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Impact of Mutual Health Insurance on Urban Households Health Expenses and Vulnerability in Burkina Faso

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Mutual Health Insurance Impact on Urban Households Health Expenses and Vulnerability in Burkina Faso

The objective of this paper is to assess the effects of long-term participation in a mutual health insurance programme on urban households' health expenses and vulnerability in Burkina Faso. With data collected in 2013 from a series of interviews with beneficiaries of two mutual health insurance, the study performs a descriptive approach and an econometric technique (propensity score matching). The mutual health insurance program is highly valued, with 90.7% of short term (STB) and 98.3% long-term (LTB) beneficiaries willing to renew their policy insurance. They considered mutual health insurance schemes to be a good mechanism for covering disease risks, as 63.5% of STB and 79.3% of LTB were ready to take out insurance with another company if their mutual insurance no longer offered it. With a higher vulnerability incidence among STB (48.2%) compared to LTB (41.4%), access to mutual health insurance services seems to have a different impact on the well-being of beneficiary households. Indeed, long-term participation in a mutual health insurance has a positive impact on reducing household health expenses ($ATT=0.185$; $t = 2.152^{**}$) and no statistically significant effect on their vulnerability ($ATT=0.002$; $t=0.022$). More efforts should be made to improve its effect on vulnerability, especially for the poorest.

Keywords: Mutual Health Insurance, Vulnerability, Households, Impact, Burkina Faso.

Subject classification codes: I11, I15, J17

1. Introduction

The global outbreak of the COVID-19 pandemic has shown the importance of building a strong social protection system in all countries to help address the various risks, especially systemic risks, and their consequences on social life. In recent years, many developing countries governments have started implementing universal health coverage (UHC) programmes, which are needed to strengthen health systems, reduce health inequalities, and improve access to primary health care (Trakinsky et al., 2020; Woldemichael, 2020).

Despite the growing share of the national budget devoted to health expenditure¹ in Burkina Faso, the national health insurance system is characterized by a meagreness of health care provision for many households (Kagambega, 2011; 2014). This system allows civil servants and some workers in the formal private sector to be the only beneficiaries (Droin et al. 2008). Out of more than 20 million people, between 2 and 5 million benefit directly and indirectly from formal health coverage (Kagambega, 2011). By Agier et al. (2016), this system covers only 0.5% of women and 1.5% of men. The number of contacts with health services per capita per year was 0.9 in 2014 and the bed occupancy rate is 53.2% (WHO, 2016). There are many factors hindering the extension of health coverage (De Allegri et al. 2006; Kagambega, 2011, 2014). The cost of health care benefits and medicines for households² and the economic losses resulting from illness, the lack of adequate resources at the right time, remoteness, the lack of strategic coordination of the various existing initiatives, the lack of information, the refusal of health centres to implement policies, the identification problem are still obstacles to the emergence of social protection with broad health coverage in Burkina Faso.

¹ By the World Bank database, the current health expenditure (% of GDP) in Burkina Faso grew from 3.3% in 2000 to 7.0% in 2016. <https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=BF>

² The out-of-pocket expenditures by households were about 36% in 2015, from 27.0% in 2007. <https://data.worldbank.org/indicator/SH.XPD.OOPC.CH.ZS?locations=BF>

In this context, a system of universal health coverage (UHC) was introduced in 2018 with the objective of a better generalized social health insurance policy. Coverage is supposed to be conditional on a contribution and set according to the capacity of each household (Agier et al., 2016). This new system is built on a national health insurance fund and initially cover all workers in the formal sector before being gradually extended to all populations. However, extending this new system to the informal sector and rural population remain a challenge. At that point, it is important to rely on the experience of mutual health insurance. So far, mutual health insurance schemes have been one of the active insurance programmes, which consider actors from the formal, informal and rural sectors. Although with a limited funding and outreach, they have proved important in addressing some limitations of the formal national health insurance system.

In 2013, there were nearly 105 mutual health insurance organisations in the country, representing nearly 150,000 beneficiaries (LeFaso, 2014). Half of these mutual health insurance organisations are part of the mutual health organisations support network named RAMS which supports the creation and promotion of mutual health companies in order to encourage access to quality care (Droin et al. 2008). Within the framework of the current policy of organising and extending coverage of the population's health needs, it is obvious to take an interest in these mutual health insurance schemes, which have a long history and a strong geographical proximity to households. There can be seen as a gateway to universal health insurance (UHI). A good idea would be to build on the achievements of these organisations. But relying on these actors presupposes that the government has a fruitful idea of their contribution to the well-being of individuals or households participating in their programs. After almost three decades, very few studies have analysed their contribution to reducing the burden of health expenditure and their impact on households' well-being.

To partially fill this gap, this paper examines the impact of a long-term participation in a mutual health insurance on household health expenditure and vulnerability. We rely on data we collected from beneficiaries of two mutual health insurance schemes in Burkina Faso in 2013 to analyse the determinants of household long-term participation in mutual health insurance and its impact on their health expenditure and vulnerability. Thanks to the mutual health insurance mechanism, beneficiary households can assess the interest and relevance of the programmes. Our main assumption is that long membership is synonym with good, reduced health expenses, and reduced households' vulnerability. Alongside a descriptive qualitative overview, we perform the econometric propensity score matching method to assess the effects of long-term participation in mutual health insurance on health expenses and vulnerability.

