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## Abstract

Bangladesh needs to start afresh with innovative means of financing the provision of health care since in its absence the poor end up relying largely on self-insurance devices to mitigate health risks, which entails high implicit premiums. Existing insurance type programmes essentially consist of subsidy-oriented interventions, not necessarily in kind, requiring up-front cash at each stage of service delivery, hence failing to overcome the incidence of high out-of-pocket (OOP) payments, nor do the existing programmes succeed in dealing with events leading to catastrophic payments. Given this vacuum, an innovative micro health insurance (MHI) scheme has been designed keeping in view the targets of adequate risk protection, inclusivity of access, affordability and programme sustainability. The research design embracing the methods of cluster randomised trial allows for identification of direct and indirect effects of MHI on actual OOP incurred by the insured vis-à-vis the non-insured households who are otherwise similar in economic, educational and social dimensions. Such an analysis holds the promise of determining whether MHI type of intervention may eventually lead to large-scale implementation so that quality health care reach the poor en masse thereby contributing to the cause of *universal health coverage*.

**Key Words:** Micro Health Insurance, Cluster Randomised Trials, Out-of-Pocket Payments, Cost of Risks

**JEL Classification Code:** C83, G21, G22 and I18

# 1. Introduction

The poor and the emerging middle class face a wide range of risks (illness and injury, death of livestock, harvest failure, flood, cyclones, drought, and so on). They usually adopt various self-insurance devices such as engaging in *ex-ante* income diversification, investing in lower risk assets, using up liquid savings, informal borrowing, even disposing of productive assets and the like. More recently reliance on microcredit has expanded greatly, but such avenues do not offer a great deal of scope for risk mitigation. In addition, some *ex-ante* activities (e.g., income diversification and investing in lower risk assets) may themselves increase the risks of future poverty (i.e., vulnerability), while the *ex-post* strategies (e.g., disposing of productive assets) may lead to persistent or deepening poverty.

In the absence of well-targeted safety net measures, most poor end up relying largely on self-insurance devices to mitigate risks with high implicit premiums. Several authors have proposed that microinsurance products (e.g., life, health & livestock) if suitably designed would go a long way in preventing the risks of further poverty (Ahsan, 2009; Dror, 2007 and Morduch, 2006). Evidence suggests that health is the dominant category of shocks experienced by the poor in Bangladesh and annually households spend about five per cent of total expenditure to meet out-of-pocket (OOP) health care expenses (Ahsan *et al*., 2012, 2013a). There is also evidence that OOP payments push over three per cent of the households into poverty annually (Hamid and Ahsan, 2013). Thus, countries like Bangladesh need to start afresh with innovative means of raising funds for the provision of health care. Micro Health Insurance (MHI) is one such innovation, which relies on pooling the risk as well as the available resources for the provision of affordable care. There is growing evidence that micro health insurance is quite effective in reducing OOP payments, increasing health services utilisation and improved financial access to the impoverished people (Sekabaraga, 2011). Some authors also focused on the importance of such scheme in Bangladesh (e.g., Ensor *et al*., 2000).

Ahsan *et al*. (2013b) found the virtual non-existence of a genuine 'micro health insurance' scheme serving the poor in Bangladesh; what exists are essentially subsidy-oriented interventions offering services featuring high variability in both the extent and quality of care, depending largely on the geographic location of the poor. Evidence shows that there is very low utilisation of formal care and high OOP payment on the one hand and very low demand for existing micro health products on the other (Ahsan *et al.*, 2012, 2013).

Though an unquestioned pioneer of microfinance initiatives, Bangladesh is in a serious state of deficit in terms of advances in significant microinsurance activities, especially in the health context. Given this vacuum, the authors have been engaged in discovering a meaningful pilot intervention at an affordable system cost, especially in the MHI format. Accordingly, a holistic MHI scheme (entitled "*Niramoy*") has been designed keeping in view the targets of adequate risk protection, inclusivity of access and affordability.[1] It is anticipated that such action research would eventually lead to large-scale implementation of health interventions so that quality health care reach the poor en masse thereby contributing to the cause of *universal health coverage* (UHC).

The holistic design process requires identification and congregation of all relevant partners (e.g., microfinance institutions, the insurance company, drug companies, the hospital,

[1] "NIRAMOY" is a Bangla word which refers to recovery chiefly from illness, but may also refer to overcoming a crisis.

and, above all, the beneficiaries) under a common platform so that each 'partner' bears some of the risks involved in the experimentation. Of course, all partners had to accept the various elements of the platform, namely, the benefit package design, premium setting, and the processes of awareness raising, marketing and enrolment in order to implement the scheme in a rural location of Bangladesh. The overarching objective of the scheme proposed here is to involve all stakeholders in the process and also to induct a commercial insurer in order to further anchor it from both regulatory and sustainability points of view.

