HEALTH ECONOMICS
Health Econ. **15**: 19–31 (2006)
Published online 7 September 2005 in Wiley InterScience (www.interscience.wiley.com). **DOI:**10.1002/hec.1014

Horizontal equity in utilisation of care and fairness of health financing: a comparison of micro-health insurance and user fees in Rwanda

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Summary

This paper uses two methods to compare the impact of health care payments under insurance and user fees. Concentration indices for insured and uninsured groups are computed following the indirect standardisation method to evaluate horizontal inequity in utilisation of basic health care services. The minimum standard approach analyses the extent to which out-of-pocket health spending contributed to increased poverty. The analysis uses cross-sectional household survey data collected in Rwanda in 2000 in the context of the introduction of community-based health insurance. Results indicate that health spending had a small impact on the socio-economic situation of uninsured and insured households; however, this is at the expense of horizontal inequity in utilisation of care for user-fee paying individuals who reported significantly lower visit rates than the insured. Copyright © 2005 John Wiley & Sons, Ltd.

Keywords horizontal inequity; minimum standard approach; insurance; user fees; Rwanda

Introduction

Informal health insurance, sometimes referred to as community-based health insurance (CBHI), mutuelles, mutual health associations, or micro-health insurance (MHI) is increasingly championed as an alternative to user fees to improve equity in access to medical care in low-income countries [1]. These insurance schemes are informally organised risk-sharing groups with voluntary enrolment whose objective is to improve members' access to care by lowering the out-of-pocket (OOP) price at the time of purchase [2]. They have been criticized for various reasons, including organisational and institutional weaknesses and for charging unaffordable premiums, which exclude the poor from enrolment [3,4]. Also, to the extent that only basic services are covered, insurance may have a minimal impact on equity if patients must pay OOP for more expensive referral services. However, there are very few published studies of the impact of insurance in low-income settings.

Several studies have examined the impact of OOP payments in the context of developed countries. Researchers have studied equity in financing and utilisation of medical care for the population in OECD countries [5–7], among insured groups in Latin America [8,9], and the impoverishing effect of health payments on insured households in Vietnam [10]. The available evidence suggests that when user fees are charged, medical

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Received 23 June 2004
Accepted 8 April 2005

service use is significantly affected by individuals' socio-economic background [11–14]. Empirical evidence on informal insurance is limited and focuses on organizational and financial sustainability [3,4,15], and the socio-demographic determinants of insurance enrolment [16]. To date none have used micro-level data to quantify the impact of OOP payments on horizontal inequity in service use and on households' socio-economic situation by comparing insured and user-fee paying households in a low-income context.

According to the egalitarian equity principle a health system is equitable if medical care is distributed based on patients' need to achieve better health, as judged by health professionals and unrestricted by patients' income and wealth [17]. An alternative approach to operational assessment of the impact of health care payments is the minimum standard approach. This addresses the extent to which health care payments compromise household ability to purchase other goods and services including food, shelter or clothing [18].

This paper uses two methods, the calculation of the concentration index using indirect standardisation of utilisation and the minimum standard approach to compare the impact of OOP payments for medical care on insured and uninsured groups in Rwanda. First, indirect standardisation examines how OOP payments for care affects horizontal inequity in utilisation of care, that is whether individuals use care according to their need and independent of their socio-economic characteristics [6]. We analyse horizontal inequity within insured and uninsured groups by quantifying and comparing the actual distribution of visits with a need-adjusted distribution.

Second, the minimum standard approach (MSA) quantifies the extent to which health payments cause household income to drop below a threshold, which can be defined in terms of absolute levels of income, i.e. the poverty line (PL) [10]. Using the MSA approach we examine the financial implication of OOP payments on households by comparing the socio-economic situation of insured and uninsured households before and after paying for care and with respect to the poverty line. So far, these methods have not been used to compare the impact of OOP payments on user-fee paying and insured individuals. We examine these questions using cross-sectional household survey data collected in three Rwandan health districts in 2000.

The remainder of the paper presents the methodological framework, describes the Rwandan health insurance and user fee context, and details the household survey data and estimation procedures for indirect standardization and for the minimum standard approach. Results are shown and their relevance discussed given the health policy context.

Methodological framework

Most studies to date have used ANOVA and regression analysis to examine equity in utilisation of health care, as for example in the RAND Health Insurance Study in the USA [19]; and in a study on the Egyptian School Health Insurance Program [20]. While regression can be used to test for the presence of inequity, it does not allow the extent of inequity to be quantified [21]. In the more recent literature, horizontal inequity (HI) in utilisation has been measured using concentration indices for actual use and need-adjusted use [6,22]. Among these methods is the indirect standardization-based approach.[a]

Wagstaff and van Doorslaer [23] suggest measuring HI by the difference between the inequality in actual and needed use of medical care, expressed by the concentration indices for actual use C_M, and need-adjusted utilisation C_N. C_M quantifies the degree of income-related inequality in the distribution of actual use of medical care. C_N is computed based on the expected, need-adjusted amount of care the person would have received, had he or she been treated as others with the same need characteristics. A positive (negative) HI value suggests horizontal inequity favouring the better-off (worse-off). If HI equals zero, medical care and need are proportionately distributed across income distributions.

This method was used to compare the relative degree of horizontal inequity in utilisation across OECD health care systems. Results point to significant inequity favouring the rich in utilisation of specialist care, irrespective of insurance coverage [6].

Health financing may be equitable but still contribute to poverty. The notion of equity in utilisation and financing of care may not be enough to judge whether a health system protects the income of the poor against expensive health care use. This is particularly the case in the context

of a low-income country. The minimum standard approach serves to examine the extent to which a health financing system protects household income against falling below a threshold because of OOP health care payments. Results can be shown visually using Pen's parades, which plot household income before and after health payment along the *y*-axis against households ranked by pre-payment income along the *x*-axis. Alternatively, the head-count ratio and poverty gap measures can be computed [10].

