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HEALTH CARE UTILIZATION IN RURAL SENEGAL: THE FACTS BEFORE THE EXTENSION OF HEALTH INSURANCE TO FARMERS

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HEALTH CARE UTILIZATION IN RURAL SENEGAL: THE FACTS BEFORE THE EXTENSION OF HEALTH INSURANCE TO FARMERS[1]

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ABSTRACT

The aim of our study is to analyze the determinants of the use of curative care from qualified workers in an area of Senegal where 94% of the population do not have health insurance coverage. We collected information on 505 households and 18 health posts in order to better understand the determinants of health care utilization before the project implementation. Our method takes into account that the demand for treatment is not determined by the individual alone and controls for the unobserved effects at the household and community level that affect health-seeking behaviour. While most studies focus on characteristics of the demand for treatment, we also examine characteristics of the closest facility to analyze the impact of accessibility, price and quality of medical services on health-seeking behaviour. To analyze the impact of economic status, we include the cost of time of health inputs to take into account that the better off have a higher opportunity cost of time. We find that household economic status, price and quality of care are important determinants of the likelihood of seeking treatment from a qualified provider. The socio-economic inequalities in the use of curative care suggest the importance of expanding health insurance coverage to low and middle-income households.

INTRODUCTION

In Senegal, households directly contribute up to 37.6% of the total health financing. 89% of households' health expenditures are out-of-pocket-spending while 11% are health insurance contributions (Ministry of Health, 2005). Only 15.2% of the Senegalese population has health insurance, most of whom are private workers, civil servants or recipients of community-based health insurance (Government of Senegal, 2008). A lack of health financial protection for the poorest individuals can negatively affect their access to health care and therefore increase health inequalities. High Out-Of-Pocket Spending (OOPS) can lead to poverty as many households in Senegal resort to the sale of assets and borrowing to finance their health care. As some of the most vulnerable people in developing countries live in rural areas and depend on agriculture, the Government of Senegal voted in August 2008 to adopt the National Agro-sylvo-pastoral Health Insurance Law in order to protect every person making a living from agriculture from health catastrophic risk in Senegal (Government of Senegal, 2007).

The purpose of this paper is to analyze the determinants of the utilization of curative care in the pilot area where health insurance will be extended to subsistence farmers.

1. Is there a financial barrier to health care in rural Senegal? We will focus on the effect of socio-

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economic factors on health care utilization after controlling for the opportunity cost of time.

2. What are the effects of the context? We will look at the impact of community and households' characteristics on health care utilization.

Several studies have analyzed the effect of observed characteristics on the utilization of health care in Senegal (Fassin et al. 1988, Jütting 2004, Ndiaye et al. 2005). Franckel and Lalou (2009) have shown that the health process for childhood malaria is a collective process that involves several relatives which highlights a similarity of health-seeking behaviours among the members of the same household. In addition, because medical density is low in rural areas, Franckel and Lalou (2008) found that the village context is an important determinant of health-seeking behaviour in Senegal. Sepehri et al. (2008) show that failing to take into account this homogeneity of behaviour among a household's members can led to biased results and consequently to ineffective health policies. The contribution of our paper to the existing literature is to analyze the utilization of care by controlling for both observed and unobserved characteristics of household and community.

The paper is structured as follows: The next section gives information on data, section 3 presents the literature review of the determinants of health-seeking behaviour, and section 4 gives some descriptive statistics on health care access and out-of-pocket medical expenses. Section 5 describes the models used to estimate the determinants of the likelihood of visiting a qualified health provider during last illness. Finally, the paper presents and discusses results.

POPULATION AND DATA

Senegal is a West African country with a population of approximately 12 million people with 7 million people living in rural areas. It is divided into 14 administrative regions. Our study was conducted in Ross Bethio, Gaë and Guédé, three rural communities in the Saint-Louis region located in Walo and Fouta Toro. These regions are well-watered and fertile ecological zones situated on the banks of the Senegal River. The Walo is characterized by higher seasonal volatility and fluvial agriculture allowing rice culture, while Fouta is a semi-desert region characterized by tomato and onion crops. Most of the 110,000 inhabitants of these rural communities derive their livelihoods from subsistence farming, with an annual adult equivalent[2] median household consumption expenditure of 354,013 FCFA (745 USD)[3] of which on average 2.35% is spent on health.

We carried out a household survey and a survey of health facilities during May and June 2009. The household survey targeted rural households who live on agriculture and belong to a Farmer Organization. To sample households, we used a two-stage stratified sampling procedure where each household has the same probability of inclusion in the sample. First our 93 clusters that are Farmers' Organizations were randomly selected, with a probability of being included directly proportional to their size. In the second stage, a fixed number of households was randomly selected from each chosen Farmers' Organization. We calculated the sample-size requirement in the framework of the impact study of the agro-sylvo-pastoral insurance scheme following the methodology described in Duflo et al. (2008) to determine the Minimum Detectable size Effect (MDE).[4] The study covers 505 households; this sample size is big enough to measure the impacts of the project on

[2] As households differ in size and demographic composition, we use equivalence scales to make comparable consumption indicators. The cost of a child relative to that of an adult was fixed at 0.3 while the economies of scale was set at 0.9 following recommendations from Deaton and Zaidi (2002).

[3] At the time of the survey, 1USD was equivalent to FCFA 475.

[4] If we make the assumption on the minimum impact that the experiment has a good chance to detect (MDE), the formula given by the MDE can define the minimum sample size required to achieve a given power under a certain level of significance. Thus the sample size was calculated for a given probability of a type I error of 5%, i.e. the probability to conclude that the effect of the project is nil while the project had an effect.

Table 1: Percentage of consultation in the closest health post during last visit in a Health Post5 (HP)

Closest HP \ HP visited	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	83	0	0	0	17	0	0	0	0	0	0	0	0	0	0
C	0	0	96	0	0	4	0	0	0	0	0	0	0	0	0	0
D	0	0	0	88	0	0	0	0	0	2	0	0	4	6	0	0
E	0	0	0	3	95	0	0	0	0	0	0	1	1	0	0	0
F	0	8	0	0	0	92	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	2	0	95	0	0	3	0	0	0	0	0	0
H	0	0	0	0	0	0	1	96	0	3	0	0	0	0	0	0
I	0	0	0	0	4	0	3	0	82	0	11	0	0	0	0	0
J	0	0	0	0	0	0	4	0	0	96	0	0	0	0	0	0
K	0	0	0	0	0	0	1	0	0	0	99	0	0	0	0	0
L	0	0	0	0	0	0	0	0	0	0	0	92	8	0	0	0
M	0	1	0	0	0	1	0	0	0	0	0	2	94	0	2	0
N	0	0	0	0	2	0	0	0	0	0	0	0	11	87	0	0
O	0	0	0	3	0	0	0	0	0	0	0	0	3	0	94	0
P	2	0	0	0	0	0	0	0	0	0	0	1	3	0	0	94
% sample	0.3	6.6	0.9	1.7	6.4	8.6	25.7	4.3	3	21.9	7.6	1	4.5	1.8	1.3	4.2

several outcomes. We also collected information on public facilities in the area in order to link demand-side and supply-side factors. An exhaustive survey has been conducted of the public health facilities of the rural communities targeted.

