WHEN ILL, WHY DO CHILDREN NOT UTILISE HEALTH CARE?

-The case of Zambia

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1 Introduction

When ill, an adult individual decide if, when and where to seek health care, and also to some extent how much. A child however can rarely decide whether or not to utilise health care, but is dependent on the adults in the household to make these decisions (Jacobsson, 2000; Bolin et al, 2001). These decisions are, of course, influenced by the costs of utilisation and the perceptions of the benefits of care. When a child is ill, the adults in the household may choose to give self-medication instead of visiting a health facility or choose not to act on the illness at all. The propensity to utilise various forms of health care varies between children. Accessibility to health care is one important factor, where distance plays an important role, but also means of transport. Other influential factors are type (and severity) of illness and socio-economic background, e.g. the household's ability to pay for health care. We know from other studies that aggregate health care utilisation among Zambian households are, except for illness, influenced by income, distance to facilities and household composition (Hjortsberg, 2002).

Health care utilisation reflects on the well being of individuals (WHO, 2001a). We know that good health is highly desired by both women and men (United Nations, 2000). From an equity perspective it is interesting to study socio-economic differences in health care utilisation among individuals who are ill, e.g. time or monetary costs. Health care utilisation is also interesting to study from an efficiency perspective as health is the foundation for work productivity, education (the capacity to learn), and the capacity to grow physically and emotionally. At macro-economic level, good health of the population is a critical input into poverty reduction, economic growth, and long-term economic development (The Commission on Macroeconomics and Health, 2001). In the developing world, there is still much to be

achieved regarding health improvements. Life expectancy at birth in Sub-Saharan Africa is still only two-thirds the average level in the developed world. This is where the disease burden is the greatest, but also where the resources to provide care are the lowest. The provision of health care in many African countries is insufficient, especially in rural areas, and under-utilisation is a concern (World Bank, 1996; Mwabu et al, 1993).

Zambia, situated in Sub-saharan Africa, is one of the poorest countries in Africa. The country has few doctors and nurses, and medical equipment, supplies and drugs are scarce. The infrastructure is weak in rural areas, making access to health services problematic. Other problems are that drugs are not always available and the staffing level often is inadequate especially in rural areas where it is difficult to recruit medical staff (Ministry of Health, 2001a). The government exemption policy does among other things state that children below the age of 6 years are entitled to free health care.

The aim of this paper is on the one hand to, among children below the age of six years who are ill, determine which factors influence the propensity to utilise either health care at a health facility or self-medication (or do nothing), and on the other hand to determine the factors that influence the magnitude of their expenditures incurred for health care. The paper begins with a short introduction of the Zambian health care delivery system followed by a theoretical discussion of the expected determinants for health care utilisation. This is followed by a presentation of the econometric model applied and the data used. Then an analysis of the empirical data is presented.

2 Zambian health care

Zambia currently ranks as one of the poorest countries in the world (World Bank 2002b). With an estimated population of 10.2 million in 2000 of whom 37% live in urban areas (CSO 2001), Zambia is one of the more urbanised countries in sub-Saharan Africa. Despite efforts to improve the health status of Zambians, key health indicators have worsened over the past decade. The under-five mortality was in 1999 estimated to be 187 per 1000 live births compared to 159 in the region. Life expectancy at birth in was 38.5 years the same year compared to 46.8 in the region (World Bank, 2002a). Many of the health problems come from infected water and chronic food shortages. Malaria is one of the leading causes of death for adults and children, and many suffer from malnutrition. In the river valleys, tropical diseases such as sleeping sickness (carried by tsetse flies), river blindness (caused by blackfly bites) and schistosomiasis, also known as bilharzia (caused by a flatworm that enters the bloodstream), affect thousands of Zambians. Tuberculosis (TB), meningitis and measles are also serious health concerns. Cholera outbreaks still occur. As other countries in the region HIV, TB and malaria are the leading causes for mortality (WHO, 2001b).

Health care provision is divided between the Government who is the largest provider of health care, the formal private sector, and non-governmental organisations (NGOs) e.g. missions. Zambia also has a thriving non-formal private sector, comprising traditional healers and traditional birth attendants. Mission facilities are mainly located in the rural areas and play an important role in the delivery of health care.

Hospital care is mainly provided by the central government, but some hospitals are owned and operated by missions and mine companies under the leadership of the Ministry of Health. The

national coverage of hospital beds per 100 capita is around 2.39 (Nakamba et al, 2002). The national coverage of nurses is one nurse per 6 000 inhabitants and trained medical doctors is one per 16 000 inhabitants (Ministry of Health, 2001a). Approximately two thirds of all primary care is provided by the government. The rest is divided between missions, companies, and private clinics located in the larger cities. The density of health centres is about the same across the country with approximately 14.5 health centres per 100 000 population (UNZA and IHE, 1999). The fee structure varies, and particularly a difference between rural and urban areas has been detected. Fees are generally higher in urban areas (Ministry of Health, 2001b; ZIHP, 2002). The cost sharing and exemption policy, which applies to publicly provided health care, is in principle generous. Patients qualifying for free care are provided this at district health facilities. The following medical services are free: treatment of chronic illnesses such as TB, HIV/AIDS; treatments of sexually transmitted diseases; treatment of epidemics (e.g.cholera); ante-natal, delivery and post-natal; family planning; emergency cases (e.g. accidents). The Ministry of Health has also decided that children below the age of 6, women with maternity problems, elderly (above 65 years), disabled and "people who cannot afford to pay for health services because truly they have no means" should receive free health care (Ministry of Health 1993; 1995). However these recommendations are not always followed, mainly due to poor funding, and several reports have shown the failure of exemption policies as well as the heterogeneity in the fee structure (Kahenya and Lake, 1994; The Participatory Assessment Group, 1996; Ponga and Chileya, 1997; Kalyalya et al, 1998).

