

Reinsurance of health insurance for the informal sector

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Abstract Deficient financing of health services in low-income countries and the absence of universal insurance coverage leaves most of the informal sector in medical indigence, because people cannot assume the financial consequences of illness. The role of communities in solving this problem has been recognized, and many initiatives are under way. However, community financing is rarely structured as health insurance. Communities that pool risks (or offer insurance) have been described as micro-insurance units. The sources of their financial instability and the options for stabilization are explained. Field data from Uganda and the Philippines, as well as simulated situations, are used to examine the arguments. The article focuses on risk transfer from micro-insurance units to reinsurance. The main insight of the study is that when the financial results of micro-insurance units can be estimated, they can enter reinsurance treaties and be stabilized from the first year. The second insight is that the reinsurance pool may require several years of operation before reaching cost neutrality.

Keywords Insurance, Health/trends; Insurance carriers/organization and administration; Financing, Health/methods; Insurance pools/organization and administration; Community networks/utilization; Risk assessment; Developing countries (*source: MeSH*).

Mots clés Assurance-maladie/orientations; Compagnie assurance/organisation et administration; Financement, Santé/méthodes; Assurance risques partages/organisation et administration; Réseaux coordonnés/utilisation; Evaluation risque; Pays en développement (*source: INSERM*).

Palabras clave Seguro de salud/tendencias; Aseguradoras/organización y administración; Financiamiento de la salud/métodos; Fondos de seguro/organización y administración; Redes comunitarias/utilización; Medición de riesgo; Países en desarrollo (*fuentes: BIREME*).

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Voir page 677 le résumé en français. En la página 677 figura un resumen en español.

Introduction

The formula for success in extending health insurance in countries of the Organisation for Economic Co-operation and Development (OECD) has been to link affiliation with employment. However, this linkage is inapplicable to people outside formal or steady employment, such as the rural, agricultural, self-employed, or urban poor. These groups represent a significant part of the population in low-income and middle-income countries. Because of their inability to pay for contributory insurance, they fall into medical indigence. Other factors that complicate a top-down solution in most low-income countries include the low capacity of governments to collect taxes, pool or redistribute resources, and manage risks (1, p.7). Access of individuals is hampered by distance from health centres (2, p.79; 3), user fees which are regressive but also present an obstacle to those who engage mainly in barter economy (1, p.97; 2, pp.91–92), low levels

of education, low health status, minority status, ethnic or tribal affiliation, and gender inequality (2, p.80, 4–8).

So the question is what can be done to reduce financial exposure of people in the informal sector to the cost of illness. Government-financed universal insurance coverage has been an insurmountable challenge. A market-driven alternative has been inoperable, because low demand for health services has often been matched by low or no supply of services. And the few who try to provide solutions for the informal sector often encounter endemic financial instability.

What role for communities?

It is increasingly recognized that community-level “social citizenship” reflects a forceful mutuality of interests, and that governments should help develop coalitions with these structures (9, p.112). Many agents have been supporting community-based health services. These include government units, nongovernmental organizations, charitable societies such as churches, cooperatives, or mutual societies (e.g. micro-finance institutions), and civic groups

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organized on an ad hoc basis. Little has been done, however, by these support groups to structure community-based activity as insurance, or to identify the operative conditions that enable community-based organizations (CBOs) to lead and sustain this activity. In fact, little is known about how CBOs can best launch health insurance; how CBOs can adapt health insurance to local risks and living conditions; and how CBOs can enhance demand for health insurance.

Can insurance function at community level?

The fundamental requirement for insurance is pooling of many loss exposures. CBOs that include no element of pooling cannot be considered as insurance, even if they require prepayment (e.g. schemes covering only preventive care, such as annual check-ups, prenatal visits, vaccinations). Similarly, credit facility for health costs or a medical savings account cannot qualify as insurance. The main difference between the two is that savings offer no interpersonal trade (10). The term "micro-insurance" has been coined to distinguish voluntary, contributory, risk-pooling endeavours from other community health schemes (11). "Micro" refers to the small size of the group, the volume of transactions, and the locus of operations at a grass-roots level of society. The term "unit" is used to emphasize that viability depends on linkage to a larger entity. Similar to other insurance schemes, micro-insurance units (MIUs) link people through a mutual selection of risk-averse preferences, for which payment is determined as a function of the benefit package. By pooling individual risks, MIUs can offer an averaging of the risk and its cost, which would otherwise be too large for individual exposure. But MIUs can offer insurance only if they themselves are financially stable.