Lack of quality provision of care plagues many micro health initiatives, and to this end, we have identified a private 600-bed Medical College Hospital in a rural location, which can provide a large range of services, both in-and-outpatient including emergency, to the poor of the region. Drug costs, as is well-known, remain the main challenge in designing an affordable premium in MHI schemes, and in order to contain the same, socially committed pharmaceutical companies have been integrated into the pool of partners. Benefit package design and its pricing (i.e., the insurance premium) are the other facets of this process. Based on extensive analysis of provider's services and fess, the pattern of morbidity of the target population, health seeking behaviour and of the sources of burdensome out-of-pocket (OOP) health expenses faced by the rural poor in Bangladesh, a benefit package has been designed. Premium calculation has also been done simultaneously and in a manner congruent with the standard actuarial practices.

With the foregoing serving as introduction, the remainder of the paper has been organised as follows. Section 2 explains the structure (including a holistic design and modus operandi) of the scheme; section 3 describes the benefit package, co-payments and inclusion criteria; section 4 illustrates the premium determination procedures, section 5 describes the randomised experimental design in order to effectively evaluate the programme; section 6 illustrates the awareness campaign for rolling out the intervention; and section 7 provides conclusions.

## 2. Structure of the Scheme

### 2.1 A Holistic Design

Design of an MHI scheme involves complex activities like product design and pricing, product sales and distribution including marketing and monitoring clients' satisfaction, technical management (membership, premium and claims), financial management, management of agreements with the network of health care providers, drug companies, and risk bearing (insurance and financial consolidation) (ILO/STEP-GTZ, 2006). This present scheme is a unique holistic model of MHI which has assembled all relevant parties including a major healthcare provider, locally active MFIs, pharmaceutical companies, a social business company and a prominent commercial insurer under one umbrella to carry out these diverse tasks (see Figure 1). This model can be viewed as a variant of partner-agent model where a third party leveraging its expertise mediates with the partners.[2] The importance of an umbrella organisation to harness the economies of scale in management, an on-going chore, has been endorsed in the literature (Carrin, 2003). The research team has pioneered this holistic vision and has been playing a pivotal role in bringing these otherwise diverse partners up to speed.[3]

[2] In the present context, Microinsurance Research Unit (MRU) of Institute of Microfinance (InM) plays the role of the third-party.

[3] Alternatively, MFIs may take on this chore once they are sufficiently adept.

The provider hospital is the mainstay of this pilot project; its state-of-the-art facilities and rural location are major attributes prompting its selection.[4] Three participating MFIs (ASPADA, POPI and SSS), all active in the vicinity of the provider hospital (i.e., within a 5-7 kilometre radius), form another indispensable partner as their clients are the eligible beneficiaries of the scheme. This is also the first-ever initiative to have inducted a leading commercial risk carrier, a milestone for the microinsurance sector in Bangladesh. Several pharmaceutical companies (including General Pharma and Sanofi Aventis) are committed to providing drugs at significantly discounted prices. An IT company (Grameen-Intel Social Business Company) is providing technical cooperation to integrate a Mobile Health application. Each of these organisations has consented to be part of this novel pilot scheme and has signed specific agreements to this effect with the third party.

### 2.2 Modus Operandi

The chain of mutual interactions among various partners has been illustrated in Figure 1. As already stated, the third-party organisation plays the pivotal role in the functioning of the model through proper coordination of the entire process involving many partners.[5] Accordingly, a unit office (consisting of a pilot project manager, a pilot project officer, an MIS officer and some field staff) has been set up in the hospital premises.

Creating awareness about the catastrophic health expenses and providing them with the benefit is the first and foremost activity of any MHI intervention. In this regard, trust is a crucial factor (Carrin, 2003). MFIs, already engaged in a lending contract with members, have earned their trust and goodwill, especially so for institutions with a long history. Thus, the unit office with active involvement of MFI field officers has been carrying out promotional activities. MFIs are entrusted with the premium collection from the beneficiaries for due transmittal to the insurer's bank account. MFIs also monitor whether the insured receive the health care coverage as per the insurance policy.

Hospital provides all treatments (outpatient, inpatient and maternal) and bills the insurer for its services based on the prior negotiated schedule. Presently the schedule is in the nature of (discounted) fee-for-services (FFS), which is not an ideal mechanism in view of the risk of moral hazard, cost control and thus adverse impact on the premium. Instead, some form of supply side cost sharing would be superior (Eggleston, 2000; Robinson, 2002; Ellis, 1993). But efforts to sway the hospital to move in the direction of DRG ('diagnosis related groups') mode of pricing were unsuccessful. However the hospital administration and medical practitioners have committed to ration and prescribe services in strict conformity of medical ethics and have agreed to provide significant discount on current fees.

