Mutual health insurance in Rwanda: Evidence on access to care and financial risk protection☆

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ABSTRACT

Objective: Rwanda has expanded mutual health insurance considerably in recent years, which has a great potential for making health services more accessible. In this paper, we examine the effect of mutual health insurance (MHI) on utilization of health services and financial risk protection.

Methods: We used data from a nationally representative survey from 2005–2006. We analysed this data through summary statistics as well as regression models.

Findings: Our statistical modelling shows that MHI coverage is associated with significantly increased utilization of health services. Indeed, individuals in households that had MHI coverage used health services twice as much when they were ill as those in households that had no insurance coverage. Additionally, MHI is also associated with a higher degree of financial risk protection and the incidence of catastrophic health expenditure was almost four times less than in households with no coverage. Nonetheless, the limitations of the MHI coverage also become apparent.

Conclusion: These promising results indicate that MHI has had a strong positive impact on access to health care and can continue to improve health of Rwandans even more if its limitations are addressed further.

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1. Introduction

Contemporary thinking stresses the role of health systems in governing access to health care services. Indeed, there is increased recognition of the pivotal need for health systems development as a building block for improving population health [1]. Health financing is a core component of health systems, and as such, many countries have implemented major reforms to health systems financing in the past decade or so, with a view of making health care more accessible and equitable to their populations [2–5].

The essence of equitable and accessible health systems is enshrined in the notion of 'universal coverage' as confirmed by health leaders in a resolution at the World Health Assembly in 2005 [6]. Health spending through out-of-pocket payments (OOP) is not always easy to cope with. Households may encounter financial hardship and poverty as a result. In fact, over 150 million people face catastrophic health expenditure every year and 100 million fall into poverty worldwide after paying for health care [7]. Many

other households simply forgo care because it is deemed too expensive. Thus, benefiting from health care remains difficult or impossible for many households because of financial barriers. We therefore posit that universal coverage and access to health insurance, with an important degree of prepayment, is an important policy objective that could improve financial protection for many.

There are different strategies for increasing prepayment and reaching universal coverage [8]. Tax-based systems, social health insurance systems or mixed systems commonly exist in most developed countries that have reached universal coverage. However, for developing countries, transition strategies are usually needed. These strategies include different prepayment mechanisms to reduce OOP and improve access to care, such as mutual health insurance (MHI). MHI or community-based health insurance exists in many African countries. However only a few programs have been scaled up considerably [9]. The sustainability and financial risk pooling capacities of these schemes are considered limited when compared to nationwide schemes. Nonetheless, they may be a first step towards universal coverage [8,10,11]. Rwanda has been successful in terms of expanding population coverage over relatively short periods of time. As a result, there is wide interest in examining the Rwandan model as a strategy for fast-tracking achievement of universal coverage.

1.1. Mutual health insurance in Rwanda

Over the last years, Rwanda has seen an important increase in its expenditure on health with total health expenditure (THE) per capita increasing from US$ 9 in 2000 to US$ 34 in 2006. Public sources, including external resources, accounted for the majority of THE. Households contributed for 26% of THE through OOP [12]. In its efforts to improve access, the country has developed a comprehensive health sector strategic plan. A major focus of this plan is the expansion of health insurance to the informal sector through MHI [13].

Building on the experience of earlier pilots, the government supported start-up initiatives and over 100 MHI schemes were creted between 2000 and 2003 [14–18]. Population coverage increased continuously during this period and was estimated to have reached 27% in 2004 [19]. MHI was further scaled up in 2005 with the support of external funding [20,21]. The aim of this expansion was to rapidly increase membership of vulnerable groups through premium subsidies and strengthen administrative capacities and pooling mechanisms [19,22]. By 2007, around 74% of the population had some form of health insurance cover [19]. Further, in 2008, a formal legal framework for MHI was created with the adoption of a law on mutual health insurance. This set a new milestone towards universal coverage by making health insurance compulsory. This law also introduced formal cross-subsidization between existing health insurance schemes, leading the way forward for a possible national pool.

