CSAE WPS/2004-11

The Utilization of Curative Health Care in Mozambique: Does Income Matter?

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Third draft, December 2003

Abstract
In Mozambique, easily treatable diseases such as malaria, diarrhea, and respiratory infections contribute to a heavy burden of disease. Notwithstanding efforts by the Mozambican government to promote access to health care, many who could benefit from simple cost-effective health care services do not currently receive treatment. Moreover, it is known that the utilization of health services varies considerably across spatial domains and socio-economic groups. This paper is concerned with understanding the determinants of utilization of curative health services, paying particular attention to the role of income. It provides a broad analytical framework for analyzing both the binary decision to seek formal health care in the event of illness, and the multinomial choice of health care provider. The results show that income is not an important determinant of health care choices in Mozambique. Rather, other factors, in particular education and physical access, are more important. Moreover, unlike in some studies, own (time) price elasticity does not vary notably with income. At a methodological level, the analysis shows that the general conclusions are robust to a number of estimation issues that are rarely addressed explicitly in the analysis of health care choices, including sample selection, the potential endogeneity of consumption, and cluster-level unobservables. For the analysis of provider choice, the paper demonstrates the merits of a “flexible” behavioral model. In particular, the paper rejects some of the restrictions of the standard model of provider choice, and shows that both the level of the price elasticity and the extent to which the elasticity varies with income is sensitive to the empirical specification.

Acknowledgements
I am grateful to the National Statistics Institute (INE) in Mozambique for granting me permission to use the 1996/97 Household Survey. Additional data was kindly provided by the Swiss Development Cooperation (Maputo). I am particularly grateful to Isabel Soares, Enrico Pavignani, and Amelia Cumbi for assistance in interpreting the data and providing valuable background information. Some of the research on which this paper is based was carried out as a component of an IFPRI/Ministry of Planning and Finance project (*Policy Analysis and Training for Poverty Reduction in Mozambique*). I am grateful to Ken Simler for the opportunity to participate in this work, and for his support and suggestions. I have also benefited from comments and suggestions from Marcel Fafchamps and Pieter Serneels. Financial support from *Jan Wallanders and Tom Hedelius' Foundation for Research in the Social Sciences* is gratefully acknowledged.

1. INTRODUCTION

In Mozambique, easily treatable diseases such as malaria, diarrhea, and respiratory infections contribute to a heavy burden of disease. This situation is commonplace in developing countries (WHO 2000; 2001; World Bank 1993). In part, the problem reflects a lack of access to and utilization of basic curative health services. Such services can only play a minor role in addressing the profound health challenges that developing countries face. Yet, they are often conceived as basic rights or entitlements, and both national governments and international organizations are at least formally committed to promoting broad access to basic health care (Culyer 1989; Culyer and Wagstaff 1993; Hurley 2000). Reflecting this commitment, the Mozambican government has expanded the rural health facility infrastructure in recent years, and promoted a policy of access based on need rather than income or ability to pay. However, notwithstanding these efforts, many who could benefit from simple cost-effective health care services do not currently receive treatment, and the utilization of health services varies considerably across spatial domains and socio-economic groups.

This paper is concerned with understanding the determinants of utilization of curative health services, paying particular attention to the role of income. The relationship between income and utilization of health services has been the focus of a sizeable literature on the benefit-incidence of public spending (e.g. Baker and van der Gaag 1993; Castro Leal, et al. 2000; Demery 2000; Heltberg, et al. 2001; Makinen, et al. 2000; Sahn and Younger 2000; van de Walle 1995). Much of this work has highlighted the existence and severity of health related inequalities and inequities in many contexts. However, although simple correlation between income and health service utilization is of interest, it is important to recognize that the presence or absence of such correlation tells us little about the direct impact of income on utilization. Reflecting this concern, this paper seeks to goes beyond a simple descriptive analysis of the relationship between utilization and income, to understand the importance of specific variables as determinants of utilization.

The analysis indicates that income is not an important determinant of health care choices in Mozambique, and that own price elasticity does not vary notably with income. These results, which are shown to be robust to a number of estimation issues that are rarely addressed explicitly in the analysis of health care choices, stand in contrast to findings in many other countries. They suggest that money cost does not comprise an important barrier to utilization in Mozambique, but that education and physical access comprise important factors. However, the paper also demonstrates the sensitivity of findings to empirical specification, and confirms the merits of a "flexible" behavioral model. In particular, the paper rejects some of the restrictions of the standard model of provider choice, and shows that both the level of the price elasticity and the extent to which the elasticity varies with income is sensitive to the empirical specification.

The paper is organized as follows. Section 2 sets out a basic analytical framework for analyzing the binary choice of seeking care, drawing extensively on the existing literature on health care demand. The section also provides an overview of evidence on the incidence of illness and the decision to seek curative care in Mozambique, and presents findings from an empirical analysis of the decision to visit a formal health care provider. Section 3 extends the basic analytical framework to address the multinomial choice of health care provider for curative care. The empirical analysis covers both a basic multinomial model, and a fuller and more flexible model that includes alternative-specific prices. Here, the paper looks not only at the direct impact of income on health care choices, but also asks whether the time price elasticity varies with income. Finally, section 4 concludes.

2. THE DECISION TO SEEK CARE FROM A FORMAL PROVIDER

2.1 Modeling and estimation of the binary choice to seek care

Recent economic analysis of health care choices have been rooted in the human capital and household production literature. In his seminal contribution, Becker (1965) shed light on the simultaneous process of home production and consumption, and the impact of market prices, time prices, incomes, and technologies on the production function for home goods. Using this framework, Grossman (1972a; 1972b) presented a model in which health does not affect market and non-market productivity, but rather the total amount of time that can be spent productively.[1] In this model, it is health rather than health care that enters the utility function. Health care, along with time and other intermediate inputs, comprise arguments in a health production function, and the demand for curative medical care represents the rational response to a health shock, which leads individuals to shift some resources away from consumption towards medical care and other inputs that result in an improvement of health.

In Grossman's model, the marginal productivity of health capital depends on the wage rate. If the wage rate is higher, health is more valuable. But health also requires complementary time input, the cost of which increases with the wage rate. Hence, although the model establishes clear mechanisms by which increases in income can lead to an increased demand for medical care—both through the increased demand for health capital and through a substitution away from time inputs into the production of health towards health care and other inputs—predictions are sensitive to the precise specification of the model. For example, the impact of the wage rate on the demand for medical care would depend critically on technology, in particular the time and money costs associated with accessing medical care. In contrast with the wage rate, wealth does not have an impact on either the marginal productivity of health capital or on the shadow price of time inputs. The impact of wealth on health care demand therefore represents a pure income effect. The importance of the income effect depends to a great extent on whether health capital is considered a compliment to wealth.

A number of empirical studies in developed countries have been motivated by this framework, focusing on different dimensions of health care demand, including the number of visits in a given period (Acton 1975; Heller 1982), expenditure on health care (Grossman 1972a; b), demand for and choice of medical care under different insurance schemes (Manning, et al. 1987). These studies have tended to find positive but small effects of income on medical care use, although findings differ for different types of health services. In developing countries, data limitations have not permitted testing based on Grossman's dynamic framework. Instead, empirical analysis has been based on a simpler static framework (e.g. Gertler, et al. 1987; Gertler and van der Gaag 1990). In this framework, the choice between use and non-use of health services can be

[1] Grossman contrasted a pure consumption model, in which health capital enters directly in the utility function, and the investment model, where health capital determines the amount of time available for work. For a recent review, see Grossman (2000).

cast in a simple random utility model. Assuming a given health shock, the respective utility of receiving health services (s) and not receiving services (ns) can be represented as

$$U^s = U(h_s, x_s, \varepsilon_s; \boldsymbol{\varphi}_s) \text{ and } U^{ns} = U(h_{ns}, x_{ns}, \varepsilon_{ns}; \boldsymbol{\varphi}_{ns}),$$

where, h is health status, x is non-health consumption, ε is a random error term, and $\boldsymbol{\varphi}$ is a parameter vector. Health status (h_s and h_{ns}), in turn, can be represented as a health production function,

$$h_s = h(\mathbf{z}; \boldsymbol{\beta}_s) \text{ and } h_{ns} = h(\mathbf{z}; \boldsymbol{\beta}_{ns}),$$

where $\mathbf{z}$ is a vector of individual, household, community, and health care provider characteristics. The health care choice is represented by the indicator function

$$S = 1[U_s > U_{ns}],$$

whereby an individual visits a provider if the utility of doing so is greater than if no visit is made. The essential feature of the model concerns the trade-off between health and non-health consumption. This trade-off arises so long as $x_s < x_{ns}$ and $h_s > h_{ns}$.

In order to operationalize this general framework, we must be more specific about functional form. Following the early literature on health care demand in developing countries (e.g. Akin, et al. 1984; 1986; Mwabu 1986), the empirical specification is based on a linear utility and health production function, such that

$$U^s = \varphi_{s1} h_s + \varphi_{s2} x_s + \varepsilon_s \text{ and } U^{ns} = \varphi_{ns1} h_{ns} + \varphi_{ns2} x_{ns} + \varepsilon_{ns}, \text{ where}$$

$$h_s = \boldsymbol{\beta}_s^z{}'\mathbf{z} \text{ and } h_{ns} = \boldsymbol{\beta}_{ns}^z{}'\mathbf{z}.$$[2]

Finally, non-health consumption, x, is a function of exogenous income, y, and travel time, i.e.

$$x_s = \gamma_{s1} y - \gamma_{s2}\, Time \text{ and } x_{ns} = \gamma_{ns1} y - \gamma_{ns2}\, Time.$$[3]

Using the linear functions for h and x, and with an appropriate reparametrization, the indirect utility function can be written as

$$V^s = V[\boldsymbol{\alpha}_s{}'\mathbf{w} + \varepsilon_s] \text{ and } V^{ns} = V[\boldsymbol{\alpha}_{ns}{}'\mathbf{w} + \varepsilon_{ns}], \text{ where}$$

$$\mathbf{w} = \begin{bmatrix} \mathbf{z} \\ y \\ Time \end{bmatrix}.$$

On this basis, the probability of using the health service is

[2] Gertler and van der Gaag (1990) and Dow (1996a) have noted considerable weaknesses with this specification. In particular, it does not permit the price elasticity of demand to be a function of income. This issue is discussed further below.

[3] For simplicity, we only consider time costs here. However, the budget constraint could also include direct money cost and other indirect cost. In some models, distance enters directly as a "nuisance" variable, rather than through the budget constraint (Acton 1975; Akin, et al. 1986; Akin, et al. 1995; Lavy and Germain 1994; Lavy and Quigley 1991).

$$\Pr[S=1|\mathbf{w}]=\Pr[V^{s}>V^{ns}]=\Pr[(\boldsymbol{\alpha}_{s}-\boldsymbol{\alpha}_{ns})\mathbf{w}>\varepsilon_{ns}-\varepsilon_{s}]=\Pr[\boldsymbol{\alpha}\mathbf{w}>\varepsilon]\text{, where}$$

$$(\boldsymbol{\alpha}=\boldsymbol{\alpha}_{s}-\boldsymbol{\alpha}_{ns}\text{ and }\varepsilon=\varepsilon_{\mathrm{ns}}-\varepsilon_{\mathrm{s}})\ .$$

Under the assumption that $\varepsilon \sim$ N(0,1),

$$\Pr[S=1|\mathbf{w}]=\Pr[\boldsymbol{\alpha}'\mathbf{w}>\varepsilon]=\Pr[\boldsymbol{\alpha}'\mathbf{w}<\varepsilon]=\Phi(\boldsymbol{\alpha}'\mathbf{w}),$$

where Φ is the standard normal distribution. This is the Probit model. Under appropriate regularity conditions, the parameter vector α can be estimated consistently using Maximum Likelihood techniques. This approach will further permit us to perform a series of hypothesis tests concerning single and joint restrictions on the coefficients of interest.

2.2 Data, variables, and estimation

The empirical analysis is based on the 1996/97 Mozambique National Household Survey on Living Conditions (IAF).[4] The survey was designed and implemented by the National Statistics Institute in Mozambique during the period of February 1996 to April 1997. The sample was selected in three stages and was geographically stratified to ensure representativeness at both at provincial level and for urban and rural areas. For the purposes of the analysis in this paper, the full sample consists of 41,302 individuals in just over 8,000 households.[5] Parts of the analysis refers to the sub-sample (n=4,591) of individuals that report having been ill in the four weeks preceding the interview.

Reporting of illness

On the basis of self-reported information, approximately 11.2 percent of respondents report being ill in the four weeks preceding the survey (see Figure 1 below and Table A 1 in appendix).[6] The incidence of reported illness higher in higher income groups, for women, and among the young and elderly.[7] There is also considerable variation across provinces in illness reporting. The survey only contains limited information on the nature and severity of the illness. Illness is more severe among the poorer, and individuals in the poorest quintile tend to be ill for longer, have a higher incidence of activity limitation, and be limited in their activities for a longer period. The higher incidence of self-reported illness among the rich is counterintuitive but not unusual in household surveys (see, e.g. Wolfe and Behrman (1984) and Makinen et al. (1999)).

