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## **AAEA conference 2002 - Long Beach, July 28-31**

### **The impact of health insurance on the access to health care and financial protection in rural areas of developing countries: Case study Senegal**

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Key words: rural development, health insurance, impact analysis, social protection, Senegal

JEL classification: O17, I19, O55

#### Abstract:

Access to public and private health insurance in rural areas of low income countries is severely constrained by high unit cost of transaction per contract due to information asymmetries between insurance sellers and buyers. This leads to a situation in which the majority of the poor have to rely on out-of-pocket expenditures when they are ill, resulting in a high vulnerability for health shocks which negatively affect the overall risk management of the household, investment and resource allocation decisions. Recently, however, in various parts of the world community based health insurance schemes have emerged and are becoming increasingly recognized as an instrument to finance health care in poor developing countries. These mutual insurance schemes often develop out of micro-finance institutions such as the Grameen Bank in Bangladesh and are based on similar principles, i.e. relying on collective shared norms, solidarity and enforcement by peers.

Taking the example of “les mutuelles de santés” (mutual health organization) in rural Senegal this paper analyzes whether or not members in a mutual health insurance scheme have actually a better access to health care than non-members. A binary probit model is estimated for the determinants of participation in a mutual and a logit/log linear model is used to measure the impact on health care utilization and financial protection. Impact is measured in terms of (a) access to health care facilities, i.e. if members frequent health facilities more often than non-members controlling for age, sex, education and the frequency of illness, which capture the need for health care and the health status and (b) the amount of out-of-pocket payments in case of health care use. The results show that while the health insurance schemes reach otherwise excluded people, the poorest of the poor in the communities are not covered. As important determinants for being a member beside income, we find that religion, belonging to a certain ethnic group, access to social capital and community characteristics are important. Regarding the impact on the access to health care, members of a mutual have better access to health care services than non-members after controlling for common individual, household and community characteristics. The probability of making use of hospitalization increases by 2 %-age points with membership and expenditure in case of need is reduced by about 50% compared with non-members. Given the results from this study, community financing schemes have the potential to improve existing the risk management capacity of rural households. To reduce identified limitations of the schemes, an enlargement of the risk pool and a scaling up/linking of the schemes is, however, a prerequisite. Appropriate instruments to be further tested should include re-insurance policies, subsidies for the poorest and developing linkages to the private sector via the promotion of group insurance policies. All these instruments call for a stronger role of public health policy in rural areas of low income countries.

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# 1 Introduction

People are exposed to various life risks which represent a permanent threat to the quality of their lives, their capabilities and in general their “freedom of choice”. In developing countries the control of health risks is of crucial importance for at least two main reasons. First, people living in low-income countries and especially in rural areas have far lower life expectancies and far higher age-adjusted mortality rates than people living in the rest of the world. Important single health risks like Malaria, tuberculosis, HIV/AIDS and childhood infectious diseases are avoidable or can be controlled in order to minimize their impact on human lives. Second, improving the health and longevity of the poor is not only an end in itself but also a mean to achieve fundamental goals relating to poverty reduction. Healthier people are more productive, specialize more and have fewer children, secure in the knowledge that their children would survive. Third, illness is very expensive for the poor. Beside the outlays for treatment, people can not continue to work and lose further income. Despite the positive relationship between health and development, the access of the world’s poor to essential health services is constrained notably due to limited financial resources to pay for services of a good quality. A recently debated option to overcome existing social exclusion in health care provision are community-based health insurance schemes. These schemes are based on voluntary membership, reciprocity and are often linked to a local health care provider. In several countries these schemes operate in conjunction with health care providers, mainly hospitals in the area.

Proponents argue that these schemes have the potential to increase the access to health care (e.g. Dror and Jacquier 1999). The results of the few available studies so far are however less optimistic (e.g. Bennett et al. 1998, Criel 1998, Atim 1998). It is argued that often the risk pool is too small, adverse selection problems arise, the schemes are heavily depending on subsidies, financial and managerial difficulties arise and the overall sustainability seems to be not insured. Whereas these studies are important contributions to our knowledge about the strengths and weaknesses of the schemes in general, the context in which these schemes have been introduced and the objectives of the schemes itself have not been given enough attention. Also, the potential social benefit of the schemes, i.e. their impact on access to health care, labor productivity and the risk management capacity of the household has been largely ignored. Against this background, this paper analyzes if mutual health insurance schemes improve the access to health care in rural Senegal. We tackle two principal questions: What are important socio-economic determinants explaining membership in a voluntary health insurance scheme? Thereby we identify important factors influencing the demand for health insurance. Second, what is the impact of the schemes on the utilization of health care and the level of financial protection comparing members and non-members?

To answer these question we use a binary probit model for estimating marginal coefficients for the determinants of participation and a logit/log-linear model to analyze the impact on health care utilization and financial protection between members and non-members. With this methodology applied we go beyond most of the available studies on the impact of community financing schemes so far, which have either relied on secondary literature (e.g. Bennett et al. 1998) or restricted their data analysis to qualitative interpretations (e.g. Atim 1998).