Currently, MHI membership remains voluntary in practice, although the 2008 law stipulates the need for all Rwandans to be part of a health insurance scheme. For non-subsidized members, premiums are paid annually and were US$ 1.8 per person per year in 2006. Premiums are collected by community health workers and transferred to a district level MHI fund, which is also subsidized by other sources including the government, and pays for outpatient and inpatient services on a fee-for-service basis [19]. Membership fees are waived for certain groups such genocide survivors and people living with HIV/AIDS. Estimates from 2006 suggest that up to 45% of funds at MHI branches were from subsidies from various international and national agencies. Co-payments at the health centre level are a flat rate of US$ 0.4 per visit and 10% of costs at the hospital level. The benefit package includes a range of preventive and curative services including drugs benefits. Variations in the actual benefits offered by the schemes may exist and are primarily due to differences in the availability of services in the catchment area. However, a 2007 legislation on MHI included a specific list of benefits offered. Occupational diseases are excluded from the benefit package as they are covered by the a national social security scheme [23].

In addition to MHI, there are also two other large public health insurance schemes. The Rwandaise d'assurance maladie (RAMA) is a mandatory scheme for government employees and their dependants and covered 2.3% of the population in 2007. The Military Medical insurance is a mandatory scheme for defense personnel and their families and covered around 1% of the population in 2007. The benefit package of these schemes is generally considered to be superior to that of the MHI. Very few people have formal private health insurance but some employers provide limited health care related benefits [23].

MHI remains the most prominent and diversified scheme in terms of population coverage and as such further analysis of it is very useful. This paper contributes to the evidence on MHI by examining its relationship with utilization and financial risk protection at the national level by analysing survey data from Rwanda. Previous research on MHI in Rwanda has looked at topics such as the community participation issues, institutional arrangements, financial sustainability of facilities as well as contribution to the scheme [11,14,24–26]. Of particular relevance to this paper is a study of 3 pilot districts that was conducted in 2000 [15]. It found that uninsured households had a lower utilization rate and encountered more out-of-pocket payments as compared to households who were MHI members. Our analysis is novel as the scheme has morphed significantly these since 3 pilot projects were examined. Using new nationally representative data, we are also able to look at the incidence of catastrophic health expenditure and degree of financial risk protection offered by MHI in addition to its effect on utilization. This research will guide policymakers and provide useful insights within the Rwandan context as well as for other countries that are considering moving towards universal coverage through similar models. The paper continues with Section 2, which describes the data and methodology in detail. Section 3 presents the results from the analysis and Section 4 discusses the findings and links them to the current policy dialogue in Rwanda.

2. Materials and methods

The data used for this analysis is from the Integrated Living Conditions Survey 2005–2006 (EICV2) conducted by the National Institute of Statistics of Rwanda. This nationally representative survey gathered data from over 6800 households and around 34,000 individuals. Information was collected at the household and the individual level.

Household level information included consumption expenditure on food, non-food items and out-of-pocket health expenditures including: consultation; laboratory tests; hospitalization; and medication costs. Individual level information included socio-economic indicators, insurance status, self-reported illness and utilization of services. The recall period for utilization of services was 2 weeks. The survey contains multiple questions on OOP with differing recall periods. We used a recall period of 2 weeks for outpatient services expenditure and 12 months for inpatient services expenditure.

We explored the relationship between MHI insurance and utilization of health services and financial risk protection among MHI members and the non-insured population. Due to the mandatory nature of other alternative health insurance schemes such as RAMA and the military insurance, we assume that people enrolled in these schemes would be unlikely to join MHI. As a result, we excluded the population covered by these other health insurance schemes from our analysis. Health insurance coverage was modelled as the household head's coverage. The quintile variable was defined on the basis of household expenditure. The statistical analysis was carried out using StataCorp'a Stata 9.2.