We will first conduct a brief review of the impact of insurance on health expenses and household vulnerability and provide a description of the data and the beneficiaries perception of the effects of mutual health insurance. Then, the econometric method is explained, and the results will be presented and discussed. The last section is a conclusion.

2. Literature review

It is recognized that disease risk is most prevalent among households and children, particularly in sub-Saharan Africa (IHME & World Bank, 2013; Cohen and Sebstad, 2000). Sickness leave can result in a household inability to generate income and force it to allocate part of this income to an area that is not included in its current economic portfolio. Despite the seasonal nature of some diseases such as malaria, very few households can anticipate them with formal savings and insurance. In Burkina Faso, Bocoum et al (2018) study the burden of household health care in rural areas and find that the burden of health shocks and health expenditure is high, ranging from one-third of

monthly non-medical consumption for the treatment of common infectious diseases to almost three times the monthly non-medical expenditure in the case of death of a household member. The economic consequence is that households deplete their savings, sell their livestock or reduce their consumption. In the absence of sustainable livelihoods, this increases household vulnerability. Facilitating access to basic health services is one of the solutions that can strengthen their physical potential while minimizing their economic vulnerability. The implementation of large-scale insurance programmes could contribute to the process of improving household well-being. However, the value of insurance is widely discussed, especially since many studies seem to show a low level of re-adherence, around 30% if the product is subsidized and below 15% if it remains voluntary (De Bock and Gelade, 2012). In Africa, governments in countries such as Rwanda and Ethiopia play a central role in encouraging individuals to enrol in CBHI (Lavers, 2019; Woldemichael, 2020). In contrast to West African countries, enrolment rate is high, about 75% in Rwanda (Chemouni, 2018; Lavers, 2019) and CBHI covers 11 million people, or about 16% of the informal sector in Ethiopia (Lavers T., 2019).

Health insurance makes sense when it leads to a change in the demand for care and an improvement in the beneficiaries' well-being. Mutual insurance should play a catalytic role as studies seem to show that participation in these programs is positively correlated with an increasing level of health care consumption and a reduction in personal health expenditure (Franco et al. 2008; Jütting 2003; Pham Tra and Pham Thong, 2012; Spaan et al. 2012). Franco et al (2008) show that in Mali, mutual members with up-to-date premiums were 1.7 times more likely to be treated for fever at a modern facility, 3 times more likely to present their child with diarrhoea at a health centre and 2 times more likely to receive four or more prenatal visits and sleep under an insecticide-treated net. In Vietnam, Pham Tra and Pham Thong (2012) find that participation in the Health

Protection Funds for the Poor program reduces individual expenditures on care for poor participants and increases the intensity with which they seek care and regular follow-up in public health facilities. Jütting (2003) sought to analyse the well-being of rural members of a health insurance program in Senegal compared to non-members. The author concluded that even in poor environments, insurance programs can work as members of mutual health insurance schemes are more likely to use hospital services than non-members and to pay much less when they need care. Similarly, by Lavers (2019), participation in CBHI improves healthcare utilization and reduces the out-of-pocket (OOP) expenditure across income groups in Ethiopia. This result is in line with the finding of Spaan et al (2012), who show through a meta-analysis on health insurance in Africa and Asia that mutual health insurance and social health insurance contribute to improving health services use and protecting members by reducing OOP expenditure.

These analyses contrast with those of Morsink et al (2011), Wagstaff (2007), Wagstaff et al (2007) and Chankova et al (2008) who found, respectively, that insurance had no impact on personal health expenditures and did not reduce ambulatory care expenditures. Households with health insurance are more likely to have enough money to pay for health care (Wilms, 2006) while some are forced to borrow from various formal and informal sources to pay the insurance premium. For instance, Wilms (2006) observed in Uganda that less than half of the insured were able to pay for insurance and that in rural areas, more than 60% did not have enough money to pay for health insurance. In rural sector, at least 53% of households had borrowed money to insure themselves. In urban area, 75% of the insured could not afford the premium. In the same vein, Trakinsky et al. (2020) assess the performance of financial protection indicators for UHC monitoring. They show that, among households that reported a sick member, those in the poorest wealth quintile had higher rates of zero OOPs than those in the richest quintiles. They

conclude that it is likely a lack of affordability, rather than a simple lack of need, that explains the higher rates of zero OOPs observed among poor households. From this perspective, Dong et al. (2005) suggested early on that the insurance premium should be adjusted for income and subsidised for a large proportion of poor to help break out of the cycle of vulnerability and poverty.

According to Yilma et al. (2015), health insurance schemes could protect household's economic welfare in the short and long run by facilitating rapid recovery and reducing pressure on households to reallocate resources from productive uses to medical expenses. In Ethiopia, Yilma et al. (2015) find that the main benefit of the health insurance scheme is its effect on reducing the need to borrow, which could have longer-term benefits by reducing vulnerability to other forms of shocks. For Hamid et al (2011), the combination of health insurance with microcredit further contributes to improving the poverty status of beneficiary households. Based on primary data from the 2006 household standard of living Survey in rural Bangladesh, they found that Grameen Bank's micro health insurance program had a statistically significant positive impact on household food self-sufficiency and income stability.