The minimum standard approach has been applied to examine how health expenditures have added to poverty in Vietnam. Findings suggest that some insured households were clearly pushed further into poverty by OOP payments, while others were pushed below the PL; this was mainly due to the more frequently occurring outpatient payments not covered by insurance [22].

Health insurance and user fees in Rwanda

Rwanda is amongst the poorest countries with a *per capita* GDP of US$ 250 in 2000. It has a population of about 8 million, of which 90% are active in agriculture. Patients have paid user fees to public providers since 1976 [24].

In 1999, the Rwandan government in collaboration with local communities and the technical assistance of the USAID-funded Partnerships for Health Reform (PHR) project developed and implemented 54 micro-health insurance schemes in three rural districts (Kabgayi, Byumba, Kabutare). Overall, the three districts have three hospitals and 54 public or church-owned health centres (HC) serving a rural population of about one million people. The health centres in the study areas do not have any doctors and care is provided by nurses and ancillary personnel only. There are no emergency room or radiology facilities in HC. The rural poor have difficulty paying the cost of transport to seek general or specialist care in the capital Kigali, and low occupancy rates in district hospitals point to access problems even at a district level.

MHI covers drugs and services provided in all HC, and ambulance transport to the district hospital, where a limited package of services is covered. Households enrol in MHI by paying an annual premium of RWF 2500 (about $7.50 in 2000) to the MHI affiliated with their 'preferred' health centre. The uninsured continue to pay user fees in health centres and hospitals. Insured patients pay a RWF 100 (US$ 0.30) co-payment per episode of illness in health centres and user fees for care not covered by MHI (e.g. drugs excluded from the Ministry of Health essential drug list) [25].

Table 1 describes the relevant health system characteristics for insured and uninsured patients. These characteristics may affect the extent to which systematic deviations from an equitable distribution of utilisation of health care may occur. The first column lists the provider characteristics in the three districts: payment for care in HC, their gatekeeper function, ambulance transfers, payment for care in hospitals, and supply-side subsidies. The second column describes the system faced by insured patients with respect to these characteristics. For example, MHI pays HC a monthly capitation payment. HC play a gatekeeper function for insured patients, whose hospital treatment is only covered by MHI with health centre referral. The third column describes the service use and payment system for uninsured, user-fee paying patients.

MHI membership is voluntary. At the end of their first operational year (June 2000), the 54 MHI had 88 303 members (about 10% of the districts' population), which had increased to 189 646 members (about 19% of the population) by the end of the fourth year (June 2003). Previous analysis based on household survey data found no relationship between MHI enrolment and household income proxied by monetary expenditures [26].

Data, methods and limitations

Data and variables

The analysis uses data collected through a cross-sectional household survey in the three rural districts where MHI is offered. The survey was conducted at the end of the first MHI operational year in September 2000, based on a weighted two-stage cluster design. The sample contained 3139 households among them 354 insured and 2785

Table 1. Equity relevant health system characteristics and provider incentives

Characteristics	MHI patients	Uninsured patients
Payment for care in public and church-owned health centre (HC)	Members pay MHI annual enrolment fees based on which, MHI pays capitation payment to HC	Patients pay user fees for each consultation (RWF200), each service (e.g. laboratory) and drug at the point of delivery. About 2–5% of patients is exempt from payment due to indigent status
	All services and drugs on essential drug list free for insured patients at the point of delivery. Co-payment of RWF100 per episode of illness	
HC gatekeeper	Yes	No
Ambulance transfer	Paid by MHI if referred by HC, through capitation amount paid to the HC. No co-payment for patient	User fee paid by patient (about RWF2500 per transport to hospital)
Payment for care in district hospital (DH)	MHI covers consultation, overnight stay and full episode (incl. drugs) of C-section in 2 districts; while full episodes of C-section, malaria and children below 5 are covered in 1 district. Patients pay OOP for care not covered by MHI (like uninsured)	Patients pay user fees for all services and drugs at point of service delivery
Supply-side subsidies	All facilities receive subsidies from donors and government in form of salaries for public employees, salary mark-ups, and drug donations	

uninsured households, with 14 574 individuals in total [16].

The survey instrument included a household and a curative care module. To be interviewed in the latter, an individual had to report an accident, injury or illness (headache, diarrhoea, fever, coughing) within a two-week recall period and was thus considered to have a need for medical care. In total, 3835 sick individuals completed the curative module, of which 376 were insured and 3459 uninsured. A significantly higher share of the uninsured (27%) than the insured (21%) ($\chi^2 = 20.44$; $p < 0.001$) qualified for the curative part of the questionnaire, suggesting that the uninsured were in worse perceived health during the time of the interview. Addressing the curative questionnaire only to sick individuals could cause selection bias if different socio-demographic and socio-economic groups differ with respect to their perceived health status and need for care.[b] If, as is the most likely case, low-income groups with a need for care were less likely to perceive or express it when interviewed [27], then they are excluded from the analysis, which would have the effect of underestimating the degree of inequity.

The equity analysis includes all sick individuals interviewed in the curative module. The minimum standard analysis uses all households interviewed. The household is taken as the sharing unit for monetary expenditure. Table 2 presents the variables used in the analysis.