We have chosen the case of Senegal which is specifically interesting, as we find here (Tine 2000):

- a relatively long, 10-year experience with mutual health insurance schemes.

- an innovative institutional setting. There exists a contract between a non-profit health care provider, a catholic-run hospital, and the mutuals, which allows them to receive health care at a lower rate.

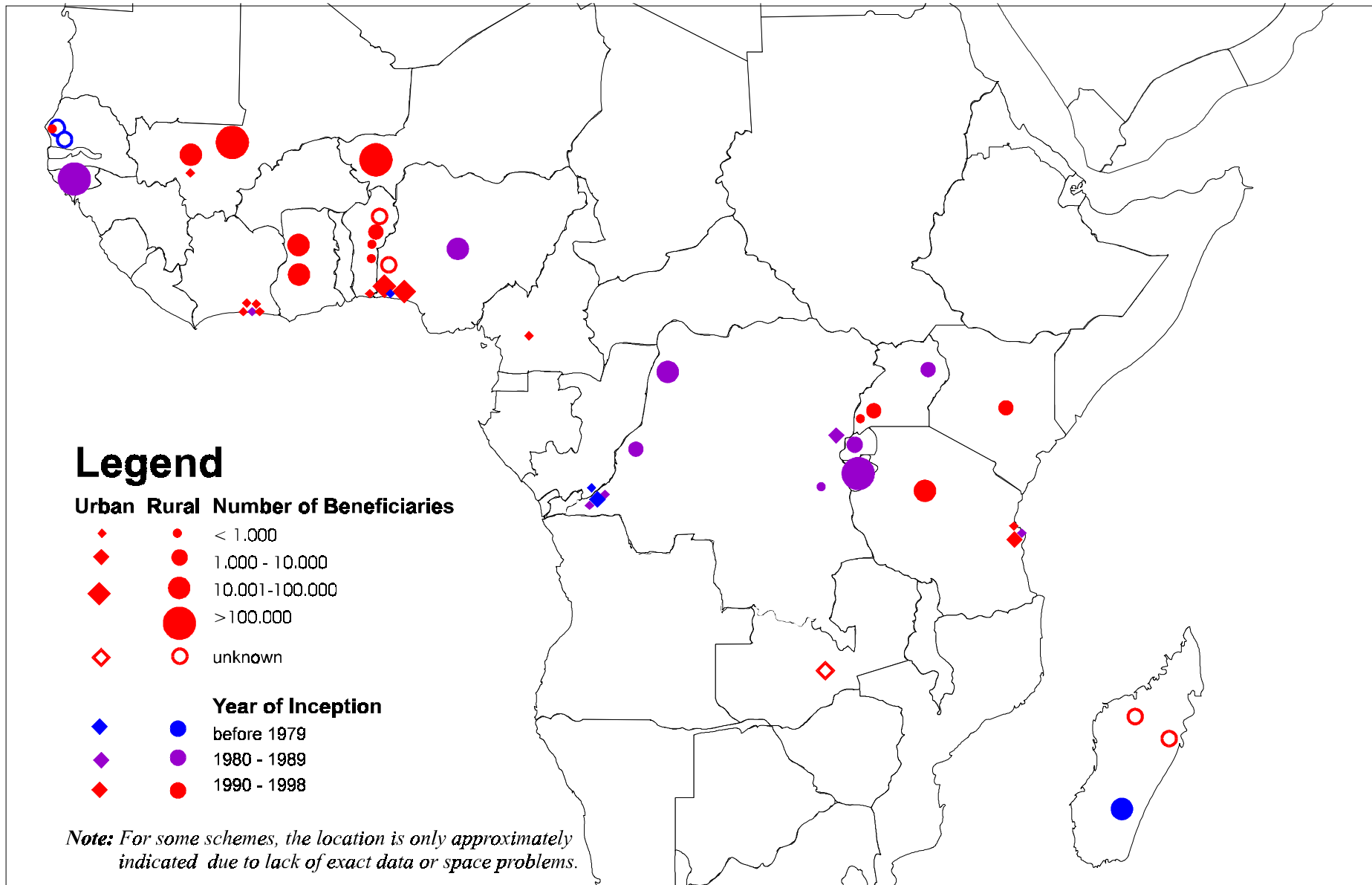
The outline of the paper is as follows: Section 2 gives a quick overview on health insurance schemes in rural Sub-Sahara Africa and presents the specific situation in Senegal. Following that, section 3 describes the research design and the methodology used. The results of the estimations are discussed in section 4. Section 5 concluded the paper.

## **2 Health insurance in rural Sub-Sahara-Africa**

Wiesmann and Jütting (2001) present in detail an overview of health insurance schemes outside formal sector employment in Sub-Saharan Africa, which is based on extensive research which has been done in the past few years (Bennett et al. 1998, Atim 1998, Musau 1999). The majority of the schemes have been set up in the nineties. The reasons which promote and foster the development of mutual health insurance schemes have not been analyzed in depth so far, but some tendencies are quite obvious (Wiesmann and Jütting 2001): First, people have been forced to think about alternative solutions as health care at the public facilities is no longer offered for free and the introduction of user fees has had negative effects especially for the poor. Second, in the context of decentralization more power has been delegated to the communities which allow them to take over more responsibilities also in the provision of local public goods. Third, the quite positive experience with credit and financing institutions is leading to the discussion if the mutuals should enlarge their portfolio to include also insurance products. Finally, the cost of illness debate in the literature has shown that health shocks often force households to high cost risk coping strategies. Access to insurance could reduce these costs substantially (Weinberger and Jütting 2000, Asfaw et al. 2001).