It is however suggested to consider different factors including the gender issues regarding the willingness-to-pay (WTP) for community-based insurance. In Burkina Faso, Dong et al. (2003) found that, education, income and expenditure, episodes of diseases, household head, marriage rate influenced the difference in WTP between men and women. Being men, having high level of education and coming from an advantaged family increase the willingness to join a CBHI. Inversely, the higher the age and the longer the distance, the lower the WTP. Similarly, the insurance take-up does not seem to be systematic, especially among poor households. Panda et al (2015) show that after 4 years of existence in rural Bihar and Uttar Pradesh in India, the health insurance recovery

rate is only 20%. They found that only people living in households that received benefits correctly are the ones likely to recover the health insurance policy.

The above review provides a contrasted view on the impact of mutual health insurance on households that raises the importance of our study perspective in the case of Burkina Faso. We look at the impact of mutual health insurance on household health care expenses and vulnerability by assuming that subscribing to a mutual health insurance scheme reduces health expenditure and improves the opportunity to re-enrol in health insurance. As a result, long-term participation reduces household vulnerability.

3. Data and descriptive statistics

3.1. Source of data

The data we use are part of the data from the survey we conducted in 2013 on “Microinsurance and Households vulnerability” in Burkina Faso with a view to assessing the outreach and effectiveness of various insurance programs. Data collected is cross-cutting and covers three types of insurance programs: agricultural insurance, mutual health insurance, and credit-life insurance. For the purpose of this study, we extract data on health insurance, based on interviews with some randomly selected beneficiaries of two large urban mutual health insurance schemes in Burkina Faso named Laafi Baore (LB) in Ouagadougou and Keneya Sira (KS) in Bobo Dioulasso. Both organisations are urban mutual health organisations affiliated to the Burkina Faso mutual health organisations support network (RAMS) and based on the mutualist principles (Box 1).

Box 1: Characteristics of urban health mutual Laafi Baore and Keneya Sira in Burkina Faso

LB started its activities in early 2006 with the aim of facilitating its members' access to quality health care at a lower cost by partially covering the cost of hospitalisation in Ouagadougou. Anyone aged at least 18 years can join as head of a household (or parents) and insure minor family members. In 2013, the health insurance costs 800 FCFA per month. The mechanism consists in covering 70% of medical expenses (doctors and medicines), the remaining 30% being paid by the insured. In the event of illness and related expenses, patients' families pay

only 30% of the expenses with their membership card to the partner institutions, 70% of which are covered by the mutual insurance company. Nearly 800 households were insured with LB in 2013. LB mobilised CFAF 10 million as premiums, or CFAF 13,441 per insured household.

KS was founded in May 2004 with the objective to help the poor people of Bobo Dioulasso, whose resources seem limited, to solve their ordinary health problems in a sustainable way. In 2013, 1400 members were registered from 111 members in 2004-2005 financial year. KS is also open to anyone willing to accept the cooperative principles. Membership was subject to the payment of a membership fee set at CFAF 1000 in 2013 and the member paid an annual premium of CFAF 2000. In 2012, KS has introduced the principle of a 20% co-payment, i.e. it covers 80% of medical expenses. It collected approximately CFAF 2.8 million as premiums.

Source: Varenne et al. (2010) and Author (based on documentation and interviews)

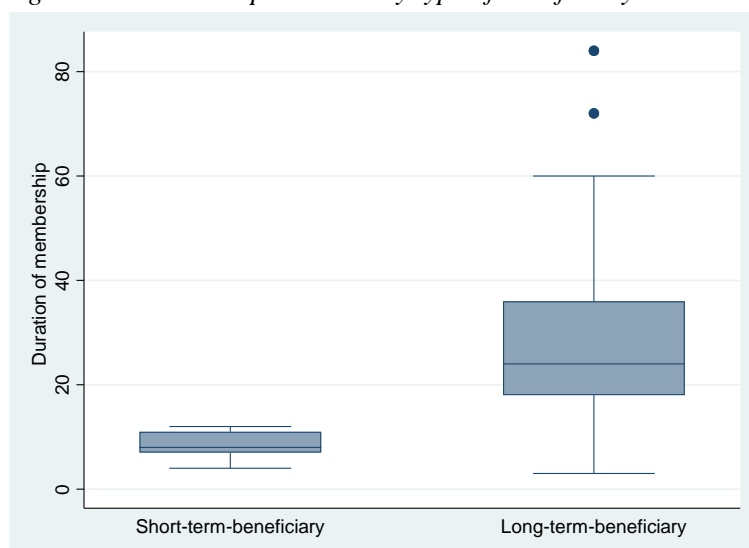
To carry out the sampling, we applied a simple random sampling inside from the targeted areas. A random number is determined for each insured using the random function in Excel. Then, we sort in descending order according to randomness and we retain the first subscribers up to the determined size. In Bobo Dioulasso, 57 insured households were surveyed, and 55 households took part in the surveys in Ouagadougou. A total of 112 surveys were carried out. A questionnaire was introduced with 6 main themes: (i) household identification: socio-demographic characteristics; (ii) housing characteristics and household comfort; (iii) food and non-food consumption expenditure; (iv) activities and income of household members and assets (land, livestock assets, agricultural and non-agricultural productive equipment and durable and other assets); (v) major risks/shocks over the last three (3) years and intra-household risk management strategies; (vi) health insurance: detailed information on current insurance, interest, changes/impacts on your life and that of your household, level of satisfaction. Some of these various themes have been analysed in this study to evaluate the impact of long-term participation in mutual programs on households' medical expenses and vulnerability. Due to the similarity in the two mutual mechanism, we decide to consider analysing all the 112 observations by focusing only on the membership duration.

