across alternatives. This rises from a relaxation of the assumption of additive separability in the utility function. According to Dow (1996b), although additive separability has been strongly rejected in continuous demand models (see Deaton and Muellbauer, 1980), this assumption is maintained in most empirical models of health care. This implies that the conditional utility is represented as an additively separable function of health and non-health consumption.

The assumption of additive separability can be relaxed in a number of ways. First, inclusion of an interactive term between consumption and health improvements in the utility function. Second, rich and poor may place different values on improvement in health status. Practically, this implies that both income and price terms may be estimated with separate alternative specific coefficients (Dow, 1996b). Third, flexibility can also be added to the model through parametrization of the budget period but this depends on the functioning of credit markets (Gertler et al., 1987). Using the market wage may systematically overestimate the value of time because of the presence of unemployment or underemployment. Similarly, the travel time variable is problematic, because the costs of travel may, in many instances, be shared with other activities, such as visit to the market. Therefore, Dow (1996b) proposes that separate coefficients are estimated for travel time (travel may enter the health production function, and long travel times may further worsen the health status of an ill person) and wages (which affect the cost of remaining ill). This can be justified on theoretical grounds, and Dow (1996b) also finds that travel time has an effect independent of opportunity cost of time.

Several issues in estimation emerge. First, there are problems of sample selection. Secondly, the estimation technique or functional form involves the use of the basic multinomial logit model. Thirdly, the variables used in estimation. In our case, the dependent variable is the provider choice and the different alternatives offered. The independent variables include individual, household, community and other attributes such as price, user costs and expenditure variables.

Functional form

In the previous section, we specified a general model of utility maximization using a random utility model (see also McFadden, 1973). However, the literature on health care demand shows that the multinomial logit model (MNLM) can, under certain conditions, be derived from the latent variable model. Previous literature offers no clear guidance on the appropriateness of MNLM. Mwabu et al. (1993) note that, *a priori*, there is no way of determining the decision structure of health care choice. They therefore opt for the standard multinomial estimation. However, Gertler et al. (1987) test for the difference between the nested and standard multinomial logit and reject the hypothesis that MNLM is not different from the nested multinomial logit model (NMLM). Similarly, Dor et al.

(1987) reject MNLM in favour of NMLM. Sahn et al. (2003) applied NMLM in rural Tanzania.

Given the nature of the choice structure at hand in Uganda, it may appear that the NMLM is preferable. However, no testing procedure for discriminating among the three structures is defined. In so far as results differ across different specifications of the choice structure, this feature of the model makes it more problematic (see also Lindelow, 2002). McFadden (1984) shows that “empirical experience is that the MNLM is relatively robust, as measured by goodness of fit or prediction accuracy, in many cases where the independence of relative alternatives (IRA) property is theoretically implausible”. The flexible MNLM is also easier to deal with computationally and therefore we adopted it for this study.

Interpreting the estimated coefficient in the flexible MNLM is complicated by the fact that the model is non-linear in explanatory variables. This implies that the impact of independent variables on the probability of seeking a particular type of health care will depend on the value of that variable and other independent variables. As such, the results are best interpreted through the analysis of marginal effects and predicted probabilities. The marginal effect of variable x on alternative k refers to a change in the probability of individual i choosing alternative k in response to a change in x . This can be represented using the MNLM functional form as:

$$\frac{\partial \Pr(V_k = 1)}{\partial x} = \Pr(V_k = 1) \left[\alpha_{k,x} - \sum_{j=1}^J \alpha_{j,x} \Pr(V_j = 1) \right] \quad (6)$$

where $\alpha_{j,x}$ are the alternative specific coefficients associated with variable x . In this case, we observe that the marginal effect depends on the values of all independent variables, and the coefficients for each outcome. We calculate the marginal effects at the means of all explanatory variables.

In the same way, the predicted probabilities can be calculated in two ways. First, the predicted probabilities can be calculated for each individual, given the values of the independent variables associated with that individual. Specifically, the predicted probability that individual i will choose alternative k is given by:

$$\Pr(k = 1) = \frac{\exp(\hat{V}_k^*)}{\sum_{j=1}^J \exp(\hat{V}_j^*)} \quad (7)$$

where \hat{V}^* is evaluated as the predicted conditional utility evaluated at the values of the explanatory variables of individual i .

A second approach to looking at the predicted probabilities controls for variation in all

the independent variables except the one of interest. Predicted probabilities are calculated for a representative individual, for which, the values of the independent variables are fixed at specific levels — such as minimum, maximum, mean, or median — for the sample or subsamples. Using these models, we tested the hypothesis that actual consumption/demand of health care will differ according to demand factors such as education, income, quality and appropriateness of the services provided.

Data type and adjustments

The main source of data for this study was the 2002/03 National Household Survey (NHS). This survey was designed and implemented by UBOS and was conducted from May 2002 to April 2003. The survey covered a nationally representative sample of 9,710 households consisting of 48,561 individuals, with an exception of Pader District and a few enumeration areas in Gulu and Kitgum Districts. The survey design allowed for analysis at the national, regional and rural/urban levels. This report focused on the rural subsample, consisting of 30,928 individuals, of whom 8,856 reported to have been sick within the past 30 days before the survey.

The survey collected detailed information on several aspects of the household. At the individual level, information collected included age, sex, marital status, migration history, education, health and employment status. At the household level, information on consumption (food and non-food) expenditure, assets, dwelling characteristics, basic services used and transfers were collected. In addition, a community survey was administered.

In addition to the household survey, data were collected on quality of facilities. Complementary data were obtained from a health care services survey that collected information on quality and costs. Data from sampled health facilities in several districts across the four regions (Central, Northern, Western and Eastern) were collected. The focus was on structural aspects of health quality related particularly to availability of electricity in the health facility, availability of drugs, and availability and number of qualified doctors and nurses. The other source of data was the public health spending information collected from the Ministry of Health and the district health offices. The spending figures usually include all sources of funding and current spending including materials, medicines and salaries. The different variables used in the analysis are discussed in the next section. The Stata software was used for the analysis in this study.