What causes financial instability of MIUs?

The financial viability of MIUs is threatened by two major causes: income-side instability and expenditure-side instability.

Income-side instability

Where the income of MIUs comes mainly from contributions, this income depends firstly on an accurate calculation of contributions, and secondly on satisfactory compliance rate.

Income needs to cover the average cost of the benefit package, plus administrative costs. The average cost is calculated on the basis of the cost and probability of claimed benefit. Large health schemes in high-income countries usually calculate their budget on the basis of historical expenditure

patterns (12, p. 96). MIUs cannot emulate this practice, owing to their lack of reliable long-term utilization and cost records. Personal observations of the author during field missions to Uganda (April 2000) and the Philippines (October 2000 and February 2001) suggest that in reality, contribution levels have been set not by estimating costs or probabilities of events, but by referring to external issues such as the fee of an outpatient visit (as in Uganda) or the cost of other insurance schemes (as in PhilHealth, Philippines).

Regardless of the method by which contributions are fixed, when actual contribution income falls short of the expected amount, there is a "compliance gap". This gap may reflect deficient managerial skills at the level of the MIU. Maintaining a high compliance rate is complicated by the unstable earning patterns and cyclical income of members. For rural work, irregular income patterns are usually linked to crop cycles and reliance on a single crop. Temporal fluctuations in environmental conditions (such as droughts, floods, typhoons) and other random events may aggravate income instability. Many other types of work have similar characteristics, including seasonal work such as tourism, migrant work, and work exposed to political risk, such as public works and activities dependent on government subsidies.

Fluctuations in the number of members also influence contribution income. The challenge for MIUs is both to attract members and to retain them over long periods during which they consume no or few services. In their effort to enhance outreach, MIUs may be tempted to offer a benefit package that they cannot afford. Underfunded outreach at the expense of sustainability is an additional risk for MIUs.

Expenditure-side instability

Group size. The number of members of MIUs is usually small, and this is related to some expenditure-side instability. For one thing, random statistical fluctuations in the number of claims will be significant when the number of expected claims is small. This can occur either when the membership is small or when the claim probability is very low (even if group size is not very small). The linkage between group size and occurrence distribution explains why the statistical profile of large schemes is different from that of MIUs, with the self-explanatory financial consequences. The illustration of different distributions of claims around the mean, for two groups (one of 100 members and the second of 1000 members) is provided in Fig. 1, in a claim/non-claim simulated scenario under the binomial law. The graph shows that at a given probability of claim, fluctuations in the number of claims from the mean are more likely in small groups. The group sizes chosen for this illustration reflect the typical size of many MIUs: between 100 and 1000 paying members. The linkage between outliers and group size disappears in groups exceeding a few thousand people.