[4] *Inquérito Nacional aos Agregados Familiares Sobre as Condições de Vida* (IAF). Details concerning the survey can be found in Datt et al. (2000) and MPF et al. (1998).

[5] The survey covered 42,769 individuals in 8,250 households. 1,467 observations, or just over 3 percent of the sample, was dropped due to inconsistencies or missing values in relevant variables. A large proportion of the dropped observations was due to missing data for age variables and housing characteristics (e.g. water supply and sanitation).

[6] In what follows, all percentages are calculated using sampling weights.

[7] This may be because richer households have a lower tolerance-threshold for their definition of "ill" than do poorer households. Also, recall of illness episodes may be related to education and formal treatment episodes. Both of these factors would make illness reporting by wealthier households more likely for a given health status.

The most common specific ailments are malaria (24.6 percent) and diarrhoea (17.2 percent), but 34 percent of those reporting illness reported none of the listed symptom groups. The pattern of reported symptoms does not vary considerably across income groups, although there is a tendency for a higher proportion of the poorest to report "other" illness, which may be an indication of difficulties of self-diagnosing. While diarrhea is a big problem in infants (36.6 percent), the elderly (46 years or older) primarily suffer from symptoms other than those categories included in questionnaire (48 percent). Symptoms also vary across urban and rural areas, with malaria being more commonly reported in urban areas and other (unspecified) symptoms being more common in rural areas. This may be due to differences in the capacity to self-diagnose, or to understand a diagnosis communicated by a health professional. Similarly to illness reporting, there are notable provincial disparities in reported symptoms across provinces, in particularly in respect of malaria and diarrhea..

The Decision to Seek Care

Those who reported seeking care were asked to specify whether this consultation was with a (i) hospital; (ii) private clinic; (iii) health post; (iv) doctor; (v) nurse; (vi) pharmacy; (vii) traditional medical practitioner; or, (viii) other.[8] The probit analysis focuses on visits to a formal health care provider, conditional on illness. Using information on reported health care choices, an indicator variable was constructed for whether an individual had sought care at a formal provider, including a hospital, health center, or health post. In the sample, 5.8 percent of individuals report having visited a formal provider in the four weeks preceding the survey. Conversely, 51.9 percent of the sub-sample of individuals who report illness made a visit to a formal providers (see Table 1). As can be seen from Figure 1 below, utilization of formal health care providers varies considerably depending on province, urban/rural domain, and income, with hospital care being more important in the southern provinces, in urban areas, and among the rich (see also Table A 2 in appendix).

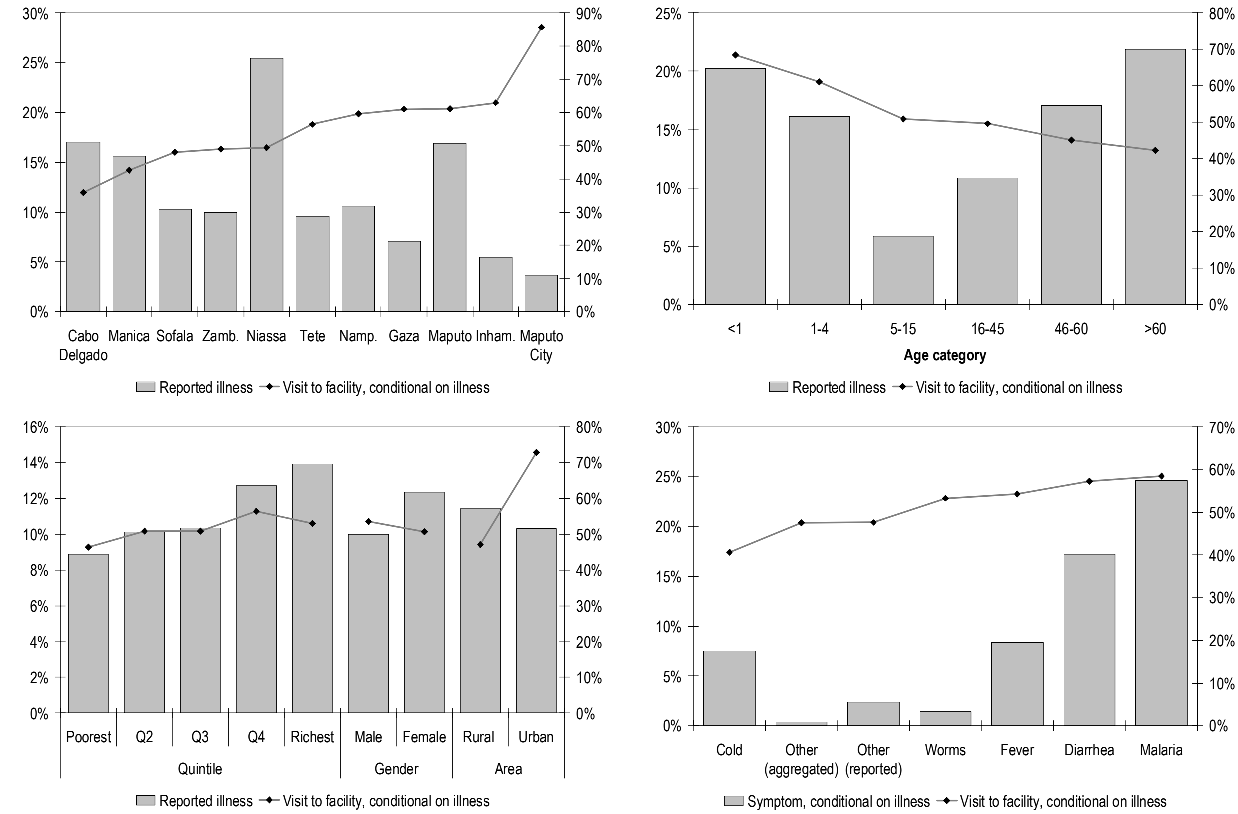
Table 1 – Dependent variable: visit to formal provider

	Mean	
	Full sample	**Sub-sample of sick**
Health care visit [a]	5.8	51.9

[a] *Includes visits to health post, health center, hospital, or other formal provider*

[8] The questionnaire only permitted one care-seeking episode. If several consultations were made in the last month, answers prefer to the last consultation. The survey hence ignores many of the complexities that characterize health seeking behavior. For example, Beattie and Kraushaar (1999) report evidence from Mozambique that many people consult TMPs as a complement to formal health services. See also discussion of use of TMPs in Cabral (1999).

Figure 1 – Illness reporting and the binary choice of seeking care



Explanatory variables

The utilization of health services is likely to depend on demand factors such as income, cost of and access to care, education, social norms and traditions, and the quality and appropriateness of the services provided, etc. (see Table A 3 and Table A 4 for descriptive statistics on individuals and households). The analysis focuses on three sets of explanatory variables: individual, household, and community (a complete description of the variables in the analysis is presented Table A 5 in the Appendix).

Among the individual level variables, we pay particular attention to the role of income, proxied by per capita household consumption. Household consumption was measured through detailed questionnaire modules on food and non-food consumption and expenditures. Non-food consumption includes both direct consumption and imputed use-value from household housing and assets.[9] Household-level consumption estimates have been deflated using spatial price indices, defined for 13 regional domains in the original data analysis. These spatial domains were used to reflect spatial differences in prices and in consumption and expenditure patterns. The distinction between poor and non-poor individuals is based on poverty lines constructed for the respective spatial domains on the basis of the minimum cost of meeting the defined minimum standard of food and non-food consumption. Consumption varies from 1,720 Meticais for the poorest quintile,

[9] See Datt et al. (2000) for details.

to 12,308 Meticais for the richest quintile. The analysis also controls for other factors related to economic activity, in particular whether the individual or someone in the household is reports having an occupation and is currently working.

Beyond the economic characteristics of the household and individuals, there are a range of other individual- and household-level factors that are important as determinants of health seeking behavior. We control for age, education, gender, and severity and nature of illness. In order to permit non-linear effects, both education and age enter as a series of dummy variables. Education refers to the own education (highest grade attained) for individuals over 16 years, while younger individuals are assigned the highest grade attained by any household member. The severity and nature of illness is controlled for through the inclusion of both symptom dummies and a dummy variable for whether the individual reported activity limitations.[10] At household level, wealth is proxied by the number of rooms of the dwelling, and an indicator variable for ownership of a radio. Other characteristics of the dwelling, such as presence of latrine or water closet and water source, were not considered on the grounds that these variables not only proxy for wealth, but also are determinants of health status and illness incidence.[11]

In respect of community characteristics, we primarily control for physical access to health care, both through travel time, road quality and access to transport, a dummy variable for whether there is a health center or post in the community, and a dummy variable for whether there is a hospital located in the district. The travel time to the closest formal provider was based on information collected thought a community key informant. In urban areas, where community informants were not interviewed, it was assumed to by 20 minutes.[12] As facility data were not collected as part of the household survey, it is not possible to control directly for quality.[13] In the preliminary analysis, we used a district-level proxy for quality based on public expenditure on health care. This proxy did not have a significant impact on health seeking behavior, and is not used in the analysis.

Analysis

The empirical analysis of binary health care choice addresses five issues. First, three basic probit models were estimated over the sub-sample of individuals who report an incidence of illness in the four weeks preceding the interview, where each model differs in respect of the specification of consumption. Second, separate models were estimated for different sub-populations and spatial domains (poor/non-poor and urban/rural) to test whether the coefficient estimates of interest are the same across the respective sub-populations. Third, we address possible selection issues arising

[10] Most studies of health care demand include a measure of health status as an explanatory variable. Akin et al. (1995) include symptoms and seriousness of illness; Gertler et al. (1987) and Gertler and van der Gaag (1990) include number of days healthy in last four weeks in the health production function; Lavy and Quigley (1991) use number of days individuals report being unable to perform tasks. As many of these studies note, these variables are problematic in that they may be endogenous to the health care choice. In order to limit this problem, we use simple dummy variables.

[11] These health related household assets are however used in the estimation of illness reporting (see below).

[12] This assumption was validated looking at reported travel time by urban respondents who actually visited a provider. Although there was some variation in reported travel time, 20 minutes is close to the mean and a reasonable approximation for most individuals in the sample.

[13] There are many studies demonstrating the importance of different dimensions of quality in health seeking behavior (see e.g. Akin, et al. 1998; Hutchinson 1999; Litvack and Bodart 1993).

from the use of the sub-sample of ill individuals through an explicit estimation of the selection process. Fourth, we test for endogeneity of consumption variables. Finally, we look at whether taking into account community-level fixed effects alters the findings.

2.3 Results

Binary health care choice: visit to a formal provider conditional on illness

Table A 8 reports results from three different specifications are reported. In specification (A), consumption enters as a continuous variable; in (B) both consumption and consumption squared are included; and in (C) quintile dummies are included to permit a more non-linear impact of consumption. As a general conclusion, consumption is not consistently significant as a determinant of health service utilization. In (A), consumption is significant, but when a squared term is also included in (B), neither consumption or the squared term is significant. Of the quintile dummies, only the fourth quintile has a significant effect, and they are not jointly significant.

Looking at the relative impact of different variables in a probit model is complicated by the fact that the model is non-linear in the explanatory variables, and, as a consequence, the impact of independent variables on the probability of seeking a particular type of care depend on the value of that and other independent variables. However, we can assess the importance of different explanatory variables by looking at marginal changes in predicted probabilities for a "representative individual". In this case, we control for variation in all independent variables except the one of interest. The predicted probability under scenario *m* is

$$\widetilde{\Pr}_i[S=1 \big| \tilde{\mathbf{w}}^m] = \widetilde{\Pr}[\hat{\boldsymbol{\alpha}}'\tilde{\mathbf{w}}^m < \varepsilon] = \Phi(\hat{\boldsymbol{\alpha}}'\tilde{\mathbf{w}}^m),$$

where $\hat{\boldsymbol{\alpha}}$ is the vector of estimated coefficients, and $\tilde{\mathbf{w}}$ is the vector of explanatory variables, where all variables are at the population mean except the variable of interest. The predicted probability under scenario *m* can be compared with an alternative scenario, *m'*, where the value of the variable under consideration is changed while the rest remain constant. This approach provides a useful perspective on how predicted probabilities depend on specific variables of interest.[14]

As can be seen from Figure 2, the effect of consumption on predicted probability of a health care visit in the event of illness is small. This can be contrasted with the effects of education, accessibility, severity, and other significant variables, which are considerably more important (Table 2). Although the impact of consumption is limited, some other variables related to consumption, in particular whether someone in the household is professionally active has a significant effect. Also, regardless of the specification, age has a significant effect, such that children, in particular infants, are considerably more likely to seek care. This is consistent with the descriptive statistics presented above.

[14] However, it is important to remember that because of the non-linearities in the mapping between independent variables into probability space, predicted probabilities at averages are not in general equal to average predicted probabilities.