Variables used in the estimation

Choice of health care provider

The dependent variable is the provider choice. Tables A1 and A2 in the appendixes summarize the variables used. We considered individuals who were regarded as usual household members⁹ and reported having been sick during the 30 days prior to the study. We assumed that any individual who reported having been sick sought either formal or home care. The response to an illness episode often reflects the complex nature of the health and the economic and social context in which health and health care is embedded. In this study, given a person's perception of the nature of illness, economic and physical

constraints (access) and to some extent considering past experiences, a course of action will be taken to seek treatment. This treatment may involve multiple visits with one or more health care providers. Evidence from the field visits and community discussions showed that some individuals used more than one provider. In such a context, past experience of treatments may be an important determinant of visit patterns. The behavioural response is likely to depend on the type of illness. A review of the theory by Leonard and Leonard (1998) shows that there are reasons to expect the behavioural response to be related to the type of disease; Mwabu (1986) offers empirical evidence of consultation patterns being highly sensitive to patients illness.

In the survey, the alternatives offered were (1) none, (2) home, (3) hospital 1-outdoor patient, (4) hospital 2-indoor patient, (5) clinic, (6) dispensary, (7) health centre, (8) drug shop, (9) pharmacy, (10) traditional doctor or (11) others. In this study, choice was limited to one consultation only. If several consultations were made in the 30 days prior to the survey, answers referred to the last consultation. The survey therefore ignored many of the complexities that are likely to characterize health seeking behaviour in Uganda. For purposes of our estimation and because the number of observations in some cases was small, these alternatives were grouped into four options:

- i) Home care/no consultation/self care, pharmacy/drug shop and traditional healers.¹⁰
- ii) Hospital. This includes both private and public hospital. There are very few private hospitals in rural Uganda (less than 3% of those who reported illness consulted private hospitals). However, public hospitals are more fairly distributed with at least one hospital per district.¹¹ The decision to combine the two is based on the fact that in rural areas, the hospitals provide more less a similar service at a similar fee. Moreover, overall, consultation with hospitals was only about 11% in rural areas. We considered this an adequate level of representation to be included in the analysis. In addition, NGOs have a considerable presence in the health sector in rural Uganda. However, they work mainly through the public sector and support the delivery of community-based preventive health care. They operate mainly through health posts run by religious organizations such as the Catholic, Protestant, Islam and Orthodox groups.
- iii) Public clinic includes government clinics, dispensaries and health centres. As described in earlier sections of this report, these facilities are smaller than referral hospitals and provide fewer services than major hospitals do. In general, these types of clinics are usually the first contact with the health system.
- iv) Private clinic. Purely privately-owned clinics at the level of dispensary or health centre. This option was selected based on the fact that private clinics are playing a major role in the provision of health care services in Uganda. Hutchinson (2001) shows that the Uganda population prefers the expensive private facilities to the public health clinics and argues that this preference is explained by the differences in quality of services provided.

Among the independent variables are individual, household and community characteristics. The individual variables are age, gender, education and per capita income. Whereas age and per capita income are continuous variables, the rest are captured as dummy variables. Gender takes a value of one for men. Education is captured through

“ladder-type” dummy variables: no education, primary education, secondary education and tertiary education. This setup ensures that the variables will only capture the incremental effects of the levels of education. In addition, for respondents whose ages are below 14, the education of the mother is used instead. This follows from the assumption that for younger children, mothers make health care decisions.

Income is derived from total monthly household consumption expenditure deflated by a regional price index. This is generally consistent with other literature. Household expenditure is more often used than current income because it reflects permanent income which is expected to be more stable than current income. We do not use personal expenditure data because it is unreliable. We therefore use per capita monthly expenditure (see also Gertler and van der Gaag, 1990; Sahn et al., 2003; Glick and Sahn, 2006) to capture the concept of individual share in the total household expenditure. This avoids the likely strong correlation between expenditure (income) and household size. A measure of health status has not been included as an explanatory variable. Akin et al. (1995) include seriousness of illness (proxied by number of days lost due to illness or injury). However, Gertler et al. (1987) use the number of days healthy in the last four weeks in the health production function. As noted in much of the literature, these variables are problematic in that they are endogenous to the choice of health care service.

A range of variables has been used in the literature to capture health quality.¹² Some studies assume quality is a provider, rather than a facility characteristic and therefore refer to the expected improvement in health status from using a particular provider as a quality aspect. Akin et al. (1995) suggest that the best proxy for quality is operational cost per capita (based on reported expenditure per facility). They, however, argue that this is not a perfect measure of quality due to differences in efficiency. Many studies of demand for health have used only staffing and structural characteristics as proxies for quality. Litvack and Bodart (1993) limit quality to drug availability while Lavy and Germain (1994) measure quality through drug availability, staffing and infrastructure. However, generally, there is likely to be collinearity between different structural quality variables, and Mwabu et al. (1993) find that this feature of the data prevents them from examining the independent impact of different quality characteristics. We therefore use data on observed physical (structural) conditions of facilities, especially availability of electricity in the facility. Due to data limitations, we do not use staffing characteristics as proxies for quality.