Several issues relating to the data and variables used should be highlighted:

First, *household monetary expenditures* are recorded over one month, and include payments made for food and non-food items, and other expenditures including health payments. Annualising monthly amounts by multiplying twelve times will lead to overestimates for households who had lumpy general household payments during the reporting period, and to underestimates of all households who reported zero expenditure during this time [28]. To circumvent the zero-value problem without losing observations, each

Table 2. Variable definition and description

Variable definition	Variable	All sick individuals			Sick uninsured			Sick MHI members		
		Obs	Mean	Std dev.	Obs	Mean	Std dev.	Obs	Mean	Std dev.
Curative module of household survey:										
Patient MHI member	MHIpat	3835	0.098	0.297	3459	0.000	0.000	376	1.000	0.000
Patient gender (1 = male)	genPat	3835	0.437	0.496	3459	0.436	0.496	376	0.441	0.497
Patient age	agePat	3831	24.182	20.699	3456	24.276	20.768	375	23.320	20.063
Patient age 0–5 years	d_agepat	3835	0.245	0.430	3459	0.244	0.429	376	0.253	0.435
Patient (age 6+) with school	d_schpat	2912	0.603	0.489	2632	0.589	0.492	280	0.736	0.442
Pregnant (female 15–49 age)	pregnant	3835	0.071	0.258	3459	0.068	0.252	376	0.101	0.302
Ave household size	rhhsize	3835	5.324	2.329	3459	5.269	2.338	376	5.827	2.182
SAS before care (1 = not serious; 2 = serious; 3 = very serious)	SAS	3810	1.837	0.672	3439	1.844	0.668	371	1.774	0.715
SAS dummy (0 = not serious)	d_SAS	3835	0.681	0.466	3459	0.689	0.463	376	0.612	0.488
4 and more bed days before seeking care	Beddays4+	3835	0.777	0.416	3459	0.776	0.417	376	0.787	0.410
1 professional care visit	visit1	3835	0.180	0.384	3459	0.150	0.357	376	0.455	0.499
Hospitalised of those with care.	d_HDcare	857	0.111	0.314	672	0.128	0.334	185	0.049	0.216
Monetary expenditure (p/c p/m)	rexpc	3835	2739.636	4970.552	3459	2695.514	4990.844	376	3145.535	4767.090
Household module of household survey:		All households			Uninsured households			MHI member households		
Pre-payment monetary expenditures (p/c p/m)	PreYpc	3139	3173.607	7500.623	2785	3029.925	7218.841	354	4303.991	9364.069
OOP health payments (p/c p/m)	OOP_Ppc	3139	194.658	978.677	2785	189.060	959.335	354	238.697	1119.807
Post-payment monetary expenditures (p/c p/m)	PostYpc	3139	2978.949	7161.203	2785	2840.864	6865.785	354	4065.294	9098.093

Note: p/c p/m = per capita per month.

observation of monetary expenditure variable is increased by one, which does affect the shape of the distribution [29]. While this is inappropriate for conducting individual household level estimates, the method is acceptable for estimating and comparing group averages [28].

Per capita values are computed by dividing total household amounts by the household size without equivalence adjustment, as the equivalence scale literature does not provide any satisfactory alternative on how to divide a household's expenditures by its members[c] [29]. This monthly *per capita* amount (PreYpc) is used as a proxy for income prior to OOP payment for health care.

Second, *out-of-pocket health expenditures* per household (OOPpc) includes OOP payments made by the household during the previous month associated with treatment and diagnosis of illness and injury, drugs and services purchased at providers and pharmacies, inpatient services, values paid to traditional healers, transport costs, and co-payments paid by MHI members. It excludes MHI premium paid by the insured since we focus on the extent to which MHI membership protects household income against the financial risk related to utilisation of health care in response to a unforeseen 'shock', and ensures that OOP payments do not push households into, or further into poverty[d] [22]. Monthly *per capita* amounts are computed.

Third, *utilisation* is proxied by the provider visit dummy (visit1), which was assessed based on the question 'Did you visit a professional provider (doctor, nurse, health centre, hospital, private clinic, or dispensary) outside of the house in the last two weeks to treat your illness?' Using a two-week recall period results in highly accurate utilisation data. The disadvantage is that the vast majority of sick respondents have no utilisation and most users report only one visit, resulting in a skewed distribution of the visit variable. Due to the seasonality of infectious diseases (e.g. malaria, respiratory infections), this variable reflects the time period when the survey was conducted, and does not lend itself to annual interpretation.

Also, insurance coverage may be endogenous with respect to service use. In other studies, health-related control variables have been used to mitigate the bias due to unobserved heterogeneity [30], while others have relied upon multiple-equation strategies with instrumental variables [31]. In this paper, we use none of these techniques because the questionnaire did not collect the necessary data that would have allowed correcting for the selection bias of insurance choice [16]. This may affect the actual level of utilisation of insured services. If there is adverse selection of more seriously sick individuals into MHI, then without adverse selection, utilisation levels might be lower.

Fourth, *need for health care* is measured as self-assessed severity (SAS) among those individuals who reported an illness or injury during the two-week recall period, who are considered as having a need for care. SAS takes the value of 1 if individuals are 'seriously' or 'very seriously' sick, and 0 if 'not that sick'. This SAS measure is different from the more general self-assessed health status variable used in other surveys [32] and it should not be used for comparison with results reported in other studies. SAS reflects individuals' self-perception of their severity of illness, and may cause inconsistent estimates if it is correlated with unmeasured initial health endowments or socio-economic status [22]. Alternatively, self-reporting of medical conditions could be used, but this requires that individuals have regular contacts with health personnel, which is rather rare in low-income settings [27]. Additional need proxies in the need model include gender, age, pregnancy, and number of days in bed when sick.

Fifth, inequity patterns can be due to the distribution of other factors (e.g. preferences and taste for specific health care), which may affect the distribution of the demand for care; implying that voluntary insurance membership ought to be treated as *endogenous*. Although these factors can be controlled for by including them as additional determinants in the need standardisation process, the survey did not collect the variables necessary to do this [16]. As the purpose of this analysis is to examine the extent to which insurance coverage affects the degree of inequity, the self-selection effect is not investigated any further [6].