Figure 2 – Predicted probabilities (1)

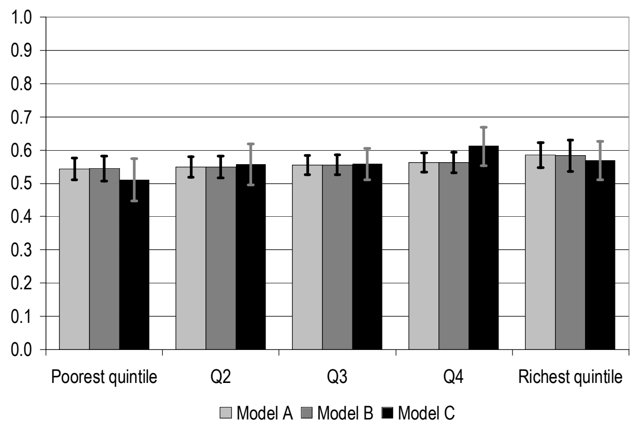


Table 2 – Predicted probabilities (2)

	Predicted probability	95% CI
Education		
No education	0.48	(0.42,0.54)
Less than primary 1	0.56	(0.52,0.60)
Primary 1	0.68	(0.62,0.74)
Primary 2 or more	0.68	(0.58,0.77)
Community level literacy		
29% of district literate (lowest)	0.49	(0.43,0.56)
89% of district literate (highest)	0.68	(0.58,0.77)
Physical accessibility of health care		
15 min. travel and access	0.68	(0.64,0.72)
120 min. travel and good access	0.50	(0.45,0.55)
120 min. travel and poor access	0.42	(0.35,0.49)
Illness severity (activity limitation)		
No activity limitation	0.52	(0.48,0.57)
Activity limitation	0.59	(0.55,0.62)

Note: Predicted probabilities at population means for all variables except the one indicated

In order to shed further light on the importance of income on care-seeking behavior, we also test whether parameter estimates are significantly different for poor and non-poor individuals, and for individuals in urban and rural areas (results for relevant sub-populations are presented in Table A 9). The hypothesis that all the coefficients are the same for the poor and the non-poor is rejected by the data.[15] However, separate Chow tests indicate that the coefficients on consumption, education, and age, are not significantly different for the poor and non-poor, while the coefficients on travel time are significantly smaller (in absolute terms) for the poor than non-poor. Similar conclusions hold in respect of the difference in coefficient estimates for individuals in urban and rural areas.

Selection bias

As in most surveys, information relating to health care decisions is only reported conditional on previous reporting of illness in the IAF. However, the process that determines health status and illness reporting (for a given health status) is unlikely to be exogenous to health care choices. In particular, there may be unobservables that determine both reporting of illness and utilization of health services, leading to possible selection bias.[16] Put differently, the probability that an individual who reports illness will seek care (for some given health status) may be different from the probability of individuals who do not report illness (if they had the same health status). If this is the case, results from the analysis of the sub-sample of individuals who report illness do not accurately reflect the relationship for the population as whole.

[15] This is the case regardless of whether poverty is defined using the official poverty line, or if those below median income are considered poor.

[16] Correlation between error terms in selection and health care choice can be due to a range of factors, e.g. the presence of unobservables such as perception of illness or health endowment.

Some contributors have sought to address this issue, but the evidence is mixed. Dor and van der Gaag (1993) use a two-step approach and find no selection bias in health care demand estimated conditional on being ill. Using a different methodology, Dow (1996b) finds that in data from Côte d'Ivoire, health demand estimates conditioned on health status do not suffer from statistical selection bias. Akin et al. (1998), on the other hand, estimate an illness equation jointly with the choice of care equation and find that failure to control for sample selectivity of the reported illness does reduce the estimated price coefficient in the demand equation.

Here, we address the selection issue by estimating a nested bi-probit (Table A 10 reports results on illness reporting and the selection-corrected probit on health care visit to a formal provider). A number of the variables that are included in the care visit probit are also significant determinants of illness reporting, including gender, age, and the number of household members. In addition, some of the excluded variables, in particular water source in the home, low per capita spending on health in the district (proxy for quality), and the month of the interview, are significant. However, the broad conclusions from the simple conditional probit still stand, suggesting that selection bias is not important. Moreover, the Wald test cannot reject the hypothesis of zero correlation between the error terms in the selection equation and the main probit equation.

Endogeneity of consumption

We further test for the possibility that consumption is endogenous in the model, which would result in biased estimates. In an instrumental variable probit, we instrument for consumption with household asset variables and dummy variables for the month of the interview. The coefficients of the IV probit are very similar to the standard probit. Moreover, on the basis of the Smith-Blundell test for exogeneity (Smith and Blundell 1986), the hypothesis that consumption is exogenous cannot be rejected (p-value 0.766).

Unobserved community heterogeneity

So far, we have assumed that cluster effects are exogenous, and simply corrected for the clustered structure of the data by presenting robust estimates of standard errors (i.e. taking into account within-cluster correlation of error terms).[17] However, if exogeneity does not hold, community level unobservables are not independent of the regressors, and a fixed effects model is appropriate. This would be the case, for example, if unobservable characteristics of the community such as health care quality were correlated with observable characteristics such as income level.

Table A 11 presents results from both random and fixed effect logits, and contrasts the results with a standard logit. The estimates are similar across the respective models. Assuming the random effects model is correctly specified and efficient, the Hausman test rejects the hypothesis that the coefficients of the fixed effects model are systematically different from the random effects model (Prob>chi2 = 0.164). This offers some support of the assumption that cluster effects are exogenous. Although the random effects estimator can achieve greater efficiency than a standard logit or probit, its properties are not well understood, in particular for small sample.

[17] If cluster-level (village) heterogeneity is exogenous, the standard probit or logit model is consistent, although the random effects model is more efficient.

3. PROVIDER CHOICE

3.1 Extending the model to analyze provider choice

The framework for modeling and estimating a binary choice of seeking health care can easily be extended to consider the choice between alternative providers. When sick, an individual faces J health care options.[18] In the simplest case, the choice between alternatives depends only on individual, household, and community characteristics, *z*. In this case, the utility of option *j*, conditional on illness is

$$U_j = U(h_j, x, \varepsilon_j; \boldsymbol{\varphi}_j) \text{, where}$$

$$h_j = h(\mathbf{z}; \boldsymbol{\beta}_j) .$$

As before, **z** is a vector of individual, household, and community characteristics, and x is non-health consumption. The choice of provider can be represented by the indicator function,

$$S_j = 1[U_j = Max(U_1, U_1, ...U_J)] .$$

Similarly to the dichotomous case, we need to be more specific about functional form in order to operationalize this general framework. With a linear model (see e.g. Akin, et al. 1984; 1986; Mwabu 1986),

$$U_j = \varphi_{1j} h_j + \varphi_{2j} x + \varepsilon_j \text{, where}$$

$$h_j = \boldsymbol{\beta}_j ' \mathbf{z} .$$

With reparamterization, the indirect utility function can be written as

$$V_j = \boldsymbol{\alpha}_{1j} ' \mathbf{z} + \alpha_{2j} x + \varepsilon_j = \boldsymbol{\alpha}_j ' \mathbf{w} .$$

Note that there are no differences in the explanatory variables across alternatives. In other words, differences in V_j are entirely due to differences in alternative specific parameters. This is the Multinomial Logit Model (MNLM), based on McFadden (1973). Under appropriate conditions, the MNLM can be derived from the latent variable model by specifying the distribution of error terms as iid with type I extreme value distribution (McFadden 1981), such that

$$\Pr(choice = j) = \frac{e^{\boldsymbol{\alpha}_j ' \mathbf{w}}}{e^{\boldsymbol{\alpha}_1 ' \mathbf{w}} + ... + e^{\boldsymbol{\alpha}_j ' \mathbf{w}} + ... + e^{\boldsymbol{\alpha}_J ' \mathbf{w}}} .$$[19]

In many cases, it may be desirable to move beyond the simple model to include provider attributes, in particular alternative-specific costs. This permits an analysis of the price-responsiveness of health care demand. In principle, this can easily be done by taking into account

[18] The set of choices would typically include home/self-care as well as different types of health care providers.

[19] In order to achieve identification, one of the coefficient vectors is set to zero.

cost of health care in the budget constraint. In other words, rather than treating consumption as exogenous, non-health consumption is the difference between exogenous income, y, and the unit cost of care from provider j, p_j. In this case,

$$x_j = \gamma_{1j} y - \gamma_{2j} p_j \text{, which gives}$$

$$V_j = \boldsymbol{\alpha}_j^{\mathbf{z}}{}'\mathbf{z} + \alpha_{1j} y + \alpha_{2j} p_j + \varepsilon_j \,.$$

However, as pointed out by Gertler et al. (1987), and Gertler and van der Gaag (1990), this specification assumes that responsiveness to prices is independent of income.[20] To address this perceived weakness, they proposed an empirical specification based on a semi-quadratic utility function which is linear in health but quadratic in consumption, where

$$U_j = \varphi_{1j} h_j + \varphi_{2j} x_j + \varphi_{3j} x_j^2 + \varepsilon_j \text{, which gives}$$

$$V_j = \boldsymbol{\alpha}_j^{\mathbf{z}}{}'\mathbf{z} + \alpha_{1j} y + \alpha_{2j} p_j + \alpha_{3j} y^2 + \alpha_{4j} y \cdot p_j + \alpha_{5j} p_j{}^2 + \varepsilon_j$$

There has been some debate in the literature about what constraints should be imposed on the parameters of the above model. Gertler et al. (1987), constrain all income and price related coefficients to be equal across the different alternatives, such that

$$\alpha_{mj} = \alpha_{mk} \quad m = 1,..,5;\ \forall k \in J \text{, and}$$

$$\alpha_5 = -2\alpha_4 \,.$$

Moreover, because y and y^2 do not vary across alternatives, these variables then drop out of the estimated equation (i.e. $\alpha_1 = 0$ and $\alpha_3 = 0$). Although this specification includes a price-income interaction term, thus permitting the price responsiveness of demand to be a function of income, Dow (1996a) raises a number of concerns in respect of the implicit restrictions that the model embodies. As an alternative, he proposes a "flexible behavioral model", which has been favored in some recent studies of health care demand (see e.g. Akin, et al. 1998). First, in this flexible specification, coefficients on price and price/income variables are allowed to vary across alternatives. This is motivated by a relaxation of the assumption of additive separability in the utility function.[21] Second, Dow also seeks to add flexibility to the basic model through the parameterization of the budget constraint, whereby uncertainty about the appropriate budget period results in a relaxation of the restriction on the relationship between α_4 and α_5.[22] Finally,

[20] To see this, it suffices to note that the difference in utility between two choices does not depend on income, and hence income does not directly affect choice.

[21] The assumption can be relaxed in a number of ways. Dow proposes the inclusion of an interaction term between consumption and health improvements in the utility function; rich and poor may place different values on improvement in health status.

[22] The idea is based on Gertler et al. (1987). They note that the appropriate measure of income depends on the functioning of credit markets. If capital markets are perfect, the relevant income constraint is the present value of income. At the other extreme, the income constraint is the current income. They propose a specification which permits this issue being resolved by the data. Income was measured as total family income in the month prior to the survey. Gertler et al. find that the hypothesis that budgeting is restricted to one period is accepted and hence data on current income is applicable. On this basis, Dow (1996b) specifies residual consumption as $x_{j,t}=\lambda y-p_j$, where λ is an

Dow (1996b) argues for the inclusion of cross-prices in the utility from choice *j*, providing theoretical justification for this by assuming forward-looking behaviour. The estimated equation hence becomes

$$U_j = \boldsymbol{\alpha}_j^{\mathbf{z}}{}'\mathbf{z} + \alpha_{1j} y + \boldsymbol{\alpha}_{2j}\mathbf{p} + \alpha_{3j} y^2 + \alpha_{4j} y \cdot p_j + \alpha_{5j} p_j{}^2 + \varepsilon_j \text{, where}$$

$$\mathbf{p} = [p_1, \ldots, p_J]'.$$

3.2 Variables, and estimation

In the analysis of provider choice, the dependent variable is a polychotomous variable reflecting the five health care alternatives captured by the survey (Table 3).