Alderman and Lavy (1996) show that estimates of price effects without controlling for quality are problematic. In this study the complementary data on prices and quality collected from the districts permitted linking to the household level data. The study included three attributes of alternatives in the model. The variables selected are: (i) price of care from provider j ; (ii) price squared; and (iii) a price/income interaction. These are in line with the model specified above. Several studies on health care demand have used hedonic price equations for private doctors and imputed prices for all individuals (Lavy and Quigley, 1993). Other studies opt to use official fees as proxies for prices. Price of health care from provider j can be defined as:

$$p_j = c_j + wt_j$$

where c_j is the fee and t_j is the opportunity cost of time spent seeking care. In this case, opportunity cost of time can be proxied by the wage as defined above. The time spent seeking care includes both travel time and time spent waiting to receive care. However, we run into difficulties as travel time and waiting time are not reported by individuals in the survey. In the community questionnaire, distance to nearest health facility was recorded, but again there were missing observations for many communities. Therefore, due to this data limitation, only the fee paid (direct for private clinics or indirect for public hospitals/clinics) was used as an explanatory variable. For public hospitals and dispensaries, we derived indirect costs of registration (such as the money patients spend to buy exercise books/stationery used for their medical records-registration) as the fee.¹³ These amounts varied by public health facility and location. We compared the amounts at three different levels: (i) prices paid by the consumers; (ii) information from the district directorate of health services (DDHS),¹⁴ and (iii) the community level price indicators. In most cases, the cost incurred was basically purchase of an exercise book or stationery and this was a consistent expense across all communities and households. Like in Akin et al. (1995), we used this indirect registration fee as the best proxy for facility price (fees charged at public hospitals and dispensaries). For private clinics, facility price is proxied by the amount of money paid for consultation/registration to the clinics and hospitals in cases where these providers are used. We used available information from the clinics/hospitals and compared this with what a sample of consumers and the DDHS provided. Interestingly, the prices were not so varied within locations when the three different sources were compared. Therefore, we derived a meaningful measure of average costs based on the registration fees for the public units and information from the private clinics/hospitals for the private cases. In situations where we were not able to obtain reliable prices, we derived average prices from the information provided by the DDHS, communities and providers then aggregated these to the subcounty level. This information was then merged with the household survey data. In Uganda, it is evident that user costs vary by form of treatment. However, in our survey, the form of treatment received was not observed.

Individuals who did not seek medical care (self-treat) were assumed not to have spent any money on consultation and therefore were assigned a value of zero. We had serious difficulty deriving the user fees for traditional medical practitioners and therefore included them among the self-care group. Likewise, there were no consultation fees charged by drug shops or pharmacies. This is consistent with the response from those who used this option as more than 80% indicated they did not spend any money on consultation.

In terms of the actual expenditure for individuals seeking health care, the socioeconomic survey based on the household consumption expenditure module¹⁵ provided information for those who had fallen sick during the 30 days prior to the survey. Although this may have been a good measure of quality, problems of endogeneity may arise if these data were used.

5. Empirical results

Descriptive results

The survey used in this study contained a series of information on aspects such as gender, regional location, education level, age, type of illness reported and health provider consulted. This report considered 8,720 rural individuals reported to have been sick within the 30 days before the survey. This represents 28.2% of the total rural population comprising 30,928 individuals. Females comprised 51% of the rural population and of the females who reported sick, 30% were married. The average rural household size was 7, with a per capita monthly consumption of Ugsh30,960. The average distance to the health provider was 5.9 km. The Eastern Region had the highest number of individuals in the survey comprising 29.6%, followed by Central, Western and Northern (Table 3).

There was variation in the reporting of illness by region and gender. In total, more females reported ill (52.9%) and this was the same trend in all the four regions. There were differences in the regional contribution to the population that reported ill. Eastern Region reported the highest percentage (36.1%) followed by Central, Western and Northern.

Table 3: Rural population composition and reporting of illness, by region and gender

Region	Total rural population	Per cent of population	Number sick	Reporting ill(%)	Contribution to Pop. reporting ill	Reporting ill (%) by Gender	
						Female	Male
Central	8,218	26.57	2,228	27.11	25.55	51.80	48.20
Eastern	9,161	29.62	3,152	34.41	36.15	53.01	46.99
Northern	5,543	17.92	1,378	24.86	15.80	55.52	44.48
Western	8,006	25.89	1,962	24.51	22.50	52.24	47.76
Total	30,928	100.00	8,720	28.19	100.00	52.92	47.08

Source: Researchers' own computation.

In addition, there were differences in the reporting of illness by age category as indicated in Table 4. The average age of those individuals who reported sick was 19. Individuals were categorized as infants (0–4), young children (5–14), older children (15–21), adults (22–49) and those in the retirement (50 and above). Reporting of illness was highest among infants (29.5%). This is not surprising given the fact that infants are more vulnerable to sickness. Furthermore, often the response time to seek treatment for children with any sign of sickness is much faster than for adults or older children and hence the higher likelihood of reporting infant's illness. Children below 14 years of age constituted the highest percentage of the rural population (53%). With the exception of

infants, more females reported illness in all the other age categories.

Table 4: Reporting of illness, by age category and gender

Age category	Total rural population				Reporting of illness		
	Total		Gender		Total sick	Gender	
	Number	Per cent	Females	Males	Per cent	Females	Males
age 0-4	6,077	19.65	9.83	9.82	29.51	14.36	15.15
age 5-14	10,325	33.38	17.03	16.35	25.71	13.66	12.05
age 15-21	4,227	13.67	6.93	6.74	9.20	4.87	4.32
age 22-49	8,253	26.68	14.05	12.64	25.53	14.74	10.79
age 50-plus	2,046	6.62	3.17	3.44	10.06	5.30	4.76
Total	30,928	100.00	51.01	48.99	100.00	52.92	47.08

Source: Researchers' own computation.

The education level of the rural individuals and those who reported sick was considered (Table 5). The highest number of the sick (49%) reported having primary education followed by 44% with no education and the lowest being 1.3% with tertiary education.

Table 5: Reporting of illness, by education level

Level of education	Total rural population		Contribution to population reporting ill	
	Number	Percentage	Number	Percentage
No education	10,059	32.52	3,797	43.54
Primary	17,875	57.80	4,267	48.93
Secondary	2,485	8.03	544	6.24
Tertiary	509	1.65	112	1.28
Total	30,928	100	8,720	100

Source: Researchers' own computation.