The map in Figure 1 gives a view of health insurance schemes outside the formal employment sector in Sub-Saharan Africa. The map clearly shows that so far, community based health insurance is more common in West Africa than in Central or East Africa. In some countries, these new schemes are mainly an urban phenomenon – such as in Côte d’Ivoire and in Tanzania – whereas in other states, they are predominantly covering people in rural areas; examples are Uganda, Ghana and Benin.

**Figure 1: Urban and rural health insurance schemes in Sub-Saharan Africa – year of inception and size**



Source: Wiesmann and Jütting (2001)

Some of the schemes are confined to a local cooperative of craftsmen or traders, therefore they are often very small and may cover less than 100 beneficiaries (Kiwara 1997). Other insurance schemes are extended over the whole country and many communities and include up to 1 million or even more beneficiaries (Bennett et al. 1998). The number of beneficiaries can change rapidly and neither reveals the financial balance of the schemes, nor does it say much about the scheme's sustainability. Indeed, a few schemes had to be terminated after some years (Criel 1998, Bennett et al. 1998), whilst others have been in operation for decades.

In Senegal there has been a relative long tradition with mutual health insurance. The first experience started in the village of Fandène in the Thiès region in 1990. From the beginning, the movement in Senegal has been supported by a local health care provider, the non-profit hospital St. Jean de Dieu. Today there are 16 mutual health insurance schemes operating in the area of Thiès. The main features of the schemes are:

- the schemes are community based
- 90 % of the schemes operate in rural areas
- with the exception of one mutual – Ngaye Ngaye - they only cover hospitalization
- the mutuals have a contract with the hospital St. Jean de Dieu, where they get a reduction of up to 50 % for treatment
- in general the household is a member of a mutual, who participates in the decisions. He has a membership card on which he can put all or selected members of his family (beneficiaries). The membership fee is per person insured.

Table 1 presents the details of the different payment forms at the hospital.

**Table 1: Hospitalization fees for members and non-members at St. Jean de Dieu Hospital**

	<b>Hospitalization</b>		
	<b>Ticket for consultation</b>	<b>Daily cost</b>	<b>Operation (surgery)</b>
<b>Members</b>	3 000 F CFA	3 750 F CFA	750 F CFA/unit
<b>Payment by :</b>	member	mutual	member
<b>Non-members</b>	6 000 F CFA	7 500 F CFA	1 500 F CFA/unit
<b>Payment by:</b>	non-member	non-member	non-member

Source: ZEF-ISED survey, 2000

It shows that a member has to pay a minimum amount of 3.000 F CFA for a treatment. If he needs surgery he has to pay himself 50 % of the total costs for the operation. The daily cost of hospitalization, including also laboratory analysis, consultation and to some extent radiography, is paid by the mutual which benefits of a reduction of 50 %. A mutual pays 3750 F CFA/day for each hospitalization of its members, compared with 7500 F CFA/day a non-member has to pay. In case of hospitalization, the member has to bring with him a letter

of guarantee which is given to him by the manager of the mutual if the member has paid the insurance premium regularly. A stay at the hospital between 10 and 15 days is integrally paid by the mutual. If the hospitalization exceeds this limit, the mutual pays the hospital for the entire invoice, because it guaranteed to do so. Afterwards the member reimburses the mutual step by step. To receive the described benefits the members of a mutual have to pay a monthly premium between 100 and 200 F CFA and the head of the household has to buy once a membership card for 1.000 F CFA.

### 3 Research design and methodology

#### 3.1 Research design

A household survey was carried out by the Institute for Health and Development (ISED) in Dakar in cooperation with the Center for Development Research in Bonn. It started with a pre-test in March 2000 and the final survey took place in May 2000. The participation rate in the interviews was with more than 95% very high.

For the survey, we chose a two stage sampling procedure: First, we selected 4 villages out of the 16 villages in which mutuals operate. In each of the selected villages Fandène, Sanghé, Ngaye Ngaye and Mont Rolland only one mutual is in place, which has the same name as the village itself.

The following table summarizes the major differences between the analyzed schemes:

**Table 2: Selection criteria for mutual to be included in the survey**

Name of mutual/Village	Years of operation	Distance from Hospital	% of member household in villages	Services
<b>Fandène</b>	10 years	6 km	90,3 %	Hospitalization
<b>Sanghé</b>	3 years	8 km	37,4 %	Hospitalization
<b>Ngaye Ngaye</b>	6 years	30 km	81,5 %	Primary health care
<b>Mont Rolland</b>	4 years	15 km	62,6 %	Hospitalization

Source: ZEF-ISED survey, 2000

In a second step, we selected randomly the households for the interviews. In all four villages, members and non-members were interviewed. In order to get a random sample out of the four villages, we used household lists of all inhabitants (members and non-members) of the four villages in order to calculate the percentage distribution between members and non-members and their respective weight in the sample. We interviewed a total of 346 households, 70% of which are members and 30 % of which are non-members. The data set contains information of roughly 2.900 persons, from which are 60 % members and 40 % non-members. This means that some household heads have not insured their complete family.