Fig. 1. Distribution influenced by group size

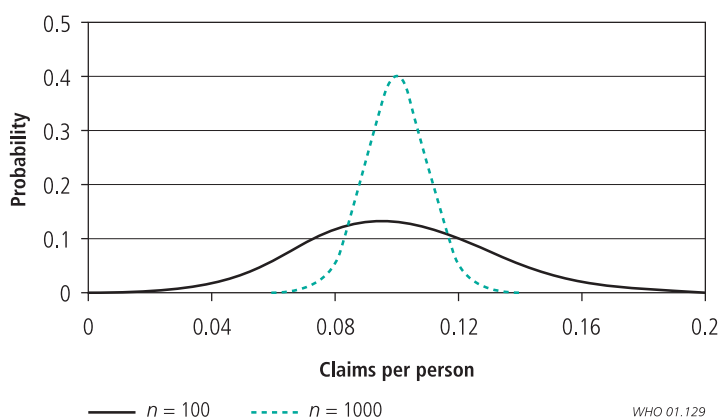


Fig. 2. Variance of claims

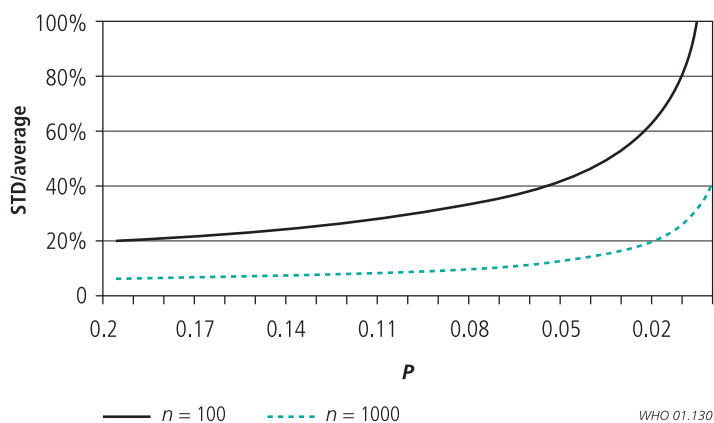
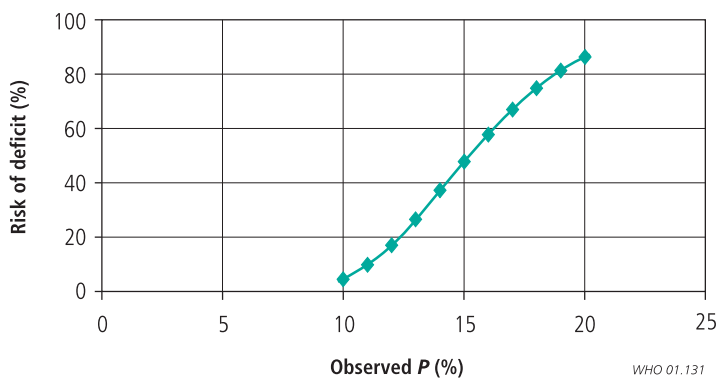


Fig. 3. Impact of error in estimating P



It seems self-evident that high probability of risk exposes insurers to a high expected claims cost; what is less self-evident is that when the probability drops, small groups benefit less from the drop than large groups, because the statistical possibility of a higher than average claim load occurring is sensitive to group size. Fig. 2 illustrates this phenomenon, juxtaposing a group of 100 and one of 1000 members, and employing the normal distribution approximation to the binomial law. As can be seen,

when the probability is 2%, both groups are exposed to the chance that the claim load will be above the expected mean; but whereas this risk (for claims to be 60% or higher than the mean) is in the order of 1% for the large group, it is a significant 16% for the small group.

Underestimated probability of risk. Fig. 1 and Fig. 2 have shown that the level of fluctuations depends on the probability of risk. Thus, an erroneous estimate of P will unavoidably lead to an erroneous estimate of the expected statistical fluctuations. The financial corollary of this error is higher likelihood of insolvency. This relation is more significant for small groups, as Fig. 3 shows. The graph (calculated with the same assumptions as Fig. 2) demonstrates that when the required income is fixed on an assumed $P = 10\%$ and allowing a level of insolvency of 5%, an observed value of P of 15% causes the risk of insolvency to jump from 5% to 50%; and an observed P -value of 20% instead of the estimated 10%, will escalate the risk of insolvency to 90% instead of 5%.

Fluctuations in unit cost of benefits. Variance in the unit cost of benefits is an additional potential source of financial instability. Provider payment systems such as capitation or flat rates have become common remedies for unit-cost fluctuations. Reaching such a favourable negotiated deal requires a strong bargaining position, which single MIUs may not always have. When unit-cost variation cannot be averaged out or transferred to the provider, the cost of single episodes of care is likely to vary significantly (for instance, a prescription for a simple pain killer will be cheaper than an antibiotic; or the costs of one incident involving hospitalization can vary depending on the length of stay). Fig. 4 provides an example from ORT Health Plus Scheme (La Union, Philippines): 80% of all medico-technical procedures cost up to 200 Philippine pesos, but the remaining 20% cost up to 6 times more.