3.2. Descriptive Analysis

3.2.1. Treatment variables and outcome variables

Our main hypothesis is based on the membership duration in a specific mutual health insurance programme which suggests long-term participation results in a significant decrease in households health care expenses and vulnerability. To conduct this analysis, we separate two groups of insured households, i.e. short-term (less than 2 years) and long-term beneficiaries (more than 2 years). This distinction is based on the assumption that the time spent in the programme (at least 2 years) implies regular access to a quality of health care and gives sufficient experience and time to rigorously appreciate the interest as well as the impact of the programmes.

Figure 1. Membership duration by type of beneficiary



Source: Author's calculation based on 2013 survey data from Burkina Faso.

The short-term beneficiary group is composed of 54 insured households and long-term beneficiary group of 58 insured households. Figure 1 shows the membership duration by type of beneficiary. The average membership duration is 20.3 months and is 8.6 months for short-term beneficiary and 31.2 months for long-term beneficiary. The difference between the two group is statistically significant ($t = -9.3066$) and allows to conduct our analysis based on the two groups. This variable will be used as our main treatment variable as binary indicator.

Table 1 : Average exposure and expenditure amount

	Detail on status	Frequency of disease risks	Amount of damages induced (CFAF)	Relative vulnerability status
Status of beneficiary	Short-term beneficiary	2.3	71492.7 (65175.6)	48.2%
	Long-term beneficiary	1.9	92642.9 (102891.3)	41.4%
Total	All-average	2.1	82445.5 (87047.8)	44.6%

Source: Author's calculation based on 2013 survey data from Burkina Faso.

We consider two main outcome variables which are health expenses and vulnerability to poverty. The first outcome variable is household health expenses in line with the disease risk. Over the past three years, disease has been the most frequently cited risk by households surveyed. On average, long-term insured households were slightly less affected than short-term insured households (Table 1). Disease risk weighs heavily on the household budget. Households spend on average CFAF 82 445.5³ on health services. Short-term beneficiary households spend less than long-term insured households. This may reflect the difference in living standards between the two groups. The more we spend, the less we are exposed to disease risks.

The second outcome is the vulnerability to poverty. First, the national poverty line (CFAF 108,454) estimated by the Burkina National Institute of Statistics and Demography (INSD,-2010) was updated to CFAF 116,154 in 2012. Compared with the reported consumption expenditure, 43.8% of insured households can be considered poor, which is similar to the official poverty rate estimated at 43.9% in 2010. We then estimated the level of vulnerability⁴ of households according to their standard of living and the amount of damage caused by illness risks. On this basis, 46.4% of households can be

³³ USD 1 = CFAF 495.97 in December 2012.

⁴ The calculation of this observed vulnerability takes into account respectively the sum of the value of households' net available savings, the current value of livestock, the value of household consumption expenditure, minus the value of the amounts of damage caused by the occurrence of risks. This is compared to the 2013 poverty line in Burkina Faso .

considered vulnerable and 53.6% as non-vulnerable. This result is very close to that obtained by World Bank (2013) which showed that household vulnerability is 44.8%. Vulnerability appears to be much higher among short-term beneficiary households (48.2%) compared to long-term beneficiary households (41.4%). This suggests that the latter are in better economic and financial arrangements to respond to the challenges associated with the multiple daily shocks.

3.2.2. Age, education and other socio-economic dimensions

The average age is 40.8 years. Insured are mostly single or married monogamous. Short-term insured age is higher than long-term age. Health insurance companies seem targeting men more, while women are more represented in the short-term beneficiaries' group and men in long-term group. Two thirds of beneficiaries are household headed. Long-term beneficiaries are more likely to be heads of households than short-term insured. Beneficiaries are from households with an average size of 5.2 individuals, with 5.4 in short term beneficiary households and 4.9 in long-term beneficiary households.

In term of habitation ownership, short-term and long-term insured are more likely to rent a house or apartment. Long-term insured appear to be the most educated with a difference of 10% points at the "superior level". As a result, the socio-professional stratification shows that long-term insured are more executive and employer. They are slightly more represented in industry, agriculture, manual processing sectors. Short-term insured are mainly employee, individual worker and intervene more generally in private, public and informal sectors.