Few Zambians carry some kind of health insurance. However, those working for companies are sometimes provided free or subsidised health care. Means of cost-sharing have been introduced, which has lead to the introduction of pre-payment schemes, but it is unsure how

many are members of these. Also, one may argue that the schemes are not insurances as such since people tend to wait until they are ill to sign in and pay to become members of a scheme and are then entitled to free care. Some districts have introduced a rule that says that after making the first payment the individual has to wait, e.g. 48 hours, before the scheme to be effective.

Medicines can be bought at health centres and hospitals, but there is also a thriving informal market for them. They can be found on open markets, in bars and restaurants, and at street traders.

3 Theoretical framework

When experiencing an episode of illness the individual decides if health care should be sought or not, weighting the potential benefits and costs of utilisation against each other. A child however, rarely makes this decision but rather the adults in the household. Several factors affect costs and benefits as perceived by individuals when deciding to invest in a child's health. To structure the discussion on these factors it is useful to follow the Grossman model (Grossman, 1972) and recent expansions of his model (Jacobson, 2000; Bolin, Jacobson and Lindgren, 2001) as a point of reference. We view the household as the producer of health, which means that each family member is a producer of not only own health but also of the health of other household members. When producing health, not only own income and wealth can be used, but income and wealth from other household members. The individual receives both investment and consumption benefits from investing in own health and in the health of other household members. In terms of investing in a child's health, the investment benefits occur because increased child health will decrease time spent taking care of a sick child. Household time available for work will then increase. Consumption benefits occur when household members derive utility form the well being of the child. We expect several factors to affect costs and benefits of seeking health care for a child. We will focus on the following variables; health status, income, wealth, age, education and gender.

The decision to seek care depends very much on the perceptions of to what extent health care will improve health status of the child. If health care is sought it is expected that the child gets well faster and/or for the end result to be better. In general when children suffer from severe diseases we expect other household members to have greater incentives to let them utilise medical services, other things being equal. Still if a child is ill and other household members know that health care will cure the disease, the child may not utilise health care due to high

costs incurred for seeking care. The expected cost, i.e. cost of access, for health care is a large determinant of seeking care or not (Acton, 1975; Le Grand, 1982; Manning et al, 1987; Clarke, 1998, Steen Carlsson, 1999). The cost of access to health care is a combination of direct out of pocket payments and time costs, which depends on labour income and the cost of lost household production. Differences in health care utilisation between different social groups in developing countries are often explained by access costs (Gertler and van der Gaag, 1990; Timyan et al, 1993).

We expect the decisions to let a child utilise health care and how much care to consume when ill to be affected by the level of labour income and an exogenous shift in wealth (Grossman, 2000; Wagstaff; 1986; Muurinen, 1982). With a higher total labour income, the household is more able to afford care, but on the other hand different household members' current labour incomes have a countervailing effect on health care utilisation of the child since the shadow price of time increases. Still, it is reasonable to assume that the household's wealth and income is positively related to health care consumption.

Given a child is ill, it is not self-evident how the age of the child affects the propensity to consume health care. However serious illnesses can affect both infants and children, why the effect of age on health care not is straightforward. It is possible that the marginal effect of health care on health varies with age for children. Not only age, but gender of the child may influence health care utilisation. Household members may have preferences for investing in the health of one gender above the other.

Another factor with complex effects on health care utilisation is education. We expect education of household members to have long run influences on the efficiency in producing

health as well as for knowledge of which investments in health should be made. In the short run, education influences knowledge of the effects of different health care measures and the possibilities to utilise different types of sources of how to improve health. To the extent that education influences preferences (including time preferences) this will affect how benefits and costs of health care are perceived, which may lead to systematic socio-economic differences (Grossman and Kaestner, 1997; Cebu Study Team, 1991; Kenkel, 1991; Mullahy, 1999). It has been found that the education of mothers bear a positive affect on the likelihood of taking their children to health care facilities (Curry and Gruber, 1996).

As noted above, we expect several characteristics of household members to affect the child's health care utilisation. Especially the head of household (the adult that makes day to day decisions of the running of the household) is likely to bear a strong influence on health care utilisation amongst the children. This viewpoint is supported by several empirical test of pooling, using data from both developed and developing countries, which show that depending on who controls resources different effects have been shown on family behaviour. In Mali it has been found that the decision to seek care depends on who controls household resources (World Bank, 1999). Increases in child health, nutrition and survival probabilities have been associated with mother's control over household resources (Thomas, 1990, 1994).

The perceived benefits of health care are also affected by decisions at the provider side. Providers make priorities between diseases and individuals, which affect individuals' expectations of the child's medical treatment. Differences among children in health care utilisation can therefore be a reflection of intentional or unintentional health policies. Moreover, in developing countries, even if fees are relatively low or in some cases non-existing, the quality of health care may be sufficiently low to discourage use of health

facilities. It has been found that low utilisation rates depends on poor quality of services and high non-financial costs for consuming care (Jack, 1999). In Cameroon utilisation among the poorest quintile increased greater than the rest of the population when user fees where introduced concurrently with quality improvements at health centres (Litvack and Bodart, 1993).

4 Empirical model

4.1 Data

The source of data for the empirical analysis is the Zambian Living Conditions Monitoring Survey (LCMS) performed in 1998 (CSO, 1998). The survey was carried out nation-wide in all the 72 health care districts in Zambia. Data was collected on the living standards of households and persons in the areas of education, health, income sources, income levels, food production and consumption, and access to various amenities.

The LCMS 1998 covered a random sample of 16 710 households and 94 000 individuals representing a sampling fraction of about 1 household per every 113 households, stratified to 50 percent in rural and urban areas respectively. To increase representivity of the sample, weighting methods can be applied. However, the effectiveness of this is uncertain (Clarke and Tate, 1998; Chambaz, 1998; Harris-Kojetin and Robison, 1998), why we chose not to apply any weights.