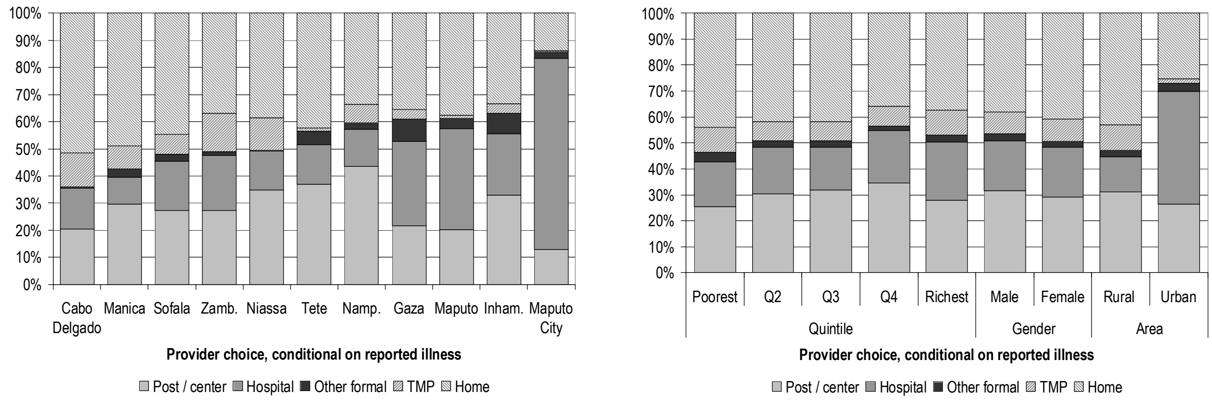
Table 3 – Dependent variable: provider choice

	Mean	
	Full sample	**Sub-sample of sick**
Home/self care	93.2	39.6
Traditional practitioner	0.9	8.4
Hospital	2.1	19.2
Health post or center	3.4	30.2
Other	0.3	2.5

As can be seen from table Figure 3 below, there is considerable variation in provider choice across provinces, urban-rural domain, and to some extent, socioeconomic group (see also Table A 2 in appendix) For example, in urban areas, 43.4 percent of those seeking care report attending hospitals, while the corresponding percentage for rural areas is 13.6 percent. Mirroring this difference, individuals in rural areas are more likely to attend health posts (31.1 percent, compared to 26.3 percent in urban areas) and traditional practitioners (10.0 percent, compared to 1.7 percent in urban areas).

unknown parameter representing the budgeting period for the income y from which the health care price p_j is subtracted.

Figure 3 – Provider choice by province, quintile, gender, and area



For a first look at provider choice, we estimate a MNLM using the same set community, household, and individual level explanatory variables. We continue to control for proximity to a primary health facility, and the availability of a hospital in the district, but no alternative-specific variables—e.g. price or travel time to each type of provider—are included. As above, the analysis focuses on the role of consumption, with the impact of consumption explored for three different specifications.

Second, we estimate a "flexible" specification with alternative-specific prices. As in many other surveys, we do not have observed data on prices from all providers for each individual in the sample, but only on actual payments made by users of particular services (see Table A 6). On this basis, some studies have estimated hedonic price equations for specific providers and imputed prices for all individuals (see e.g. Gertler, et al. 1987; Gertler and van der Gaag 1990; Lavy and Quigley 1991). However, most contributors opt to use official fees as proxies for prices. Of course, user fees often vary by form of treatment, and in most surveys the form of treatment actually received is not observed. This is the case in the Mozambique survey, where the data do not reveal what services or medicines were received in exchange for any payment. Akin et al. (1995) suggest that official outpatient registration fee be used as best proxy for ranking of overall facility price. However, user fees in Mozambique are very limited, and do not vary significantly across providers or provider types. Currently, the fee for outpatient consultations in both hospitals, health center, and health posts is 1,000 MT in urban areas and 500 MT in rural areas—the same level as in 1996 despite substantial increases in the general price index. In the absence of price variation, a money price effect cannot be identified. This has led many analysts to focus on time prices to identify a price effect. This procedure is followed here.[23]

The time price was constructed as the product of opportunity cost of time and the travel time associated with the respective alternative.[24] Travel time of home care is assumed to be zero. For traditional practitioner, data from community key informant were used. Where data were missing, values were constructed by averaging reported actual travel time for individuals in the

[23] Although there is some theoretical foundation for simply considering time price as a part of the overall cost of care (Becker 1965), the little evidence that is available suggests that the effect of time and money prices can be very different (Mwabu 1989).

[24] In principle, the time spent seeking care includes both travel time and time spent waiting to receive care. Due to data limitations, only travel time is used as an explanatory variable.

community who had visited a traditional practitioner in the four weeks preceding the interview.[25] The opportunity cost of time is proxied by per capita household consumption. This is in contrast with some of the literature which has used community-level wage rates as reported by a key informant (e.g. Gertler, et al. 1987; Gertler and van der Gaag 1990). These data were not consistently available in the Mozambique data. Moreover, although household consumption has the disadvantage of being endogenous to health, it captures within-community differences in the opportunity cost of time.

Following the empirical specification set out above, consumption, consumption squared, price and cross-prices, own price squared, an own price-income interaction term are included as explanatory variables. This specification permits us to assess whether consumption has an impact on provider choice, as well as the extent to which demand responsiveness to prices varies depending on income. Moreover, the flexible specification permits us to test some of the assumptions that underpin the more restricted modeling framework set out above.

The results of the MNLM is potentially sensitive to the assumption of independence from irrelevant alternatives (IIA). By construction, the relative probability of choosing two alternatives is unaffected by the presence of additional alternatives. This restriction can be relaxed by using more flexible models, in particular the nested MNLM or the Multinomial Probit Model (MNPM). However, these models suffer from their own weaknesses. The nested MNLM requires the modeler to specify the nesting structure. This is inherently *ad hoc*, and there are no ways of testing alternative nesting structures against each other. Conversely, the flexibility of the MNP is acquired at the cost of computational ease, essentially restricting the number of alternatives that can be considered. The literature offers limited guidance on the choice of modeling framework. Although there is some evidence that results can differ depending on the modeling framework (Akin, et al. 1995; Bolduc, et al. 1996; Dor, et al. 1987; Mwabu, et al. 1993), it is not conclusive. Moreover, McFadden (1984, p. 1414) points out that "empirical experience is that the MNLM is relatively robust, as measured by goodness of fit or prediction accuracy, in many cases where the IIA property is theoretically implausible." Here, we have more than four alternatives, and we want to avoid imposing an *ad hoc* nesting structure. For these reasons, the models are estimated using standard MNLM technique, although the IIA assumption is tested.

3.3 Results

A simple multinomial logit model

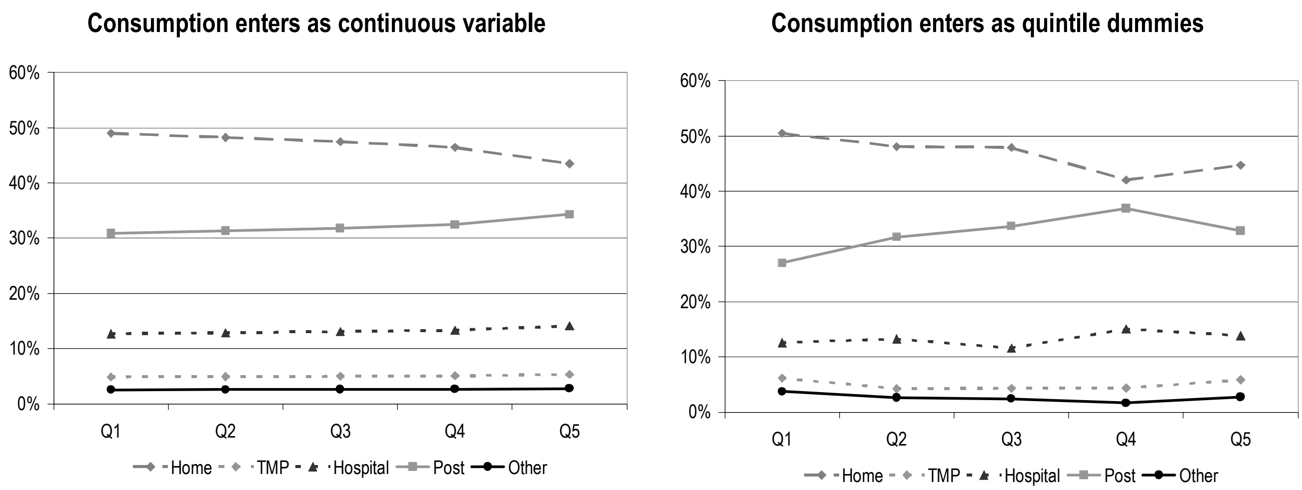
Similarly to the binary model, we estimate three different specifications, where income enters either as a continuous variable (on its own or including squared consumption), or as income quintiles. Full results for the basic model and Wald tests for coefficient significance for models (B) and (C) are presented in Table A 12.[26] The results broadly mirror the binary case; consumption is significant in the basic model (A), but not significant when a consumption squared term is included, or when consumption enters as quintile dummies. Moreover, for the polychotomous

[25] If there were fewer than three individuals in the lowest sampling unity who had visited a traditional practitioner, the average for the larger geographical unit (administrative post) was used. A similar procedure was used to construct a travel time variable for hospitals, health centers/posts, and other providers.

[26] Full results for the alternative specifications are not available, but are available upon request.

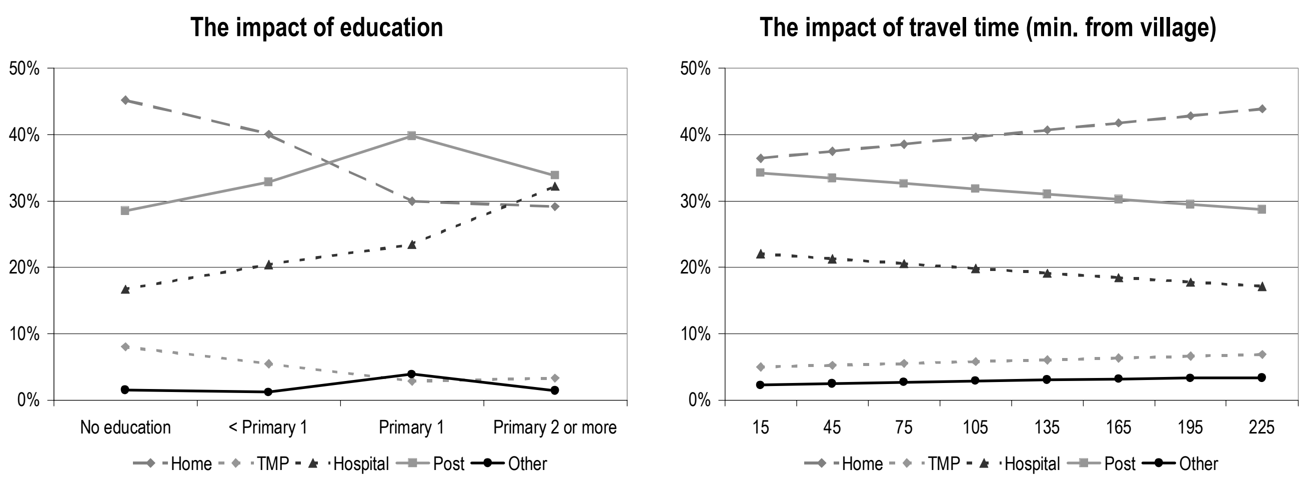
provider choice variable, the consumption is only significant for some alternatives (hospital and health post). Besides not being consistently significant, the effect of consumption on predicted probabilities is small, regardless of the specification (see Figure 4; Table A 14 in appendix present predicted probabilities with confidence intervals). As income increases, the estimates suggest that, controlling for other factors, individuals shift away from home/no care to seeking care at a hospital or health posts.

Figure 4 – Predicted probabilities: The effect of income



The results suggest that other variables than consumption are more important in the choice of health care provider. In particular, as expected, higher levels of education are associated with higher probabilities of seeking care in a hospital or health center, with a rapid fall in the probability of home care. The probability of home care also increases with travel time (see Figure 5 and Table A 15 in appendix). As before, age, severity, and urban residence have a significant impact on health care choices, at least for some of the alternatives.

Figure 5 – Predicted probabilities: The effect of education and physical access



We test the validity of the IIA assumption. As noted above, the IIA assumption implies that the odds for any pair of outcomes are determined without reference to the other outcomes that may be available. In this case, the Hausman test cannot reject the IIA assumption.[27]

Alternative-specific variables and demand elasticities

We now introduce alternative-specific "prices" and estimate a more flexible model. This permits us to assess whether price elasticity is a function of income, while also testing some of the assumptions that underpin the theoretical model.

The concern with price elasticity is related to the extensive and ongoing debate about the merits and implications of user fees for health services, and has been one of the main motivations for the substantial literature on health care demand.[28] The use fee debate was sparked off by early studies which found that neither fees nor income have a large impact on care-seeking behavior of households, and claimed that equity is better served by improving quality and expanding services (e.g. Akin, et al. 1986; Heller 1982). However, subsequent studies have found higher estimates of elasticity (e.g. Gertler and van der Gaag 1990; Haddad and Fournier 1995; Lavy and Quigley 1991; Sauerbon, et al. 1994), and have also found considerable differences in price sensitivity across age groups, gender, and income categories. Although most of these studies suffer from a lack of exogenous price variation (Gertler and Hammer 1997), they have played an important role in shaping the debate about user fees.

Results from the "flexible" specification are reported in Table A 13. The hypothesis that cross price effects all equal zero is rejected, as is the hypothesis that own-price coefficients are the same across alternatives.[29] The results hence suggest that the flexible model is appropriate. Neither consumption nor consumption squared are significant. Looking at the coefficients on prices variables, we find that the own-price effect is significant only for the health post alternative. In some cases, the cross-price coefficients are also significant, in particular the price for the health post alternative. The coefficients on own price squared are significant for hospital and health post, while the consumption-price interaction is not significant for any of the alternatives.