Self-reported data on incidence of illness is problematic due to the subjectivity of responses. However, going by the results of the survey, there were considerable differences across age-group, gender and region. The average number of sick days was 7 with the majority (50.9%) suffering from malaria followed by ulcers and others (18.5%) plus respiratory (13.9%) as indicated in Table 6. This finding is consistent with that of other studies that indicate malaria/fever accounts for over 50% of the burden of disease in Uganda (World Bank, 1993). With an exception of the 50-plus age category that reported suffering from ulcers and others most (33.6%), all the other categories had malaria as the most common type of illness.

Table 6: Type of illness for those reporting illness, by age category

Type of illness	Age group
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	Total	Se	0-4	5-14	15-21	22-49	50-plus
Malaria	50.91	0.005	58.57	51.96	49.25	48.92	32.31
Respiratory	13.89	0.004	12.55	14.9	13.09	13.67	16.5
Measles	2.98	0.002	5.6	4.01	2	0.36	0.23
Diarrhoea	4.36	0.002	7.89	2.77	2.87	2.74	3.53
Accident	1.02	0.001	0.35	1.07	1.5	1.39	1.48
Infections & hypertension*	8.15	0.003	5.21	10.17	8.73	7.64	12.4
Ulcers and others	18.69	0.004	9.83	15.12	22.57	25.27	33.56
Total	100		100	100	100	100	100

Notes: * Intestinal and skin infection, AIDS, dental, mental illness, hypertension.

There was also significant variation in the pattern of reported illness by region (for example, only 1.8% reported diarrhoea in the west compared to 10.3% in the north). Malaria was also the highest reported illness in all the four regions. There were also noteworthy results in the disease pattern across gender groups and education categories. Malaria was the most common type of illness among men and women and across all the education groups. This was followed by ulcers and respiratory problems as indicated in Tables 7 and 8.

Table 7: Type of illness for those reporting illness, by region and gender

Type of Illness	Region				Gender	
	Central	East	North	West	Female	Male
Malaria	53.73	51.46	34.25	58.51	50.53	51.33
Respiratory	19.43	9.04	17.56	12.79	13.67	14.13
Measles	2.83	5.36	0.87	0.82	3.03	2.92
Diarrhoea	2.15	4.92	10.3	1.78	4.31	4.41
Accident	1.12	0.76	0.58	1.63	0.35	1.78
Infections & hypertension*	6.06	7.39	13.35	8.1	8.71	7.53
Ulcers and others	14.68	21.07	23.08	16.36	19.39	17.9
Total	100	100	100	100	100	100

Notes: * Intestinal and skin infection, AIDS, dental, mental illness, hypertension.

Table 8: Type of illness for those reporting illness, by education category

Type of Illness	Education Category			
	No education	Primary education	Secondary education	Tertiary education
Malaria	52.49	49.14	53.13	53.57
Respiratory	13.75	13.99	14.34	12.5
Measles	4.19	2.3	0.55	0
Diarrhoea	6.85	2.39	2.76	2.68
Accident	0.47	1.34	2.02	2.68
Infections & hypertension*	7.19	9.51	5.33	2.68
Ulcers and others	15.06	21.33	21.88	25.89
Total	100	100	100	100

Notes: * Intestinal and skin infection, AIDS, dental, mental illness, hypertension.

An individual's behavioural response to an illness is said to depend on his or her perception of the illness, physical and financial constraints, previous experiences and available treatment options (Mwabu et al., 1993). Of those who reported to have been

sick, about 36.1% consulted private clinic/dispensary/health centre followed by 35.8% that had no care/self treatment. Hospital usage had the lowest percentages in total. This, however, does not mean that hospitals are not important to the rural people in Uganda. It could be because of the distance to the nearest hospital or simply the nature of illness. This indicates that in general, people in rural Uganda prefer private clinics/dispensaries/health centres to public health providers. Tables 9 to 11 give a summary of the health seeking behaviour by gender, age, type of illness, region and education level.

The choice of health care provider by gender and age is presented in Table 9. More males than females used private clinics. High percentages in the use of private clinics and no care are recorded in all the age categories with the infants having the highest percentage in private clinics and those of 50 years and above having the highest percentage in no care.

Table 9: Choice of health provider, by gender and age

Provider	Gender			Age group				
	Total	Female	Male	0–4	5–14	15–21	22–49	50-plus
No care/self treatment	35.80	35.88	35.71	31.21	38.18	34.91	36.60	41.98
Hospital	11.22	10.99	11.47	10.49	11.28	12.34	11.02	12.63
Public clinic	16.79	17.57	15.91	18.19	16.01	14.59	15.96	18.77
Private clinic	36.19	35.56	36.91	40.11	34.52	38.15	36.42	26.62

Source: Researchers' own computation.

Of those who reported suffering from malaria, the highest percentage went to a private clinic followed by no care (Table 10).¹⁶ About 42% of those who reported respiratory problems did not consult any health care provider or self-medicated followed by 32.5% who consulted a private clinic.

Table 10: Health seeking behaviour, by type of illness

Type of illness	Total	SE	No care	Hospital	Public clinic	Private clinic	Total
Malaria	50.12	0.0053	32.73	10.25	17.14	39.87	100
Respiratory	13.67	0.0037	42.03	9.74	15.69	32.54	100
Measles	2.94	0.0018	21.15	12.31	15.77	50.77	100
Diarrhoea	4.29	0.0022	34.74	11.84	20.53	32.89	100
Accident	1.00	0.0011	24.72	21.35	11.24	42.70	100
Infections & hypertension*	8.03	0.0029	40.93	12.24	17.44	29.40	100
Ulcers and others	18.41	0.0041	40.49	13.62	15.95	29.94	100

Notes: * Intestinal and skin infection, AIDS, dental, mental illness, hypertension.

Source: Researchers' own computation.