The household's total consumption is available for a period of one month, and is specified in detail. In the sample, 2784 children below 6 years of age were reported to have experienced an illness during the last two weeks preceding the survey. If the child had been ill a question was asked whether the child was taken to a health care facility, if self-medication was used or if nothing was done. Given that actions were taken to improve the health status of the child, expenditures related to the illness episode were recorded.

4.2 Model

Based on our theoretical discussion we may formulate a hypothesis regarding which variables influence a child's health care seeking utilisation. We use an approach that has become

generally accepted for analysing health care utilisation, which is that utilisation depends on two different decision processes (Pohlmeier and Ulrich, 1995). Firstly, we wish to estimate which factors influence the decision of seeking care. C is the choice given that the child is ill, and the alternatives are; doing nothing, consulting health care provider or using self-medication. H is a vector of health variables, X is a vector of variables indicating the economic status for the individual, Z is a vector indicating household characteristics, I is a vector indicating individual characteristics, and A is a vector of access variables (in the first equation we have to rely on proxies for insurance and exemptions from payments).

$$C = f(H, X, Z, I, A) \qquad (1)$$

Secondly, conditional on seeking care or using self-medication, we wish to estimate which factors influence the magnitude of that particular child's health care expenditures:

$$E_c = g(H, X, Z, I, A) \qquad (2)$$

where E is total health care expenditures incurred for care and c is the choice (professional health care, c=1, or self-medication, c=2).

The first vector of explanatory variables, H, indicates the child's health status and reflects the marginal utility of seeking care, which is important both for the choice of seeking care as well as the magnitude of expenditures. It includes variables indicating which type of illness the child is reported to be suffering from. It is difficult to predict the significance and the influence of the different diseases, especially since they are self-reported. Stigma is attached to certain illnesses especially considering the high HIV prevalence in the country. Not

withstanding the reporting in these sickness measures it is still important to include them to reflect differences in children's health status.

The second vector X, consists of variables measuring the household's economic status such as the household's total monthly expenditures measured per equivalent adult, INC, which is expected to be positively related to both the probability of utilising care and self-medication (eq. 1) as well as the magnitude of health expenditures and expenditures for self-medication (eq. 2). Household consumption (INC) is a better measure of economic status than reported income, because it is less sensitive to short-term fluctuations and because it includes the value of home production, which in developing countries is an important source of income (Deaton, 1998; Behrman and Deolalikar 1988; Gertler and van der Gaag, 1990; Parker and Wong 1997; Steen Carlsson and Lyttkens, 1997). In addition to temporary fluctuations, household income in Zambia shows seasonal variations.

The third vector, Z, is a vector indicating household characteristics. Variables in this vector are education, EDUChh, and gender of household head, FEMhh. For the decision of utilising care, using self-medication or doing nothing, we expect EDUChh to be positively related to both utilising health care and using self-medication compared to doing nothing. Its effect on the magnitude of health expenditures is uncertain. The effect of FEMhh is uncertain, both for the choice to seek care and for the magnitude of health expenditures.

The fourth vector, I, contains variables of individual characteristics. The expected effects of the variables AGE, indicating age of individual, and FEMALE, indicating if the gender is female, may well be important but the direction of the influence is not self-evident. The education of the mother of the child, M_EDUC, is expected to reflect positively on the

probability of the child utilising care (both self-medication and professional), since we expect education to be connected with the understanding of the importance of health care. To indicate if the mother is an orphan, we use a variable indicating if the biological mother is dead, ORPHAN, which is expected to be negatively related to both utilising professional care and self-medication, since we expect the propensity to invest in the health of a child is greater for non-orphans. The variable FOOD indicates if the child is given solid food more than once a day. Again we expect the propensity to invest in the health of a child to be positive for those who are given solid food more than once a day.

The fifth vector, A, reflects access to health care. For those children utilising care at a health facility, two variables indicates mode of payment, INSUR, whether the child has any type of health insurance, and EXEMT, if the individual is exempted from paying fees at facilities. Obviously, both variables are expected to be negatively related to the magnitude of expenditures incurred at health care facilities. Unfortunately, these variables are only observed among those individuals seeking health care at a health facility and can therefore not be included in the analysis of the determinants for the choice of utilisation of care or not. Distance to the nearest health care facility, DIST, if the household lives in a rural area, RURAL and ownership of motor-vehicle, MOTORV. Distance is expected to influence the probability of seeking care negatively and its effect on the probability of using self-medication is uncertain. In rural areas where people work close to home and have to travel far to reach a health care facility, distance is a relevant measure. In urban areas, facilities are closer to home and it is possible to utilise health care on the way to work. Having a vehicle is expected to influence the probability of seeking care or using self-medication positively and also expenditures incurred. The effect of living in a rural area is expected to be negative for utilising care or using self-medication because of poorer infrastructure. Its effect on the

magnitude of expenditures incurred for professional care is expected to be negative since fees at facilities are lower in rural areas. The effect on self-medication is expected to be negative since we expect individuals to use herbs and traditional medicines, which may be provided free or to a low cost. Finally for those children that seek care at a health facility we include a variable that indicates if more than one visit was made, VISIT. It is expected to be positively related to expenditures. Unfortunately we lack data on the provider side such as quality of health care, e.g. number of physicians.

In the table below, the dependent and explanatory variables are presented. For the explanatory variables in equation 1, the first column, hc, refers to propensity to seek health care at a health facility, and the second column refers to propensity to use self-medication, sm, compared to doing nothing. In equation 2, the third and fourth column refers to expenditures incurred at a health care facility and expenditures for self-medication respectively.

Table 1. List of variables and their expected sign in equation 1 and 2 for use of health care (hc) and self-medication (sm) respectively.