2.1. Utilization

We modelled the relationship between MHI and the use of health services at the individual level in the subpopulation described earlier who reported illness. In this context, utilization included outpatient and inpatient services, but excluded care provided exclusively at pharmacies. We used a logistic regression model with a binary utilization variable as the dependent variable. The model takes the form:

$$\ln\frac{\Pr(\text{use}=1)}{\Pr(\text{use}=0)} = BX$$

In this model use = 0 represents the base group of individuals who did not use any health services and use = 1 is the group of individuals who used health services. X is a vector of explanatory variables and B is a vector of coefficients for X. The covariates considered included age, sex, whether the household head had completed primary education, household size, household expenditure quintile, region, household insurance status and the interaction of household insurance status with expenditure quintile. The base region for the regression analysis was the Eastern province. We tested for endogeneity between insurance and utilization using the Durbin–Wu–Hausman test, which showed no significance [27].

2.2. Financial risk protection

Household financial burden was measured by the out-of-pocket health expenditure (OOP) as a share of its capacity to pay (CTP), which is a household's non-subsistence spending. To calculate this latter measure, we defined a subsistence expenditure threshold based on food. All household expenditure exceeding this threshold was considered to be non-subsistence expenditure. This methodology has been used in previous literature [28–30]. An ordered logit model was used to explore the relationship between MHI and the financial burden of households. The dependent variable in the regression was household financial burden (OOP/CTP) which was grouped into 4 categories: 0–10%, 10–20%, 20–40%, and 40% and higher. The covariates considered included: sex of the household head, whether the household had members under 5 years of age, whether the household had members over 65 years of age, whether the household head had completed primary education, household size, household expenditure quintile, region and household health insurance status. This model was at the household level and once again, households covered by other health insurance schemes were not included.

The model took on the form:

$$\Pr(\text{OOP/CTP}=i) = \Pr(k_{i-1} < B_k X < k_i)$$

where $\Pr(\text{OOP/CTP}=i)$ is the probability of OOP/CTP being i relative to the cut-off points k estimated for a common vector X and its coefficients B corresponding to the particular k's. We tested for endogeneity between health insurance and OOP/CTP using the Durbin–Wu–Hausman test, which, once again, showed no significance. We remind the reader that the base region for the regression analysis was the Eastern province. It should also be noted that this model tries to take into account increased utilization through using the whole sample rather than just households that reported using services.

2.3. Socioeconomic characteristics

Socioeconomic characteristics of overall survey sample as well by health insurance groups are shown in Table 1. About 26% of households had a household head who had completed at least primary education. The geographical distribution of sampled individuals was even across the regions. The elderly, defined here as being 65 years of age or older constituted only around 3% of the population.

3. Results

3.1. General results

MHI coverage in the whole population was 36.6% when the survey was conducted as shown in Table 2. Poorer households were less likely to be insured. A Pearson-Chi square test confirmed that MHI coverage varies by quintile (p-value < 0.000). Other insurance schemes, such as RAMA, only covered 4.7% of households.

Table 1

Socio-economic characteristics of the survey sample.

Variable	Mean				95% confidence interval	
	No insurance	MHI	Other insurance	Overall	(of overall mean)	
Household size	4.8	5.2	5.5	5.0	4.9	5.1
Household head with completed primary education	22.24%	29.12%	57.65%	26.40%	25.40%	27.50%
Kigali	10.48%	5.95%	21.74%	9.40%	8.70%	10.00%
Southern province	29.67%	20.49%	31.26%	26.40%	25.30%	27.40%
Western province	21.10%	28.10%	21.09%	23.70%	22.70%	24.70%
Northern province	16.88%	21.62%	11.21%	18.30%	17.40%	19.30%
Eastern province	21.87%	23.84%	14.71%	22.30%	21.30%	23.20%
Individuals under 5 years of age	16.85%	16.27%	13.37%	16.50%	16.10%	16.80%
Individual 65 years and over of age	3.14%	3.21%	1.29%	3.10%	2.90%	3.30%
Individual male	47.09%	47.94%	47.75%	47.40%	46.90%	48.00%
Household annual expenditure (USD)[a]	1159	1291	3054	1297	1230	1362
Household annual capacity-to-pay (USD)[a]	815	892	2648	929	864	994

[a] Exchange rate from 2006: 1 US$ = 551.7.