This was the same trend with those who reported ulcers and other diseases. The private clinic and no care provider options, just like in the age categories had the highest number of individuals suffering from different sicknesses. The major reason for seeking care from private clinics was that it is presumed that their services are better and drugs are always available even if at a higher cost. In addition, the nature of illness often determines which type of health facility to visit first. There was seemingly limited consultation with

hospitals in rural Uganda because the few public and private hospitals in most rural areas are scattered. Operation of health services by NGOs is limited to a few hospitals and health centres operated by religious institutions. The purely private hospitals are few in the rural areas and are concentrated mainly in the large cities.

Table 11 summarizes the choice of health provider by region and education level. There were significant variations in the provider choices among the regions. In particular, the highest percentages of those living in the Central and Western regions attended private clinics. This is not surprising given that these regions are wealthier than the others. In the Eastern and Northern regions, the highest percentages used more of the no care option, reflecting the poor medical infrastructure in the regions and high levels of poverty.

Table 11: Choice of health provider, by region and education level

Health provider Choices	Total	Central	East	North	West	No education	Pri- mary	Sec- ondary	Tertiary
No care	35.61	35.32	42.16	32.22	28.64	34.55	37.08	34.56	35.71
Hospital	11.43	12.70	7.30	13.57	14.17	10.85	11.48	11.76	10.71
Public-Clinic	16.88	9.78	18.31	23.66	17.48	18.44	15.94	12.50	14.29
Private-Clinic	36.08	42.19	32.23	30.55	39.70	36.16	35.51	41.18	39.29

Source: Researchers' own computation.

There was not much variation in choice of health provider by education level. Those with secondary and tertiary education used private clinics most (Table 11). A number of factors can be attributed to the differences in use patterns across geographic regions, demographic and socioeconomic groups. These are explored in more detail in the next section.

Determinants of provider choice

In this section we present the results of the effects of individual, household and community characteristics based on the flexible discrete choice model as applied to health care demand in rural areas of Uganda. We present the marginal effects and then discuss the alternative effects based on qualitative variables. Simulations of the model are done. In the model presented in Section 4, four options are used: No care/self-treat, hospital (public or private),¹⁷ public clinic (dispensary, health centre, or public clinic) and private clinic (dispensary, health centre, or private clinic). Identification of the parameters requires that a reference alternative must be identified because only the difference in utility between any alternative and the reference alternative matters in the estimation of the coefficients. The obvious natural reference alternative is home care/self-treat. Tables A3 and A4 in the appendixes present the results of the health care demand function. Table A3 presents the results of the standard coefficients while Table A4 presents the marginal coefficients. These results and their interpretations are discussed below.

The effect of individual and household level characteristics

Age

The results of how age affects the probability of seeking care generally conformed to our expectations. We disaggregated the age groups into four categories. This was done because the health demands for children below 5 years would be different from those between 6 and 14 and for those between 15 and 21. Relative to the left out category of children under the age of 5, the group aged 50 and above were less likely to seek care from private clinics compared with the other alternatives: No care, public clinics and hospitals. Furthermore, children aged 5–14 and individuals aged 22–49 were less likely to seek care from public hospitals and private clinics. In terms of gender, the results showed that females were more likely to obtain care from public clinics than men.

Education

Surprisingly, none of the education variables was a significant determinant of health care choice. This was the same when we included the number of years of the household head. However, this variable captures only direct effects. Schooling may affect demand directly through its effects on income or through its effect on entry into the sample individuals reporting illness. It is arguable that the insignificant result obtained in this study was due to the very low level of education in the rural areas of Uganda. More than 60% of the rural population cannot read and write. Similar results are obtained by Gertler and van der Gaag (1990) using a nested multinomial model in rural Côte d'Ivoire and Glick et al. (2000) in Madagascar.

Sick days

The positive sign on the number of sick days for the case of consultations with all the three categories implied that the longer the duration of reported illness, the greater the likelihood of demanding treatment, especially from hospitals. This was an expected result since most hospitals provide referral and inpatient services unlike clinics. This finding is consistent with the results of Sahn et al. (2003) in Tanzania and Ichoku and Leibbrandt (2003) in Nigeria. This conformed to *a priori* expectations.

Income

Household income was represented in this study by household expenditure per capita. This variable had particularly strong effects on choosing private clinics (relative to self care). That is, better-off individuals are more likely than the poor to consult a private clinic or hospital. Individuals who were better off were less likely to consult a public clinic/dispensary or even to self-treat. However, the coefficients on the income variable offered only a partial perspective on the effect of income. Analysing the full effect of income on health seeking behaviour is complicated because of the complex way through which income enters the estimated model. As can be seen in the description of variables, income proxied by per capita expenditure enters directly, but also indirectly through the income price interaction term. This feature of the model is discussed jointly with the price elasticities (Table 12).

The effect of community level characteristics and indicators of quality

Facility quality

The index of structural development and quality (electricity) remained an important determinant of health seeking behaviour among rural individuals for all the treatment options. The positive sign on the electricity variable indicated that availability of electricity in the premises increased demand for treatment across all options. This result conformed to our expectations because it was expected that with electricity present, the facility would be better equipped to provide services such as laboratory tests, sterilization of equipment and surgical services.

Regional variables

Three regional variables, with Eastern region as the reference region, were used to capture regional disparities. There was significant variation in choice of provider among the regions relative to Eastern region. Relative to this region, Central and Western showed higher levels of consultation of hospitals. There was seemingly less demand for public and private clinics in the Western Region. In terms of demand for private clinics, interesting results depicting wealth patterns were observed. There was less likelihood of the use of private clinics in the north relative to the east, while there was more use of private clinics in the Central Region. This was an expected result given that the Northern Region is the poorest while Central and Western regions are the wealthiest and are the better serviced of the all the regions in Uganda. Therefore, the people in these regions would have both financial and physical access to health services of all types.