Dependent variables					
CHOICE					0= Not acting to cure the disease (doing nothing) 1= Seeking health care at a health facility 2= Self-medication
lnEXPhc					Total expenditures incurred when seeking care at a health facility (logarithmic)
lnExpsm					Total expenditures incurred for self medication (logarithmic)
Explana-tory var.	**Eq. 1**		**Eq. 2**		
	hc	**sm**	**hc**	**sm**	
					Health, H
INFECT	+/-	+/-	+/-	+/-	Suffering from an eye, ear, chest, mouth infection
DIABD	+/-	+/-	+/-	+/-	Suffering from diarrhoea or abdominal pains
HEAD	+/-	+/-	+/-	+/-	Suffering from headache
INJURY	+/-	+/-	+/-	+/-	Suffering from injury of any type
OTHER	+/-	+/-	+/-	+/-	Suffering from measles or not specified disease
MALARIA	+/-	+/-	+/-	+/-	Suffering from malaria

					Economic status, X
lnINC	+	+	+	+	Monthly total expenditure of household, per equivalent adult (logarithmic)
					Household characteristics, Z
EDUChh	+	+	+/-	+/-	Education of head of household, years in school, standardised[1] between 0-1
FEMhh	+	+	+/-	+/-	Gender of head of household (Female =1)
					Individual characteristics, I
AGE	+/-	+/-	+/-	+/-	Age of person standardised[1] between 0-1
FEMALE	+/-	+/-	+/-	+/-	Gender of person (Female=1)
M_EDUC	+	+	+/-	+/-	Education of mother, years in school, standardised[1] between 0-1
ORPHAN	-	-	-	-	If biological mother is dead (Yes=1)
FOOD	+	+	+	+	If given solid food more than once a day (Yes=1)
					Access variables, A
INSUR	n.a.	n.a.	-	n.a.	Insurance, employer or pre-payment scheme paid part of expenditures (Yes=1)
EXEMT	n.a.	n.a.	-	n.a.	Was exempted from paying fees at health facilities (Yes=1)
DIST	-	+/-	n.a.	n.a.	Distance to the nearest health care facility in km, standardised[1] between 0-1
MOTOR	+	+	n.a.	+	If the household owns a motor vehicle or not (Yes =1)
BIKE	+	+	n.a.	+	If the household owns a bike or not (Yes =1)
RURAL	-	-	-	-	Indicates if the household is located in a rural area (Yes =1)
VISIT	n.a.	n.a.	+	n.a.	More than one visit at health facility was made (Yes =1)

1 - Standardised by subtracting with the minimum value and dividing with the difference between maximum and minimum value.
n.a – not applicable

4.3 Method

We view the process of seeking health care as a two-stage process (Pohlmeier and Ulrich, 1995). Data are generated by ill individuals making choices of seeking health care and if doing so health care expenditures are registered. The observed distribution of expenditures is determined by these unordered choices. The analysis of selection bias in the presence of polychotomous decisions has been analysed by Hay (1980) and Lee (1983) and is discussed in Maddala (1983). We choose to use a Multinomial Logit selection model (Maddala, 1985). We have a selection variable, *z*, which takes values 0, 1,…J for J+1 outcomes. In our case 3 outcomes; self-medication, health care facility or none. In the model these are considered being independent of each other. The model for determining *z* is,

$$\text{Prob}[z_i=j] = \exp(a_j' v_i) / [1 + \sum_{j=1}^{J} \exp(a_j' v_i)] \qquad (3)$$

where ‘i’ is the observation and ‘j’ is the choice or outcome. Selection is based on $z_i=j$. a is a vector of unknown parameters, v_i is a vector of explanatory variables.

The regression equation for expenditures is,

$$y_j = b'x_i + (r_j s_j)[f(a_j'v_i)/\Phi(a_j'v_i)] + h_j$$

$$= b'x_i + (r_j s_j) l_j + h_j$$

$$= b'x_i + q_j l_j + h_j. \qquad (4)$$

where y_j (health care expenditure), the dependent variable, only is observed when the j:th category is chosen, b is a vector of unknown parameters, x_i is a vector of explanatory variables and h_j are residuals. The functions $f(\bullet)$ and $\Phi(\bullet)$ are the probability density function and the cumulative density function of the standard normal distribution respectively. l_j is just the Prob[$z=j$]. The two-step estimation technique is in step one to estimate the multinomial logit model by maximum likelihood. Select those observations for which z takes the value in question. For these observations compute l_j. In step two obtain consistent estimates of b and q_j by least squares regression of y_j on x and l_j.

The marginal effect of a particular regressor on y consists of two components. The first is the direct effect on y through equation (3). The second is the indirect effect that occurs if the regressor also appears in (4), for in this case it also affects the probability that z_i is positive, and will therefore influence y through l. Marginal effects are calculated at the mean of x.

5 Descriptive statistics

The proportion of illness is shown in the table below. 11.9 percent or 2784 of the children below 6 years reported to have experienced an illness episode during two weeks preceding the survey. Among those being ill, 52 percent decided to consult a health facility, 28.3 percent used self-medication only and 19.7 percent did not seek any care at all. It was more common to visit a health facility among non-poor households compared to the poorer households ($p<0.000$).

Table 2. Proportion of children below the age of 6 reporting illness/injury in a two-week period preceding the survey by stratum.

	Prevalence of illness	Consulted health facility	Self-medication	No care
Total	11.9	52.0	28.3	19.7
Poverty of household*				
Extremely poor	20.0	45.9	27.5	26.6
Poor	21.9	52.8	29.9	17.3
Non poor	21.1	60.8	28.6	10.6

*Households with a monthly adult equivalent expenditure of less than ZMK 32,861 were considered as extremely poor. Those in households with monthly adult equivalent expenditure of less than ZMK 47,187 but equal to or greater than ZMK 32,861 were considered moderately poor. Persons in households with monthly adult equivalent expenditure equal to or greater than ZMK 47,187 were considered non poor. Adult equivalent scales (weights) are based on calorie and protein requirements for different age groups. Each person is assigned a weight between 0 and 1 according to their age relative to the caloric and protein requirement of an adult person (Child below 1 year=0, Child 1-3 years=0.36, Child 4-6 years=0.62,Child 7-9 years=0.78,Child 10-12 years=0.95, Adult (13+ years) =1.00) (CSO, 2000).
1 US Dollar = 2400 Zambian Kwacha (31st of December 1998)
Source: CSO, 1998.