Also, given the very low average use rates of 0.2 visits *per capita* per year in Rwandan health centres under user fees, self-selection into MHI was considered as a desirable health policy result. If there were self-selection, this would be reflected in considerably higher service use by the insured. Health facility data show higher visit rates for insured than uninsured individuals (about 1.3 versus 0.2 visits *per capita* per year in health centres, respectively); however, the Ministry of Health did not consider these use levels as indicative of adverse selection, moral hazard, or frivolous service use [33]. HC partnering with

small MHI reported considerably higher use levels (up to 3 visits per member per year), suggesting that adverse selection is a risk with voluntary and low enrolment.

Sixth, measuring inequality requires that genuine dispersion be separated from *measurement errors* [29]. There is no reason to expect that the occurrence of measurement errors could be different among the insured or uninsured, implying that it should not affect the comparative results between the two groups.

Finally, there are potentially biases arising from *omitted variables* and *heterogeneity*. Estimates of health expenditures from household surveys are potentially subject to both recall bias and small sample bias due to the infrequency with which some payments are made [29]. Whether estimates are biased depends upon whether reporting health expenditures is systematically related to income, which is the case in this data. Again, insured and uninsured households should be equally exposed to these problems.

Estimation procedure

The indirect standardisation method is used to compute the need-adjusted use measures for calculating the concentration index. A binary choice model serves to estimate individuals' need-adjusted visit probability by insurance status. In a logit regression, the dependent variable takes the value of 1 if individuals report a visit during the two weeks prior to the interview, or zero otherwise [34]:

$$P_i(\text{visit}) = 1/(1 + 1/e^{L_i}) \tag{1}$$

$$L_i = b_1 + b_2\ X_{2i} + \cdots + b_k\ X_{ki} \tag{2}$$

where X_{ki} represents a set of variables that are assumed to reflect the expected need for care and influence a sick person's (k) visit probability P(visit).

In the standardising procedure, need is proxied by the SAS dummy and additional variables associated with differential need for health care and influencing the probability of a visit [6]. Using only SAS as the need proxy could cause biased results if individuals across socio-economic groups differentially perceive their health, or if other factors affect their care-seeking behaviour, independent of their health status [21]. The following logit model serves to estimate the need-adjusted expected visit probability separately for insured and uninsured sick individuals[e]:

$$\begin{aligned} P_i(\text{visit}) = \text{F(L)} = {} & \alpha + \pi_1\ (\text{genPat}) + \pi_2\ (\text{d\_agepat}) \\ & + \pi_3\ (\text{pregnant}) + \pi_4\ (\text{bedday4+}) \\ & + \pi_5\ (\text{d\_SAS}) + \varepsilon \end{aligned} \tag{3}$$

where gender (genPat) equals 1 if male; the age dummy (d_agepat) takes the value of 1 if the sick individual is 0–5 years old; a pregnancy dummy (pregnant) is 1 if the sick person was pregnant during the interview or the year prior to the interview; a bed dummy (bedday4+) that equals 1 if the interviewee had spent four or more days in bed due to illness; and the SAS dummy (0 = not seriously sick; 1 = serious and very seriously sick). Predicted values are saved for MHI members and the uninsured, and concentration indices for actual visits C_{M} and for need-adjusted visits C_{N} are derived based on the covariance method to measure horizontal inequity in utilisation within each group[f] [6]. These methods were introduced by Wagstaff *et al.* [35], and have since been used and described frequently [13,23,36,37].

In the minimum standard analysis, a short-term concept is applied by using a cross-sectional data set and assuming that all costs are borne in the same period. The minimum level is defined by the Rwandan consumption PL of RWF 4920 ($11 in 2000) per month per adult [38], and is used for purely comparative reasons. The mean levels of households' monetary expenditures (PreYpc) are compared before $X(\text{pre})_{\text{PL}}$ and after $X(\text{post})_{\text{PL}}$ OOP payments for the use of health care for insured and uninsured groups, and normalised by the PL. Pre-health payment income normalised by PL equals

$$X(\text{pre})_{\text{PL}} = (\text{PreYpc})/\text{PL} \tag{4}$$

Post-health payment income normalized by the PL equals:

$$X(\text{post})_{\text{PL}} = X(\text{pre})_{\text{PL}} - (\text{OOPpc}/\text{PL}) \tag{5}$$

where (OOPpc) reflects total *per capita* OOP health payments for the use of health care. The poverty impact of health payments is assessed by the changes in the *poverty headcount* and in the *poverty gap* [10] within insured and uninsured groups. The methodology of the minimum standard approach is described in Wagstaff *et al.* [10].

The analysis uses weighted data and svydes commands in STATA v.7.0 [39].

Results

Horizontal inequity in utilisation

Table 3 presents results. MHI members report significantly higher utilisation rates for actual (M) and need-adjusted visits (M_N) than user-fee paying individuals. For both groups, adjusting the visit probability by variables indicating higher need does not affect the expected visit values (M_N), implying that the 'need' characteristics used do not yield any relevant differences in utilisation. Hence, financial and not need-related criteria seem to determine uninsured individuals' care-seeking behaviour, leading to large differences in service use between insured and uninsured groups.

The zero-values for the insured concentration indices C_M and C_N imply that actual and need-adjusted service use among MHI members is equally distributed across socio-economic groups. This equal distribution coincides with the equal distribution of need for care, as expressed by the zero-value for HI for MHI members, indicating that the insured use care according to their need, and independent of their socio-economic background.