Price and its interactions

Like in the case of income, price enters the estimated equation in a number of complex ways. Given the different channels through which price affects health seeking behaviour, the coefficients on the respective variables are difficult to interpret. Looking at the variable fees,¹⁸ which is an indicator of price of the medical service, this variable was expected to be negative and significant. While it is economically reasonable to expect medical fees/ costs to be a hindrance to health care utilization, quite a number of studies have found this variable insignificant. Likewise, we found price of health care not significant in this study. This necessitates interpretation to look at price elasticities of demand.

Table 12: Health care price elasticities by expenditure

Quartile	Hospital			Public clinic		
	Hospital*	Public clinic	Private clinic	Hospital	Public clinic*	Private clinic
1	-0.13	0.06	0.04	0.07	-0.61	0.03
2	-0.14	0.05	0.01	0.05	-0.53	0.02
3	-0.17	0.04	0.01	0.04	-0.37	0.03
4	-0.18	0.04	0.01	0.04	-0.19	0.03
All	-0.15	0.05	0.02	0.05	-0.34	0.02

Notes: * column reflects own price elasticities, other columns show cross elasticities. Computed from multinomial logit estimates.

According to Train (1986), elasticity represents the percentage change in the probability of having a consultation with provider k due to a percentage change in price of consultation with provider x, where the percentage change in price is infinitesimal. Own

price elasticities were calculated for hospitals and public clinics for all the observations in the sample. The results are reported by income quartile (Table 12). Two important aspects emerged from the analysis of demand elasticities. First, there was considerable variation in elasticity of demand within income quartiles. Second, the elasticity demand varied substantially with income. In the case of demand for care at public clinics, the elasticity was higher for households with lower income implying that an increase in prices was likely to reduce access to care, particularly for poorer households.

Interestingly, the own price elasticity of demand for hospitals increases with income. This implied that the demand response to price increases would be strongest among the non-poor households. A possible explanation for this aberrant behaviour is that the health care market suffers from information asymmetry between the consumer and provider. Consumers often rely completely on the prescriptions of the health care provider. In such situations, it is easy for consumers to use cost as the parameter for quality of treatment. This may give contradictory signals to consumers. Higher costs may be seen as indicative of greater quality of care.

Finally, we tested the model to see the effect of excluding the quality variables. In this case, we sought to determine the extent to which the exclusion of quality factors (electricity) might bias the price parameters (see also Sahn et al., 2003). We found that there were major changes in the price coefficient and other parameters for all the providers with the exclusion of the quality variables. The price variable became significant and positive for all the cases implying that the potential bias from lack of additional information on the quality of health care may be important for our estimates.

Policy simulations

In this section we test the effect of different policy initiatives on the choice of health service. A number of policy options have been tried in Uganda, including the user fees and universal primary education. In addition, the government has in the past provided credit to households and communities in an attempt to help them out of poverty. A number of donor institutions have supported these initiatives, which hitherto may not have been evaluated. Clearly, there are an infinite number of permutations of policy changes that can be considered but we limit our results to a few indicative cases. The effects of a policy change were simulated by changing the values of one or more of the explanatory variables in accordance with the policy in question. The changes in explanatory variables result in changes in the predicted probabilities, and these are taken to be the effect of the policy. We did not consider higher order changes in this study. Thus, the simulations in this report do not include differential effects but only average effects. However, the results of the simulations should be treated as suggestions that are plausible but not real, and therefore treated with caution.

As explained in Train (1986), “what-if” simulations using a discrete choice model involve doing two simulations. The first simulation uses the “base values” of the exogenous variables to compute for the probabilities. The second computes the probabilities using the values of exogenous variables reflecting the policy being analysed. The difference between the two results is the impact of policy change. The simulation study in this case is defined by interventions aimed at improving access to medical care.

Our desired result is to reduce the probability that people will receive no treatment or self-treatment and increase the probability that individuals seek care from a medical practitioner in private or public clinics in the event of illness. We therefore suggested interventions in electricity, basic fees and welfare (poverty) dimensions. Table A5 in the appendixes shows the results of the simulations.

First, we considered a programme of equipping clinics with gas and generators to enable them create their own electricity supply. Currently, slightly more than 1% of the rural areas have electricity. This implies that for cases that require, for example, laboratory tests or sterilization of equipment for surgical purposes, they have to be referred to the hospitals or facilities with electricity and these are mainly found in the urban centres. As such, a programme to provide gas and generators would help improve utilization of rural health facilities. Providing gas and generators to rural hospitals and public clinics would increase their utilization by approximately 6%, and reduce private health care utilization and self-treatment by 3% and 2% respectively. This implies a diversion away from private clinics and self-treatment and shows that most rural individuals possibly consult private clinics because they have better facilities backed by electricity compared with the public clinics and hospitals.

Second, the effect of medical costs was considered. Even though the Government of Uganda removed user fees in 2001, indirect fees are charged in public hospitals and private clinics continue to play a major role in determining access to medical services. Specifically, we considered a scenario where the costs of using public facilities are eliminated. We maintained fees for private services and assumed that removal of registration fees would divert patients from no care and private care to public facilities. Table A5 shows that the removal of registration in all public medical facilities resulted in an increase in the probability that individuals seek care from public clinics and hospitals. There was a decline in self-treatment and no change for private clinics.

A third simulation considered the effect of a reduction in poverty among rural households and individuals by increasing incomes by 10% for all households. The result of poverty reduction would lead to a small increase in consultation for private clinics by 5% and less for public clinics by 3%, hospitals 1% and self-treatment 3%. However, this result may not be the same if the private sector responds by raising their prices.

6. Conclusion and policy implications

This study examined the determinants of access to health care facilities in Uganda and provided empirical evidence on individual, household and community characteristics on individual health seeking decisions during sickness. The motivation for such analysis is threefold. One, to improve the understanding of how changes in these variables affect health seeking behaviour of individuals. Two, to understand the effect of qualitative variables of utilization of health services and three, to assess the implications of changes in policy on health seeking behaviour of individuals. Much of the analysis in this report was devoted to measuring the determinants of health seeking behaviour among rural individuals in Uganda.