Table 2: Socio-demographic and professional characteristics of mutual health insurance beneficiaries

Parameters	Details	Status of beneficiary		Total
		Short-term beneficiary	Long term beneficiary	
Household head	Headed	50.0%	77.6%	64.3%
Sex	Male	48.6%	52.1%	66.0%

	Female	51.4%	47.9%	34.0%
Age	Average Age	41.8	39.8	40.8
Marital status	Monogamous	24.1%	25.9%	25.0%
	Polygamous	24.1%	5.2%	14.3%
	Divorce, widow	0.0%	1.7%	0.9%
	Cohabitation	3.7%	0.0%	1.8%
	Single	48.1%	67.2%	58.0%
House ownership	Owner	38.9%	39.7%	39.3%
	Rent	48.1%	51.7%	50.0%
	Other-free	13.0%	8.6%	10.7%
Household size	Number	5.4	4.9	5.1
Literacy	Read and write	29.6%	32.8%	31.3%
Level of education	None	68.5%	67.2%	67.9%
	Primary	3.7%	5.2%	4.5%
	Secondary	13.0%	12.1%	12.5%
	High school	13.0%	5.2%	8.9%
	Superior	3.7%	13.8%	8.9%
Activities sectors	Agriculture	0.0%	6.9%	3.6%
	Crafts, manual processing	5.6%	8.6%	7.1%
	Industries	3.7%	20.7%	12.5%
	Public service	20.4%	10.3%	15.2%
	Private service	55.6%	43.1%	49.1%
	Other services	14.8%	10.3%	12.5%
Socio-professional categories	Executive	11.1%	13.8%	12.5%
	Employee	40.7%	39.7%	40.2%
	Labourer	9.3%	12.0%	10.7%
	Employer	1.9%	5.2%	3.6%
	Own account	37.0%	29.3%	33.0%
N	Observations	54	58	112

Source: Author's calculation based on 2013 survey data from Burkina Faso.

3.2.3. Perceived coverage and disposition to insure households' members

Access to the mutual health insurance service appears to have a high added value. According to beneficiaries, the value of health insurance coverage is higher than the amount of contributions they pay to receive health benefits. Insured households pay an average of CFAF 13,985.7 in premiums and receive CFAF 18,006.7 in coverage per capita (Table 3). This valuation of insurance coverage is slightly better perceived by long-term insured compared to short-term ones.

Table 3: Insurance premium and perceived value of coverage in Burkina Faso (in CFAF)

	Detail on status	Average insurance premium payment	Perceived value of insurance coverage (proxy)
Status of beneficiary	Short-term beneficiary	11 696.3 (12 299,8)	15 657.4 (15 623.0)
	Long-term beneficiary	16 117.24 (13 266,5)	20 194.0 (16 057.6)
N-total	All average	13985.7 (112 943.6)	18 006.7 (15 941.6)

NB : in brackets (standard deviation)

Source: Author's calculation based on 2013 survey data from Burkina Faso.

We then apprehend the health insurance attractiveness and its value not only through the desire to take out a new insurance policy but also through the purchase of insurance for other members of the household. Table 4 shows that more than 9 out of 10 insured were willing to take out a new insurance policy with the same mutual insurance scheme. As they have had time to assess the effects, more long-term insured wanted to renew their insurance policy (98.1%) than short-term beneficiaries (90.7%).

In 74.1% of all insured households, at least one member in addition to the main insured had access to health insurance product. There is a difference between short-term insured households (77.8%) and long-term insured households (70.7%). This could mean that households in the short-term group who are most vulnerable are looking for more means to protect themselves against potential disease risks. They seem interested in anticipating the effects of a future shock. This strategic behaviour is facilitated by the system of mutual health insurance where contributions can be made for each member of the household in addition to the principal insured. In contrast, compared to long-term beneficiaries (79.3%), short-term insured (63.5%) are less more likely to switch to another company if their current health insurance no longer offers insurance service. This result is far from expressing a contradiction but rather the rapport of trust between these two insured groups and their current mutual health companies on the one hand, and their perception of the intrinsic value of the health insurance, on the other hand.

Table 4: Health insurance take-up and interest for beneficiaries in Burkina Faso

	Detail on status	Perceived impact on health care spending			Monthly health expenses reduction by ... CFAF ¹
		Health costs unchanged	Cutting in health care costs	Health spending more important	
Status of beneficiary	Short-term beneficiary	71.7%	24.5%	3.8%	7377.8 (4888.9)
	Long-term beneficiary	57.9%	33.3%	8.8%	9 334.5 (6175.1)
N-total	All average	64.5%	29.1%	6.4%	8 391.1 (5653.2)

NB : 1 : considers positive answers in %

Source: Author's calculation based on 2013 survey data from Burkina Faso.

3.2.4. Perceived effects of health insurance: qualitative versus quantitative

Table 5 presents the results of the perception of mutual health effects according to the insured group. It shows that 64.5% of insured believe that access to insurance has not had a significant effect on their health expenses. Almost a third observed a decrease in their expenses, as they were covered by mutual health insurance scheme at least 70% of their health expenses. We observe differences between short-term and long-term participants as the latter find a higher impact. The reduction in monthly health expenses is CFAF 8,391.1 and it is greater for long-term beneficiaries. These results suggest that long-term participation in the insurance programmes could help reduce health expenditures and improve well-being.