CONCEPTUAL BACKGROUND

CHARACTERISTICS OF MEDICAL SERVICES

In Senegal, the low quality of care and the lack of control in the health system lead people to bypass the preliminary level (health post) and to consult directly with a higher-level provider (health centre or hospital). Nevertheless, the high cost and distance associated with consulting high-level providers explain why 72.5% of the sample went to the health post the last time they visited a health facility compared to only 9% who went to the health centre and 8.5% to the hospital. We use the closest health post to the household to obtain information on health care offered since people tend to visit the closest health post as shown in Table 1 (following page).

Table 1 indicates that among the people whose closest facility is health post A, 100% went to this facility the last time they visited a health post whereas among those whose closest facility is health post B, 83% went to this facility and 17% visited health post F. Thus, health posts in rural area can be considered non-competitive firms because of the low public medical density and the absence of a private sector.

We suspect that the likelihood of seeking treatment depends on the availability and the price and quality of medical services in the closest health post. The availability of a health facility is an important determinant of health care access (Ahmed et al. 2009, Buchmueller et al. 2004). The average distance to the closest health post is only 4 kilometres. However, we find that hospitals and health centres were not geographically accessible in a majority of villages; on

[5] A=Diama Yalar, B=Savoigne, C=Gnith, D=Podor, E=Guia, F=Ross Bethio, G=Gae, H=Mbilor, I=Guidakhar, J=Bokhol, K=Guege Chantier, L=Guede Village, M=Donaye, N=Diambo, O=Ndiawara, P=Mboyo

average the closest high-level provider is located 20 km away from the village of the household. Senegal respects the regulation of the World Health Organization (WHO) concerning the number of health posts available for the population, but the country would need to increase by a factor of three the number of health centres and the number of hospitals in order to reach the WHO regulation.[6]

As a result, most of the people surveyed have to spend extra money and time if they want to be treated in a high-level facility. Because of the geography of the area, especially in the rural community of Guédé where the Morphil Island is locked in the Senegal River, the distance in kilometres does not give a good approximation of the effort that

a household has to make to seek treatment from a health post. For this reason, we prefer to use the average cost paid by the individuals in the village to go to this facility.

The price of health inputs has been studied widely in the literature because of its policy implications. Some argue that demand for treatment is inelastic to price (Akin et al. 1998) while others argue that user fees discourage the demand for medical care; several studies have shown that the introduction of user fees reduces the utilization of health care (Litvack et al. 1993, Ngugi 1999, Xu et al. 2006). Based on this literature, the effect of the price of health care on the demand is then undetermined and depends considerably on the context. Price and quality are correlated as an increase in price can be offset by quality improvements (Audibert and Mathonnat 2000). Our price index is computed from the mean of three standardized variables: the price of outpatient care per adult,[7] the price of outpatient care per child and the price of inpatient care. We faced a problem concerning the measure of inpatient care since the ratemaking varies between health posts. Some facilities set a fee per day, while others a capitation and some health posts offer free inpatient care. To enable comparison, we use the median length of stay[8] for inpatient care during most recent sickness to calculate price in each facility.

There is no consensus on how to measure quality, but poor quality of care in developing countries is indicated by several factors. First, the scarcity of qualified health workers is explained by difficulties faced by the Ministry of Health in recruiting and retaining qualified health workers in rural areas. In Senegal, the problem of geographical distribution could be improved by better financial and non-financial incentives for health staff working in areas ranked as arduous (Zurn et al., 2010). Misdiagnosis is also common and treatment effectiveness depends on the availability of drugs in the facility. We measure the quality of care by the status of the head nurse of the closest health post. The difference in wages and advantages between civil and contract staff can explain the lack of motivation of the latter. The use of a qualitative variable rather than a quantitative variable to measure quality seems more appropriate. For instance, the number of medical workers depends on other factors such as the attendance and localization of the health post and thus might not be a good proxy for the quality. We have noticed that when the head nurse is on contract, it can affect the management of the facility. This is mainly explained by the fact that in Senegal health committees make decisions concerning the price and activities of the facility. Health committees are made up of the head nurse of the health post, the doctor of the medical district and are generally presided by a local personality of the village. Thus, as decisions are made locally, it is common to observe an important

[6] WHO, Statistical information system

[7] The price of the ticket of consultation for adults is 200 FCFA for 95% of the health posts and 300 FCFA for 5% and the price of ticket for children is 100 FCFA for 87% and 200 FCFA for 13% of the health posts of the sample.

[8] The median length of stay is five days.

variability in price and quality between the different health posts surveyed. The difference in price between health posts can be attributed to the head nurse's perception of the users' ability to pay. The price level affects the quality of care through the revenues generated by the facility; low user fees are associated with a poor quality of care. Both elements can be explained by the education and incentives of the head nurse.

COST AND TIME

In the Grossman model (Grossman 1972a), individuals combine inputs of time and purchased medical care to produce health investments that increase utility. In the investment model, Grossman found a positive impact of wage rate on the reduced form of the demand for medical care. There is a large body of literature on the effect of wealth on health care utilization. Household economic status is measured by assets owned by the household[9] where the weights used to construct the indicator are derived from the first dimension of Principal Component Analysis (PCA). We do so because a measure of permanent income is less likely to be endogenous, and we have more observations on and greater reliability of asset data compared to data on income and expenditures. In the literature, several studies have found that income positively affects the likelihood of seeking treatment (Sepehri 2008, Lawson 2005). The opportunity cost with respect to time can also determine the willingness to seek treatment. Its effect can thus attenuate the positive effect of income on health care utilization if we consider that the better off have a higher opportunity cost of time. The opportunity cost of time is hard to measure but is related to the wage of the individual. As we do not know the hourly wage of a subsistence farmer, we measure the opportunity cost by whether or not the individual works on the household fields. We assume that people working in their own fields will have fewer opportunities to seek treatment compared to non-workers and those working in the formal sector who are on the sick list. To take into account that there is a time price of health input and that the time price is higher among the richest quintile, we add a multiplicative variable between the employment status and the wealth quintile.