Such analysis is important for policy purposes, not only because it serves as a guide for the development of policy to improve the health sector and well-being of Uganda's population, but also because it establishes the importance of various social and economic factors, both within or beyond the control of policy makers. This kind of information may be useful as a guide for policy makers in the design of effective institutional programmes and the choice of policy for the health and other sectors to be implemented among rural communities in Uganda. A number of conclusions and policies were derived, and this was driven by our need to consider how individuals behave during episodes of illness, and what factors affect this behaviour.

Before turning to the key results, some weaknesses can be drawn from studies of this nature. First, we highlighted the fact that the data had some weaknesses, particularly on health variables such as attributes of health delivery and quality of health care services along various dimensions. We complemented these data with information from other sources including the Ministry of Health, district health offices and some hospitals in various parts of the country. The qualitative data obtained from the Ministry of Health and district health service directors did not cover the entire country and did not capture other details such as structural characteristics. Secondly, the survey did not capture the complexities that are not clearly evident in individual and household responses to illness. Third, studies based on a one-time survey may draw conclusions that are not accurate for other times of the year or on average. The fourth aspect is that in this study, income was treated as exogenous yet there could be possibilities of income loss due to illness on households.

Both empirical and descriptive analyses presented in this study suggest that health seeking behaviour of individuals in rural areas of Uganda is correlated with socioeconomic attributes of individuals, households and communities. The results of the descriptive analysis provide evidence on illness prevalence, decision to seek care, choice of health provider, type of illness, availability of drugs and equipment, and a host of individual level variables. Rural individuals in Uganda consulted more with private clinics and no care/self-treat, an indication that the public health services may not be efficient and reliable.

Based on a multinomial model, the model specification is closely consistent with the

“flexible” model proposed by Dow (1999). The results showed the importance of age, household size and income (proxied by per capita expenditure) as determinants of health seeking behaviour. The results also showed that community and quality characteristics including availability of electricity, and location as measured by regional dummy variables are important in the choice of provider. Finally, the interaction between prices and income, defined in the model as the composite of user fees and income were found to be important determinants of choice.

Several policy insights can be obtained from the simulations conducted in this study. For policy makers concerned about how to make Ugandan health services in rural areas more efficient and reliable, policies aimed at providing gas and generators, increasing incomes and removing all user costs would have substantial positive outcomes on the demand for health care. Removal of hidden registration fees user costs would have some positive impact on access to public health care and reduce the use of no care/self-treatment. The results indicated that poverty reduction would lead to a decrease in use of public health facilities, hospitals, and self-treatment, but result in an increase in private care, independent of other changes. Finally, the strengths of the results presented here point towards important practical policy interventions and offer new insights into future research on demand for services in developing countries.

Notes

1. Infant mortality rate 75(78), under 5 mortality rate 137 (134) and total fertility rate 6.5 (6.7) indicated in the table differ from World Development Indicators – World Bank (2008) published figures (shown here in brackets), because of adjustments to use only data from comparable survey areas. The estimates differ slightly because World Bank (2008) reports data that are adjusted for intertemporal comparability. For details, see UNICEF-WHO-World Bank-UNDP (2007).
2. Uganda Bureau of Statistics (UBOS) and Macro International Inc, (2007).
3. UNDP Uganda (2007).
4. Population-weighted average for sub-Saharan Africa excluding South Africa.
5. Government of Uganda (2006a).
6. World Health Organization (2007)
7. Government of Uganda (2006b)
8. See also Dow (1999) for a detailed review of this theory and model.
9. Usual household members are individuals who had lived in the household for more than six months before the survey including babies born to household members within the reference period.
10. The proportions for those treated by traditional healers was too small (1.8%) and the pharmacy group was combined with home care/self-treat because going to a pharmacy is a decision to self-treat with drugs.
11. Uganda now has more than 75 districts, but based on the previous well-established 56 districts, there is a hospital within each of the districts.
12. The usage of the term quality is mixed. Some authors (Lavy and Quigley, 1993) use it to simply describe the type of health provider while Gertler et al., (1987) and Gertler and van der Gaag (1990) do not derive quality from any observable characteristics of facilities.
13. As noted earlier, user fees were abolished in public facilities in 2001. However, indirect costs such as registration fees still appear in most public health facilities and these fees are not so different from the user fees.
14. In the new arrangements, the district director of health services (DDHS) is used to deliver a package of health services to the population and monitor the performance of private health providers. The Ministry of Health is responsible for policy formulation, standards

and guidelines, overall supervision and monitoring (Government of Uganda, 2000).

15. Section 6A of the socioeconomic questionnaire had a section on health and medical care expenditure over the past 30 days (including consultation, medicines, clinic charges, traditional doctors fees/medicines and others).
16. The alternative “no care” should not be equated with no treatment. Depending on the type of illness and knowledge of the individual, there may be scope for self-treatment.
17. In the case of hospitals, we were not able to distinguish between outpatient and inpatient visits.
18. We used fees based on the general initial charge for consultation, e.g., purchase of an exercise book for individual’s medical records and consultation fees for private clinics.

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Dependent variable

Option/Provider choice

1	No consultation/self care/traditional health centre/others
2	Hospital (public or private)
3	Public clinic, dispensary or health centre
4	Private clinic, dispensary or health centre

Independent variable*Individual characteristics*

age	Age in years
female	gender group is female
married	marital status (married=1, else 0)
Incons	log of monthly per capita consumption
no_educ1	No education (0/1)
pri_educ1	Primary education
sec_educ1	secondary education
ter_educ1	Tertiary education
Sickdays	Number of days sick

Regional dummy variables

Reg1	Central
Reg2	Eastern
Reg3	Northern
Reg4	Western

Qualitative variables

Electricity	Facility has electricity (yes=1 else 0)
Infees	Price of care
Lnfeesq	Square of price of care
Cons_fees	price/income interaction

Notes:

Education variable refers to education of mother if individual is less than 15 years old.