Catastrophes. A catastrophic event is random, of low probability, and too costly for most individuals to absorb even for a single occurrence. MIUs might be exposed to two categories of health catastrophes: “predictable” catastrophes, which include idiosyncratic events with low probability and high cost. Data from Kisiizi, Uganda, showed that a single case of surgery could bankrupt an entire MIU for a full financial exercise. This example would suggest that the smaller the MIU, and the smaller the financial volume, the more such events resemble catastrophic situations. Insuring this risk could be one of the attraction-poles of MIUs. The second type, “unpredictable” catastrophes, involves covariant events that result from natural disasters such as flooding, contamination of water sources, epidemics and the like. These can cause an unpredicted large increase in the number of claims. Clearly, a risk that affects an entire village cannot be insured solely within the village; it requires pooling with areas not exposed to that risk (9, p.136).

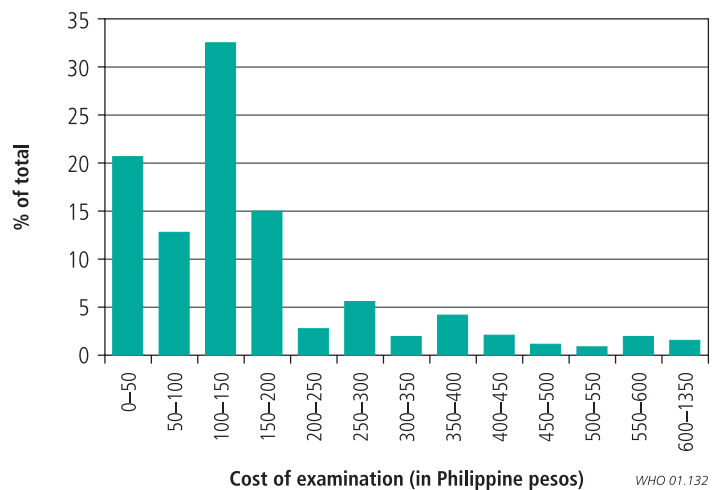
How can the financing of MIUs be stabilized?

Experience with single MIUs, and lessons from micro-finance schemes would suggest that risk-pooling mechanisms launched by CBOs are quite rudimentary, while complex arrangements often enjoy outside technical and financial assistance. Furthermore, there is evidence that MIUs seeking and relying on outside resources (13) tend to operate in isolation from other MIUs in order to improve their competitive edge for external funding. Those who fail to secure external subsidies risk folding. The approach espoused here, to guarantee financial viability of MIUs from inception through risk management tools, represents a paradigm shift compared to the school of thought that views the creation of subsidy-based MIUs as the main challenge. The fundamental concept advanced here is that just as MIUs pool risks that are too large for individual exposure, reinsurance can pool risks that a single MIU may find difficult to bear. Simply defined, reinsurance is the transfer of liability from a primary insurer (the MIU) to another insurance company (the reinsurer). The transfer of risks to a reinsurer is called cession.

Reinsurance activity covers four domains, which are financing, capacity, stabilization, and catastrophe protection; sometimes a fifth domain is added, which would certainly be necessary for MIUs: underwriting and managerial assistance (14). Financing relates to calculating and accumulating the reserves (surplus) that an insurer must retain to guarantee its insurance risk. The traditional view is that substantial own funds are the mark of a healthy financial position. For newly established MIUs in particular, contingency reserves are unavailable, and it is even doubtful if the use of own funds to cover peaks in risk is more effective than financial reinsurance that can be designed to cover both costs and the formation of actuarial provisions. Maintaining reserves also raises the possibility that MIUs could be exposed to members' pressure to spend accumulated sums on benefit enhancements, whereas reinsurance avoids such demands. Capacity refers to the size of a single type of risk the MIU can accumulate. Stabilizing describes the ability to reduce the year-to-year fluctuations in risk (or loss) exposure. Catastrophe protection simply means insuring the MIU against a loss that may endanger its very existence. Lastly, underwriting and managerial assistance offered by the reinsurance allows for sharing information, statistical expertise, and managerial experience that would normally be unaffordable by MIUs, and which can improve performance.