Among the different types of diseases reported by respondents we find that the most prevalent illness is malaria, which 33 percent of the respondents reported to suffer from. The second most prevalent disease reported is cough/cold chest infection, (15 percent). Following this disease are: headache (8 percent), abdominal pains (7 percent) and diarrhoea without blood (6 percent), injury of any type (6 percent), and then a number of diseases, with less than 5 percent prevalence. These figures need to be interpreted with care. Firstly, because they are

self-reported and secondly because stigma is attached to certain diseases due to a high HIV prevalence in the country.

Table 3. Diseases reported by respondents in different age groups, percentages.[1]

Type of illness	All	0-6	7-14	15-44	45-64	65+
Fever/malaria	33,6	34,9	33,1	33,0	33,5	33,3
Cough/cold/ chest infection	15,2	17,4	14,0	14,4	15,9	11,7
Diarrhoea without blood	7,5	15,8	5,1	4,7	3,9	2,3
Diarrhoea with blood	1,6	2,8	1,3	1,0	0,7	1,8
Diarrhoea and vomiting	1,7	4,3	0,8	0,8	0,6	1,2
Vomiting	0,5	0,9	0,5	0,3	0,6	0,6
Abdominal pains	6,3	3,0	7,3	7,7	6,5	9,4
Eye infection	5,4	8,5	4,5	4,1	4,0	5,8
Ear infection	0,7	0,9	0,6	0,7	0,6	
Toothache/mouth infection	3,0	1,1	3,8	3,6	3,6	2,9
Headache	8,4	1,5	10,2	11,1	10,7	11,7
Measles	0,7	0,9	0,8	0,6	0,4	2,3
Injury of any type	5,7	2,3	6,0	7,3	7,6	5,8
Other	9,7	5,6	11,7	10,7	11,4	11,1
TOTAL	100	100	100	100	100	100

1 Self reported illness

Source: CSO, 1998.

In the table below, the mode of payment for services are shown together with the incurred expenditures. Almost every second individual paid directly from their own pocket for their health care while 28 percent where exempted from payment. In total 24 percent belonged to some kind of insurance. The expenditures incurred varied between groups and was 26 000 ZMK on average including transport costs for reaching the facility. Those reporting to be exempted from paying consultation fees incurred expenditures of 10 000 ZMK in total for the services provided.

Table 4. Mode of payment for services and expenditures incurred when seeking health care (including transport costs), in ZMK.

Mode of payment at health facility	N	Proportion	Mean expenditures

Insured	Pre-payment scheme	407	3.7	3 900
	Employer and/or insurance	341	3.7	5 606
	Didn't pay (reason unspec.)	166	0.4	683
Uninsured	Paid directly	1837	22.1	7 018
Exempted	Exempted from payment	1072	70.1	1 968
Total		1366	100	3 292

1 US Dollar = 2400 Zambian Kwacha (31st of December 1998)

Source: CSO, 1998.

Those children not utilising health care at a health facility but used self-medication incurred an average of 1635 ZMK for medicines.

In table 5 the sample means of the explanatory variables are presented. We find that the average expenditure per equivalent adult is 50 778 ZMK. The mean age is 2.4 years and slightly less than half were females. The mothers of the children had spent on average 7.1 years in school and the head of household 7.6 years. Only fifteen percent of the households have a female head of household. Head of household is the person the other household members regard as the head. He or she is the one who normally makes day-to-day decisions governing the running of the household. Only 1.6 percent of the children had lost their birthmother and sixteen percent were children to the head of household. Seventy percent of the children were reported to be give solid food more than twice a day. More than half of the households are located in a rural area and the mean distance to nearest health facility is 4.9 km. One in three households own a bicycle, but only 4 percent of the households own a motor vehicle.

Table 5. Background characteristics of children being ill N=2784

		Mean or proportion
Monthly expenditure of household	Per equivalent adult	50 778
	Total ZMK	246 890

Age		2.4
Sex	Female	49.1
Education of mother	Years in school	7.1
Education of head of household	Years in school	7.6
Sex of head of household	Female	15.9
Orphan	Mother dead	1.6
Relation to head of household	Child of head of household	16.0
Given solid foods	more than twice a day	70.5
Distance to health care facility	Km	4.9
Household ownership of transportation	Motor vehicle	4.0
	Bike	34.3
Area	Urban area	46.5
	Rural area	53.5
Number of visits to health care facility among those who utilised health care	More than one	12.4
	One	87.6

Standard deviation in parenthesis

1 US Dollar = 2400 Zambian Kwacha (31st of December 1998)

Source: CSO, 1998.

6 Results

In the table below the final results of the logit model for seeking professional care, using self-medication or doing nothing (reference level) is presented. We have included all the variables indicating type of illness except for malaria, which acts as a reference category. The variables indicating which type of illness the child is suffering from, all except for unspecified diseases (OTHER) influence the probability of seeking care negatively compared to if the child is suffering from malaria. Income is positively and significantly related to the dependent variable. Age bears a negative influence on the likelihood of seeking care. If the child is an orphan, the likelihood of seeking professional care decreases. The education of the mother bears a positive influence on the likelihood of seeking care as well as if the child is given solid food more than once a day. Distance bears a negative influence on seeking professional care and if the child lives in a rural area it influences the likelihood of seeking professional care negatively.