The data was entered immediately after completing the survey using SPSS Windows. In addition to the household survey, we interviewed key persons (leaders of the mutuals) in order to get complementary information about the functioning, problems and success of the mutuals.

### 3.2 Methodology

The modeling of an impact of mutual health insurance schemes on health care use and expenditure faces the important challenge of dealing with the problem of “endogeneity” and “self-selection”. This problem receives currently a lot of attention in different areas of development economics: Publications focus on measuring the impact of micro-finance institutions (e.g. Coleman 1999, Nada 1999), estimating the returns of education (e.g. Bedi and Gaston 1999) as well as analyzing the impact of health insurance on various outcomes such as health demand and financial protection (Waters 1999, Yip and Berman 2001). In each of these cases the evaluation of a policy intervention or institutional innovation poses the problem that it is very difficult to assign individuals randomly to non-program control groups and others to program treatment groups. From this it results, that the identification of an adequate control group is the first and even most important step when trying to control for self-selection.

With respect to the impact of health insurance on the health care use, Waters 1999 names the potential endogeneity of the choice of insurance for health care use as the main problem, leading to potential selection bias. Individuals who self-select into the insurance program have unobservable characteristics – related to preference or health status (adverse selection) – that might make them more likely than other to join the program and also might influence their decision to use health care services. An observed association between health insurance affiliation and health care use and expenditure may therefore be due not to insurance but to the underlying unobservable characteristics. To control for this effect, in the Senegal study an omitted variable version of the Hausman test (Hausman 1978) is applied. This test is based on two steps: First, the reduced form of the participation equation is estimated. Second, the fitted values are included into the health care demand equation as a regressor. A significantly non zero coefficient for the predicted value term is an indication that the suspected endogenous variable is in fact endogenous (Waters 1999). To specifically control for self-selection into the program, proxies for the health status and health risks have been included in all of the studies. Finally, village or district dummies are included to control for unobservable characteristics of communities such as social values and solidarity to see if it influences individual choice to enroll in a community-financing scheme. To control for a sample selection bias in the demand equation for health care the total sample is included, i.e. those sick and those not sick as well as those being member and non-members. Finally, the models are checked for stability and robustness through adding and subtracting key variables and by applying the F-test.

To estimate the determinants of participation in a mutual health organization, we follow an approach applied by WEINBERGER (2000). In that approach participation in a local organization is depended on the rational choice of an individual weighting costs and benefits of membership. It is assumed that participation of a household ( $p$ ) in a mutual depend on the current income of the household ( $y$ ), characteristics of the household head ( $H$ ), who decides if the household joins or not, household characteristics ( $Z$ ), community characteristics ( $C$ ) and on the error term  $u$ , who is uncorvariant with the other regressors.

The following equation describes our model:

$$(1) \quad p_i = f(y_i, Z_i, H_i, C)$$



In order to estimate the probability of participation we use a binary probit model:

(2) Binary probit model:

$$p_i^* = \beta y_i + \phi Z_i + \alpha H_i + \delta C + u_i$$

$p_i = 1$  if  $p_i^* > 0$ , meaning the household  $i$  is member of the insurance scheme

$p_i = 0$  otherwise

To assess the impact of mutual health organization on financial protection of members two aspects have to be taken into account: the probability of visiting a health care provider and the out-of-pocket expenditure borne by the individuals. The strong disadvantage of using health care expenditure alone as a predictor of financial protection is that this would allow to capture the lack of financial protection for those who choose not to seek health care because they cannot afford it. The first part of the model assesses the determinants of utilization and thereby we can analyze whether membership in a mutual reduces barriers to access health care services. We use a two-part model developed as part of the Rand Health Insurance Experiment in the US (MANNING ET AL. 1987).<sup>2</sup>

- a logit model, which assesses the probability of visiting a health care provider:

$\text{Prob}(\text{visit} > 0) = X_\beta + M_\alpha + u$ , where  $X$  stand as a vector for individual, household and community characteristics (including membership) and

- a log-linear model that estimates the incurred level of out-of-pocket expenditures, conditioning on positive use of health care services:

$$\text{Log}(\text{out-of-pocket expenditure} / \text{visit} > 0) = X_\gamma + M_\chi + e$$

Where  $X$  again represents a set of independent variables that are hypothesized to affect individual pattern of utilization,  $M$  represents a dummy variable for membership in a mutual health organizations and  $u$  and  $e$  as terms of interference. The independent variables determining the demand for health care and expenditure in the case of illness are – among others – age, gender, education, health status and income.