For user-fee paying individuals substantial inequality in utilisation remains. The positive concentration index for actual service use C_M suggests that visits are more common among the richer uninsured [21], even though the zero-value for C_N implies an equal distribution of expected, need-adjusted visits. The positive horizontal inequity index HI for user-fee paying individuals indicates that compared to the poor, the richer uninsured use a higher share of care than expected on the basis of their need. Hence, the lack of MHI coverage does seem to act as a barrier to access to health care for low-income groups and contributes to horizontal inequity in service use.

Socio-economic effect of OOP health payments

Following Equations (4) and (5), Figure 1 shows the Pen's parade for all insured household pre- and post-payment incomes. Figure 2 shows the same Pen's parade for a random sample of the same size of uninsured households. Plotting all uninsured households would obscure the impact among the uninsured. Overlaid on the chart are 'paintdrops', reflecting OOP payments for the use of care [10].

The pre-payment income distributions in both figures show that the majority of households live in poverty. As visualised by the 'paintdrops', OOP payments push some poor households further into poverty, and some non-poor households into poverty. To the extent that there is adverse selection in the current MHI, this exaggerates the paintdrops in Figure 1, which would be smaller without such adverse selection and which would mean that MHI protects the insured even better against unexpected health expenditures.

Table 4 presents the related poverty measures [10] for insured and uninsured households. First, as in Table 3, utilisation rates for individuals classified below the PL show that poor MHI members report significantly higher visit rates than the uninsured. Second, the poverty headcount ratio shows the proportion of insured and uninsured households below PL before (H_0) and after (H_1) health payments. OOP spending increases the headcount ratio by 0.6% points for MHI and by 1.3% points for uninsured households. Third, comparing the normalized poverty gaps before and after health care indicates that for MHI

Table 3. Horizontal inequity in utilisation, by insurance status

Sick individuals	MHI	User fees	p-values
Actual visits			
M: Actual mean visit	0.453	0.146	$p<0.001$
C_M: Concentration index based on actual visits	0.079	0.270	
Need-adjusted visit probability			
M_N : Adjusted mean visit	0.453	0.146	$p<0.001$
C_N: Adjusted concentration index	0.042	0.008	
HI (indirect) $= C_M - C_N$	0.037	0.261	
N (sick individuals)	376	3459	

Note: Weighted data. Newey–West regression estimators provided implausible results for C_M and C_N.