Table 6 Estimated coefficients in multinomial logit model for the choice of seeking care, using self-medication or doing nothing (=reference level), step 1.

	Prob (Y) = Professional care			Prob(Y) = Self-medication		
Variable	**Coefficient**	**SE**	**p-value**	**Coefficient**	**SE**	**p-value**
Constant	-2.152	0.900	0.017	-3.548	1.001	0.000
INFECT	-0.463	0.179	0.010	-0.347	0.192	0.071
DIABD	-0.444	0.179	0.013	-0.433	0.195	0.026
HEAD	-1.234	0.632	0.051	-0.317	0.565	0.575
INJURY	-0.954	0.454	0.036	-1.068	0.509	0.036
OTHER	0.310	0.307	0.312	-0.561	0.365	0.124
LnINC	0.302	0.085	0.000	0.305	0.092	0.001
EDUhh	-0.109	0.453	0.810	0.115	0.496	0.816
FEMhh	0.121	0.205	0.556	-0.137	0.220	0.533
AGE	-1.427	0.289	0.000	-0.143	0.309	0.643
FEMALE	0.107	0.138	0.439	0.165	0.150	0.273
ORPHAN	-1.257	0.749	0.093	-1.296	0.888	0.144
RELATION	0.121	0.209	0.561	0.264	0.233	0.257
M_EDUC	1.792	0.538	0.001	0.590	0.584	0.313
FOOD	0.507	0.298	0.088	0.876	0.379	0.021
DIST	-2.483	0.775	0.001	0.355	0.632	0.574
MOTOR	0.689	0.496	0.164	0.610	0.522	0.243
BIKE	0.054	0.151	0.722	0.161	0.163	0.322
RURAL	-0.527	0.168	0.002	-0.350	0.183	0.055

Log-L - 1638.875 Log-L_{restr} -1743.511 χ^2 (36) = 209.3 Significance level .000
IIA-test: 481.3 Significance level .000

In the model explaining the probability of using self-medication (compared to doing nothing), we find that variables indicating type of disease influence the probability of using self-medication negatively compared to if the child is suffering from malaria (all except for headache and other type of illnesses). Level of income affects the use of self-medication positively. If the child is given solid food more than once a day it bears a positive impact on using self-medication. Living in a rural area bears a negative influence on using self-medication.

For those children seeking either health care at a facility or using self-medication, we wish to establish what affects their expenditures. The regression, conditional on the child seeking care at a health facility is shown in the table below. Since the marginal effects are estimated at the mean, even if single households are affected by the variable, the effect at the mean may be non-significant. We find that the model explain 37 percent of expenditures on health care. In general significant variables (shaded area) have the expected signs. When seeking professional care at a health facility suffering from a (according to the individual) headache or unspecified disease affect expenditures positively (compared to having malaria). A higher income means higher expenditures. Among individual characteristics, age is significant having negative impact on expenditures and if the child is given solid food more than once a day bears a positive impact on expenditures. Having an insurance or being exempted naturally influences the level of expenditures incurred at health facilities negatively. Living in a rural area bears a negative impact on expenditures. Lamda is significant, which means that we can identify a sample selection process.

Table 7. Estimated coefficients in the model for expenditures on professional health care, step 2.

Variable	Coefficient	SE	p-value	Marg. Eff.	p-value
Constant	0.333	2.083	0.873		
INFECT	-0.088	0.306	0.773	0.100	0.762
DIABD	-0.052	0.299	0.861	0.073	0.816
HEAD	-2.513	1.760	0.153	-1.678	0.362
INJURY	0.790	0.927	0.394	0.982	0.300
OTHER	1.806	0.511	0.000	1.244	0.044
LnINC	0.518	0.149	0.001	0.439	0.006
EDUhh	-0.279	0.736	0.704	-0.127	0.867
FEMhh	0.151	0.363	0.677	-0.023	0.952
AGE	-2.374	0.766	0.002	-1.285	0.199
FEMALE	0.251	0.226	0.268	0.254	0.270
ORPHAN	-0.028	1.722	0.987	0.287	0.870
RELATION	0.040	0.359	0.912	0.086	0.814
M_EDUC	0.894	1.104	0.418	-0.247	0.850
FOOD	0.512	0.263	0.052	0.524	0.051
INSUR	-3.733	0.440	0.000	-3.733*	0.000
EXEMT	-4.698	0.289	0.000	-4.697*	0.000
RURAL	-1.366	0.428	0.001	-1.127	0.013
VISITS	0.373	0.267	0.162	0.373*	0.161
Lambda	2.172	1.268	0.087		

R^2_{adj}=.276 $F_{19,900}$=17.66, Prob val=.000 Log-L_{restr}=-2416.7
Hausman: χ^2 (19) =2.09 Significance level 1.000
*These variables are not included in step one, why the total marginal effect cannot be estimated, instead the direct marginal effect on y is presented.

It is not surprising that the model explaining expenditures on self-medication performs somewhat less satisfactory since it is likely that utilisation of self-medication not necessary leads to incurring expenditures at the time of consumption, i.e. medicines have been acquired at another time. We find that suffering from some kind of infection, diarrhoea, abdominal pains or headache bear a negative impact on expenditures on self-medication compared to having malaria. Having a higher income, influences expenditures on self-medication positively. Age affects expenditures positively. The longer the distance to the nearest health care facility, the lower expenditures on self-medication while having a motor vehicle means higher expenditures on self-medication. Living in rural area influences expenditures negatively. In this regression model we find that lambda is insignificant, and also a Hausman test fails to identify a sample selection effect. However, it seems likely that there are different

processes involved both in the decision to use self-medication and in the determination of the magnitude of expenditures. Hence we prefer to retain the two-part model.

Table 8. Estimated coefficients in the model for expenditures on self-medication, step 2.