Table 5: Perceived impact of health insurance on health care expenditure

Status of beneficiary	Detail on status	Health insurance renewing ¹	Household insured (one more member at least)¹	Obtain insurance from another company, if the mutual no longer offers it¹
Beneficiary status	Short-term beneficiary	90.7%	77.8%	63.5%
	Long-term beneficiary	98.3%	70.7%	79.3%
N-total	All average	94.6%	74.1%	71.8%

NB: 1: Reporting-considering only positive answers in %.

Source: Author's calculation based on 2013 survey data from Burkina Faso.

4. Econometric Strategy

Our goal is to estimate the causal impact of the long-term participation in health insurance programs on health expenses and vulnerability addressing endogeneity and heterogeneity in treatment effect. We have to better appreciate the identification of this effect. The outcome of the insured group (short-term or long-term) is directly observable, it is not the case for the counterpart with same characteristics due to many factors, particularly when the condition of randomization in treatment is not respected. To overcome the sampling bias, we use the propensity score matching (PSM) method of Rosenbaum and Rubin (1983). This method is expected to reduce the selection bias in non-randomised data sets and facilitate the comparison. It is based on two steps. We first conduct a logit regression model in which a set of control variables is considered to estimate a propensity score. The logit estimation technique regression is consistent with dichotomous dependent variables and is employed here to assess the decision to be a long-term participant in a mutual health programme or otherwise. It is specified as follows:

$$Y_i = \beta X_i + u_i \quad (1)$$

where $Y_i = 1$, if the insured household makes a choice to participate longer in a specific program and $Y_i=0$, if the individual insured household has just joined the program and/or choose not to be a long-term participant. Equation (1) represents a model with a binary choice involving an estimation of the probability of an individual insured household being long-term beneficiary (Y_i) given a set of factors (X_i) which are considered exogenous to the individual. It is expressed as below:

$$P(Y_i = 1) = f(X_i, \beta_i) \quad (2)$$

$$P(Y_i = 0) = 1 - f(X_i, \beta_i) \quad (3)$$

where Y_i is the observed response of i^{th} individual insured household who is long-term beneficiary or not and $Y_i = 1$; $Y_i=0$ and X_i are the set of characteristics as defined. The logit model uses the logistic cumulative function to estimate the probability as follows:

$$P(Y = 1) = \frac{e^u}{1 + e^u} \quad (4)$$

$$P(Y = 0) = 1 - \frac{e^u}{1 + e^u} \quad (5)$$

where $u = \beta'X$. The probability model is a regression of conditional expectations of Y on X . The same analysis is carried out for “health care expenses reduction” and “vulnerability to poverty” as binary outcomes.

Then, we consider a selection of a matching procedure to enable the comparison between subjects (treated group/control group) that share the same propensity score. We choose for our study the “Kernel matching” because it is nonparametric method and it is the only method where data on all the units in the control group are used to construct the counterfactual. Afterwards the measurement of the treatment impact is done through calculating the average treatment effect on treated subjects (ATT) through another regression. More specifically, the effect of the treatment on any of the subjects is: $Y_i(1) - Y_i(0)$ and the average treatment effect for the treated subjects (ATT) is:

$$E[Y_i(1) - Y_i(0)|D=1] \text{ where } E \text{ refers to the expectation.}$$

When X is the multidimensional vector of pre-treatment characteristics, the propensity score is represented as:

$$p(X) \equiv \Pr(D = 1|X) = E(D|X)$$

Considering the beneficiary population and the propensity score $p(X_i)$, the impact of the long-term participation is evaluated by calculating the ATT as follows:

$$\begin{aligned} \tau &\equiv E\{Y_{1i} - Y_{0i} | D_i = 1\} \\ &= E[E\{Y_{1i} - Y_{0i} | D_i = 1, p(X_i)\}] \\ &= E[E\{Y_{1i} | D_i = 1, p(X_i)\}] - E\{Y_{0i} | D_i = 0, p(X_i) | D_i = 1 \} \end{aligned}$$

where i denotes the i^{th} beneficiary, Y_{0i} and Y_{1i} are the potential outcomes (health expenses or household vulnerability) — for the two opposing conditions.

In addition to the propensity score matching based on kernel, we will consider other methods or matching techniques to test the robustness of our results, such as PSM

with radius and nearest neighbour methods.

5. Results and discussion

Results are presented and discussed in section 5.1 and 5.2. We first discuss the determinants of the different outcomes and treatment indicators: long-term participation, health expenses and household vulnerability. Then, we analyse the impact of long-term participation on health expenses and vulnerability of household beneficiary.

5.1. Determinants of long-term membership in a health insurance program

As the PSM method selects only variables which affect both program participation and outcomes, only gender, age, household size, literacy, high school, employee, house-construction material are retained in estimation of the propensity score. To this effect, we conduct the determinants analysis by focusing on these variables of control.