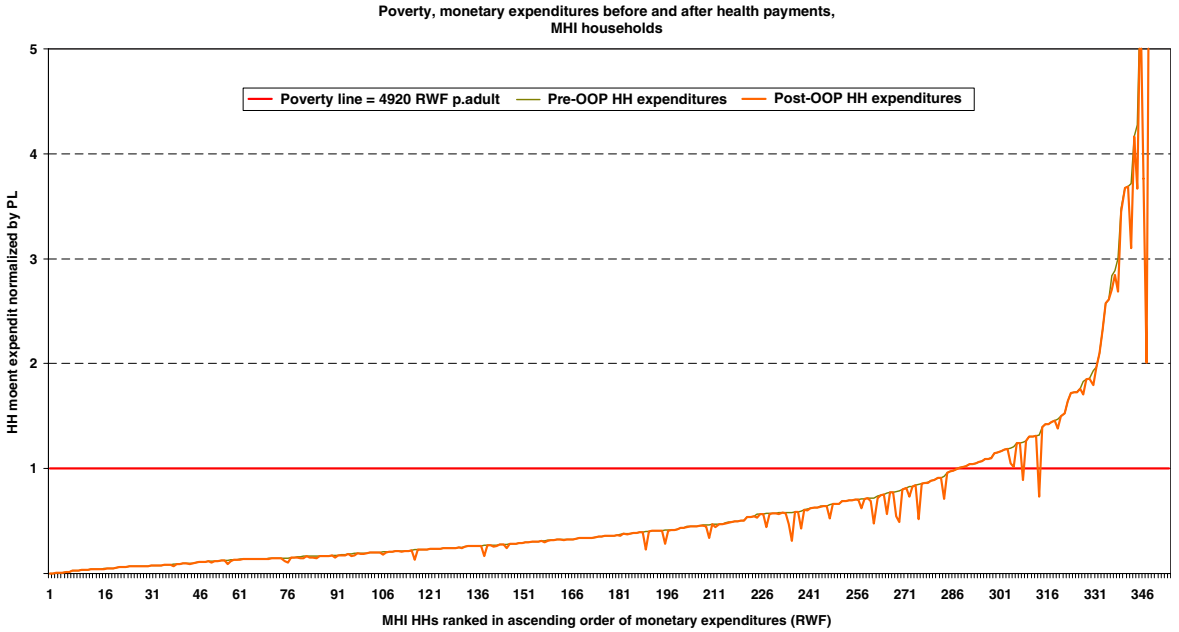

Figure 1. Pen's parade, full sample of insured households

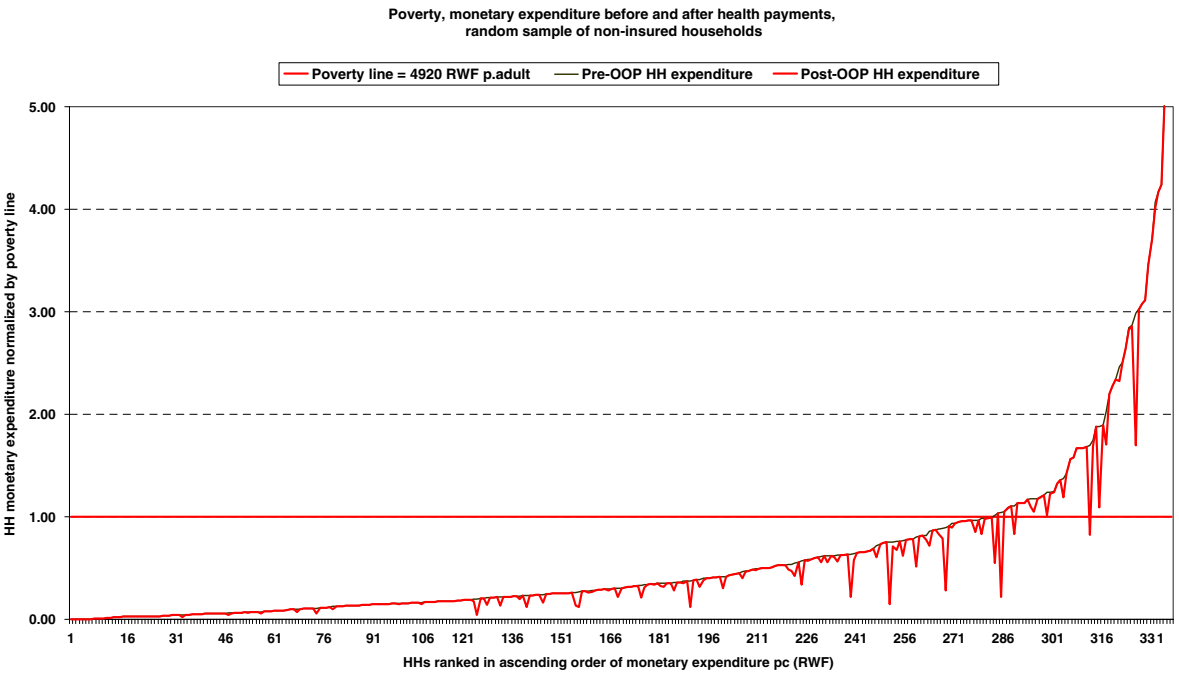

Figure 2. Pen's parade, random sample of uninsured households

Table 4. OOP spending in terms of the PL, by MHI status

	MHI	User fees
PL per adult per month (RWF)	4920	4920
Utilisation rates of sick individuals <PL		
Outpatient utilisation rate HC, per capita	0.43***	0.13
Inpatient utilisation rate hospitals, per capita	0.37***	0.1
Poverty headcount: Number of households below PL		
N: Number of households in sample	354	2785
P(pre): Number of households < PL before health	287	2412
P(post): Number of households < PL after health	289	2447
Headcount ratio: Proportion of households below PL		
H_0(before health): P(pre)/N	81.1%	86.6%
H_1(after health): P(post)/N:	81.6%	87.9%
H_1-H_0: Increase of headcount ratio, %-points	0.6	1.3
Poverty gap: Average shortfall of income from PL		
G(pre) (RWF): Area A in Figure 2	2628	2856
G(post) (RWF): Area $A+B+C$ in Figure 2	2687	2953
G(post)−G(pre): Increase of poverty gap (RWF)	59	97
Normalized poverty gap: % by which income falls below poverty line		
NG(pre): G(pre)/PL	53.4%	58%
NG(post): G(post)/PL	54.6%	60%
PI(NG): Increase of normalized poverty gap, %-points	1.2	2

Note: Weighted data. ***Significant at 1% level. See Wagstaff and Van Doorslaer [10].

members, OOP payments (due to the use of care not covered by MHI) increased the average shortfall of income below PL by 1.2% points; while this was 2% points for the uninsured.

These results suggest that for uninsured and insured households, OOP health spending has a similar small impact on their socio-economic situation. However, for MHI members, this is at significantly higher visit rates and horizontal equity in utilisation, which is not the case for the uninsured. There are still some insured households who drop below or further below the PL. This is due to insured individuals having to pay for hospital care not covered by MHI. Thus, in the long run the current MHI benefit package may not be large enough to protect household income against poverty, and might be expanded to include hospital care.

Discussion and conclusion

In this paper we have compared distributions of health centre visits among insured and user-fee paying sick individuals in Rwanda to quantify horizontal inequity in service use. We have also used the minimum standard approach to measure the extent to which OOP payments for the use of care pushes household income into poverty if individuals are insured or pay user fees. This was done using data from households and sick individuals interviewed in a household survey conducted in three Rwandan districts in 2000 [16].

The comparative results for insured and user-fee paying groups suggest the following. First, sick insured individuals report a markedly higher visit rate than the uninsured. In addition, for the insured, the distribution of visits matches their distribution of their need for care, implying that MHI contributes to horizontal equity in utilisation. Second, user fees create horizontal inequity in utilisation: visits strongly correlate with user-fee paying individuals' socio-economic background.

Third, once households have paid their annual MHI premium (see endnote d), OOP payments have a similar small impact on the headcount and the normalised poverty gap for insured and uninsured households. This is because user-fee paying individuals report significantly fewer

provider visits, and hence do not have any out-of-pocket expenses for health care. It could be that the poor uninsured chose not to use care because they fear that paying user fees might endanger their ability to purchase other goods and services. Thus, MHI and user fees have similar implications for poor households' monetary expenditures against financial shocks caused by OOP payments for the use of medical care. However, this is at a considerably higher utilisation level and horizontal equity in service use for MHI members, whereas user fees cause horizontal inequities in utilisation at a lower mean level of service use.

Fourth, OOP payment for care not covered by MHI still causes some insured households to drop below or further below the PL, implying that the current MHI benefit package may not be large enough to protect household income against poverty, and should thus be expanded to include hospital care. This result is compatible with findings from Vietnam, where the more frequently occurring outpatient payments, not covered by insurance, had clearly pushed some households further into poverty or below the extreme poverty line [10].