Variable	Coefficient	SE	p-value	Marg. Eff.	p-value
Constant	0.528	3.713	0.887		
INFECT	-0.848	0.344	0.014	-0.759	0.033
DIABD	-0.280	0.367	0.445	0.418	0.585
HEAD	-1.619	1.134	0.154	-1.281	0.274
INJURY	-1.894	1.138	0.096	-2.497	0.048
OTHER	-1.875	0.965	0.052	-1.632	0.107
LnINC	0.428	0.177	0.016	0.389	0.034
EDUhh	0.727	0.934	0.436	0.564	0.555
FEMhh	0.407	0.429	0.343	-0.690	0.535
AGE	1.043	0.847	0.133	1.410	0.105
FEMALE	-0.201	0.285	0.479	-0.328	0.298
ORPHAN	0.510	2.139	0.812	0.395	0.854
RELATION	0.055	0.469	0.907	-0.151	0.771
M_EDUC	-1.483	1.218	0.224	-1.673	0.172
FOOD	-1.068	1.049	0.308	-1.165	0.273
RURAL	-0.851	0.508	0.094	-0.674	0.086
lambda	1.477	1.654	0.372		

R^2_{adj}=.104 $F_{17,2691}$=18.46, Significance=.000 Log-L_{restr}= -6888.7
Hausman: χ^2 (17) =5.86 Significance level 0.997

7 Discussion

To be included……

References

Acton J P. Nonmonetary factors in the demand for medical services: Some empirical evidence. *Journal of Political Economy,* 1975;83:595-614.

Behrman J R, Deolalikar A B. Health and Nutrition. In *Handbook of Development Economics vol I,* Chenery H, Srinivasan T N (eds). Elsevier Science,1988.

Bolin K, Jacobson L, Lindgren B. The Family as the Health Producer - When Spouses are Nash-bargainers. *Journal of Health Economics*. 2001;20, 349-362.

Cebu Study Team. Underlying and proximate determinants of child health: The Cebu longitudinal health and nutrition study. *American Journal of Epidemiology* 1991; 133(2):185-201.

Chambaz C. Calculation of weights for the European panel of households: A comparison of some indicators based on variables selected to correct for homogeneous categorical non-response. Proceedings of the Statistics Canada Symposium 98 Longitudinal Analysis for Complex Surveys. 1998.

Clarke P M. Cost benefit analysis and mammographic screening: a travel cost approach. *Journal of Health Economics*, 1998;17:767-787.

Clarke P S, Tate P F. Weighting versus modelling in adjusting for non-response in the British labour force survey: An application to gross flows estimation. Proceedings of the Statistics Canada Symposium 98 Longitudinal Analysis for Complex Surveys. 1998.

CSO. *Living Conditions in Zambia 1998.* Central Statistics Office, Lusaka, Zambia, 1998.

CSO. *Report on LCMS 1998*, Central Statistics Office, Lusaka, Zambia, 2000.

CSO. *Zambian Census 2000*, Central Statistics Office, Lusaka, Zambia, 2001.

Curry J, Gruber J. Health insurance eligibility, utilization of medical care, and child health. *The Quarterly Journal of Economics* 1996; 111:431-466.

Deaton A. *The analysis of household surveys –A microeconomic approach to development policy*. The Johns Hopkins University Press, 1998.

Diop F, Seshamani V, Mulenga C. *Household health seeking behaviour in Zambia*. Technical Report no 20, Bethesda, MD: Partnerships for Health Reform Project, Abt Associates Inc, 1998.

Evans A, Young K. *Gender Issues in Household Labour Allocation: The Case of Northern Province*. Zambia, ODA/ESCOR Research Report, 1988.

Gertler P, van der Gaag J. *The willingness to pay for medical care*. Baltimore, The Johns Hopkins University Press, 1990.

Grossman M, Kaestner R. Effects of education on health. In *The Social Benefits of Education.* Behrman J R, Stacey N (eds). University of Michigan Press, Ann Arbor, MI, 1997.

Grossman M. The demand for health: a theoretical and empirical investigation. *NBER Occasional Paper* 119, New York, 1972.

Grossman M. The Human Capital Model. In *Handbook of Health Economics vol 1A*. Culyer A J, Newhouse J P (eds). Elsevier, Amsterdam, 2000.

Hanson K, McPake B. *Demand for Health Services in Zambia*, London School of Hygiene and Tropical Medicine (Mimeograph), London, 2000.

Harris-Kojetin B A, Robison E L. Evaluating non-response adjustment in the current population survey (CPS) using longitudinal data. Proceedings of the Statistics Canada Symposium 98 Longitudinal Analysis for Complex Surveys. 1998.

Hay D. Selectivity Bias in a Simultaneous Logit – OLS Model. Manuscript, Department of Economics, University of Southern California, 1980.

Hjortsberg C. Determinants of household health care utilisation –The case of Zambia. In submission 2002.

Jack W. *Principles of health economics for developing countries*. WBI Development Studies, World Bank Institute, Washington D.C., USA, 1999.

Jacobson L. The family as producer of health - an extended Grossman model. *Journal of Health Economics*. 2000;19:611-638.

Kahenya G, Lake S. *User fees and their impact on utilization of key health services*. UNICEF Monograph No 4. Lusaka: UNICEF/Ministry of Health, 1994.

Kalyalya D S, Lake S, Milimo J T. *Promoting equity within cost-sharing schemes: Report of the Zambia case study*. Report prepared for UNICEF Bamako Initiative Management Unit, 1998.

KANDO project. *Kitwe-Ndola Hospital Management Project: Strategic Review of the KANDO project*. Working Draft, Zambia, 1998.

Kenkel D S. Health behavior, health knowledge, and schooling. *Journal of Political Economy* 1991; 99(2):287-305.

Le Grand J. *The strategy of equality: Redistribution and the social services*. Allen and Unwin, London, 1982.