THE ROLE OF EDUCATION

Education and cultural factors may affect people's recognition and perception of illness and consequently the potential benefit of visiting a qualified health provider (Grossman 1972, Hjortsberg 2003). Cultural factors play an important role in Western Africa because beliefs can affect conception, nosology and thus treatment of the disease. For example, some beliefs and cultural aspects can prevent individuals from receiving treatment. Coppo et al. (1992) find that in Mali schistomiasis is rarely treated as the prevalence is very high, so the population considers symptoms to be normal. Education can affect health-seeking behaviour through three main channels. Grossman argued that education increases efficiency in health production and thus reduces the price of health investment. Moreover, the returns on health are likely to be higher for the more educated. Second, educated people are more informed and will be more likely to link symptoms with the presence of a disease, which will affect the perception of the disease and of its degree of severity. Nevertheless, the direction of the relationship between education and the demand for health from qualified workers is unknown; people with low education can underestimate or overestimate the severity of their symptoms. Finally, we find that the demand

for traditional medicine decreases with education as 2.23% visited a traditional healer among those who have no diploma, 1.95% among those with a first certificate, 1.56% for those having a secondary certificate and 0% for those who have the

[9] We include the presence of a fridge, air conditioner, fan, radio, television and vehicle in the household and the plot size.

baccalaureate. Education is measured by the number of years of education for adults (>16 years old); for relatives under 16 years old, we use the number of years of education of their mother, or the number of years of education of the household head if the mother does not live in the household.

THE COLLECTIVE MANAGEMENT OF THE DEMAND FOR HEALTH CARE IN RURAL SENEGAL

The model of demand for health developed by Grossman put the individual as the sole decision maker. In Senegal, as in most African societies, the decision of an individual member of a household to visit a health provider is not made by the individual alone.

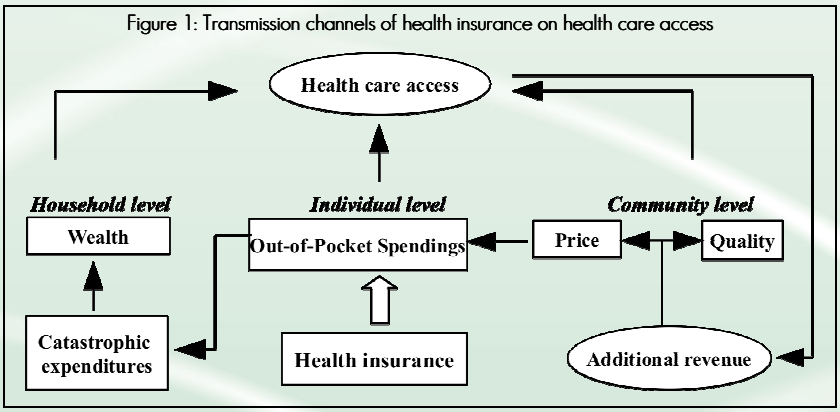


Figure 1: Transmission channels of health insurance on health care access

The head of the household plays an important role in the demand of health care of other family members. In our study, we find that among married women, 45% declare that her spouse makes decisions alone concerning her health and 29% make decisions together; only 16% do not need the husband's permission to seek health care. The same conclusion appears to be true for children as 49% of women declare that it is the sole responsibility of her spouse to decide if a child needs treatment. It appears that in Senegal, adult men take responsibility for the health of their relatives. To test that the head of the household plays an important role in the health-seeking behaviour of household members, we introduce in our model several variables measuring the impact of the characteristics of the head of household on the likelihood of seeking care. We do not exclude that household members are also prioritized in the allocation of medical services.

In rural Burkina, households were found to allocate significantly fewer resources to the health care of sick children compared to sick adults (Sauerborn et al. 2004). For this reason, we add the relationship of each member to the head of household as a control variable. Gender differences in health care access have been found in several studies (Chen et al. 1981, Nanda 2002).

Being a woman can be positively or negatively correlated with the utilization of medical services. A positive effect is commonly explained by the fact that women put more priority on health than men. A negative effect is often associated with gender inequalities against women. The gender of the individual allows controlling for gender inequality in our estimates.

seek care as the uninsured, while membership in a voluntary scheme increases access by 32%.

Table 2: Percentage of visit by type of provider and wealth quintile during last illness

Wealth quintile	Qualified worker	Community staff	Pharmacist	Traditional Healer	Other	Self-treatment	No care	Visit someone[10]
1=Poorest	79.14	1.47	0.34	2.71	0.56	9.7	6.09	84.22
2	78.32	1.00	0.11	2.32	0.00	14.16	4.09	81.75
3	81.66	1.80	0.22	2.59	0.34	5.96	7.42	86.61
4	84.09	1.33	0.33	1.33	0.33	6.63	5.97	87.41
5	86.78	0.00	0.90	1.81	0.34	5.88	4.29	89.83
Total	81.99	1.12	0.38	2.15	0.31	8.48	5.57	85.95

We add the insurance status of the individual to see if the insured are more likely to use medical services. 6% have health insurance of which 82% have a compulsory insurance in our sample (See Figure 1).

Table 3. Summary statistics of health care utilization and out-of-pocket medical expenses at the individual level the last time the individual visited a health provider

Indicators	Obs.	Mean	SD
Percentage that was cured after the first visit	3911	90	0.3
Percentage that had a second visit	4256	5	0.22
Percentage that was cured after the second visit	205	55	0.48
Average transport cost for the first visit (FCFA)	3827	318	1,448
Average consultation cost for the first visit (FCFA)	3942	345	982
Average X-ray cost for the first visit (FCFA)	155	7,335	8,076
Average lab test cost for the first visit (FCFA)	312	4,820	9,448
Average inpatient care cost for the first visit (FCFA)	142	23,568	68,192
Average drug cost for the first visit (FCFA)	3470	5,752	14,905
Average health expenditure[11] for the first visit (FCFA)	3147	7,428	24,927
Average health expenditure for the second visit (FCFA)	134	18,117	61,040
Average total health expenditure (FCFA)	3147	8,082	30,236

THE TRANSMISSION CHANNELS OF HEALTH INSURANCE TO HEALTH CARE ACCESS

Finally, health insurance has been found to have a positive impact on the likelihood of seeking treatment. J. Jütting (2004) finds that in Senegal, community-based insurance increases the utilization of inpatient care by 2 percentage points. A. Sepehri et al. find that compulsory health insurance enrolees are twice as likely to

With respect to the literature review, health insurance can affect health care access through several transmission channels. On the demand side, health insurance can lower the financial barrier to healthcare access through the reduction of out-of-pocket-spending (Jowett et al. 2003). Ceteris paribus, the reduction in out-of-pocket-spending will decrease the likelihood of catastrophic expenditures and consequently will prevent vulnerable households from being impoverished (Yardim et al. 2010). The indirect

[10] It includes a visit to a qualified worker, community staff, a pharmacist, a traditional healer and another provider.

[11] Health expenditure includes the cost of transport, consultation, X-ray, lab test, inpatient care and drugs. The observation is excluded from the sample if at least one information is missing.

effect of insurance will be to increase health care access through its effect on the wealth of the household. On the supply side, the increase in demand for medical care could generate additional revenues for health facilities and thus could affect health care access through the improvement of the quality of care (Diop et al. 2000, Eklund and Stavum 1996).