This analysis has limits related to the data set and methods used. Including only those individuals who reported they needed care in the equity analysis may cause selection bias. As argued above, the direction of this bias would most likely be to understate the degree of inequity in service use among insured and uninsured individuals. Thus our findings can be seen as representing the lower bound on the degree of inequity present among the sample population. The need indicator SAS relates to the specific illness episode rather than general health status. It is therefore different from the more general self-assessed health status variable used in other surveys [6,32] and findings should not be used for comparison with results reported in other studies. The PL served as a theoretical threshold income for purely comparative reasons, against which insured and uninsured income is assessed. Longitudinal data would be needed to examine the poverty impact of health payments and households' income smoothing over time.

Despite these limitations, the above findings have health policy implication for Rwanda and other countries. If governments aim to improve access to care for the poor, then cost recovery methods must ensure horizontal equity in utilisation, and prevent health payments from causing impoverishment. In Rwanda, this could be addressed by increasing MHI enrolment and expanding the current MHI benefit package to include hospital care. However, a greater range of services covered by MHI would imply a premium increase, which could negatively affect enrolment, and lead to the exclusion of vulnerable groups. This raises the question about the extent to which donors and governments expect poor people to fund their own health care, even if this is through risk-sharing mechanisms such as MHI.

The MHI benefit package covers access to care in rural health centres, where the poor seek care. As there is no free care in Rwandan health facilities, nor is there currently any intention at the policy level to remove user fees, MHI could be used as a mechanism to target subsidies to the poor, for example in form of reduced premiums or premium exemption. This has already been attempted in Rwanda, where local churches paid the annual MHI premium for about 3000 poor widows, children, indigents and orphans [40].

Based on the above findings and considering that user fees are the most widely spread OOP payment method in many low-income countries, risk-sharing mechanisms that promote horizontal equity in service use and protect low-income groups against poverty should be a priority for future health policy research.

Acknowledgements

The authors are grateful to the USAID-funded Partnerships for Health Reform (PHR) project administered by Abt Associates Inc., for the use of the data set, and to two anonymous referees for helpful comments on an earlier draft. The article is adapted from the dissertation of Pia Schneider, completed under the supervision of Kara Hanson at the University of London, London School of Hygiene and Tropical Medicine. Kara Hanson works with the Health Economics and Financing Programme which is funded by the UK Department for International Development.

Notes

a. See: World Bank, Quantitative Techniques for Health Equity Analysis. Technical Notes: http://www.worldbank.org/poverty/health/wbact/health_eg.htm [7 December 2004].

b. In low-income contexts, need is often proxied by individuals' self-assessed health status. Case and Deaton (2002) argue that poor people may perceive their health status as less severe than the better-off, mainly because they do not have the luxury of letting health compromise their daily work.
c. While *per capita* values give too little to adults and too much to children, dividing household expenditures according to each individual's need may underestimate the true dispersion of consumption among them. The Rwandan Household and Living Condition Survey (HLCS) conducted in 2000 uses the same adult equivalence scale that was used in the 1983 National Budget and Consumption Survey. The scale contains different weights by gender and age group, giving higher values to women than men, due to women's longer work hours. However, the HLCS methodology does not describe the basis for the different weights.
d. If premium were included in OOP payments, all insured households would have 'paintdrops' in Figure 1 and the poverty impact of OOP payment would be higher. The equity impact of MHI premium has been examined in another study. Schneider and Diop (2001) found MHI premiums to be slightly regressive with respect to household monetary expenditures. This suggests that the annual MHI premium level is too high for poor households and should be lowered for the poor to reach progressivity in health financing and protect them from falling into poverty.
e. Logit regression results for insured and uninsured individuals can be requested from authors.
f. See: World Bank, Quantitative Techniques for Health Equity Analysis. Technical Notes: http://www.worldbank.org/poverty/health/wbact/health_eg.htm. [7 December 2004]. The regression approach and the formula approach are not appropriate with weighted data. Therefore, the covariance method is used to estimate concentration indices.

References

1. Bennett S. The role of community-based health insurance within the health care financing system: a framework for analysis. *Health Policy Plann* 2004; **19**(3): 147–158.
2. Hurley J. An overview of the normative economics of the health sector. In *Handbook of Health Economics*, Culyer AJ, Newhouse JP (eds). Elsevier Science: Rotterdam, 2000; 55–118.
3. ILO. *Extending social protection in health through community based health organizations*: *Evidence and challenges*. Discussion Paper, ILO — Universitas, Geneva, 2002.
4. Bennett S, Creese A, Monasch R. *Health insurance schemes for people outside formal sector employment*. WHO Current Concerns WHO/ARA/CC/98.1. World Health Organization, Geneva, 1998.
5. Jimenez-Martin S, Labeaga J, Martinez-Granado M. Latent class versus two-part models in the demand for physician services across the European Union. *Health Econ* 2002; **11**(4): 301–321.
6. Van Doorslaer E, Koolman X, Puffer F. Equity in the use of physician visits in OECD countries: has equal treatment for equal need been achieved? In *Measuring Up*: *Improving Health Systems Performance in OECD Countries*, OECD (eds). OECD: Paris, 2002; 225–248.
7. Van Doorslaer E, Wagstaff A, van der Burg H. Equity in the delivery of health care: some further international comparisons. *J Health Econ* 2000; **19**(5): 553–584.
8. Waters HR. Measuring equity in access to health care. *Soc Sci Med* 2000; **51**: 599–612.
9. Bitran R, Munoz J, Aguad P, Navarrete M, Ubilla G. Equity in the financing of social security for health in Chile. *Health Policy Plann* 2000; **50**: 171–196.
10. Wagstaff A, Van Doorslaer E. *Paying for health care*: *quantifying fairness*, *catastrophe*, *and impoverishment*, *with applications to Vietnam*, *1993–98*. The World Bank, Washington, DC, 2001. http://econ.worldbank.org/files/2601_wps2715.pdf
11. Gilson L. The lessons of user fee experience in Africa. In *Sustainable Health Care Financing in Southern Africa*, Beattie A, Doherty J, Gilson L, Lambo E, Shaw P (eds). The World Bank: Washington, DC, 1996; 35–48.
12. Russell S, Gilson L. User fee policy to promote health service access for the poor: a wolf in sheep's clothing? *Int J Health Services* 1997; **27**(2): 357–365.
13. Ensor T, San PB. Access and payment for health care: the poor of northern Vietnam. *Int J Health Plann Manage* 1996; **11**(1): 69–83.
14. Falkingham J. Poverty, out-of-pocket payments and access to health care: evidence from Tajikistan. *Soc Sci Med* 2004; **58**: 247–258.
15. Atim C. *Contribution of Mutual Health Organizations to Financing*, *Delivery*, *and Access to Health Care*. Technical Report No. 18. Partnerships for Health Reform (PHR), Abt Associates Inc., Bethesda, MD, 1998.
16. Schneider P, Diop F. *Impact of Prepayment Pilot on Health Care Utilization and Financing in Rwanda*: *Findings from Final Household Survey*. *TE002*. The Partners for Health Reformplus (PHRplus) Project, Abt Associates Inc., Bethesda, MD, 2001.
17. Wagstaff A, Van Doorslaer E. Equity in the finance and delivery of health care: concepts and definitions. In *Equity in the Finance and Delivery of Health Care*: *An International Perspective*, Van Doorslaer E, Wagstaff A, Rutten F (eds). Oxford University Press: Oxford, 1993.