Lee L. Generalized Econometric Models with Selectivity. *Econometrica* 1983;51:507-512.

Litvack J I, Bodart C. User fees plus quality equals improved access to health care: results of a field experiment in Cameroon. *Social Science and Medicine* 1993;37(3): 369-383.

Long K. The concept of health: Rural perspectives. *The Nursing Clinics of North America*. 1993; 28:123-130.

Maddala G S. A survey of the literature on selectivity bias as it pertains to health care markets. In *Advances in health economics and health services research – Biased selection in health care markets*, Scheffler, R M, Rossiter L F (eds). Jai Press Inc: London, England, 1985.

Maddala G S. *Limited-dependent and qualitative variables in econometrics*. Cambridge University Press, Cambridge, 1983.

Manning W G, Newhouse J P, Duan N, Keeler E B, Leibowitz, A and Marquis, M S. Health insurance and the demand for medical care: Evidence from a randomised experiment. *The American Economic Review* 1987; 77:251-277.

Ministry of Health, 1996 *National Strategic Health Plan 1995-1999,* Ministry of Health, Zambia.

Ministry of Health. *Exemption from paying user fees and pre-payment fees*. Circular No 4 of 1995, Ministry of Health, Zambia, 1995.

Ministry of Health. *Guidelines on the introduction of medical fees*. Ministry of Health, Zambia, 1993.

Ministry of Health. Information received from the Head of Planning Unit, Ministry of Health, Zambia, [November 2001].

Ministry of Health. *National Health Policy*. Ministry of Health, Lusaka, Zambia, 2001.

Ministry of Health. *National Human Resource Plan for Health.* Ministry of Health, Lusaka, 2001.

Mullahy J. It'll only hurt a second? Microeconomic determinants of who gets flu shots. *Health Economics* 1999; 8(1):9-24.

Muurinen J M. Demand for health: A generalised Grossman model. *Journal of Economics* 1982; 1:5-28.

Mwabu G, Ainsworth M, Nyamete, A. Quality of Medical care and choice of medical treatment in Kenya: An empirical analysis. *Journal of Human Resources* 1993;28(4):838-862.

Nakamba P, Hongoro C, McPake B, Chirwa B, Sund B. Zambia – Case study. In *Health Sector Reforms: What about hospitals?*. NVH report, Gothenburg, 2002.

Ndulo J, Faxelid E, Tishelman C, Krantz I. Shopping for Sexually transmitted diseases treatment: focus group discussions among lay persons in rural and urban Zambia. *Sexually Transmitted Diseases* 2000;27:496-503.

Parker S W, Wong R. Household income and health care expenditures in Mexico. *Health Policy* 1997; 40:237-255.

Pohlmeier W, Ulrich V. An Econometric Model of the Two-Part Decision Process in the Demand for Health. *Journal of Human Resources* 1995;30:339-361.

Ponga A B, Chileya C K . *Evaluation of the Health Care Cost Scheme.* Ministry of Health, Zambia, 1997.

Steen Carlsson K, Lyttkens C-H. *Health care utilization and individual consumption possibilities*. Studies in Health Economics 22, Department of Community Medicine, Lund University, Lund, 1997.

Steen Carlsson K. *Equality of access in health care*. Department of Economics, Lund University, Sweden, 1999.

Thaddeus S, Maine D. *Too far to Walk: Maternal mortality in context*. Columbia University School of Public health, Prevention and maternal mortality program, Center for Population and Family Health, Faculty of Medicine, New York, 1990.

The Commission on Macroeconomics and Health. *Macroeconomics and health: Investing health for economic development*. WHO, Geneva, 2001.

The Participatory Assessment Group (PAG). *Health sector reform review*. Prepared by Sumaili F, Milimo J. Ministry of Health, Zambia, 1996.

Thomas D, Strauss J, Henriques MH. How does mother's education affect child height? *Journal of Human Resources* 1991; 26(2):183-211.

Thomas D. Intra Household Resource allocation: an inferential approach. *Journal of Human Resources*. 1990;25(4), 635-664.

Thomas D. Like father like son: like mother, like daughter: Parental resource and child height. *Journal of Human Resources*. 1994;29(4), 950-988.

Timyan J, Brechin S J, Measham D M, Ogunleye B. Access to Care: More than a problem of Distance. In *The health of women: A global perspective, Boulder*, Koblinsky M, Timyan J, Gay J (eds). CO: Westview Press, USA, 1993.

United Nations. *We are the peoples: The Role of the United Nations in the Twenty First Century*. The Millenium Report, New York, 2000.

UNZA and IHE. *Zambian health expenditure review 1997*. Ministry of Health, Zambia, 1999.

Vlassoff C. Gender inequalities in health in the third world: uncharted ground. *Social Science and Medicine* 1994;39(9):1249-59.

Wagstaff A. The demand for health: Some new empirical evidence. *Journal of Health Economics* 1986; 5:195-233.

Wagstaff, A, 1986, The demand for health, Some empirical evidence, Journal of Health Economics 5:195-233.

WHO WHO information database, http://www.who.ch/ [15 May 2002].

WHO. *Macroeconomics and health: Investing in health for economic development*. Report of the commission on macroeconomics and health, World Health Organization, Geneva, 2001.

World Bank, 2002b, Global Poverty Monitoring, http://www.worldbank.org/research/povmonitor/ [18 April 2002]

World Bank. Health care in Mali: Building on community involvement. *Operations Evaluation Department Study* OED 188. World Bank, Washington, 1999.

World Bank. Seminar proceeding 1 from conference on Sustainable Health Care Financing in Southern Africa 1996, http://www.worldbank.org/healthreform/library/sa/shaw1.pdf [May 24 2002]

World Bank. World Bank country database. http://www.worldbank.org/data/, [April 18 2002]

ZIHP (Zambian Integrated Health Program), interview with Yann Dierric and Maureen Daura, [1 March 2002].