Sharing risks between insurance carriers is common practice in the insurance industry, regardless of the size of insurers. True, where social health insurance can operate within "pay-as-you-go" financing (as in most OECD countries), reinsurance is rare. However, MIUs cannot operate on a pay-as-you-go basis; nor do they enjoy unlimited deficit

Fig. 4. Distribution of unit cost of medico-technical services (ORT, 1999)



financing from external sources. Hence, MIUs need to be assisted to provide insurance. The political imperative for this is that MIUs provide insurance to low income and low health status populations in the informal sector, and thus meet a need that otherwise goes unmet.

A concern is sometimes raised that reinsurance is operated only by the private (for profit) sector, and thus MIUs may be exposed to excessive costs for reinsurance protection. In fact, MIUs cannot at present attract profit-oriented reinsurers. This valid concern has motivated a search for a structure that would operate reinsurance tools in support of MIUs, in affordable conditions. The project to conceptualize, model, and pilot this kind of reinsurance has been launched by a team composed of experts from International Labour Organization (ILO), the World Bank, and the University of Lyon (Claude Bernard), led by the author, financed by an award from the World Bank's Development Marketplace and the ILO, and called "Social Re" (15).

What can be reinsured?

In the previous section, several causes of instability were described. In this section it will be shown that most of these can be reinsured.

Data from Kisiizi, Uganda, on the incidence of hospitalization (during a period of about one year, among 30 MIUs, covering between 15 and 57 households) was analysed to show the severity of random statistical fluctuations in claims numbers. The field data were compared to simulated data, obtained by using a random-number generator and assuming the binomial distribution of claims, to predict the number of incidents. The two data sets are shown in Fig. 5. With an average of 0.4 incidents per insured household for the period, the actual incidence shows a threefold to fourfold difference between MIUs. Seeing that the insured medical care costs (that are borne by the MIU) do not cover ancillary costs such

Fig. 5. Incidence of hospitalization

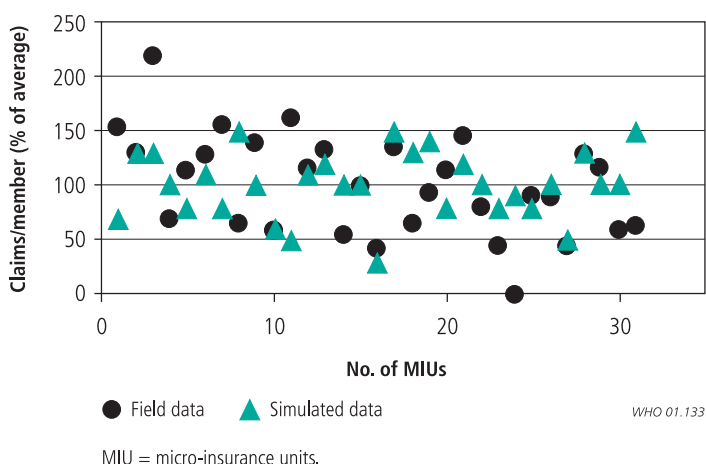


Fig. 6. The cost of securing solvency

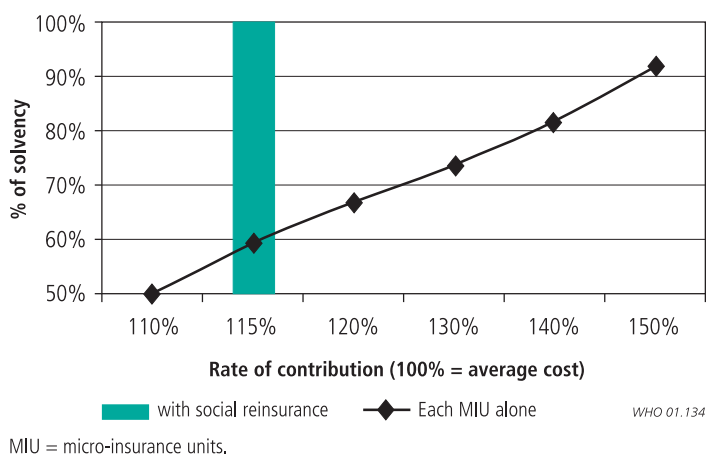
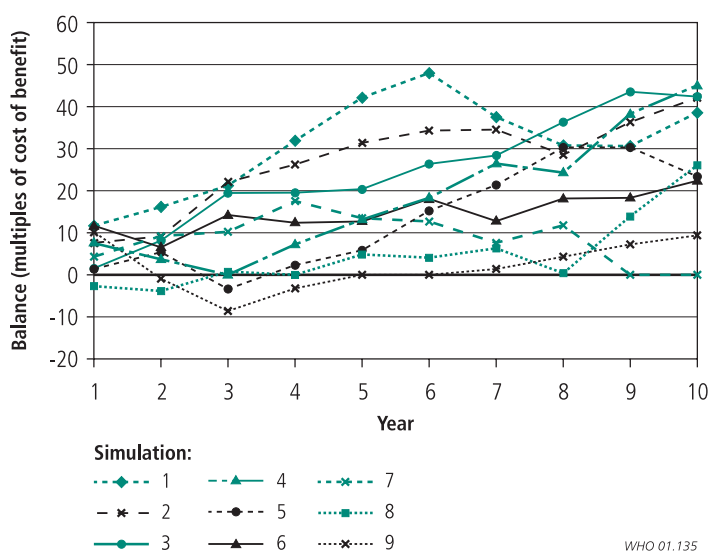