Given the different channels through which price now affects health seeking behaviour, the coefficients on the respective variables are difficult to interpret. In order to assess the impact of prices on utilization of health services, we can, as before, look at predicted probabilities. However, for prices, it is more natural to look at the effect in terms of price elasticities of demand. Following

[27] The Hausman test is based on the idea that a consistent but inefficient estimator can be obtained by estimating the model on a restricted set of outcomes. The statistic measures the difference between the coefficients in a restricted model (with some outcomes eliminated), and those of the original model.

[28] The main argument for introducing user fees has been the need to relax financial constraints in contexts of fiscal stress, but some contributors have also pointed at potential efficiency, equity, and quality gains (de Ferranti 1985; Griffin 1992; Jimenez 1989; Shaw and Ainsworth 1994; World Bank 1987).There is now a considerable literature on user fee policies and their impact. For reviews, see, e.g., Creese (1991), Creese and Kutzin (1997) Gilson (1997), Jiminez (1995), McPake et al. (1993), Newbrander et al. (1997), Reddy and Vandemoortele (1996).

[29] However, the restriction that the coefficient on own price squared equal two times the coefficient on the price-consumption interaction term (negative), which is implied by the restriction of coefficient equality across alternatives, is rejected.

Train (1986), the elasticity, E_j, of the choice probability *Pr(choice=j)* with respect to the a change in the price, p_j, is defined as

$$E_j = \left(\frac{\partial \Pr(choice = j)}{\partial p_j}\right)\left(\frac{p_j}{\Pr(choice = j)}\right) = \left(\frac{\partial U_j}{\partial p_j}\right) p_j (1 - \Pr(choice = j)) .$$

Analogous to the case of continuous demand, the elasticity represents the percentage change in the probability of having a consultation with provider *j* due to a percentage change in price of consultation with provider *j*. Own price elasticities were calculated for the hospital and health post alternatives.

The elasticities reported in Table 4 are relatively low compared to those reported in other studies.[30] However, comparisons should be made with caution, given that these estimates are based on time prices which have been calculated. There are however a couple of points that are noteworthy. First, and most importantly, there are notable differences in estimates of own price elasticity depending on the model specification, with higher elasticity in the more flexible models. This suggests that findings relating to income elasticity of health care demand can be very sensitive to the choice of specification. Second, as expected, there is essentially no difference in the own-price elasticities across quintiles when own price is the only price related variable in the model (A).[31] However, even with a more flexible specification, which is better able to capture income-dependent price effects, the own price elasticity does not vary substantially across income quintiles. Finally, for the health post alternative, the elasticity is higher for households with lower incomes, indicating that an increase in price will reduce realized access to basic care more for poorer household. Conversely, the own price elasticity of demand for hospital care increases with income. This suggests that the demand response to price increases would be strongest among richer households.

Table 4 – Time price elasticities by quintile

	Model A		Model B		Model C		Model D	
	Post	Hospital	Post	Hospital	Post	Hospital	Post	Hospital
Poorest	-0.03	-0.06	-0.08	-0.14	-0.12	-0.11	-0.15	-0.21
Q2	-0.03	-0.06	-0.08	-0.13	-0.11	-0.11	-0.15	-0.21
Q3	-0.03	-0.06	-0.08	-0.13	-0.11	-0.12	-0.15	-0.22
Q4	-0.03	-0.05	-0.07	-0.13	-0.10	-0.13	-0.14	-0.23
Richest	-0.03	-0.05	-0.06	-0.11	-0.09	-0.15	-0.13	-0.25

Model A: Own price only; price coefficients constrained to be same across alternatives
Model B: Own price, own price squared, price-consumption interaction; coefficients constrained to be same across alternatives
Model C: Own price, own price squared, price-consumption interaction; coefficients unconstrained
Model D: Own price, own price squared, price-consumption interaction, cross-price; coefficients unconstrained

[30] See Gertler and Hammer (1997) and Jack (1999) for a review of findings.

[31] In this case, $\left(\frac{\partial U_j}{\partial p_j}\right) p_j$ is the same across quintiles, but $(1 - \Pr(choice = j))$ may vary.

4. CONCLUSIONS

This paper has investigated the determinants of utilization of health services in Mozambique, paying particular attention to the role of income. It provides robust evidence on both the binary decision to seek care in the event of illness and on the multinomial choice of health care provider.

The findings show that income is not an important determinant of health care choices in Mozambique. In the binary choice model, income, proxied by consumption, is not consistently significant as a determinant of utilization of curative health services. Moreover, although the estimated impact of income is sensitive to the specification of the empirical model, the impact is consistently small. The results from the analysis of provider choice largely mirror those of the binary choice model. Again, income is not a significant determinant, except in some specifications. When significant, the impact of income on predicted probabilities is small. Aside from the direct impact of income on health care choices, some studies have suggested that the price elasticity of demand may vary considerably across income groups. The results presented above suggest that in Mozambique the own (time) price elasticity is similar across income quintiles. Overall, the results suggest that income is not an important barrier to utilization in Mozambique. Rather, other factors, in particular education and physical access, are the more important. This suggests that the government has been successful in removing money cost as a barrier to utilization, but that efforts to promote utilization through improved physical access and information must be sustained.

The paper also make a couple of methodological points. First, in the case of the binary choice model, the analysis suggests that results are robust to a number of estimation issues that are rarely addressed explicitly in the analysis of health care choices, including sample selection, the potential endogeneity of consumption, and cluster-level unobservables. Second, the analysis demonstrates the merits of the "flexible" behavioral model in the analysis of provider choice. Not only are some of the restrictions of a more basic model rejected in the analysis, but both the level of the price elasticity and the extent to which the elasticity varies with income is shown to be sensitive to the empirical specification.

APPENDIX A – TABLES

Table A 1 – Illness reporting

	Report illness (%)	Days ill*	Activity limit. (%)**	Days limit*	Symptoms (percent, conditional on reporting illness)						
					Malaria	Diarr.	Cold	Fever	Worms	Other (aggr.)***	Other (rep.)***
Poorest quintile	8.9	12.3	65.4	6.1	23.0	15.8	7.0	7.9	1.0	7.3	38.2
Q2	10.2	10.2	69.0	5.8	22.5	19.2	7.4	7.9	1.7	8.5	32.9
Q3	10.4	11.2	64.9	6.0	24.2	15.5	8.6	9.1	2.2	6.2	34.2
Q4	12.7	10.2	64.3	5.9	23.4	21.9	6.6	6.2	1.1	7.9	32.9
Richest quintile	13.9	10.5	61.0	5.4	28.9	13.8	8.0	10.5	1.2	4.7	33.1
Male	10.0	10.7	64.9	5.9	25.0	17.7	7.4	7.8	1.5	8.0	32.6
Female	12.4	10.8	64.4	5.8	24.4	16.9	7.6	8.8	1.3	5.8	35.1
< 1 year old	20.2	10.3	73.6	5.0	19.1	36.6	7.1	10.7	3.7	7.3	15.4
1-4	16.1	9.0	65.7	5.1	22.9	29.4	6.3	11.5	3.2	8.7	18.1
5-15	5.9	9.9	66.3	5.3	28.9	15.4	8.4	10.1	1.6	8.4	27.1
16-45	10.9	11.2	64.7	6.4	26.1	14.4	6.5	7.4	0.7	5.0	39.9
46-60	17.1	13.3	59.6	6.3	24.2	7.4	8.0	5.5	0.4	6.7	47.8
> 60	21.9	12.5	58.8	5.1	17.5	8.0	12.9	5.1	0.2	6.9	49.2
Rural	11.4	10.6	63.5	5.6	22.0	17.5	7.9	7.8	1.5	7.4	35.8
Urban	10.3	11.1	69.2	6.5	35.9	16.0	5.6	10.9	1.2	4.0	26.3
Niassa	25.4	10.2	77.1	6.8	27.5	20.9	2.7	7.3	0.7	5.8	35.2
Cabo Delgado	17.0	12.4	53.2	5.9	20.9	13.5	10.5	9.2	3.8	9.1	33.1
Nampula	10.6	10.3	55.2	4.5	16.2	20.5	10.6	10.4	1.4	11.5	29.4
Zambezia	9.9	10.7	66.3	5.0	19.7	29.4	3.4	8.5	0.7	3.5	34.9
Tete	9.6	11.3	94.4	10.8	22.6	19.5	14.6	9.8	1.6	8.2	23.7
Manica	15.6	9.7	63.6	5.8	28.7	9.5	9.5	2.2	1.6	3.1	45.5
Sofala	10.3	13.2	52.0	5.9	23.8	6.7	6.2	6.3	2.1	7.8	47.1
Inhambane	5.5	11.8	70.6	5.6	37.3	1.0	14.6	3.7	0.2	5.7	37.5
Gaza	7.1	10.4	68.4	6.4	38.6	9.9	5.3	10.1	0.5	6.4	29.3
Maputo	16.9	9.1	67.5	4.9	36.1	14.0	4.4	11.9	0.6	5.1	27.8
Maputo City	3.7	9.7	74.4	6.5	52.9	3.7	4.2	11.7	1.0	1.2	25.2
Total	**11.2**	**10.7**	**64.6**	**5.8**	**24.6**	**17.2**	**7.5**	**8.4**	**1.4**	**6.8**	**34.0**
Observations	*41,302*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*

All sample means calculated using sample weights

* *The number of days of illness and activity limitation is based on the sub-sample of individuals for whom the illness was not ongoing at the time of the interview*

** *Activity limitation refers to reported inability to perform basic tasks of daily living*

*** *Other (aggr.) refers to symptoms that are reported with low frequency (Persistent cough w. vomiting; Persistent cough w. blood; Skin eruptions); other (rep.) refers to the case where the respondent reported an uncoded or unspecified symptom.*

Table A 2 – Utilization of health services

	Visits to formal provider (%)*		Choice of care, conditional on reporting illness (%)				
	Uncond. on illness	Cond. on illness	Home	TMP	Hospital	Post	Other**
Poorest quintile	4.1	46.4	44.0	9.6	17.4	25.4	3.6
Q2	5.2	50.8	41.7	7.5	17.8	30.5	2.5
Q3	5.3	50.8	41.7	7.5	16.6	31.8	2.4
Q4	7.2	56.4	35.8	7.8	20.4	34.5	1.6
Richest quintile	7.4	53.0	37.3	9.7	22.2	28.0	2.8
Male	5.3	53.6	38.0	8.4	19.2	31.7	2.6
Female	6.3	50.7	40.9	8.4	19.2	29.0	2.4
< 1 year old	13.8	68.4	26.9	4.6	20.4	42.9	5.0
1-4	9.8	61.1	31.7	7.2	22.4	36.7	2.1
5-15	3.0	50.9	42.5	6.6	15.4	33.8	1.7
16-45	5.4	49.6	40.6	9.8	19.3	27.3	3.0
46-60	7.7	45.1	45.1	9.8	20.5	22.5	2.2
> 60	9.3	42.3	48.1	9.7	16.6	24.0	1.7
Rural	5.4	47.1	42.9	10.0	13.6	31.1	2.4
Urban	7.5	72.9	25.4	1.7	43.4	26.3	3.2
Niassa	12.6	49.4	38.6	12.0	14.5	34.8	0.2
Cabo Delgado	6.1	35.9	51.4	12.6	14.9	20.5	0.5
Nampula	6.3	59.6	33.6	6.8	13.5	43.6	2.5
Zambezia	4.9	49.1	36.8	14.1	20.4	27.2	1.4
Tete	5.4	56.5	42.5	1.1	14.8	36.9	4.8
Manica	6.7	42.6	48.9	8.5	10.0	29.6	3.0
Sofala	4.9	48.1	44.7	7.2	18.1	27.3	2.7
Inhambane	3.4	63.0	33.5	3.6	22.6	32.9	7.5
Gaza	4.3	61.0	35.6	3.4	31.0	21.7	8.4
Maputo	10.4	61.2	37.7	1.1	37.2	20.2	3.9
Maputo City	3.2	85.7	13.8	0.5	70.4	12.9	2.4
Total	**5.8**	**51.9**	**39.6**	**8.4**	**19.2**	**30.2**	**2.5**
Observations	*41,302*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*	*4,591*

All sample means calculated using sample weights

* *Formal providers include hospital, health center, health post, and other formal providers.*

** *Other providers include private clinics and pharmacies.*

Table A 3 – Demographic and socioeconomic characteristics (1)