## 4 Results

### 4.1 Determinants of membership in a health insurance scheme

As outline above the decision of a household to participate in a mutual health organization is supposed to be influenced by individual, household and community characteristics. The variables representing *individual* characteristics of the household head involves age, education and sex and membership in another organization. With respect to age we hypothesize that younger household heads are more open for innovations (age group 1: positive coefficient) and that with increasing age people tend to participate less (age group 3: negative coefficient). Furthermore we expect that better educated people and male headed households tend to join a mutual more often than people with less education and female headed households.

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<sup>2</sup> For a recent application see YIP and BERMAN (2001).

The following characteristics of the *household* is supposed to influence membership in a mutual: income; ethnic group, religion and the illness ratio. The most important variable to be looked at in the context of our research question is income and its effect on the decision to participate or not. In our study we have measured “income” as calculated by expenditure of the household per year and member. We assume that income has a positive influence on the decision to participate and that the poorer strata of the population will not participate due to difficulties in paying the premium. Also, it will be of interest to analyze whether the richer part of the population participates as this is important for risk pooling reasons. Hence, we include into the regression analysis income tertiles, i.e. we divided our sample in three subgroups “rich”, “average” and “poor”. Added to the quantitative measures of wealth was relative wealth. Households were asked to classify themselves according to relative wealth within the community on a rank from one (poorer than the average) to three (wealthier than the average). We expect the same findings in tendency for the relative measures than for the quantitative measures. We have included a dummy variable “Wolof” in order to measure the influence of belonging to a specific ethnic. The Wolof are known for their openness for institutional innovations in the Senegalese context (Diallo 2000). The variable “religion” is included in order to take into account that the mutuals have an exclusive contract with the catholic owned hospital St. Jean de Dieu. Moreover, the mutuals get active support by the diocese de Thiès. Hence, we expect that Christians tend to enroll proportionally more than Muslims. We assume also a positive relationship between membership in a mutual and membership in other organizations. People who have already experience in participation in local organizations are most likely more willing to join a mutual insurance than people who have no experience in participation at all. To control for adverse selection we integrate the illness ratio of the household as a proxy for the health status. The variable describes the number of cases of illness of household members in relation to the overall household size. It is assumed that less healthier households tend to join mutuals more than healthier ones, leading to adverse selection problems.

Finally, we include dummy variables capturing *village* characteristics: acknowledgement of solidarity in the village (solidarity) and village factors. We assume that people acknowledging a high value of solidarity in their village tend to participate more. With respect to the village effects, we want to control if the type of insurance matters, i.e. hospitalization care versus primary health care (Ngaye Ngaye) as well as for the specific local setting, i.e. the cultural environment in the specific village and specific characteristics of the mutual, i.e. distance to the hospital, the functioning of the mutual etc.

The results presented in table 3 show the marginal effects of the probit analysis. Three different models were evaluated, differing in their definition of the income variable. In the first model income is defined as a metric variable so as to analyze whether income has an influence on membership in a mutual. In the second model income groups are established, in order to determine effects between different income groups. In the third model income groups were also formed, but in contrast to model 2 they were not determined based on expenditure, but on the basis of self-assessment by the people surveyed.

Table 3 shows that all three methods used are highly significant. Income has the anticipated positive influence on membership. Models 2 and 3 show furthermore that the lower income groups in the villages are significantly less represented in the mutuals. That means that the wealthy people in the communities are more likely to (be able to) participate in the insurance schemes. At the household level, religion and ethnic identity play an important role in addition to income. The clearly higher participation by Christians – the probability increases by about nearly 40 %-age points compared to non-Christians – was to be expected because of the intensive promotion of the mutuals by the Catholic church.

While household characteristics do have an influence on the decision as to membership, this is obviously not the case for the individual characteristics of the head of the household, such as education, gender and age. All three characteristics are not significant. Membership in other organizations is a positive factor however. People who have already experienced the advantages and disadvantages of being associated to local groups are obviously more disposed towards membership in a health insurance scheme.

The village effects that were discovered are also interesting. Different model variations show, for example, that the inhabitants of the villages Sanghé and Mont Rolland have a significantly lower probability of membership than people coming from the village Ngaye Ngaye and Fandène. These results indicate, that obviously the different type of health insurance provided – primary health care in Ngaye Ngaye and in patient care in the other three mutuels - had no significant influence on the decision to participate. Instead specific village factors, i.e. the management of the mutual seem to play a role. The mutual of Sanghé has faced several financing and managerial difficulties which have lead to a stop of operation for some time. As a consequence several people left the mutual. Efforts to reestablish the mutual have been successful and today the mutual is functioning again, however with a lower participation rate than before.