Table 2

Health insurance coverage of households by quintile.

Population quintile	No insurance	MHI	Other insurance
Quintile 1	71.1%	26.6%	2.3%
Quintile 2	64.2%	32.7%	3.1%
Quintile 3	55.4%	42.0%	2.6%
Quintile 4	52.2%	44.4%	3.4%
Quintile 5	50.5%	37.4%	12.1%
Total	58.7%	36.6%	4.7%

Pearson chi-squared for "No insurance": $p < 0.00$. Pearson chi-squared for "MHI": $p < 0.00$. Pearson chi-squared for "Other insurance": $p < 0.00$.

3.2. Utilization

Table 3 presents self-reported illness and utilization among those who reported illness. Around 20.4% of the population reported illness in the 2 weeks prior to being interviewed. Differences in self-reported illness were not significant across quintiles. However, people in insured households reported significantly less illness. In total, less than half of the population that reported illness used health

Table 3

Self-reported illness and health services use by quintile and insurance status.

	Reported illness	Use of health services given illness
Expenditure quintile		
Quintile 1	19.8%	19.8%
Quintile 2	20.3%	26.0%
Quintile 3	20.8%	33.3%
Quintile 4	20.5%	36.0%
Quintile 5	20.6%	43.8%
Insurance status		
No insurance	22.1%	25.8%
With MHI	18.1%	52.0%
Other insurance	19.2%	41.5%
Total	20.4%	32.4%

Pearson chi-squared for "Reported illness by Expenditure quintile": $p = 0.258$. Pearson chi-squared for "Use of health services given illness by Expenditure quintile": $p < 0.00$. Pearson chi-squared for "Reported illness by Insurance status": $p < 0.00$. Pearson chi-squared for "Use of health services given illness by Insurance status": $p < 0.00$.

services (that were not exclusive pharmacy care). Richer quintiles were more likely to use health services. Those with MHI coverage were significantly more likely to use health services than the non-insured given illness.

The effect of MHI was further examined by performing a logistic regression on the use of health services by individuals within the population eligible for MHI coverage who reported illness in the preceding 2 weeks. Table 4 shows

Table 4

Logit regression results for use of health services for the defined subpopulation.

	Coefficient	Linearized Std. Error
Regression results		
Under 5 years	0.549[**]	0.067
65 or more years	−0.365[**]	0.139
Male individual	0.008	0.058
Head with primary education	0.065[*]	0.033
Household size	0.008	0.015
Quintile 2	0.408[**]	0.152
Quintile 3	0.811[**]	0.152
Quintile 4	0.824[**]	0.152
Quintile 5	1.167[**]	0.155
Kigali	0.091	0.125
Southern province	−0.050	0.099
Western province	0.122	0.100
Northern province	0.398[**]	0.112
MHI	0.891[**]	0.200
Interaction of quintile 2 and MHI	−0.182	0.258
Interaction of quintile 3 and MHI	−0.369	0.248
Interaction of quintile 4 and MHI	−0.195	0.248
Interaction of quintile 5 and MHI	−0.501[*]	0.242
Regression details		
Number of strata	1	
Number of PSUs	3874	
Number of observations	6682	
Population size	1,843,910	
Design df	3873	
$F(18,3857)$	17.85	
Prob > F	0.000	

The results of the Durbin–Wu–Hausman test for the relationship between insurance and utilization showed a p-value of 0.310 for the residual of predicted insurance coverage. As such, we cannot reject the null hypothesis and there is no evidence of endogeneity.

[*] $p \leq 0.1$

[**] $p \leq 0.01$

the results of the regression. The probability of utilization increased with MHI coverage after taking into account age, expenditure quintile, education of the head of the household and living in the Northern region. Individuals over 65 years old were less likely to use services, whereas users under 5 years old more likely to them. Additionally, richer households and those living in a household whose head had completed primary education were also more likely to use services. There was a negative interaction effect between MHI insurance and being in the richest quintile, which means that utilization is less than would otherwise be expected for these individuals. The other covariates were not significant.