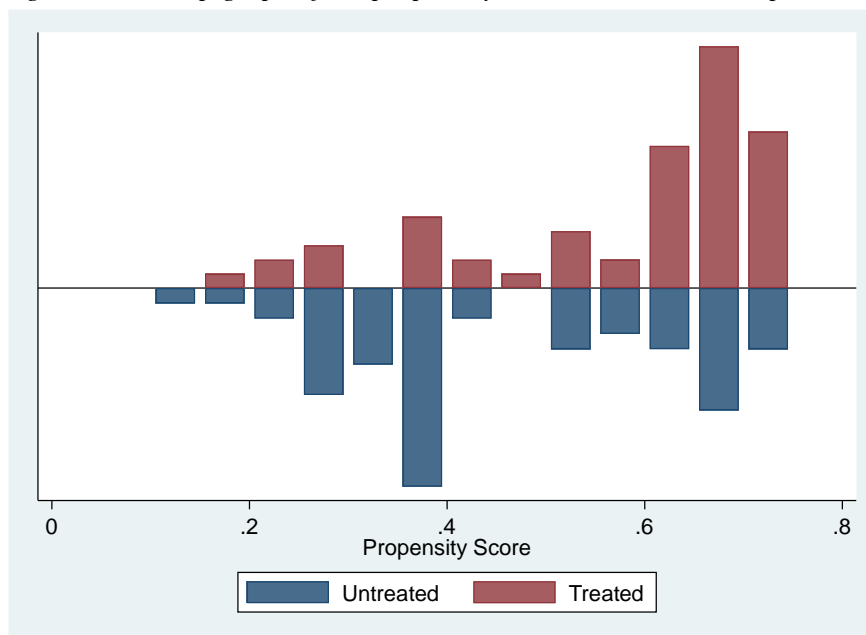
Table 6: Logit for PSM estimates for long-term participation, health expenses and household vulnerability

	Long-term participation			Health expenses reduction			Vulnerability to poverty		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Woman	-1.270***	0.463	-2.74	0.685	0.518	1.32	-0.063	0.531	-0.12
Age	0.015	0.017	0.90	-0.042**	0.020	-2.12	0.044**	0.019	2.34
Household size	-0.046	0.081	-0.57	0.056	0.084	0.66	0.272***	0.100	2.71
Employee	0.034	0.421	0.08	-1.385***	0.513	-2.70	-1.173**	0.476	-2.46
Literacy	0.232	0.525	0.44	-0.228	0.596	-0.38	-1.328**	0.592	-2.24
High school	-1.341	0.837	-1.60	0.673	0.890	0.76	0.666	0.914	0.73
Fired/cement bricks	0.693	0.526	1.32	-0.562	0.591	-0.95	-0.289	0.549	-0.53
<i>Insured status</i>				0.769	0.495	1.55	-0.025	0.482	-0.58
_Cons	-0.364	0.971	-0.38	0.697	1.078	0.65	-2.339**	1.086	-2.15
<i>LR(χ^2)</i>	14.85			14.48			30.53		
<i>Prob(LR(χ^2))</i>	0.038			0.070			0.000		
<i>Pseudo R²</i>	0.096			0.108			0.1983		
<i>Obs.</i>	112			112			112		

Table 6 provides a few results that indicate that being a woman reduces the probability of being long term beneficiary of a mutual health insurance company. Any other variables do have a statistically significant effect on long-term participation in a program, even though some of them present an expected sign. For health expenses reduction, the greater the age the lower the reduction in household health expenses. This means age can decrease the probability of household health expenses reduction. As well, being employee might decrease the likelihood of health expenses reduction. Said differently, the status of employee can cause an increase in the household health expenses. In the case of household vulnerability to poverty, the results show that being literate as well as being employee in a company reduce the probability of being vulnerable to poverty, but age and household size are a solid determinant of vulnerability to poverty.

Using the results of the logit model, we derived the propensity scores. The final number of blocks which ensures that the mean propensity score is not different for treated and controls in each block is 4. The equal variances test for the balancing property for each variable in each block is also satisfied. Also, Figure 1 indicates that the matching mechanism based on the propensity score overlap is suitable. Although 0 treated and 3 untreated are off-Support, we find that the overlap in p-scores between the two groups is good; that is, for the majority of p-scores, in both the comparison and treatment groups. The mean propensity score is not different for treated and controls.

Figure 2: Overlap graph of the propensity scores in matched sample



Source: Author's calculation based on 2013 survey data from Burkina Faso.

5.2. Effect of long-term membership on household health expenses and vulnerability

Table 7 and 8 present the results of propensity score estimates based on 3 matching methods – Kernel matching, Nearest Neighbour Matching and Radius model – regarding the effects of long-term membership on health expenses and vulnerability. All results are based on the bootstrap which corrects standard deviation biases of variables from another regression, since the procedure is performed in two steps.