**Table 3: Marginal coefficients for determinants of participation in mutual health insurance (household level)** Dependent variable: Membership in a mutual (1 if the household is member and 0 otherwise)

<b>Variable</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
Constant	-2,048*** (0,541)	-0,223 (0,155)	0,064 (0,147)
<b><i>Individual charact. of household head</i></b>			
Sex (1 = male)	0,054 (0,083)	0,071 (0,083)	-0,001 (0,083)
Age group 1 (age 21-40)	0,088 (0,092)	0,085 (0,092)	0,079 (0,091)
Age group 3 (age > 60)	0,087 (0,061)	0,079 (0,061)	0,101 (0,062)
Literacy ( can read/ read and write, 1 = yes)	0,059 (0,063)	0,062 (0,063)	0,043 (0,063)
Other organization (membership in other group, 1=yes)	0,180*** (0,066)	0,183*** (0,066)	0,120* (0,065)
<b><i>Household characteristics</i></b>			
Wolof (household belonging to ethnic group of Wolof, 1= yes)	0,249* (0,135)	0,284** (0,137)	0,229* (0,133)
Religion (1=Christian)	0,370*** (0,085)	0,369*** (0,085)	0,347*** (0,083)
Income (expenditures per household member log)	0,167*** (0,046)		
Income tercile: Lower		-0,110* (0,063)	
Income tercile: Upper		0,165** (0,073)	
Self-wealth (self-classification of household): Poor			-0,254*** (0,058)
Self-wealth: Rich			0,018 (0,113)
Illness-ratio (number of cases of illness per household divided by number of household members)	0,002 (0,088)	0,007 (0,088)	0,037 (0,086)
<b><i>Community characteristics</i></b>			
Fandène (household belonging to Fandène community, 1 = yes)	-0,029 (0,151)	-0,011 (0,152)	-0,119 (0,150)
Sanghé (household belonging to Sanghé community, 1 = yes)	-0,277** (0,132)	-0,261* (0,134)	-0,383*** (0,130)
Mont Rolland (household belonging to Mont Rolland community, 1 = yes)	-0,225 (0,139)	-0,202 (0,141)	-0,308** (0,137)
Solidarity (perceived solidarity in the village, 1=yes)	0,103 (0,066)	0,100 (0,067)	0,104* (0,065)
Number of observations	338	338	341
Pseudo R <sup>2</sup>	0,567	0,569	0,568
Chi <sup>2</sup>	120,32	121,39	127,96
Prob > Chi <sup>2</sup>	0,000	0,000	0,000
Frequencies of actual / predicted outcomes	80 %	80 %	80 %

\* Significant at 0,1 level      \*\* Significant at 0,05 level      \*\*\*Significant at 0,01 level

Source: own estimation based on ZEF-ISED survey data

So far the results have shown that the main factors influencing the demand for health insurance in rural Senegal at the household level are income, access to social networks, religion, belonging to a certain ethnic group and village effects. These results are largely confirmed by looking at the determinants of participation at the individual level. Regarding the individual level, it is specifically interesting to analyze which type of household members are insured. From a theoretical perspective one would assume that those individuals are insured which are more prone to the risk of illness. As Table 4 shows, this seems to be confirmed as the probability for women and older people is higher than for male and younger persons in the household.

**Table 4: Marginal coefficients for determinants of participation in a mutual health insurance in Senegal (individual level)**

Variable	Model coefficients
Constant	-0,100* (0,056)
Individual characteristics of member and household characteristics	
Sex (1= male)	-0,042** (0,021)
Age group 1 (age <26)	0,000 (0,027)
Age group 3 (age >50)	0,077** (0,035)
Literacy (can read/read and write, 1= yes)	0,109*** (0,022)
Other organization (membership in other group, 1= yes)	0,070** (0,028)
Relationship ( self, spouse, parents, children, 1 = yes)	0,115*** (0,022)
Frequency of illness (number of cases ill in last 6 months)	-0,011 (0,020)
Wolof (household belonging to ethnic group of Wolof, 1= yes)	0,182*** (0,049)
Religion (1= Christian)	0,386*** (0,033)
Income tertile: Lower	-0,047** (0,024)
Income tertile: Upper	0,219*** (0,028)
Community characteristics	
Fandène (individual belonging to Fandène community, 1 = yes)	-0,058 (0,058)
Sanghé (individual belonging to Sanghé community, 1 = yes)	-0,358*** (0,050)
Mont Rolland (individual belonging to Mont Rolland community, 1 = yes)	-0,332*** (0,055)
Number of observations	2855
Pseudo R <sup>2</sup>	0,549
Chi <sup>2</sup>	989,02
Prob > Chi <sup>2</sup>	0,000
Frequencies of actual / predicted outcomes	77 %

\* Significant at 0,1 level      \*\* Significant at 0,05 level      \*\*\*Significant at 0,01 level

Source: Own estimation based on ZEF-ISED survey data

It is reasonable to assume that women in the child bearing age and older people do need hospitalization care more often than other household members. Whereas the coefficient for both variables is significant, the marginal effect is, however, with less than 0,1 % points rather low, which makes it difficult to diagnose severe adverse selection problems of the schemes.

## 4.2 Impact of membership on access to modern health care services

In this section we test the hypothesis that members of a mutual have a better access to modern health care facilities than non-members. As outlined before we measure access in two respects: the probability of frequentation of a health care facility, i.e. to visit a hospital and the out-of-pocket expenditure at the point of use. Our primary variable of interest is membership in a mutual. We hypothesize that the probability of members to frequent a hospital is higher, while at the same time they pay less for their treatment in comparison to non-members after controlling for individual, household and community characteristics. This would mean that membership has a positive coefficient for the demand for health care and a negative one for the effect on expenditure. Beside membership, the other variable of key interest is income as we want to see how much demand health care utilization and out of pocket expenditure is due to the income level and the ability to pay.