	Higest grade completed (%)*				Femal e	No one in HH speaks Port.	Age (%)				
	No edu.	Less than prim. 1	Prim. 1	Prim. 2 or more			Under 1	1 to 4	5 to 15	16 to 45	Over 45
Poorest quintile	36.8	43.3	13.2	6.6	51.2	32.3	4.1	13.8	37.7	33.2	11.2
Q2	30.9	47.0	13.9	8.2	51.3	24.6	3.8	13.8	36.5	34.5	11.3
Q3	30.8	42.7	18.2	8.3	52.2	24.1	3.9	12.4	34.4	36.6	12.6
Q4	30.5	41.4	17.9	10.2	51.3	22.0	4.1	11.9	30.8	40.0	13.2
Richest quintile	28.2	35.0	17.4	19.4	50.8	21.5	2.8	9.1	25.0	46.0	17.0
Male	22.7	46.5	18.3	12.5	0.0	23.0	3.7	12.5	34.4	36.0	13.4
Female	39.8	37.5	14.0	8.8	100.0	26.6	3.8	11.9	31.5	40.1	12.7
Rural	36.0	45.0	14.0	5.0	51.7	29.7	3.8	12.1	32.8	37.2	14.0
Urbana	13.8	29.8	24.2	32.2	50.2	6.1	3.6	12.4	33.0	41.4	9.5
Niassa	36.8	39.1	13.5	10.7	50.2	29.2	3.7	14.7	32.4	36.3	12.9
Cabo Delgado	30.6	52.8	12.3	4.3	51.1	39.9	3.9	12.4	28.2	40.5	15.0
Nampula	29.3	48.4	14.3	8.0	49.9	30.2	3.8	11.9	33.8	38.6	11.9
Zambezia	38.3	42.9	13.0	5.8	50.4	16.0	3.9	11.2	33.5	39.5	11.9
Tete	37.9	37.6	16.6	7.9	52.4	44.5	4.4	13.8	37.5	33.5	10.9
Manica	28.9	44.1	16.1	10.9	50.8	28.6	4.6	14.2	33.0	36.3	11.9
Sofala	38.1	36.4	15.4	10.0	50.0	23.1	3.4	13.1	32.4	38.8	12.3
Inhambane	37.4	29.2	20.2	13.1	52.7	24.9	3.2	11.9	32.0	34.8	18.2
Gaza	26.8	44.8	20.2	8.3	56.4	24.4	3.7	11.7	32.0	34.9	17.7
Maputo	20.2	46.1	19.4	14.3	55.7	14.1	3.1	12.2	32.3	35.5	17.0
Maputo City	5.7	23.8	27.8	42.7	51.4	0.7	3.2	10.2	31.7	45.7	9.2
Total	**31.5**	**41.9**	**16.1**	**10.6**	**51.4**	**24.9**	**3.7**	**12.2**	**32.9**	**38.1**	**13.1**

Observations: 41,302

All sample means calculated using sample weights

* *In the case of children under 15, highest grade of schooling refers to the highest grade attained by any woman within the household, unless the child has attained a higher grade himself/herself.*

Table A 4 – Demographic and socioeconomic characteristics (2)

	Num. HH members	Num. rooms per person	Water source (%)		Sanitation (%)		Cons. (MT per day)	Prof. and working*
			Piped	Open source	WC	Latrine		
Poorest quintile	7.4	0.3	3.0	36.4	1.9	30.1	1,720	14.4
Q2	6.7	0.3	3.7	32.6	1.8	34.4	2,869	21.4
Q3	6.1	0.4	4.3	30.7	2.3	36.4	3,967	20.7
Q4	5.5	0.4	6.1	32.6	3.7	37.0	5,549	23.0
Richest quintile	4.8	0.5	15.6	23.8	10.9	40.5	12,308	30.2
Male	6.1	0.4	6.9	31.3	4.2	36.0	5,363	22.9
Female	6.1	0.4	6.2	31.1	4.1	35.4	5,211	21.1
Rural	5.9	0.4	1.1	38.3	1.6	30.0	4,928	14.5
Urbana	6.9	0.4	27.8	3.9	13.9	57.8	6,673	50.7
Niassa	5.8	0.4	0.2	34.6	2.4	57.3	4,864	24.6
Cabo Delgado	5.2	0.4	3.9	15.6	1.0	37.5	6,413	19.2
Nampula	5.4	0.4	4.0	33.4	1.4	29.5	5,316	13.5
Zambezia	5.4	0.4	0.9	42.9	0.7	14.1	5,061	17.4
Tete	6.0	0.3	1.8	56.9	1.2	32.5	3,833	15.3
Manica	6.9	0.3	0.5	36.6	2.2	22.9	6,283	24.4
Sofala	6.8	0.3	8.0	33.4	3.4	18.8	3,220	17.9
Inhambane	7.2	0.4	6.8	29.6	6.9	57.1	4,215	25.8
Gaza	7.1	0.3	6.8	14.0	5.4	60.9	6,079	14.5
Maputo	7.0	0.3	12.3	14.3	8.1	67.0	5,852	43.6
Maputo City	7.6	0.3	45.6	0.1	28.0	70.2	8,323	61.2
Total	**6.1**	**0.4**	**6.5**	**31.2**	**4.1**	**35.7**	**5,285**	**21.9**

Observations: 41,302

All sample means calculated using sample weights

* *An individual is considered to be a professional and working if he/she reported having and occupation or profession, and reported working in the week preceding the interview.*

Table A 5 - Independent variables: Estimation of basic health care choice

	Full sample		Sub-sample of sick	
	Mean	S.D.	Mean	S.D.
Edu: no education [a]	0.31	0.46	0.36	0.48
Edu: less than primary 1	0.42	0.49	0.43	0.49
Edu: primary 1	0.16	0.37	0.13	0.34
Edu: primary 2 or more	0.11	0.31	0.08	0.27
Female	0.51	0.50	0.57	0.50
Age: under 1	0.04	0.19	0.07	0.25
Age: 1to 4	0.12	0.33	0.18	0.38
Age: 5 to 15	0.33	0.47	0.17	0.38
Age: 16 to 45	0.38	0.49	0.37	0.48
Age: over 45	0.13	0.34	0.22	0.41
Consumption [b] ('000)	5.29	5.75	5.70	5.28
Consumption squared ('000)	61,025	633,511	60,305	261,143
No-one in HH speaks Port.	0.25	0.43	0.27	0.44
Num. HH members	6.10	2.85	5.26	2.74
Occupation and working: indiv. [c]	0.05	0.21	0.06	0.23
Occupation and working: HH [d]	0.22	0.41	0.22	0.41
Num. HH members per room	0.36	0.21	0.41	0.27
Inaccessible community [e]	0.23	0.42	0.23	0.42
Post or center in community [f]	0.37	0.48	0.37	0.48
Urban	0.20	0.40	0.19	0.39
Travel time to closest facility [g]	93	189	93	189
Travel time square	52,405	512,674	56,140	604,426
Proportion literate in district [h]	0.46	0.15	0.45	0.14
Hospital in district [i]	0.47	0.50	0.42	0.49
Severity: limitation on activities [j]	0.07	0.26	0.65	0.48
Symptom: diarrhea	0.02	0.14	0.17	0.38
Symptom: cold	0.01	0.09	0.08	0.26
Symptom: worms	0.00	0.04	0.01	0.12
Symptom: skin	0.01	0.10	0.08	0.28
Symptom: cough & vomit	0.00	0.05	0.02	0.15
Symptom: cough w. blood	0.00	0.04	0.01	0.12
Symptom: lumps	0.00	0.06	0.03	0.17
Symptom: other	0.04	0.19	0.34	0.47
Symptom: malaria	0.03	0.16	0.25	0.43

[a] *Education refers to own education (highest grade attained) for individuals over 16 years. Younger individuals are assigned the highest grade attained by any household member.*
[b] *All consumption variables constructed from data on expenditure, home production, and imputed rent from housing and durables. Consumption is deflated by a spatial price index.*
[c] *Individual reports having occupation and having worked during last month.*
[d] *Someone in household reports having occupation and having worked in last month.*
[e] *Community respondent reports that there is a lack of transport to and from community, and that roads are un-passable for part of the year*
[f] *Community respondent reports that there is a health center or health post in the community*
[g] *Travel time based on individual data…*
[h] *District level literacy rate based on 1997 census.*
[i] *Based on administrative data on location of hospitals.*

Table A 6 - Independent variables: alternative specific time prices

	Full sample		Sub-sample of sick	
	Mean	S.D.	Mean	S.D.
price: home	0	0	0	0
price: traditional practitioner	323	991	337	991
price: hospital	944	1,031	1,021	1,063
price: post	677	1,198	687	1,185
price: other	264	161	267	141
price squared: home ('000)	0	0	0	0
price squared: trad. pract. ('000)	1,086	8,185	1,095	8,133
price squared: hospital ('000)	1,955	6,153	2,173	6,067
price squared: post ('000)	1,894	9,751	1,875	10,415
price squared: other ('000)	95	298	91	143
price (home) X cons. interact. ('000)	0	0	0	0
price (trad.) X cons. interact. ('000)	2,127	10,744	2,203	7,504
price (hosp.) X cons. interact. ('000)	5,763	13,974	6,528	12,576
price (post) X cons. interact. ('000)	3,837	10,190	4,113	9,337
price (other) X cons. interact. ('000)	1,913	8,028	1,879	3,533

Note: There is very limited variation in money prices for health care in Mozambique. For the purposes of this analysis, "time price" variables were used to proxy for price. Time prices were constructed as the product of estimates of travel time and the opportunity cost of time (household per capita consumption appropriately scaled).

Table A 7 - Independent variables: Illness equation

	Full sample		Sub-sample of sick	
	Mean	S.D.	Mean	S.D.
Water source: piped	0.07	0.25	0.04	0.19
Water source: river or open srce.	0.31	0.46	0.33	0.47
Sanitation: WC	0.04	0.20	0.02	0.15
Sanitation: latrine	0.36	0.48	0.36	0.48
High district health exp.[a]	0.13	0.34	0.13	0.34
Low district health exp.	0.07	0.26	0.13	0.33
Month of interview: Jan.	0.08	0.28	0.06	0.24
Month of interview: Feb.	0.12	0.32	0.13	0.34
Month of interview: March	0.10	0.30	0.10	0.30
Month of interview: April	0.10	0.30	0.14	0.35
Month of interview: May	0.09	0.28	0.11	0.31
Month of interview: June	0.10	0.29	0.10	0.29
Month of interview: July	0.08	0.27	0.07	0.26
Month of interview: Aug.	0.03	0.18	0.02	0.14
Month of interview: Sept.	0.08	0.28	0.07	0.26
Month of interview: Oct.	0.07	0.26	0.07	0.25
Month of interview: Nov.	0.07	0.26	0.05	0.23
Month of interview: Dec.	0.07	0.26	0.07	0.26

a Districts were classified as high, middle, or low spending on the basis of regression analysis of district level spending. Standard determinants of health care expenditures--… --were included in regression. A district was considered high spending if the residual...

Table A 8 – Probit results: visit conditional on illness

	Model A		Model B		Model C	
	Coef.	***se.***	**Coef.**	***se.***	**Coef.**	***se.***
Edu: no education	-0.181	*0.072**	-0.180	*0.073**	-0.183	*0.072**
Edu: primary 1	0.299	*0.091***	0.298	*0.091***	0.287	*0.092***
Edu: primary 2 or more	0.253	*0.156*	0.250	*0.157*	0.268	*0.154*
Female	0.003	*0.055*	0.003	*0.055*	0.000	*0.055*
Age: under 1	0.606	*0.126***	0.607	*0.126***	0.606	*0.122***
Age: 1to 4	0.278	*0.106***	0.278	*0.106***	0.264	*0.102**
Age: 5 to 15	-0.080	*0.108*	-0.079	*0.109*	-0.078	*0.106*
Age: over 45	0.048	*0.075*	0.048	*0.075*	0.053	*0.075*
Consumption	**1.8E-05**	***6.5E-06****	**2.0E-05**	***1.2E-05***		
Consumption squared			**-5.4E-11**	***2.0E-10***		
Quintile 2					**0.113**	***0.111***
Quintile 3					**0.138**	***0.100***
Quintile 4					**0.288**	***0.118****
Quintile 5					**0.212**	***0.122***
No-one in HH speaks Port.	-0.170	*0.094*	-0.169	*0.094*	-0.158	*0.095*
Num. HH members	0.034	*0.012***	0.034	*0.012***	0.038	*0.013***
Occupation and working: indiv.	0.125	*0.121*	0.125	*0.121*	0.136	*0.118*
Occupation and working: HH	0.377	*0.084***	0.376	*0.084***	0.377	*0.084***
Num. HH members per room	-0.070	*0.120*	-0.073	*0.123*	-0.011	*0.120*
Inaccessible community	-0.183	*0.080**	-0.184	*0.080**	-0.184	*0.081**
Post or center in community	0.441	*0.092***	0.441	*0.092***	0.453	*0.092***
Urban	-0.404	*0.178**	-0.404	*0.178**	-0.389	*0.174**
Travel time to closest facility	-0.001	*0.000***	-0.001	*0.000***	-0.001	*0.000***
Travel time square	0.000	*0.000*	0.000	*0.000*	0.000	*0.000*
Proportion literate in district	0.708	*0.486*	0.708	*0.486*	0.693	*0.475*
Hospital in district	0.220	*0.094**	0.219	*0.094**	0.222	*0.092**
Severity: limitation on activities	0.158	*0.060***	0.159	*0.059***	0.157	*0.059***
Symptom: diarrhea	0.045	*0.113*	0.045	*0.113*	0.040	*0.109*
Symptom: cold	-0.244	*0.108**	-0.244	*0.108**	-0.246	*0.108**
Symptom: worms	-0.015	*0.218*	-0.015	*0.218*	-0.007	*0.214*
Symptom: skin	-0.044	*0.156*	-0.044	*0.156*	-0.032	*0.157*
Symptom: cough & vomit	-0.185	*0.171*	-0.185	*0.171*	-0.167	*0.170*
Symptom: cough w. blood	0.362	*0.269*	0.363	*0.269*	0.350	*0.270*
Symptom: lumps	-0.361	*0.155**	-0.360	*0.155**	-0.373	*0.159**
Symptom: other	-0.017	*0.086*	-0.017	*0.085*	-0.022	*0.085*
Constant	-0.600	*0.355*	-0.612	*0.353*	-0.704	*0.361*