Table A2: Description of variables used in analysis

Variable		Mean	Std. Dev.	Min	Max
No_care	No care/Self-treat/Home/traditional	0.356	0.479	0.000	1.000
Hospital	Hospital	0.114	0.316	0.000	1.000
Public_Clinic	Public Clinic	0.169	0.374	0.000	1.000
Private_Clinic	Private Clinic	0.360	0.481	0.000	1.000
age5_14	Age in years 5-14	0.257	0.437	0.000	1.000
age15_21	Age in years 15-21	0.092	0.289	0.000	1.000

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Appendixes

Table A1: Definition of variables in estimation

	-0.247	-0.237	-0.195
Lnfeessq	0.065*** -0.019	-0.033* -0.019	0.024 -0.017
Cons_fees	-0.050** -0.022	0.005 -0.021	-0.024 -0.017
Elect	0.587** 0.014	0.570*** -0.112	0.317*** -0.096
Reg1	0.694*** -0.121	-0.16 -0.114	0.443*** -0.09
Reg4	0.034 -0.137	-0.379*** -0.126	-0.257** -0.112
Reg3	0.416*** -0.146	-0.018 -0.129	-0.141 -0.12
Constant	-7.257*** -1.135	0.154 -1.074	-5.983*** -0.846
Observations	8,856	8,856	8,856

Table A4: Estimation results (marginal effects)

Variable	Hospital		Public Clinic		Private Clinic	
	Coef	se	coef	Se	coef	Se
age5_14*	0.029	0.019	0.004	0.021	-0.033	0.024
age15_21*	0.036	0.025	-0.002	0.027	-0.035	0.031
age22_49*	0.018	0.018	0.009	0.020	-0.027	0.023
age50p~s*	0.031	0.022	0.083***	0.026	-0.114***	0.028
female*	-0.003	0.010	0.026	0.012	-0.022	0.013
sickdays	0.005***	0.001	-0.002	0.001	-0.004***	0.001
no_educ1*	-0.003	0.014	0.009	0.017	-0.007	0.020
ter_ed~1*	-0.005	0.043	0.001	0.055	0.004	0.061
sec_ed~1*	0.000	0.021	-0.013	0.027	0.014	0.030
Incons	0.018	0.013	-0.127**	0.017	0.109***	0.019
lnfees	-0.003	0.027	0.013	0.034	-0.009	0.038
lnfeessq	0.008***	0.002	-0.012***	0.002	0.004	0.002
Cons_f~s	-0.005	0.002	0.006**	0.003	-0.002	0.004
elect*	0.140***	0.007	0.203***	0.008	0.399***	0.010
Reg1*	0.060	0.016	-0.111***	0.014	0.051***	0.018
Reg4*	0.048***	0.015	-0.034**	0.015	-0.014	0.018
Reg3*	0.081***	0.019	-0.003	0.016	-0.077***	0.021
Observations	8856					

** significant at 5% and *** significant at 1%.

Note(*) dy/dx is for discrete change of dummy variable from 0 to 1.

Table A5: Impact of changes in selected variables: An illustrative simulation

Home care	No care/ self treat	Hospital	Public clinic	Private clinic
Base	35.61	11.43	16.88	36.08
Provision of gas and generators	34.54	12.08	17.97	35.41
Per cent change	-0.03	0.06	0.06	-0.02
After removal of registration fees	35.25	11.60	17.08	36.07
Per cent change	-0.01	0.01	0.01	0.00

age22_49	Age in years 22-49	0.255	0.436	0.000	1.000
age50plus	Age in years 50 plus	0.101	0.301	0.000	1.000
Hsize	Household size	6.719	3.274	1.000	31.000
Sickdays	Number of sick days	7.388	6.883	0.000	30.000
Female	gender group is female	0.529	0.499	0.000	1.000
no_educ1	No education (0/1)	0.435	0.496	0.000	1.000
ter_educ1	tertiary education	0.013	0.113	0.000	1.000
sec_educ1	Secondary education	0.062	0.242	0.000	1.000
Lncons	log of monthly per capita consumption	10.115	0.635	8.079	13.670
lnfees2	log of medical fees	3.890	3.124	0.000	8.517
lnfees2sq	log of medical fees squared	7.777	6.245	0.000	17.034
Incons_fees2	Interaction fees* consumption expenditure	10.195	8.128	0.000	20.355
Elect	Electricity dummy	0.509	0.500	0.000	1.000
Reg1	Central	0.256	0.436	0.000	1.000
Reg4	Western	0.225	0.418	0.000	1.000
Reg3	Northern	0.158	0.365	0.000	1.000

Table A3: Estimation results (standard coefficients)

Variables	Hospital	Public clinic	Private clinic
age5_14	-0.121	-0.270*	-0.344***
	-0.167	-0.153	-0.132
age15_21	0.106	-0.104	-0.157
	-0.208	-0.196	-0.167
age22_49	-0.243	-0.311**	-0.395***
	-0.163	-0.149	-0.131
age50plus	-0.524***	-0.395**	-0.907***
	-0.186	-0.171	-0.154
Female	0.03	0.157*	0.013
	-0.093	-0.086	-0.073
Sickdays	0.059***	0.019***	0.020***
	-0.006	-0.006	-0.005
no_educ1	-0.119	-0.063	-0.113
	-0.137	-0.126	-0.111
ter_educ1	0.05	0.088	0.09
	-0.404	-0.392	-0.315
sec_educ1	-0.116	-0.17	-0.09
	-0.201	-0.199	-0.16
Lncons	0.380***	-0.252**	0.456***
	-0.11	-0.107	-0.082

continued next page

Table A3: Continued

Variables	Hospital	Public clinic	Private clinic
Lnfees	0.085	0.158	0.09

Increase in income by 10%	34.56	11.30	16.32	37.82
Per cent change	-0.03	-0.01	-0.03	0.05

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