Fig. 7. Simulated performance of social reinsurance



as food, which the families bring to hospital, one can reasonably assume no moral hazard and low demand elasticity. The simulated data were produced to verify

that such extreme fluctuations were not a distortion of inadequate field observations. The similarity between the two series is striking, and allows the impact of reinsuring this risk (for which no field data are of course available) to be explored through more simulations. The question explored was how long MIUs with a uniform size (100 members) and the same risk profile ($P = 10\%$) could remain solvent without reinsurance, when contribution rates were calculated to cover the expected average cost of the package (“original rate”). For the purpose of this simulation, the number of MIUs was increased to 90. The results are shown in Fig. 6. Most MIUs ran aground, even though surpluses were carried forward across years. The original contribution rate was thus increased at intervals of 10% (from 110% to 150%). With contributions at 110%, only 50% of the MIUs survived a 10-year period. As expected, survival rates increased with increasing contribution rates, but only those MIUs that could secure an income of 150% of the original rate for the entire 10-year period were almost safe from insolvency. This cost was compared to reinsurance. With a premium assumed to be 15% of the original rate, reinsurance secured a higher survival rate than all alternatives, and cheaper than all but the 110% alternative. It should be noted that this calculation of reinsurance assumed that the reinsurer paid all costs above the average. The conclusion seems to be compelling: from the point of view of the MIUs, reinsurance was preferable to financing of deficits from contingency reserves, and its cost was more affordable at inception than the alternative option of factoring a reserve into the contribution rates.

The same data were also used to explore how long the reinsurer could survive with this business profile, with a reduction of the number of MIUs to 10, to accommodate a small test population. This is shown in Fig. 7. As can be seen, during the first five years, the reinsurer can encounter episodes of deficit, although these are not very likely. After five years, all nine runs of the simulation showed positive results for the reinsurer. This simulation strongly suggests that reinsurance can operate on a cost-neutral basis in the long term, but that it needs the financial resources to cover possible deficits during the first few years of operations. A second simulation (not shown here), with fewer MIUs, produced less favourable results. This would suggest that, as can be expected, a larger pool of MIUs improves the results of the reinsurer and reduces the period needed for cost neutrality.

Fluctuations in income could also be reinsured under finite risk reinsurance, which is a form of coverage that combines the transfer of a risk with a profit-sharing relationship between the reinsurer and the ceding MIU. This multi-year contract allows the reinsurer to compensate limited amounts of losses in one year, against payment by the MIU through premiums and investment income in other years when surpluses are generated. This form of financial reinsurance operates a trade-off between the underwriting income of today and investment income of

tomorrow. The reinsurer's risk lies in the ability to collect payment of losses within the lifespan of the contract (timing risk).

Conclusion

It has been shown that financial instability of MIUs originates either from their small size, or from the small volume of their transactions, or from errors in risk estimates, or from a disproportionate exposure to catastrophic risks. In some cases, events may be covariant, causing cumulative losses. In addition, MIUs do not normally have the underwriting and managerial skills from inception to operate a fully fledged insurance operation.