DESCRIPTIVE STATISTICS

During their most recent sickness, we find that 82% of the total sample had sought treatment and 84% of patients who considered their illness severe did so. The percentage of visits to a qualified worker increases with wealth as shown in Table 2 (above).

The difference in the percentage of visits to a traditional healer and pharmacist between quintile 4 and quintile 5 could be explained by a higher opportunity cost of time among the richest, who prefer visiting those providers in order to avoid waiting.

By controlling for the cost of time in the multivariate analysis, we assume that the likelihood of seeking care will be higher for the richest quintile.

We can note that people who sought care are very likely to be cured as shown in Table 3 (below). Among the 5 percent of those who had a second visit to a health provider, 55 percent were cured after the second visit. The average total medical expense during last illness is 17 USD and the median health expenditure was 5 USD suggesting that health expenditures are highly skewed. When uninsured people face severe disease or injury, they have to finance their care through informal strategies.

Table 4 shows that the instrument used by households to finance their health care varies depending on the amount of health expenditures during last sickness. The higher the health expenditure, the riskier the strategy of financing. People are more likely to finance their health care with savings and the sale of agricultural output. Although financing health through savings is not risky, the price of the agricultural output is lower when people need to sell in a hurry. The least efficient strategy of health financing is the sale of assets and particularly the sale of non-agricultural assets, which includes equipments and vehicles, while the sale of agricultural assets corresponds mainly to the sale of livestock. When people have high out-of-pocket health expenditures, those who have a family member abroad can benefit from remittances; some will receive donations, but the majority will borrow money from their relatives. People who have health insurance have the lowest health out-of-pocket payments.

Table 4. Out-of-pocket spending[12] during last sickness according to the main financing strategy

Main strategy used to pay for out-of-pocket medical spending during last illness	Percentage using this instrument	Average of Out-of-Pocket (FCFA)
Health insurance	3.5	5,258
Savings	52	6,006
Sales of agricultural output	26.5	7,164
Loan from relatives	5.9	11,828
Sale of agricultural asset (livestock)	0.4	11,881
Sale of non-agricultural asset (equipment, vehicle)	2.6	25,992

METHOD

We estimate two models where the binary dependent variable of health care access is measured by a visit

[12] Out-of-Pocket payments include all categories of health-related expenses paid directly by the household at the time the household receives the health services. Expenditure on health-related transportation is excluded as well as reimbursement received from social or private health insurance schemes. (Xu et al. 2003)

Table 5: Reasons did not seek treatment from a qualified worker

Why did you refuse to seek care from a qualified worker?	Percent
I prefer self-treatment	39.01
Too expensive	27.44
Disease not severe	18.18
Facility is too far	8.10
Bad quality of care	3.14
Negligence	1.82
I prefer traditional medicine	1.16
Other	0.83
Total	100.00

to a qualified health worker[13] during an individual's last illness. We only focus on visits to a qualified worker because firstly, we linked data on individuals and households with data on qualified health workers, so it does not make sense to include untrained workers in our dependent variable. Secondly, we only consider modern medicine because care from non-qualified providers will not be part of the benefit package of the Agro-sylvo-pastoral Health Insurance Program.

First we asked each member of the household: "What provider did you visit the last time you were sick?" This allows us to gain information on health-seeking behaviour for all the household's members and not only for those who experienced a sickness during the last 30 days as was commonly done in most earlier surveys. One potential bias could occur if some individuals with particular symptoms would consider it to be a sickness and some would not. Another potential bias in the study may occur if people consider that some diseases can be cured more effectively by a non-qualified worker. As we do not have information on the symptoms and the type of disease among those who did not receive care from a qualified worker, we do not correct for these potential biases. For those who replied that they did not seek care from a qualified worker, we asked for the main reason as reported in Table 5 (following page).

Andersen (1995) identified need as a prime determinant of services' use. Perceived need is influenced by the social context and refers to how people experience their symptoms, illness and whether or not they consider their problems severe enough to visit a health provider. In our sample, among the 18% who did not seek treatment, 18.18% did not perceive need as they declare that their disease was not severe enough to seek treatment. We cannot assume that those people did not want to seek treatment, as we do not know what their decision would have been if they did consider the disease to be severe enough to seek treatment. For this reason, we created the variable Severity (S_{ijk}) that takes the value of 0 for those people and 1 for the rest of the sample. As we consider that there is a selection bias, we exclude those people from the estimates.[14]

We do not control for the health status of the individual as we consider that once an individual judges that his disease is severe enough to warrant consultation, his health status has no further effect on the probability to visit a qualified health worker. An initial model uses a simple qualitative model among the people that declare that the disease was severe enough to consider whether or not to visit a qualified worker or not. Suppose that the probability of visiting a qualified worker for the last disease of individual *i* in

[13] We include visits to a qualified health worker in health posts, health centres, public and private hospitals.

[14] Since it represents less than 3% of the sample, we do not find any significant change in our results when including those people in the estimates (Appendix 1) but because we do not have any instrument we cannot apply a Heckman two-step procedure.

the household *j* living in the community *k* (V_{ijk}) depends on:

(1):

$$\text{Logit } \{Pr(V_{ijk}=1|X_{ijk})\} = \beta_1 + \beta_2 x_{2ijk} + \ldots + \beta_n x_{nk} \quad \text{if } S_{ijk}=1$$

where β_1 is the intercept and $\{\beta_2,\ldots,\beta_n\}$ is a vector of coefficients of the set of observed variables X_{ijk} at the individual, household and community level. These control variables are described in Table 6 (following page).

There are two reasons to suggest that the coefficients estimated by the ordinary Logit will be biased. First, we assume that in Senegal the head of the household

has a powerful role in decision-making inside the household and individuals who belong to the same household share the same unobserved characteristics, thus we suspect a high degree of homogeneity in health-seeking behaviour among individuals of the same household and community. Second, we joined information on households and on health care suppliers by the closest facility to the village where the household is located and we included characteristics of the closest facility as control variables.

Thus we presuppose that the likelihood of seeking treatment for one member is correlated with the likelihood of seeking treatment for the other members of the same household and the same community. To correct for unobserved heterogeneity, we use a three-level model.[15] The structure of our data is hierarchical in the sense that it describes individuals who belong to larger units. Individuals are nested in households and households are nested in villages. The multilevel model used is a three-level random-intercept logistic model. It is a simple Generalized Linear Mixed Model with fixed effects and random intercepts; this model is described in Rabe-Hesketh and Skrondal 2005 (Appendix 2).