As control variables we include age, sex, education and the frequency of illness, which capture the need for health care and the health status of an individual. Village effects are taken into account for differences in the cost of seeking health care as well as the specific design of the mutuals. One assumption is that inhabitants from the village in Fandène have a better access to health care due to their relatively close distance to the hospital as well as to the reported well functioning of the mutual. The results of the estimates for the determinants of demand for health care services and the costs in the case of illness are presented in table 5.

The probability of visiting a health care provider has been estimated with a logit model as described in section 3.2. Given that most of the mutuals only cover hospitalization the dependent variable is “frequency of hospitalization”.<sup>3</sup> As in the case for the determinants of participation, we have estimated two models: the first one includes income as a continuous variable and the second one uses dummies for income tercils. The results presented are marginal coefficients. In the case of the log linear model for the expenditure effect, we had to transform the estimates of the dummy variables into marginal coefficients by taking the anti log of the estimate and subtracting 1 from it.

All the models are highly significant and results are quite similar between the two variations in the modeling approach with respect to the income variable. The applied test for the potential endogeneity of the membership variable vis-à-vis health care use and expenditure indicated in both cases, that membership is in fact exogenous and no corrections for endogeneity are needed. Overall, 151 out of 2,856 people have been in hospital within the last two years.<sup>4</sup> The most important result is that membership has a strong positive effect on the probability to go to a hospital, even though the magnitude is with a higher probability of 2 percentage points quite moderate. More important from the perspective of the functioning of the mutual is the expected strong negative effect on expenditure in the case of hospitalization. The findings in Table 5 show, that in case of hospitalization members pay on average less than half of the amount non-members pay. This is quite an impressive finding and is an indication that the mutuals seem to obtain the objective of a better financial protection against the risk of hospitalization.

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<sup>3</sup> The members of the mutual Ngaye Ngaye are treated in this analysis as “non-members” as this mutual does not cover hospitalization care, but only primary health care.

<sup>4</sup> A certain percentage of the hospitalized persons had to be excluded from the “expenditure” analysis as they were not aware of the costs which they had to pay because other family members paid for them.

**Table 5: Probability of hospitalization and determinants of expenditure in Senegal case study**

Variable	Model 1a <sup>1</sup> (hospital)	Model 1b <sup>1</sup> (hospital)	Model 2a <sup>1</sup> (expend.)	Model 2b <sup>1</sup> (expend.)
Constant	-0,301*** (0,065)	-0,137*** (0,021)	4,611*** (2,016)	9,445*** (0,642)
<b><i>Individual and household characteristics</i></b>				
Sex (1= male)	-0,014** (0,007)	-0,014** (0,006)	0,370 (0,214)	0,401 (0,21)
Age group 1 (age < 26)	-0,016** (0,008)	-0,016** (0,008)	-0,495*** (0,258)	-0,520*** (0,210)
Age group 3 (age > 50)	0,022** (0,009)	0,022** (0,009)	-0,008 (0,323)	-0,141 (0,327)
Literacy (can read/ read and write, 1= yes)	-0,107 (0,007)	-0,010 (0,007)	0,07 (0,243)	0,035 (0,239)
Membership ( in health insurance without Ngaye Ngaye, 1=yes)	0,020** (0,009)	0,020** (0,009)	-0,452** (0,287)	-0,514** (0,291)
Frequency of illness	0,009 (0,006)	0,008 (0,006)	-0,02 (0,16)	-0,03 (0,157)
Type of illness (complications during pregnancy/childbirth, 1=yes)			1,273** (0,303)	1,125** (0,299)
Severity of illness (number of days hospitalized)				0,015*** (0,005)
Wolof (household belonging to ethnic group of Wolof, 1 = yes)	-0,007 (0,020)	-0,005 (0,019)	-0,002 (0,576)	-0,033 (0,582)
Religion (1 = Christian household)	-0,005 (0,012)	-0,004 (0,012)	0,089 (0,324)	0,142 (0,323)
Income (expenditures per household member log)	0,015*** (0,005)		0,441** (0,174)	
Income tertile: Lower		-0,008 (0,008)		-0,120 (0,273)
Income tertile: Upper		0,016** (0,008)		0,67*** (0,238)
<b><i>Community characteristics</i></b>				
Fandène (household belonging to Fandène community, 1 = yes)	0,046** (0,022)	0,046** (0,022)	0,550 (0,67)	0,568 (0,676)
Sanghé (1= household belonging to Sanghé community, 1 = yes)	0,017 (0,020)	0,018 (0,020)	1,573 (0,643)	1,588 (0,643)
Mont Rolland (household belonging to Mont Rolland community, 1 = yes)	0,027 (0,022)	0,027 (0,021)	1,986* (0,636)	1,779 (0,629)
Number of observations	2855	2855	118	118
Chi <sup>2</sup> / F value	103,00	103,96	3,990	4,176
Corrected r squared			0,264	0,289
Prob > Chi <sup>2</sup> / F value	0,000	0,000	0,000	0,000
Frequencies of actual / predicted outcomes	94,7 %	94,7 %		