Effect of long-term membership on health expenses

Findings based on Kernel matching method support the hypothesis that long-term participation in a mutual health insurance program have a positive effect on health expenses reduction in Burkina Faso. Indeed, the average effect of health expenses reduction is significantly higher among long-term participants ($ATT=0.185$; $t = 2.152^{**}$) compared to the counterfactual group with the same average propensity score. A 10% (100%) increase in long-term participation could lead to an increase in the difference in

health expenses reduction of 1.85% (18.5%) between the treatment and control groups. This result is consistent with those of many studies that show that participation in mutual health insurance programs is positively correlated with a reduction in personal health expenditure (Jütting 2003; Spaan et al. 2012; Pham Tra and Pham Thong, 2012).

We check the robustness with other matching techniques. The two alternatives (Nearest Neighbour and Radius) confirm the kernel matching findings with the same level of significance with a slight difference in the degree of treatment effect.

Table 7: Treatment effect of long-term participation on household health spending reduction

	<i>Kernel method</i>	<i>Matching Nearest Neighbour</i>	<i>Radius</i>
Untreated (on support)	51	33	51
Treated (on support)	58	58	58
ATT/ ATE	0.185	0.224	0.182
S.E.	0.086	0.114	0.091
T-stat	2.152**	1.96**	1.99**

Source: Author's calculation based on 2013 survey data from Burkina Faso.

Effect of long-term participation on vulnerability

Findings in Table 8 suggest that, all techniques considered, the long-term participation in a mutual health insurance program has no significant effect (ATT=0.002; t=0.022) on the household vulnerability to poverty. Some of the techniques present even a negative sign indicating that short-term participation might have a higher treatment effect of vulnerability reduction compared to the counterfactual group, long-term beneficiary, with the same average propensity score, but this result is not statistically significant.

This result echoes those of studies which state that, in general, households with health insurance are more likely to have enough money to pay for health care while some are forced to borrow from various formal and informal sources to pay the insurance premium (Wilms, 2006; Trakinsky et al., 2020). The impact of long-term participation on

health expenses doesn't change noting on the economic well-being of households who have enough money to pay for health care themselves. For the more disadvantaged households, the impact of participation could worsen their current situation as they may borrow money to insure themselves. In this perspective, following Dong et al. (2005), the insurance premium should be income-adjusted, even subsidised by the government to help the poor break out of the cycle of poverty and chronic vulnerability.

Table 8: Treatment effect of long-term participation on household vulnerability

	<i>Kernel Matching</i>	<i>Nearest Neighbor Matching</i>	<i>ATT_{Radius}</i>
Untreated (on support)	51	33	51
Treated (on support)	58	58	58
ATT/ ATE	0.002	-0.034	-0.005
S.E.	0.097	0.113	0.094
T-stat	0.022	-0.305	-0.057

Source: Author's calculation based on 2013 survey data from Burkina Faso.

6. Conclusion

The study has tried to assess the impact of long-term participation into a mutual health insurance program on the urban households' health expenses and vulnerability in Burkina Faso. Based on dataset collected in 2013, and using descriptive and PSM technique, we find the following results. The mutual health insurance programs are highly appreciated, with 90.7% and 98.3% of short term (STB) and long-term (LTB) beneficiaries respectively who were willing to renew their policy insurance. Mutual health insurance is considered as a good mechanism as 63.5% of STB and 79.3% of LTB were ready to get insurance from another company, if the mutual no longer offers it. With a higher vulnerability incidence among STB (48.2%) compared to LTB (41.4%), access to mutual health insurance services seem to have varying degrees of impact on beneficiary

household's well-being. Long-term participation in a program has a positive impact on the reduction of the household health expenses (ATT=0.185; $t = 2.152^{**}$) but no statistically significant effect on their vulnerability (ATT=0.002; $t=0.022$).

This has several explanations. On the one hand, the effect is immediate on health expenditures because of the coverage promoted by the health insurance schemes. The insured person pays only 30% of the costs associated with health care spending to partner institutions. On the other hand, the impact of long-term participation on health expenses doesn't change noting on the economic well-being of households who have sufficient money to pay for health care themselves. For the less advantaged households, the impact of participation could deteriorate their current situation as some of them can borrow money in order to be insured. In general, a household vulnerability depends on a set of factors that goes beyond health care costs. There is no systematic link between lower health expenditures and overall household well-being.

More generally, the program of the two mutual health insurance had been developed at a moment to meet the urgent needs of the population, both because of the inadequacy of the formal social protection mechanism and because of their exposure to systematic disease risks in Burkina Faso. With the principle of mutualisation of health risks, they are relevant for poor households whose resources are limited to meet individually the associated costs. The mutual insurance mechanism is consistent with the local population practices based on the primacy of the social network. However, the current situation of mutual health insurance schemes requires an extension of their system by seeking to adapt them to the needs of households in Burkina Faso.

As well, in order to assess the magnitude of the health problem and to consolidate these existing programmes, the Burkinabe government has launched a large-scale health insurance project for the poor, some of whom are insured by mutual insurance companies

that are members of the RAMS network. On this basis, public and regulatory authorities must invest sufficiently in the mutual health sector by focusing on both practitioners and beneficiaries to contribute to the deepening of health risks coverage and the improvement of the population well-being. In this regard, they should support the relevant structures in terms of mobilising human, technical and financial resources to improve existing systems in order to facilitate the ongoing extension of universal health coverage in Burkina Faso.

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