Observations: 4,591
** significant at 5%; ** significant at 1%*
Provincial dummies not reported

Wald test of joint significance of consumption variables (Prob>chi2)	**0.095**	**0.185**

Table A 9 – Probit results for sub-populations: visit conditional on illness

	Not poor		Poor		Rural		Urban	
	Coef.	*se.*	Coef.	*se.*	Coef.	*se.*	Coef.	*se.*
Edu: no education	-0.340	*0.126***	-0.109	*0.090*	-0.182	*0.082**	-0.176	*0.125*
Edu: primary 1	0.198	*0.127*	0.346	*0.106***	0.361	*0.111***	0.189	*0.105*
Edu: primary 2 or more	0.176	*0.225*	0.234	*0.182*	0.337	*0.235*	0.153	*0.187*
Female	0.071	*0.098*	-0.046	*0.072*	0.037	*0.062*	-0.108	*0.092*
Age: under 1	0.832	*0.256***	0.521	*0.138***	0.547	*0.140***	1.240	*0.301***
Age: 1to 4	0.318	*0.202*	0.241	*0.104**	0.309	*0.122**	0.121	*0.169*
Age: 5 to 15	-0.088	*0.141*	-0.075	*0.131*	-0.023	*0.126*	-0.267	*0.164*
Age: over 45	0.107	*0.134*	-0.027	*0.100*	0.084	*0.087*	-0.092	*0.115*
Consumption	**1.2E-05**	***7.0E-06***	**4.3E-05**	***4.0E-05***	**2.2E-05**	***7.4E-06*****	**6.1E-06**	***7.4E-06***
No-one in HH speaks Port.	-0.140	*0.167*	-0.167	*0.108*	-0.173	*0.098*	-0.688	*0.238***
Num. HH members	0.067	*0.024***	0.033	*0.016**	0.035	*0.014**	0.036	*0.024*
Occupation and working: indiv.	0.069	*0.188*	0.189	*0.152*	0.119	*0.137*	-0.041	*0.205*
Occupation and working: HH	0.429	*0.148***	0.336	*0.106***	0.337	*0.105***	0.399	*0.124***
Num. HH members per room	-0.055	*0.171*	-0.074	*0.224*	-0.160	*0.151*	0.296	*0.170*
Inaccessible community	-0.189	*0.151*	-0.182	*0.086**				
Post or center in community	0.609	*0.132***	0.371	*0.116***				
Urban	-0.314	*0.255*	-0.420	*0.223*				
Travel time to closest facility	-0.002	*0.001***	-0.001	*0.000**	-0.001	*0.000***	-0.026	*0.007***
Travel time square	0.000	*0.000**	0.000	*0.000*	0.000	*0.000*	0.000	*0.000***
Proportion literate in district	-0.415	*0.754*	1.185	*0.594**	1.324	*0.661**	-1.551	*0.878*
Hospital in district	0.383	*0.143***	0.122	*0.093*	0.259	*0.101**	0.543	*0.371*
Severity: limitation on activities	0.094	*0.107*	0.208	*0.069***	0.161	*0.064**	0.343	*0.102***
Symptom: diarrhea	0.107	*0.162*	0.025	*0.123*	0.160	*0.119*	-0.475	*0.158***
Symptom: cold	-0.417	*0.180**	-0.137	*0.129*	-0.202	*0.115*	-0.362	*0.248*
Symptom: worms	-0.617	*0.347*	0.241	*0.244*	0.082	*0.234*	-0.597	*0.581*
Symptom: skin	-0.128	*0.183*	0.024	*0.186*	0.014	*0.179*	-0.267	*0.231*
Symptom: cough & vomit	-0.622	*0.301**	-0.033	*0.189*	-0.197	*0.193*	-0.403	*0.302*
Symptom: cough w. blood	0.873	*0.441**	0.183	*0.371*	0.304	*0.295*	0.193	*0.528*
Symptom: lumps	-0.571	*0.242**	-0.233	*0.211*	-0.408	*0.167**	-0.417	*0.320*
Symptom: other	-0.156	*0.120*	0.088	*0.094*	0.028	*0.097*	-0.267	*0.140*
Constant	-0.089	*0.541*	-0.938	*0.450**	-0.662	*0.427*	1.456	*0.493***
Observations	*1,742*		*2,849*		*3,222*		*1,369*	
** significant at 5%; ** significant at 1%*								
Provincial dummies not reported								
Chow test (Prob>chi2)								
All variables			0.007				0.000	
Education variables			0.426				0.721	
Age variables			0.707				0.038	
Access			0.037				0.000	
Consumption			0.425				0.118	

Table A 10 – Selection model: Heckprobit

	Illness reporting		Selection probit		Standard probit	
	Coef.	***se.***	**Coef.**	***se.***	**Coef.**	***se.***
Edu: no education	-0.052	*0.040*	-0.178	*0.077**	-0.181	*0.072**
Edu: primary 1	-0.070	*0.051*	0.301	*0.096***	0.299	*0.091***
Edu: primary 2 or more	-0.041	*0.057*	0.255	*0.157*	0.253	*0.156*
Female	0.144	*0.026***	-0.002	*0.075*	0.003	*0.055*
Age: under 1	0.446	*0.080***	0.590	*0.209***	0.606	*0.126***
Age: 1to 4	0.289	*0.048***	0.267	*0.153*	0.278	*0.106***
Age: 5 to 15	-0.278	*0.041***	-0.070	*0.158*	-0.080	*0.108*
Age: over 45	0.338	*0.033***	0.036	*0.155*	0.048	*0.075*
Consumption	**5.2E-07**	***2.3E-06***	**1.8E-05**	***6.5E-06*****	**1.8E-05**	***6.5E-06*****
No-one in HH speaks Port.	-0.066	*0.037*	-0.167	*0.099*	-0.170	*0.094*
Num. HH members	-0.047	*0.007***	0.036	*0.020*	0.034	*0.012***
Occupation and working: indiv.	0.043	*0.065*	0.123	*0.120*	0.125	*0.121*
Occupation and working: HH	0.060	*0.052*	0.374	*0.092*	0.377	*0.084***
Num. HH members per room	0.277	*0.076***	-0.079	*0.151*	-0.070	*0.120*
Inaccessible community	-0.027	*0.040*	-0.181	*0.088**	-0.183	*0.080**
Post or center in community	0.049	*0.048*	0.439	*0.096***	0.441	*0.092***
Urban	-0.080	*0.113*	-0.403	*0.181**	-0.404	*0.178**
Travel time to closest facility	0.000	*0.000*	-0.001	*0.000***	-0.001	*0.000***
Travel time square	0.000	*0.000***	0.000	*0.000*	0.000	*0.000*
Proportion literate in district	0.518	*0.322*	0.693	*0.531*	0.708	*0.486*
Hospital in district	-0.071	*0.041*	0.223	*0.097**	0.220	*0.094**
Severity: limitation on activities			0.158	*0.061***	0.158	*0.060***
Symptoms not reported						
Water source: piped	-0.128	*0.062**				
Water source: open	0.063	*0.037*				
Sanitation: WC	-0.117	*0.072*				
Sanitation: latrine	0.020	*0.039*				
High district health exp.	0.048	*0.067*				
Low district health exp.	0.133	*0.067**				
Month of interview: Jan.	-0.028	*0.130*				
Month of interview: Feb.	0.221	*0.128*				
Month of interview: March	0.213	*0.132*				
Month of interview: April	0.355	*0.132***				
Month of interview: May	0.294	*0.126**				
Month of interview: June	0.199	*0.127*				
Month of interview: July	0.162	*0.132*				
Month of interview: Sept.	0.142	*0.141*				
Month of interview: Oct.	0.128	*0.125*				
Month of interview: Nov.	-0.038	*0.137*				
Month of interview: Dec.	0.133	*0.136*				
Constant	-2.125	*0.248***	-0.500	*1.160*	-0.600	*0.355*
Observations	*41,302*		*41,302*		*4,591*	
Wald test of independent eq. (ρ=0) Prob>chi2			**0.925**			

** significant at 5%; ** significant at 1%*
Provincial dummies not reported

Table A 11 – Fixed and random effect logits

	Fixed effects logit		Random effects logit		Standard logit	
	Coef.	***se.***	**Coef.**	***se.***	**Coef.**	***se.***
Edu: no education	-0.159	*0.113*	-0.178	*0.102*	-0.177	*0.094*
Edu: primary 1	0.382	*0.132***	0.475	*0.124***	0.487	*0.116***
Edu: primary 2 or more	0.368	*0.177**	0.442	*0.164***	0.477	*0.153***
Female	-0.059	*0.086*	-0.044	*0.082*	-0.030	*0.077*
Age: under 1	1.501	*0.207***	1.405	*0.198***	1.272	*0.188***
Age: 1to 4	0.488	*0.131***	0.449	*0.123***	0.405	*0.115***
Age: 5 to 15	-0.210	*0.122*	-0.188	*0.115*	-0.177	*0.109*
Age: over 45	0.042	*0.117*	0.037	*0.109*	0.030	*0.103*
Consumption	2.3E-05	*9.8E-06**	-4.1E-01	*1.0E-01**	1.4E-05	*7.4E-06**
No-one in HH speaks Port.	-0.447	*0.119***	0.043	*0.016***	-0.367	*0.093***
Num. HH members	0.045	*0.018**	0.000	*0.000**	0.037	*0.014***
Occupation and working: indiv.	0.189	*0.191*	0.143	*0.184*	0.089	*0.173*
Occupation and working: HH	0.427	*0.131***	0.424	*0.113***	0.432	*0.102***
Num. HH members per room	0.101	*0.197*	0.095	*0.177*	0.091	*0.161*
Inaccessible community			-0.165	*0.123*	-0.180	*0.095*
Post or center in community			0.480	*0.131***	0.472	*0.101***
Urban			-0.375	*0.210*	-0.411	*0.161**
Travel time to closest facility			-0.001	*0.001*	-0.001	*0.001**
Travel time square			0.000	*0.000*	0.000	*0.000**
Proportion literate in district			0.475	*0.475*	0.460	*0.365*
Hospital in district			0.240	*0.122*	0.257	*0.096***
Severity: limitation on activities	0.468	*0.092***	0.405	*0.083***	0.337	*0.076***
Symptom: diarrhea	-0.232	*0.149*	-0.129	*0.135*	-0.088	*0.124*
Symptom: cold	-0.449	*0.187**	-0.354	*0.169**	-0.306	*0.155**
Symptom: worms	-0.141	*0.345*	-0.238	*0.321*	-0.242	*0.302*
Symptom: skin	-0.122	*0.173*	-0.078	*0.159*	-0.089	*0.147*
Symptom: cough & vomit	-0.408	*0.283*	-0.299	*0.264*	-0.226	*0.246*
Symptom: cough w. blood	-0.028	*0.329*	0.066	*0.312*	0.091	*0.290*
Symptom: lumps	-0.682	*0.271**	-0.567	*0.250**	-0.462	*0.232**
Symptom: other	-0.112	*0.113*	-0.143	*0.103*	-0.147	*0.095*
Constant			-0.793	*0.288***	-0.730	*0.239***

Observations: 3,583

Note: 1,008 observations dropped because all zeros or ones within groups; community level dropped in FE model because no within-group variation