\* Significant at 0,1 level    \*\* Significant at 0,05 level    \*\*\*Significant at 0,01 level

<sup>1</sup>: Models 1a/2a use “income” as an explanatory variable; models 1b/2b use “income tertiles”

Source: Own estimation based on ZEF-ISED survey data

The result is not so obvious as it might look like in the first instance: The “insurance effect” of the mutual is reduced by the fact that members are being charged, too (co-payments), that



the mutuals are generally only covering hospitalization costs up to 10-15 days and that also the poor non-members might get care for a reduced rate.<sup>5</sup>

The reduction in out-of-pocket payments for members is impressive, but the cost side of joining the health insurance scheme is also important. Households have to take into account the payment of the premiums and the probability of somebody from the family being hospitalized. For an average household the annual premium totals to roughly 2 % of the households annual average income. For poor household this amount is higher and presents a barrier for joining the mutual. Roughly 5 % of the sampled population has been hospitalized, which means that out of two households, in one household a household member will be hospitalized. Only the direct cost of one hospitalization case alone totals in average to 5 % of the annual household income. This is without calculating the indirect cost of illness, i.e. loss of working hours, a reduction in labor supply and potential reduction in labor productivity. In addition the mutual also try to improve the access to preventive health care, which might impact on the probability of falling ill.

With respect to other individual characteristics, age has an influence on frequentation as well as on expenditure. In all the models, the younger population (below 21) is frequenting the hospital less often than older people and if they are going they pay less. This is quite reasonable that with an increase in age the probability of going to a hospital and the necessity to pay more for the treatment increases. Beside age also the sex of the individual matters. Women tend to frequent the hospital more often than men. Most women going to the hospital have health problems related to maternity. Complications during pregnancy and birth have a large impact on the amount of money spent as expenditure increases by more than 120 % points. Finally, the frequency of illness and education as further individual characteristics are non-significant.

Turning to the influence of household characteristics on health care use and expenditure we find that income has the expected strong positive influence on the frequency of hospitalization as well as on expenditure. This is quite in line with common economic understanding that with raising income the demand for health care increases due to higher opportunity costs. In contrast to the analysis of the determinants of participation, the variables “religion” and “Wolof” do not play a role in neither of the models. Regarding village effects, it seems that people living in Fandène have a higher effective demand for hospitalization than the people in the other three communities.<sup>6</sup> A possible explanation is the fact that Fandène is the oldest mutual, which is according to our interview partners well organized and well functioning. In addition it is also the closest mutual to the hospital St. Jean de Dieu.

In summary, the analysis of the impact of the mutuals regarding access to health care has shown, that members frequent the hospital more often and pay less for one visit than non-members. Other important variables are “age”, “the type of illness”, “sex”, “income” and village factors.

The case study on the community-based health insurance schemes in Senegal shows that the formation of a health insurance scheme for households in rural areas is possible and can result in a better access to health care for otherwise excluded people. Especially in places where local institutions have already developed forms of mutual help, there seem to exist

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<sup>5</sup> In a personal communication the hospital director explained that even after the introduction of the mutuals poor people might get free health care or at a reduced rate. This seems to depend to a large extent on his personal relationship to the medical staff.

<sup>6</sup> This effect clearly pops up, when leaving the mutual Fandène outside and the remaining mutuals get a significant negative coefficient.

possibilities to develop them to more formalized approaches. From the Senegalese case study it turns out that beside an existing local network, the existence of viable health care provider is of tremendous importance. Without the financial support of the hospital as well as the well perceived quality provided – the hospital is well known for its good quality in service provision – , it is difficult to imagine that the mutals would still exist. Hence, subsidies seem to be necessary if one wants to set up an insurance scheme for poor people.

Finally, also individual and household characteristics play a role for the viability of rural health insurance schemes. In areas with widespread poverty and a scattered population setting up a health insurance scheme is much more difficult than in more richer and populated areas. As the analysis of the determinants of participation in micro-insurance schemes has revealed against the expectations of most donors and policy makers they do not necessarily reach all population groups in a village. Support for this group should therefore be secured by the state. This could be done for example in the form of subsidized premiums.

## **5 Outlook**

The results of the experience with mutual health organization in Senegal suggests, that rural health insurance for the poor is under certain conditions feasible. More importantly, it could be shown that access to health insurance can have a positive impact on the economic and social situation of their members. To what extent health insurance, or rather the lack thereof affects people's labor productivity and willingness to undertake risky, but potentially profitable investments needs to be further investigated.

To enlarge the access to health care of the poor and the rural population, community based health insurance schemes can be an important element and a first step. It allows to a limited degree to pool risks and thereby leads to an improvement in the health care system, where most people otherwise have to pay their health expenditure out-of-pocket. However, the study also points to the persisting problem of social exclusion, i.e. that the poorest of the community have no opportunity to participate and they have not enough resources to pay the required premium. In order to overcome these limitations of community based health insurance, broader risk pools are required. In particular, the role of external financial support such as government subsidies, donor funding, re-insurance in encouraging social inclusion needs to be further explored. Further research is needed, how these schemes can be scaled up and replicated as well as how to link them to other social risk management instruments like social funds.

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