The survival of MIUs depends largely on solving these problems. Subsidies have been unstable, and will be necessary to cover non-random costs that cannot be reinsured. For idiosyncratic (individual) and covariant (collective) random risks, reinsurance of MIUs can offer alternative solutions, which would make it possible to control the kind and degree of risk exposure for MIUs.

MIUs can be helped to respond to local risks and to enhance demand for health insurance. This is contingent on their survival as stable risk management operations, which can be improved through the five main functions of reinsurance practice.

Building capacity to collect, analyse, and transmit information on the expected business results of the MIU is a necessary first step. A working

relationship with reinsurers entails full disclosure and relations of trust. At the same time, transparent administration and better financial management can empower MIUs to attract providers, who prefer to work with solvent purchasers. By attracting supply, MIUs can also become more appealing for members. And better governance can also improve compliance of members, with the expected (although not yet proven) amplification of members' willingness to pay.

It is evident that reinsurance of MIUs is not a panacea for all health financing problems in developing countries. Reinsurance cannot increase productivity or be a source of funding, although it can play a role in developing both. However, if MIUs should act as health insurers in the informal sector, reinsurance tools can be put to work in order to sustain these schemes (see 16 and 17 for further technical details on some aspects of this approach). ■

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Conflicts of interest: none declared.

Résumé

L'assurance-maladie des personnes appartenant au secteur informel : intérêt de la réassurance

En raison du financement insuffisant des services de santé dans les pays à faible revenu et de l'absence de couverture universelle par l'assurance-maladie, la plupart des personnes appartenant au secteur informel se trouvent totalement dépourvues de couverture médicale car elles ne peuvent pas assumer les conséquences financières de la maladie. Le rôle que peuvent jouer les communautés dans la solution de ce problème a été reconnu et de nombreuses initiatives sont en cours. Toutefois, le financement communautaire est rarement structuré comme une véritable assurance-maladie. Les communautés qui ont institué un partage des risques (ou qui offrent une assurance) ont été décrites comme des groupes de micro-assurance. Les causes de leur instabilité financière et les solutions qui s'offrent

pour y remédier sont expliquées dans l'article. Des données factuelles concernant l'Ouganda et les Philippines ainsi que des simulations de situations sont utilisées pour examiner les arguments avancés. L'article met l'accent sur le transfert de risque des groupes de micro-assurance à des systèmes de réassurance. Le principal enseignement de cette étude est que, lorsque les résultats financiers des groupes de micro-assurance peuvent être estimés, il peuvent faire l'objet de traités de réassurance, ce qui permet de les stabiliser dès la première année. Le deuxième enseignement est qu'il faut parfois que le pool de réassurance fonctionne pendant plusieurs années avant que l'on puisse parvenir à équilibrer les recettes et les coûts.

Resumen

Reaseguro del seguro de enfermedad para el sector no estructurado

La deficiente financiación de los servicios de salud en los países de bajos ingresos y la falta de un seguro universal deja a la mayor parte del sector no estructurado en una situación de indigencia médica,

pues la gente no puede afrontar las consecuencias financieras de las enfermedades. Se ha reconocido el papel que pueden desempeñar las comunidades en la resolución de este problema, y hay en marcha

numerosas iniciativas en ese sentido. No obstante, la financiación comunitaria rara vez se organiza en forma de seguro de enfermedad. Las comunidades que mancomunan los riesgos (o que ofrecen algún tipo de seguro) se han descrito como unidades de microseguro. Se describen aquí las causas de su inestabilidad financiera y las alternativas para corregirla. Los argumentos presentados se examinan empleando datos del terreno de Uganda y Filipinas, así como situaciones

simuladas. El artículo se centra en la transferencia del riesgo de las unidades de microseguro al reaseguro. El principal hallazgo del estudio es que, cuando es posible estimar los resultados financieros de las unidades de microseguro, éstas pueden participar en contratos de reaseguro y ser estables desde el primer año. El segundo hallazgo es que se pueden requerir varios años de funcionamiento del consorcio de reaseguro para lograr equilibrar los ingresos y los gastos.

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