18. Culyer A, Wagstaff A. Equity and equality in health and health care. *J Health Econ* 1993; **12**: 431–457.
19. Manning WG, Newhouse JP, Duan N, Keeler EB, Leibowitz A, Marquis SM. Health insurance and the demand for medical care: evidence from a randomized experiment. *Am Econ Rev* 1987; **77**(3): 251–277.
20. Yip W, Berman P. Targeted health insurance in a low-income country and its impact on access and equity in access: Egypt's school health insurance. *Health Econ* 2001; **10**: 207–220.
21. Wagstaff A, Van Doorslaer E. Equity in the delivery of health care: methods and findings. In *Equity in the Finance and Delivery of Health Care*: *An International Perspective*, Van Doorslaer E, Wagstaff A, Rutten F (eds). Oxford University Press: Oxford, 1993.
22. Wagstaff A, Van Doorslaer E. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. *Health Econ* 2003; **12**(11): 921–933.
23. Wagstaff A, Van Doorslaer E. Equity in health care finance and delivery. In *Handbook of Health Economics*, Newhouse JP (ed.). Elsevier, North-Holland: Amsterdam, 2000; 1803–1862.
24. Shepard DS, Carrin G, Nyandagazi P. Household participation in financing of health care at government health centers in Rwanda. In *Health Economics Research in Developing Countries*, Mills A, Lee K (eds). Oxford University Press: Oxford, 1993; 140–164.
25. Schneider P, Diop FP, Bucayana S. *Developing and Implementing Prepayment Schemes in Rwanda*. Technical Report No. 45. Partnerships for Health Reform (PHR), Abt Associates Inc., Bethesda, MD, 2000.
26. Schneider P. *The contribution of micro-health insurance to equity and sustainability in Rwanda*. London School of Hygiene and Tropical Medicine, University of London, London, 2004.
27. Case A, Deaton A. *Consumption, health, gender and poverty*. Research Program in Development Studies, Princeton University, 2002.
28. Van Doorslaer E, Wagstaff A, van der Burg H. The redistributive effect of health care finance in twelve OECD countries. *J Health Econ* 1999; **18**: 291–313.
29. Deaton A. *The analysis of household surveys. A microeconometric approach to development policy*. The World Bank, Washington, DC, 1998.
30. Ettner S. Adverse selection, the purchase of medigap insurance by the elderly. *J Health Econ* 1997; **16**(5): 543–562.
31. Jowett M, Deolalikar A, Martinsson P. Health insurance and treatment seeking behaviour: evidence from a low-income country. *Health Econ* 2004; **13**(9): 845–857.
32. Blaxter M. A comparison of measures of inequality in morbidity. In *Health Inequalities in European Countries*, Fox J (ed.). European Science Foundation, Gower: London, 1989.
33. Schneider P, Diop F, Maceira D, Butera D. *Utilization, Cost and Financing of District Health Services in Rwanda*. Technical Report No. 61. Partnerships for Health Reform (PHR), Abt Associates Inc., Bethesda, MD, 2001.
34. Mukherjee C, White H, Wuyts M. *Econometrics and Data Analysis for Developing Countries*. London: Routledge, 1998.
35. Wagstaff A, Van Doorslaer E, Paci P. Equity in the finance and delivery of health care: some tentative cross-country comparisons. *Oxford Rev Econ Pol* 1989; **5**(1): 89–112.
36. Wagstaff A, Van Doorslaer E. Measuring and testing for inequity in the delivery of health care. *J Hum Resour* 2000; **35**(4): 716–733.
37. Koolman X, Van Doorslaer E. On the interpretation of a concentration index of inequality. *Health Econ* 2004; **13**(7): 649–656.
38. Ministry of Economics and Finance. *A profile of poverty in Rwanda*: *An analysis based on the results of the Household Living Condition Survey 1999–2001*. MINECOFIN, Kigali, Rwanda, 2002.
39. StataCorp. *STATA7*. Stata Press: College Station, TX, 2001.
40. Schneider P, Diop F, Leighton C. *Pilot testing Prepayment for Health Services in Rwanda*: *Results and Recommendations for Policy Directions and Implementations*. Technical Report No. 66. Partnerships for Health Reform (PHR), Abt Associates Inc., Bethesda, MD, 2001.