(2):

$$\text{Logit } \{Pr(V_{ijk}=1|X_{ijk}, \zeta_{jk}^{(2)}, \zeta_k^{(3)})\} = \beta_1 + \beta_2 x_{2ijk} + \ldots + \beta_n x_{nk} + \zeta_{jk}^{(2)} + \zeta_k^{(3)} \quad \text{if } S_{ijk}=1$$

where $\zeta_{jk}^{(2)}$ and $\zeta_k^{(3)}$ are random-effects terms for level 2 (household) and level 3 (village). The random-effects term represents the combined effect of all omitted household-level and village-level unobserved heterogeneity that affects the health-seeking behaviour of individuals in some households and villages. The random-intercepts thus represent unobserved heterogeneity in the overall response. Rabe-Hesketh and Skrondal (2006) have shown that coefficients of the hierarchical model could be biased without correcting for sampling weight if the probability of inclusion of individuals differs inside the sample. However since we have a nearly equal probability of selection design, we do not apply sample weights in our estimates. We present robust results in Table 7.

[15] To determine the level of hierarchy, we conduct a Likelihood Ratio (LR) test for a nested model. We test the null hypothesis H_0: ζ_k = 0. We find LR-Chi2(1)=19.95 with Pr>chi2=0.000. The null hypothesis has a very small p-value, so we reject H_0 and use a three-level random intercept model.

between-village residual variance. So there is an important dependence in response for the individual from the same household.

Variable	Description	Obs.	Mean	SD	Min	Max
Individual level						
Visit if severity=1	Individual i sought treatment when last disease was perceived as severe	4360	0.84	0.37	0	1
Household Head (HH)	i is the Household Head (HH)	4513	0.11	0.31	0	1
Wife	i is the wife of the HH	4513	0.12	0.32	0	1
Child	i is the child of the HH	4513	0.47	0.5	0	1
Parent	i is a parent of the HH	4513	0.03	0.16	0	1
Other relative	i is another member	4513	0.27	0.44	0	1
Age	Age of i	4513	23	19	0	98
Age-squared	Age-squared of i	4513	877	1300	0	9604
Gender	i is a female	4513	0.51	0.45	0	1
Insurance	i has health insurance	4312	0.06	0.23	0	1
Education	Years of education of i	4454	2.31	3.5	0	14
Labour	i works on the fields of the Household (H)	4484	0.28	0.45	0	1
Labour*wealth1	i works on the fields of H and belong to Q1	4484	0.07	0.25	0	1
Labour*wealth2	i works on the fields of H and belong to Q2	4484	0.06	0.24	0	1
Labour*wealth3	i works on the fields of H and belong to Q3	4484	0.06	0.23	0	1
Labour*wealth4	i works on the fields of H and belong to Q4	4484	0.06	0.23	0	1
Labour*wealth5	i works on the fields of H and belong to Q5	4484	0.06	0.22	0	1
Household level						
Education HH	Years of education of the HH	500	2.29	3.82	0	14
Wealth quintile 1	H is in the wealth quintile 1	505	0.23	0.41	0	1
Wealth quintile 2	H is in the wealth quintile 2	505	0.22	0.41	0	1
Wealth quintile 3	H is in the wealth quintile 3	505	0.20	0.4	0	1
Wealth quintile 4	H is in the wealth quintile 4	505	0.19	0.39	0	1
Wealth quintile 5	H is in the wealth quintile 5	505	0.16	0.37	0	1
Age of HH	Age of HH	505	51	12.78	18	89
Household size	Size of the household	505	8.93	3.84	1	19
Community level						
Distance to health post	Average transport cost to the closest health post (FCFA)	39	175	155.5	0	650
Head nurse status	Head nurse is civil servant	39	0.9	0.31	0	1
Price index	Mean of standardized price variables	39	-0.05	0.78	-0.4	2.9
Price of inpatient care	Price of inpatient care (FCFA)	39	1040	1624	0	5000
Drug availability	Number of essential drug available	39	19	3.4	12	26

Table 6: Description of the dependent and independent variables in total sample

RESULTS

Table 7 (following page) presents odds ratios and robust standard errors (Z) for the ordinary logistic model and the three-level random intercept logistic model. The intraclass correlations estimated without covariates are $\rho(household, community)$=0.41 and $\rho(community)$=0.15 which indicates that 41% of the total residual variance is due to the between-household residual variance and 15 % is due to the

At the individual level, the likelihood to seek treatment is influenced by the insurance status, the employment status, the relation to the household head and age.

We find that the insured are 2.4 times more likely to seek care than the uninsured. We find that the head of

the household allocates fewer resources in health towards non-productive members. Productive members who work in the household's fields are 78% more likely to have access to medical services. We find that being a parent reduces the likelihood of seeking care by 49%, suggesting that members who do not have the decision-making power in the household are less likely to seek treatment.[16] Age decreases the likelihood of seeking care but at a lower rate when age increases and, then, it has a positive effect for individuals older than 29 years. The use of health services is also determined by characteristics at the household level. We find that an additional year of education of the household head increases the likelihood of individuals seeking treatment by 7%. The introduction of the age of the household as a control variable allows us to control for the fact that the level of education in Senegal has

Table 7: Odds ratio of the logistic models for use of curative care among qualified worker[17]

	Variables	(1)		(2)	
		Odd ratios	Robust Z	Odd ratios	Robust Z
Level 1	Wife (ref :HH[18])	1.170	*(0.285)*	1.367	*(0.327)*
	Child	0.731	*(0.190)*	0.661	*(0.220)*
	Parents	0.424**	*(0.146)*	0.506*	*(0.201)*
	Other	1.028	*(0.285)*	0.975	*(0.320)*
	Age	0.962***	*(0.0109)*	0.946***	*(0.0133)*
	Age squared	1.001***	*(0.000176)*	1.001***	*(0.000228)*
	Medical Insurance	3.339***	*(1.292)*	2.442**	*(0.892)*
	Gender	1.188	*(0.125)*	1.188	*(0.128)*
	Education	1.045**	*(0.0193)*	1.026	*(0.0227)*
	Labour	1.135	*(0.290)*	1.776**	*(0.482)*
Level 2	Education of HH	1.051**	*(0.0258)*	1.072**	*(0.0293)*
	Wealth quintile 2	1.108	*(0.269)*	1.906**	*(0.517)*
	Wealth quintile 3	1.405	*(0.369)*	2.509**	*(1.051)*
	Wealth quintile 4	1.267	*(0.379)*	3.188***	*(1.119)*
	Wealth quintile 5	1.931**	*(0.596)*	5.518***	*(2.982)*
	Labour*wealth2	0.664	*(0.211)*	0.468**	*(0.178)*
	Labour*wealth3	0.728	*(0.255)*	0.501	*(0.231)*
	Labour*wealth4	0.637	*(0.200)*	0.439***	*(0.139)*
	Labour*wealth5	0.279***	*(0.111)*	0.182***	*(0.0646)*
	Age of HH	0.996	*(0.00650)*	0.999	*(0.0103)*
	Household size	1.018	*(0.0225)*	0.995	*(0.0179)*
Level 3	Average cost to the closest health post (100 FCFA)	0.804***	*(0.0401)*	0.751***	*(0.0539)*
	Status of head nurse	2.546***	*(0.653)*	2.996***	*(1.233)*
	Price index	0.848*	*(0.0842)*	0.774**	*(0.0831)*
	Variance Level Household			1.868***	*(0.111)*
	Variance Level Village			0.937***	*(0.241)*
	Observations Level 1	4072		4072	
	Observations Level 2			496	
	Observations Level 3			39	
	Pseudo R-squared	0.0739		.	
	Log Likelihood	-1512		-1359	

[16] We also find that children are less likely to seek treatment in total sample (Appendix 1).