3.3. Financial risk protection

Table 5 shows OOP on health services by households according to quintile and health insurance status. Average household OOP was of US$ 31.2, which represented 5.3% of capacity-to-pay. Households in the richest quintile spent on average US$ 85.5, compared to only US$ 6.6 for households in the poorest quintile. Conversely, these correspond respectively to 3.4% and 6.2% of CTP. MHI insured households spent significantly less on OOP: only 3.5% of their CTP compared to 6.6% for non-insured households.

Many households had a significantly higher financial burden. Overall, it exceeds 10% for 16.2% of households, 20% for 8.7% of households and 40% for 2.9% of households. Whereas the 40% threshold is considered as being catastrophic health expenditure, the lower thresholds are also indicative of a substantial burden on households.

Among just households who reported OOP, its financial burden was much higher. Indeed, 32.2% spend over 10%, 17.3% over the 20%, and 5.8% over the 40% of their CTP. Households insured with MHI had a lower financial burden, with only 20.1% of them spending over 10% compared to 41.6% for non-insured. This ratio was 9.0% compared to 23.6% for the 20% threshold and 2.2% compared to 8.6% for the 40% threshold. The differences between richer and poorer households were also more accentuated when only households who reported OOP were considered.

The effect of MHI coverage on household financial burden was also examined through modelling household out-of-pocket payments as a share of capacity-to-pay. This was grouped into 4 ordered categories: 0–10%, 20–30% 30–40% and 40% and above. The results from the regression are shown in Table 6. They demonstrate that in addition to MHI coverage, having a household head who had completed primary education, being in quintile 4, being in quintile 5 or living in the Northern Region was associated with a lower household financial burden. However, having a household member under the age of 5 or living in the Southern province was associated with a higher burden. The other covariates were not significant.

4. Discussion

The analysis found that less than half of the individuals who reported illness actually did so at the providers considered here. The pattern of health services use was also different among the insured and non-insured, as well

Table 5
Households' out-of-pocket payments and percentage of households whose payments exceeded different thresholds by quintile and insurance status.

| | For all households | | | | | For households with out-of-pocket expenditure > 0 | | | | |
| | Annual OOP[a] (USD)[b] | Mean OOP/CTP[c] | Percentage of households whose OOP/CTP exceeded | | | Annual OOP[a] (USD)[b] | Mean OOP/CTP[c] | Percentage of households whose OOP/CTP exceeded | | |
			>10%	>20%	>40%			>10%	>20%	>40%
Population quintile										
Quintile 1	6.6	6.2%	18.5%	12.1%	4.8%	19.2	18.0%	53.8%	35.3%	14.0%
Quintile 2	12.6	6.2%	19.3%	10.9%	3.7%	28.6	14.1%	43.8%	24.7%	8.4%
Quintile 3	21.8	6.1%	19.0%	10.5%	2.7%	41.1	11.5%	35.9%	19.7%	5.1%
Quintile 4	29.4	4.6%	14.2%	6.0%	1.9%	50.7	7.9%	24.4%	10.4%	3.3%
Quintile 5	85.5	3.4%	10.0%	3.9%	1.5%	138.5	5.5%	16.2%	6.4%	2.5%
Insurance status										
No insurance	34.6	6.6%	20.5%	11.6%	4.2%	70.3	13.4%	41.6%	23.6%	8.6%
With MHI	22.8	3.5%	10.5%	4.7%	1.2%	43.7	6.8%	20.1%	9.0%	2.2%
Other insurance	53.9	2.6%	7.2%	3.0%	0.5%	111.4	5.3%	14.9%	6.3%	0.9%
Total	31.2	5.3%	16.2%	8.7%	2.9%	62.1	10.5%	32.2%	17.3%	5.8%

[a] OOP: household out-of-pocket expenditure.
[b] Exchange rate: 1 US$ = 551.75.
[c] CTP: household capacity-to-pay.

Table 6
Ordered logistic regression results for out-of-pocket payments as a share of capacity-to-pay.