** significant at 5%; ** significant at 1%*

Table A 12 – Multinomial logit model

	TMP		Hospital		Post		Other	
	Coef.	***se***	**Coef.**	***se***	**Coef.**	***se***	**Coef.**	***se***
Edu: no education	0.225	*0.246*	-0.329	*0.144**	-0.235	*0.162*	0.111	*0.339*
Edu: primary 1	-0.374	*0.329*	0.433	*0.174**	0.436	*0.192**	1.408	*0.415***
Edu: primary 2 or more	-0.203	*0.504*	0.728	*0.287**	0.193	*0.322*	0.182	*0.529*
Female	-0.191	*0.188*	0.087	*0.116*	-0.065	*0.113*	-0.135	*0.232*
Age: under 1	-0.249	*0.454*	0.991	*0.221***	0.901	*0.254***	1.236	*0.478**
Age: 1to 4	0.111	*0.327*	0.557	*0.198***	0.484	*0.196**	-0.077	*0.440*
Age: 5 to 15	-0.288	*0.298*	-0.435	*0.195**	-0.018	*0.204*	-0.837	*0.404**
Age: over 45	-0.177	*0.248*	0.299	*0.149**	-0.035	*0.159*	-0.549	*0.307*
Consumption	**3.3E-05**	***1.7E-05***	**3.3E-05**	*1.3E-05***	**3.9E-05**	*1.3E-05***	**3.7E-05**	*2.7E-05*
No-one in HH speaks Port.	0.224	*0.211*	-0.576	*0.212***	-0.138	*0.181*	0.585	*0.337*
Num. HH members	-0.008	*0.038*	0.058	*0.026**	0.044	*0.025*	0.124	*0.040***
Occupation and working: indiv.	-0.915	*0.441**	0.056	*0.283*	0.011	*0.231*	0.039	*0.580*
Occupation and working: HH	0.719	*0.412*	0.731	*0.176***	0.728	*0.205***	1.249	*0.384***
Num. HH members per room	-0.042	*0.381*	0.105	*0.248*	-0.411	*0.294*	0.582	*0.331*
Inaccessible community	0.134	*0.198*	-0.293	*0.236*	-0.290	*0.177*	-0.016	*0.475*
Post or center in community	-0.070	*0.295*	0.601	*0.218***	0.827	*0.200***	-0.184	*0.452*
Urban	-1.251	*0.593**	0.252	*0.384*	-1.477	*0.494***	0.290	*0.692*
Travel time to closest facility	0.001	*0.002*	-0.002	*0.001**	-0.001	*0.001*	0.005	*0.003*
Travel time square	-4.1E-07	*1.2E-06*	2.7E-07	*1.2E-07**	9.2E-08	*1.0E-07*	-1.0E-05	*6.2E-06*
Proportion literate in district	2.611	*1.461*	0.088	*1.043*	2.265	*1.316*	0.176	*1.646*
Hospital in district	-0.198	*0.307*	0.323	*0.232*	0.322	*0.201*	0.334	*0.389*
Severity: limitation on activities	0.595	*0.182***	0.641	*0.117***	0.224	*0.124*	-0.088	*0.303*
Symptom: diarrhea	-0.173	*0.351*	-0.366	*0.191*	0.226	*0.263*	0.183	*0.448*
Symptom: cold	-0.092	*0.417*	-0.180	*0.221*	-0.495	*0.209**	-0.432	*0.543*
Symptom: worms	-0.079	*0.533*	-0.537	*0.533*	0.180	*0.396*	-0.278	*1.277*
Symptom: skin	-0.695	*0.369*	-0.111	*0.305*	-0.113	*0.299*	-0.491	*0.600*
Symptom: cough & vomit	0.079	*0.498*	-0.497	*0.380*	-0.187	*0.335*	-0.766	*0.753*
Symptom: cough w. blood	-2.065	*1.061*	1.154	*0.519**	-0.085	*0.504*	-0.807	*1.094*
Symptom: lumps	-0.158	*0.487*	-0.595	*0.425*	-0.567	*0.286**	-2.359	*1.154**
Symptom: other	0.280	*0.234*	0.235	*0.178*	-0.055	*0.169*	-0.120	*0.383*
Constant	-4.540	*1.504***	-1.563	*0.781**	-2.729	*0.912***	-4.708	*1.265***

Observations: 4,591

** significant at 5%; ** significant at 1%*

Provincial dummies not reported

Wald test: all coefficients associated with given variable(s) are zero	
Model A	
Consumption	0.024
Model B	
Consumption	0.327
Consumption squared	0.707
Model C	
Quintile 2	0.176
Quintile 3	0.235
Quintile 4	0.027
Quintile 5	0.343
All quintiles	0.265

Table A 13 – Multinomial logit: Alternative-specific coefficents

	TMP		Hospital		Post		Other	
	Coef.	se	Coef.	se	Coef.	se	Coef.	se
Edu: no education	0.218	0.253	-0.355	0.145*	-0.265	0.160	0.060	0.343
Edu: primary 1	-0.376	0.320	0.419	0.177*	0.408	0.182*	1.319	0.414**
Edu: primary 2 or more	-0.193	0.527	0.718	0.289*	0.159	0.325	0.214	0.505
Female	-0.189	0.187	0.089	0.116	-0.065	0.116	-0.177	0.224
Age: under 1	-0.222	0.451	0.960	0.223**	0.859	0.245**	1.128	0.504*
Age: 1to 4	0.105	0.323	0.540	0.198**	0.466	0.190*	-0.162	0.442
Age: 5 to 15	-0.291	0.297	-0.437	0.194*	-0.011	0.199	-0.932	0.391*
Age: over 45	-0.196	0.241	0.304	0.149*	0.000	0.163	-0.518	0.303
Consumption	**2.8E-05**	**3.9E-05**	**2.3E-05**	**2.7E-05**	**3.6E-05**	**3.3E-05**	**-6.7E-05**	**7.5E-05**
Consumption squared	**-8.7E-11**	**5.3E-10**	**1.8E-10**	**4.6E-10**	**-1.6E-10**	**5.6E-10**	**2.4E-10**	**7.2E-10**
Price: TMP	**-5.6E-05**	**2.7E-04**	**1.2E-04**	**4.4E-05****	**-7.0E-06**	**7.7E-05**	**8.4E-05**	**1.3E-04**
Price: Hospital	**-6.1E-05**	**6.2E-05**	**-3.6E-04**	**2.1E-04**	**-6.0E-05**	**7.2E-05**	**-2.3E-04**	**1.8E-04**
Price: Post	**7.4E-05**	**5.2E-05**	**-3.1E-04**	**1.5E-04***	**-3.7E-04**	**1.2E-04****	**-1.7E-04**	**8.4E-05***
Price: Other	**-5.7E-04**	**1.1E-03**	**1.9E-03**	**6.7E-04****	**1.6E-03**	**6.8E-04***	**1.9E-03**	**2.1E-03**
Own price squared	**9.3E-10**	**2.7E-08**	**6.6E-08**	**2.9E-08***	**2.3E-08**	**9.0E-09***	**-4.5E-07**	**1.6E-06**
Own price-cons. interaction	**1.6E-08**	**1.5E-08**	**-7.8E-09**	**9.8E-09**	**2.5E-09**	**1.1E-08**	**1.1E-07**	**7.4E-08**
No-one in HH speaks Port.	0.278	0.217	-0.582	0.209**	-0.167	0.180	0.464	0.341
Num. HH members	-0.008	0.039	0.052	0.026*	0.046	0.026	0.097	0.042*
Occupation and working: indiv.	-0.888	0.440*	0.076	0.280	0.000	0.230	0.035	0.580
Occupation and working: HH	0.749	0.413	0.712	0.175**	0.685	0.202**	1.207	0.383**
Num. HH members per room	-0.047	0.381	0.145	0.250	-0.370	0.302	0.667	0.369
Inaccessible community	0.151	0.193	-0.422	0.241	-0.366	0.190	-0.055	0.467
Urban	-1.525	0.516**	0.562	0.376	-0.798	0.435	-0.035	0.540
Proportion literate in district	2.675	1.477	0.604	1.169	2.338	1.254	0.403	1.644
Severity: limitation on activities	0.594	0.181**	0.657	0.113**	0.250	0.120*	-0.058	0.288
Symptom: diarrhea	-0.128	0.357	-0.382	0.192*	0.178	0.250	0.168	0.464
Symptom: cold	-0.070	0.416	-0.232	0.228	-0.559	0.207**	-0.535	0.553
Symptom: worms	-0.065	0.531	-0.469	0.510	0.158	0.384	0.075	1.201
Symptom: skin	-0.661	0.364	-0.120	0.309	-0.137	0.300	-0.357	0.634
Symptom: cough & vomit	0.090	0.512	-0.590	0.390	-0.265	0.329	-0.628	0.725
Symptom: cough w. blood	-1.974	1.059	0.959	0.503	-0.215	0.513	-0.741	1.066
Symptom: lumps	-0.120	0.481	-0.762	0.434	-0.705	0.290*	-2.462	1.139*
Symptom: other	0.297	0.241	0.236	0.184	-0.062	0.161	-0.104	0.372
Constant	-4.312	1.499**	-1.886	0.827*	-2.811	0.870**	-4.544	1.329**

Observations: 4,591
** significant at 5%; ** significant at 1%*
Provincial dummies not reported

Tests	
All price-related coeff. equal zero (P>chi2)	0.0010
All cross-price coeff. equal zero (P>chi2)	0.0004
Coeff. on own price equal across alt. (P>chi2)	0.0030
Coeff. on own price squared = -2 * coeff. on price-cons. interact. (P>chi2)	0.3682

Table A 14 – Predicted probabilities with confidence intervals for different specifications

	Home		TMP		Hospital		Post		Other	
	Prob.	***CI***	**Prob.**	***CI***	**Prob.**	***CI***	**Prob.**	***CI***	**Prob.**	***CI***
Consumption enters as continuous variable										
Q1	**0.49**	*(0.43, 0.55)*	**0.05**	*(0.04, 0.06)*	**0.13**	*(0.11, 0.14)*	**0.31**	*(0.27, 0.35)*	**0.03**	*(0.02, 0.03)*
Q2	**0.48**	*(0.42, 0.54)*	**0.05**	*(0.04, 0.06)*	**0.13**	*(0.11, 0.15)*	**0.31**	*(0.28, 0.35)*	**0.03**	*(0.02, 0.03)*
Q3	**0.47**	*(0.42, 0.54)*	**0.05**	*(0.04, 0.06)*	**0.13**	*(0.12, 0.15)*	**0.32**	*(0.28, 0.36)*	**0.03**	*(0.02, 0.03)*
Q4	**0.46**	*(0.40, 0.53)*	**0.05**	*(0.04, 0.06)*	**0.13**	*(0.12, 0.15)*	**0.32**	*(0.28, 0.37)*	**0.03**	*(0.02, 0.03)*
Q5	**0.43**	*(0.37, 0.50)*	**0.05**	*(0.05, 0.06)*	**0.14**	*(0.12, 0.17)*	**0.34**	*(0.29, 0.40)*	**0.03**	*(0.02, 0.03)*
Quintile dummies										
Q1	**0.51**	*(0.43, 0.58)*	**0.06**	*(0.05, 0.07)*	**0.13**	*(0.11, 0.15)*	**0.27**	*(0.23, 0.31)*	**0.04**	*(0.03, 0.04)*
Q2	**0.48**	*(0.40, 0.56)*	**0.04**	*(0.04, 0.05)*	**0.13**	*(0.11, 0.16)*	**0.32**	*(0.26, 0.37)*	**0.03**	*(0.02, 0.03)*
Q3	**0.48**	*(0.41, 0.55)*	**0.04**	*(0.04, 0.05)*	**0.12**	*(0.10, 0.14)*	**0.34**	*(0.29, 0.39)*	**0.02**	*(0.02, 0.03)*
Q4	**0.42**	*(0.34, 0.51)*	**0.04**	*(0.04, 0.05)*	**0.15**	*(0.12, 0.18)*	**0.37**	*(0.30, 0.44)*	**0.02**	*(0.01, 0.02)*
Q5	**0.45**	*(0.36, 0.54)*	**0.06**	*(0.05, 0.07)*	**0.14**	*(0.11, 0.17)*	**0.33**	*(0.27, 0.40)*	**0.03**	*(0.02, 0.03)*

Note: Predicted probabilities were calculated for a "representative" individual. All variables except the income related variable were kept at their means. Estimates are based on a simple MNLM, without alternative-specific prices.

Table A 15 – Change in predicted probabilities at means for changes in determinants

	Home	TMP	Hospital	Post	Other
Education					
No education	0.45	0.08	0.17	0.29	0.02
< Primary 1	0.40	0.05	0.20	0.33	0.01
Primary 1	0.30	0.03	0.23	0.40	0.04
Primary 2 or more	0.29	0.03	0.32	0.34	0.01
Command of Portuguese					
No one speak Port	0.37	0.05	0.24	0.33	0.01
Someone speak Port.	0.44	0.07	0.14	0.32	0.03
Health post or center in village					
No PSCS	0.45	0.06	0.19	0.27	0.02
PSCS	0.33	0.05	0.22	0.40	0.01
Hospital in district					
No hospital	0.43	0.07	0.18	0.30	0.01
Hospital	0.35	0.04	0.24	0.35	0.02
Travel time					
15	0.36	0.05	0.22	0.34	0.02
45	0.38	0.05	0.21	0.33	0.02
75	0.39	0.06	0.21	0.33	0.03
105	0.40	0.06	0.20	0.32	0.03
135	0.41	0.06	0.19	0.31	0.03
165	0.42	0.06	0.18	0.30	0.03
195	0.43	0.07	0.18	0.29	0.03
225	0.44	0.07	0.17	0.29	0.03

Note: Predicted probabilities were calculated for a "representative" individual. All variables except the income related variable were kept at their means.

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