[17] (1) is estimated by using a logistic regression clustered at the household level and (2) is a multilevel model with variables at the individual, household and community level and fixed effect and random effects variance at the household and village level.

[18] HH is Household Head

increased in the last 50 years, but this variable is not statistically significant.

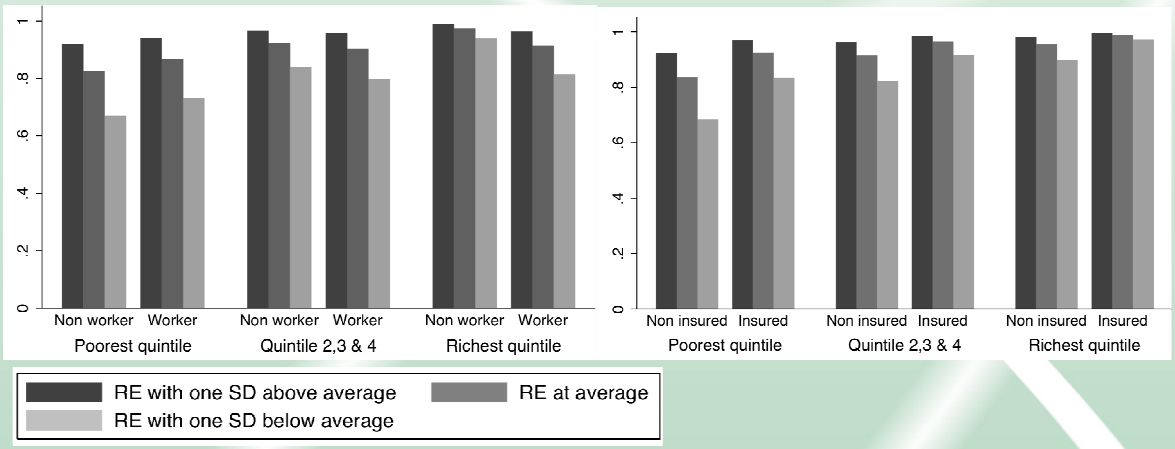
We introduced a multiplicative variable between quintiles of wealth and labour to take into account that the opportunity cost of time varies between wealth quintile. Results without the multiplicative variable are presented in Appendix 3. We find that the household economic status is a strong determinant of the likelihood of seeking care, as individuals in the richest income quintile are 5.5[19] times more likely to seek care than people from the poorest quintile. The interactive terms between labour and the quintiles are significant for wealth quintiles 2, 4 and 5. Workers in the richest quintile are as much as 82% less likely to seek treatment. The effect of the interaction is greater for the richest quintile; it is consistent with the hypothesis that the better-off face a greater opportunity cost of time. The size of the household is not significant.

At the community level, the quality and price of care, and the health post availability are important determinants of health care utilization. We find that the distance to the closest health post affects the likelihood of seeking care as an increase of 100 FCFA of the average transport cost decreases the likelihood to seek care from a qualified provider by 25 %. A good quality of care seems to be associated with a higher likelihood of seeking treatment from a qualified worker. We find that individuals located in

villages whose closest health post is managed by a civil servant are three times more likely to seek treatment. Finally, we find that an increase in price of care reduces the likelihood of seeking treatment.

Results show that an increase of the price index reduces the likelihood of seeking; when the price increases by one standard deviation, the likelihood of seeking treatment decreases by 23%. We computed predicted probabilities from the random intercept model. We have chosen several values of the household level Random Effects (RE) terms: the random effects at average and one Standard Deviation (SD) above and below the average respectively. Figure 4 presents the predicted likelihood of visiting a health care provider for insured people and workers. We can note that the likelihood of seeking treatment varies depending on the value of the random effects suggesting that unobserved heterogeneity is important especially in the poorest quintile. Figure 2 (below) shows that employment status does not affect the likelihood of seeking care in the same direction between the poorest and the richest. While employment slightly increases health care access for the worse off, it decreases health care access for the

Figure 2: Predicted probabilities of seeking treatment depending on employment status and insurance status per wealth quintile



[19] When we use others indicators of price and quality of care, we find that people in the richest quintile are between 3 to 5.5 times more likely to seek care than those in the poorest quintile.

richest because of the presence of a higher opportunity cost of time. Moreover, we also find that the increase in health care access due to insurance is higher among the poorest than the richest, which suggests that insurance has more effect on the access of the worse off[20].

[20] Because of the low percentage of insured in the poorest quintile, we could not add a multiplicative variable of the insurance status and wealth quintile to measure this effect in the multivariate analysis.

DISCUSSION

We have found that about 84% of people who considered their last illness as severe sought treatment which shows that health care access is high in this rural area of Senegal.[21] The high utilization rate of curative care is explained by a high likelihood of being cured if a treatment is received, by a strong availability of health posts, by the low level of prices set for health posts and by the low demand for traditional medicine. Although a large proportion of people are willing to seek treatment, we do not really know the sacrifices undertaken by the household to be treated. Table 4 presented evidence that the higher the health expenditure, the riskier the associated strategy of financing. Thus, severe illness probably affects the composition of expenditures of the household by depriving the household of resources that could have been spent on other goods and services. A high rate of health care access can also be correlated with an impoverishment of the households as the obligation to pay a relatively large amount of money for treatment for a disease can lead households to poverty by forcing them to sell assets.

After controlling for higher opportunity cost of time among the richest quintile, we find a strong wealth gradient for health care access. We also find that the price of medical services is negatively correlated with the utilization of health services. These results show that there is a strong financial barrier to health care access in rural Senegal and that the health insurance scheme is likely to help the poorest to seek treatment. Concerning the effect of insurance, it is worth pointing out that our variable of insurance includes essentially compulsory insurance as most of the insured are migrant workers at the National Company of Sugar located in Richard Toll. Thus, health insurance is not likely to be endogenous except if there are differences in unobservable variables among workers who benefit from the compulsory scheme.

Concerning the robustness of our results, we also ran estimates with other measures of quality and price of medical services (Appendix 4). We measured the price by the price of inpatient care as it has a greater variability; we find that an increase of 100 FCFA of the price of inpatient care decreases the likelihood of using curative care by 1%. We also measured the quality of care by the number of essential drugs[22] available in the closest health post. We find that an additional drug available in the closest health post increases the likelihood to seek care by 4%. However, the introduction of some variables has an effect on the significance level of the variables of price and quality. This is due to the poor number of health facilities in the area of the survey that is a source of collinearity.