Independent variables	Coefficient	Linearized Std. Err.
Regression results		
Male household head	0.049	0.089
Household with member over 65 years	−0.034	0.118
Household with member under 5 years	0.451**	0.088
Head with primary education	−0.101*	0.049
Household size	−0.005	0.017
Quintile 2	0.058	0.109
Quintile 3	0.122	0.109
Quintile 4	−0.203*	0.118
Quintile 5	−0.430**	0.138
Kigali	−0.176	0.143
Southern province	0.197*	0.101
Western province	0.042	0.108
Northern province	−0.259*	0.125
MHI	−0.788	0.083
/cut1	1.537	0.137
/cut2	2.264	0.143
/cut3	3.427	0.155
Regression details		
Number of strata	1	
Number of PSUs	6511	
Number of observations	6511	
Population size	1,802,583	
Design df	6510	
$F(14,6497)$	14.2	
Prob > F	0.000	

The results of the Durbin–Wu–Hausman test for the relationship between insurance and out-of-pocket payments as a share of capacity-to-pay showed a p-value of 0.369 for the residual of predicted insurance coverage. As such, we cannot reject the null hypothesis and there is no evidence of endogeneity.

* $p < 0.1$
** $p < 0.01$

between the poor and rich. 2.9% of all households faced catastrophic health expenditure in 2006, which corresponds to around 280,000 people. Among only households that reported OOP, 5.8% faced catastrophic health expenditure.

MHI is not only associated with higher utilization, but also with better financial risk protection for households. This is line with previous research on the topic [15,25,26]. Indeed, MHI insured individuals who were ill were more likely to use services irrespective of wealth. In fact, MHI has a higher impact on utilization in lower quintiles than in the highest quintile. This characteristic suggests that the MHI system in Rwanda will inherently decrease the existing utilization gap between the rich and the poor. Our model also showed that MHI insurance was strongly associated with a lower household financial burden. These results show that expansion of MHI will certainly be beneficial to improving access to health services.

However, there is also evidence of the limited nature of protection currently offered by MHI. Even among the MHI insured, more than 40% were not using health services when they were ill. In addition, one-fifth of households with MHI who sought care still faced a household financial burden exceeding 10%. We recognize that other barriers outside the immediate scope of MHI (such as income forgone when time off is taken to visit a formal health provider or the financial cost of transportation) may have important implications in this context. Nonetheless, these results imply that despite the advantages of MHI coverage as compared to having no health insurance, there was still significant room for improving the MHI benefit package offered in the 2005–2006 period. Unfortunately, this dataset does not have enough detailed information to be able to comment with confidence on what should be added to the benefit package to improve access and financial risk protection. Additionally, changes due to the 2007 legislation discussed earlier may have also affected the health services provided and potentially helped standardize benefits across schemes. Further research is needed to understand limitations of the current MHI benefits package and how to specifically improve it.

Additionally, it should be noted that we are not able to confidentially explain the regional differences in utilization and financial risk protection. The base province in the regression, the Eastern province, has a lower overall rate of urbanization, but other socio-economic characteristics are largely similar across households outside of Kigali. Regional differences may be dependant on epidemiological or other factors and another study may wish to examine this topic. Lastly, whereas we submit that the results presented in this paper are robust, it should nonetheless be kept in mind that the data used for this study is from the 2005–2006 period. MHI has expanded rapidly since then and as such some new features or impacts may not be captured in this analysis.

5. Conclusions

Our results find that many households in Rwanda did not seek health care when it was needed, while others were pushed into financial hardship as a result of seeking care. These effects are particularly accentuated for the poor and the uninsured. Indeed, MHI coverage was strongly associated with a reduction in unmet need and risk of catastrophic expenditure. Nonetheless, the MHI benefit package may require some further enhancement as members may still have faced difficulties related to accessing care. Further research is needed to understand whether the subsequent evolution in the MHI scheme has been able to address these limitations in coverage. However, the results from this study confirm that MHI continued to have a beneficial effect for members. Indeed, our results strongly support continued expansion of the MHI scheme. The experience of Rwanda in expanding coverage through MHI can undoubtedly be relevant to other countries.

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