The empirical results presented in the paper allow us to draw several implications for the successful design and implementation of the agro-sylvo-pastoral health insurance scheme. First, we showed that the head of the household prioritizes resources toward the health of productive members inside the household. The agro-sylvo-pastoral insurance scheme allows an individual membership but our findings suggest that a family package will enhance a greater access for elderly and non-productive members and then will help to reduce health inequalities within households. Second, our results also suggest that the benefit package should include transport costs in order to increase health care access. Third, we found that the decision to seek modern care is affected by the education of

[21] This high percentage is not associated with the way the question was asked. We also asked the question for children in reference to the last month and found that among the 36% who experienced an illness during the last month, 80% received a treatment.

[22] Essential drug list for Senegal includes Amoxicillin, Penicillin, Doxycycline, Chloramphénicol, Gentamicin, Oxacillin, Quinine, Sulfadoxin+Pyrimethamine, Metronizadol, Paracetamol, Coal, Diazepam, Phenobarbital, Iron, Etamsylate, Furosemide, Nicardipine, Methyldopa, Digoxin, Oxytocin, Salbutamol, Aluminium/Magnesium salt, Metopimazin, Phloroglucinol, Oral rehydration treatment, Hexetidin, Tetracycline, Ascorbic acid, Retinol, Male condom, Spermicid, Ethinylestradiol, Medroxyprogesterone and Insecticide Mosquito Net.

the head of the household. Hence the introduction of a co-payment scheme will need to be accompanied by information on health insurance and awareness campaigns concerning the use of modern health care. Finally, because of the expected increase in health facility utilization, we have to point out that health facilities could become overcrowded. Thus, the impact of the project on the quality of care is unknown and if the quality of care were to deteriorate, it would have an adverse effect on health care access. Thus, the project should be supported by an increase in health supply.

CONCLUSIONS

We analyzed the determinants of health-seeking behaviour in rural Senegal in the framework of the introduction of a health insurance scheme for farmers. We included control variables measuring aspects from the demand and the supply sides thanks to data we collected in three rural communities of the Saint Louis region. We found that unobserved characteristics of the household and the community were important determinants of the use of medical services during people's last illness. To correct for the potential unobserved heterogeneity, we apply a three-level random intercept logistic model. We found that unobserved heterogeneity needs to be taken into account; otherwise the effect of our control variables would be biased.

In rural Senegal, we found that 84% of the patients who had a health need received treatment from a qualified worker. The high rate of utilization of curative care is explained by the strong likelihood to be cured, and by the availability and affordability of medical care. When we look at what prevents the most disadvantaged members of society from seeking care, we found that the quality of care appears to be an essential determinant of health care access. We also found that the likelihood of seeking treatment is higher for the richest after taking into account the negative effect of the opportunity cost of time on the likelihood for seeking care. Finally, we found that the price of medical services is negative and significant. Those results suggest the presence of a strong financial barrier to health care access. Thus health-financing mechanisms that target vulnerable and poor populations are needed to reduce the effect of income inequalities on health care utilization.

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Appendix 1: Results for total sample[23]

		(3)		(4)	
	VARIABLES	Odd ratios	*Robust Z*	Odd ratios	*Robust Z*
Level 1	Subjective health status quartile 2 (ref=Q1)[24]			0.957	*(0.165)*
	Subjective health status quartile 3			0.831	*(0.111)*
	Subjective health status quartile 4			0.655**	*(0.137)*
	Wife (ref=HH)	1.080	*(0.288)*	1.105	*(0.303)*
	Child (ref=HH)	0.510**	*(0.164)*	0.524*	*(0.182)*
	Parents (ref=HH)	0.434**	*(0.161)*	0.437**	*(0.183)*
	Other (ref=HH)	0.767	*(0.262)*	0.808	*(0.280)*
	Age	0.953***	*(0.0142)*	0.952***	*(0.0159)*
	Age squared	1.001**	*(0.000238)*	1.001**	*(0.000253)*
	Insurance	1.896	*(1.158)*	1.958*	*(0.775)*
	Gender	1.271***	*(0.115)*	1.181*	*(0.120)*
	Education	1.032	*(0.0227)*	1.050***	*(0.0187)*
	Labour	1.628*	*(0.415)*	1.686*	*(0.488)*
Level 2	Education of the HH	1.075***	*(0.0266)*	1.072***	*(0.0256)*
	Wealth quintile 2 (ref=Q1)	1.921**	*(0.627)*	1.957**	*(0.583)*
	Wealth quintile 3	1.918**	*(0.608)*	2.186**	*(0.744)*
	Wealth quintile 4	2.745**	*(1.234)*	3.310***	*(1.269)*
	Wealth quintile 5	3.825*	*(2.827)*	3.984**	*(2.246)*
	Labour*wealth2	0.463**	*(0.153)*	0.431**	*(0.150)*
	Labour*wealth3	0.511*	*(0.207)*	0.455*	*(0.190)*
	Labour*wealth4	0.395***	*(0.123)*	0.336***	*(0.0997)*
	Labour*wealth5	0.166***	*(0.0558)*	0.164***	*(0.0502)*
	Age of the HH	0.992	*(0.00845)*	0.995	*(0.0105)*
	Household size	1.016	*(0.0150)*	1.012	*(0.0170)*
Level 3	Average transport cost to the closest HP	0.746*	*(0.119)*	0.773*	*(0.104)*
	Status of the head nurse	3.509***	*(1.656)*	3.310**	*(1.804)*
	Price index	0.998	*(0.176)*	0.833	*(0.124)*
	Variance Level Household	1.419***	*(0.494)*	1.351***	*(0.447)*
	Variance Level Village	0.779***	*(0.569)*	0.761***	*(0.540)*
	Observations	4,178		3,747	

[23] Models are multilevel model with variables at the individual, household and community level and fixed effect and random effects variance at the household and community level. (3) presents the results for total sample without controlling for the severity of disease and (4) controls for the severity of disease by using the subjective health status of the individual because in the Andersen's model, need refers to health status. We use the subjective health status as we do not have information on symptoms or disability days.

[24] Q1 is the quartile with the worst subjective health status and Q4 the best. We find that people with the best subjective health status are less likely to seek care by 35% than the individual with the worst subjective health status.

Appendix 2: The random-intercept logistic model

The model estimated is:

$$\text{Logit}\{\Pr(V_{ijk}=1|X_{ijk}, \zeta_{jk}^{(2)}, \zeta_{k}^{(3)})\} = \beta_1 + \beta_2 x_{2ijk} + \ldots + \beta_n x_{nk} + \zeta_{jk}^{(2)} + \zeta_{k}^{(3)} \quad \text{if } S_{ijk}=1$$

$$= (\beta_1 + \zeta_{jk}^{(2)} + \zeta_{k}^{(3)}) + \beta_2 x_{2ijk} + \ldots + \beta_n x_{nk}$$

The vector $X_{ijk}=(x_{2ijk}, \ldots, x_{nk})'$ contains all covariates.

where $(\zeta_{jk}^{(2)}|X_{ijk}, \zeta_{k}^{(3)} \sim N(0, \psi^{(2)})$ is a random intercept varying across households (level 2) and $(\zeta_{k}^{(3)}|X_{ijk} \sim N(0, \psi^{(3)})$ is a random intercept varying over communities (level 3). The random intercepts can be seen as the combined effect of omitted household and community-specific covariates that affect the health-seeking behaviour. The model controls unobserved heterogeneity by adding the random intercept to the linear predictor. The random effects are assumed to be independent of each other and across clusters and are respectively the household-specific and community-specific random intercept.

The latent-response model is written:

$$V_{ijk}^{*} = \beta_{0jk} + \beta_1 X_{ijk} + \varepsilon_{ijk}$$

$$\beta_{0jk} = \gamma_{00} + \zeta_{jk}^{(2)} + \zeta_{k}^{(3)} \quad \text{if } S_{ijk}=1$$

where β_{0jk} is a random intercept with mean γ_{00} and residuals $\zeta_{jk}^{(2)}$ and $\zeta_{k}^{(3)}$ at level 2 and 3 respectively.

The reduced form is obtained by substituting the level-2 and level-3 for β_{0jk} into the level-1 for V_{ijk}:

$$V_{ijk}^{*} = \gamma_{00} + \beta_1 X_{ijk} + \zeta_{jk}^{(2)} + \zeta_{k}^{(3)} + \varepsilon_{ijk}$$

where $\varepsilon_{ijk}|X_{ijk}, \zeta_{jk}^{(2)}, \zeta_{k}^{(3)}$ has a logistic distribution with variance $\pi^2/3$.

The variance of the total residual is:

$$\text{Var}(V_{ijk}=1|X_{ijk}) = \text{Var}(\zeta_{jk}^{(2)} + \zeta_{k}^{(3)} + \varepsilon_{ijk}) = \psi^{(2)} + \psi^{(3)} + \theta \quad \text{with } \theta = \pi^2/3$$

The random intercepts are shared among individuals in the same household and village. This dependence between individuals belonging to the same cluster is expressed in term of the correlation within a cluster called the intraclass correlation. The different types of intraclass correlations for the latent responses of two individuals Y^{*}_{ijk} and $Y^{*}_{i'jk}$ are measured as follows:

$\rho(community)=Cor(Y^*_{ijk}, Y^*_{i'j'k} \mid X_{ijk}, X_{i'j'k}) = \psi^{(3)} / (\psi^{(2)}+\psi^{(3)}+(\pi^2/3))$

$\rho(household, community)=Cor(Y^*_{ijk}, Y^*_{i'jk} \mid X_{ijk}, X_{i'jk}) = \psi^{(3)} + \psi^{(2)} / (\psi^{(2)}+\psi^{(3)}+(\pi^2/3))$

where $\psi^{(3)} > 0$, $\psi^{(2)} > 0$ and $\rho(household, community) > \rho(community)$ because individuals from the same household are more similar than individuals from the same village.

Appendix 3: Results without taking into account the opportunity cost for workers[25]

	VARIABLES	(5)	
		Odd Ratios	*Robust Z*
Level 1	Wife (ref=HH)	1.322	*(0.312)*
	Child (ref=HH)	0.616	*(0.205)*
	Parents (ref=HH)	0.483*	*(0.193)*
	Other (ref=HH)	0.941	*(0.302)*
	Age	0.947***	*(0.0138)*
	Age squared	1.001***	*(0.000239)*
	Medical insurance	2.190*	*(0.928)*
	Gender	1.208*	*(0.887)*
	Education	1.026	*(0.024)*
	Labour	0.821	*(0.144)*
Level 2	Education of the HH	1.068***	*(0.026)*
	Wealth quintile 2 (ref=Q=1)	1.584	*(0.482)*
	Wealth quintile 3 (ref=Q=1)	1.939	*(0.791)*
	Wealth quintile 4 (ref=Q=1)	2.318**	*(0.876)*
	Wealth quintile 5 (ref=Q=1)	2.697**	*(1.252)*
	Age of the HH	0.998	*(0.01)*
	Household size	1.001	*(0.0172)*
Level 3	Average cost to the closest health post	0.807**	*(0.077)*
	Status of the head nurse in the closest HP	5.097***	*(2.059)*
	Price index	0.765*	*(0.109)*

[25] (5) is a multilevel model without the multiplicative variable Labour*Wealth. When the opportunity cost is omitted, the variable labour is not significant and the effect on health care utilization is negative, which suggests that the labour variable captures the existence of opportunity cost of time for workers. We note that the odds of the richest quintiles are lower suggesting that the omitted opportunity cost of time is higher for the richest.

	Constant (Household)	1.821*** *(0.48)*
	Constant (Village)	0.795*** *(0.40)*
	Observations	4072

Appendix 4: Robustness check

	VARIABLES	(6)[26] Odd ratios	*Robust Z*
Level 1	Wife (ref=HH)	1.376	(0.323)
	Child (ref=HH)	0.663	(0.219)
	Parents (ref=HH)	0.495*	(0.195)
	Other (ref=HH)	0.983	(0.315)
	Age	0.945***	(0.0132)
	Age squared	1.001***	(0.000223)
	Medical insurance	2.268**	(0.801)
	Gender	1.212*	(0.129)
	Education	1.030	(0.0241)
	Labour	1.569*	(0.364)
Level 2	Education of the HH	1.077***	(0.0272)
	Wealth quintile 2 (ref=Q=1)	1.585**	(0.356)
	Wealth quintile 3 (ref=Q=1)	2.152***	(0.582)
	Wealth quintile 4 (ref=Q=1)	3.041***	(0.966)
	Wealth quintile 5 (ref=Q=1)	3.010**	(1.308)
	Labour*wealth2	0.641	(0.250)
	Labour*wealth3	0.479**	(0.140)
	Labour*wealth4	0.555*	(0.178)
	Labour*wealth5	0.222***	(0.0763)
	Age of the HH	0.995	(0.00772)
	Household size	1.003	(0.0150)
Level 3	Average transport cost to the closest HP	0.861**	(0.0593)
	Number of drugs available	1.039**	(0.0193)
	Price of inpatient care (100 FCFA)	0.989*	(0.00624)
	Constant	8.677***	(5.816)
	Variance Level Household	1.462***	(0.771)
	Variance Level Village	0.999***	(0.379)
	Observations	4,072	

[26] (6) is a multilevel model with others variables of price and quality. The price of medical services is measured by the price of inpatient care for an average length of stay of 5 days and the quality of care is measured by the number of essential drugs available in the closest health post.

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