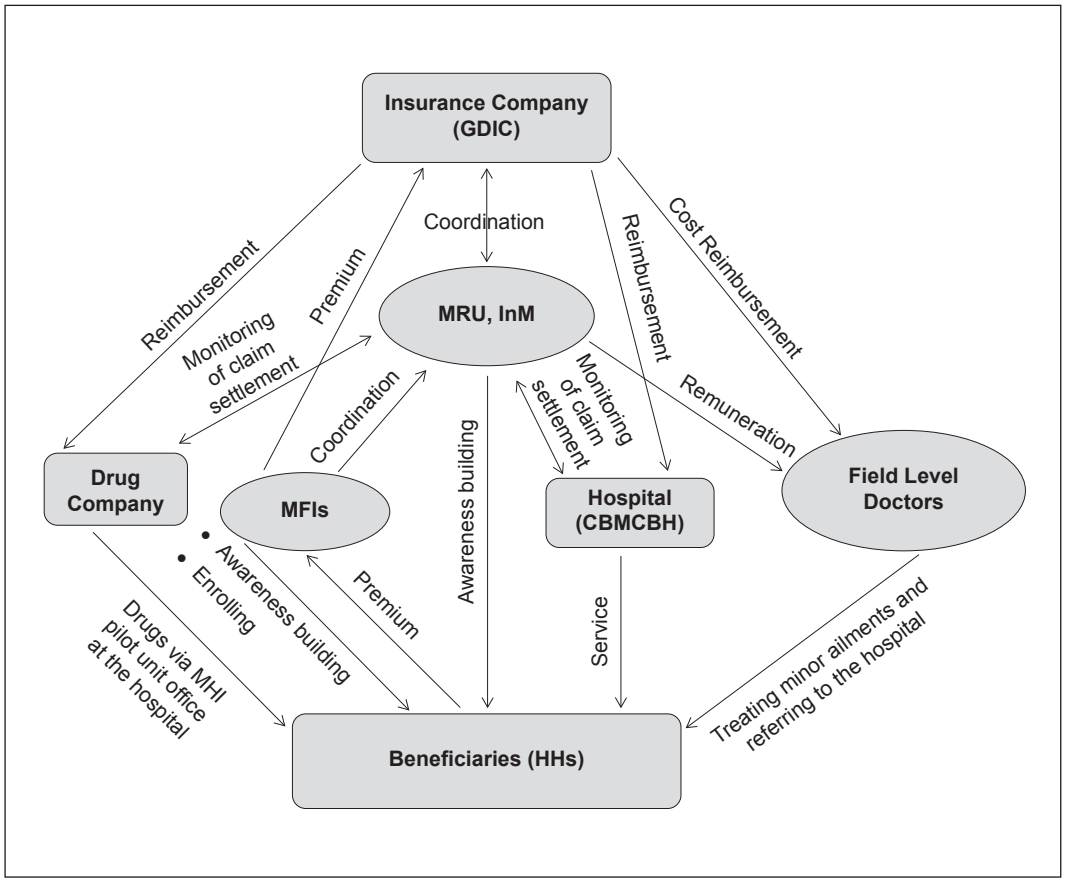
The insurance company is the risk carrier and directly pays the hospital and drug bills after due scrutiny. In addition, two paramedics/doctors have been employed in collaboration with the insurance company to provide primary healthcare at the two field outposts.

[4] Depending on the outreach and size of the scheme, it may be prudent to empanel a network of hospitals, clinics, diagnostic centres, and even drug stores (e.g., see Devadasan, 2006).

[5] MHI schemes are known to have failed due to poor technical knowledge and management capacity (Tabor, 2005).

**Figure 1**

**'NIRAMOY' MHI Scheme: Role of Different Partner Organisations in the "Niramoy" Scheme**




## 3. Benefit Package, Co-payment and Inclusion Criteria

**Benefit Package:** The benefit package has been designed on the basis of the local need. In addition to (first-hand) household behavioural information, we used secondary information by consulting with local hospitals to re-evaluate the need and disease probabilities. As detailed below, inpatient care with surgery (including Caesarean section, if relevant) as well as management of chronic care, both of which commonly lead to catastrophic OOP payments for poorer households, have been included in the benefit scheme under discussion.

Over the 12-month period, a maximum of five outpatient visits have been set for a household of four and five members, three visits for a household of two or three members, six visits for a household of six or seven members, seven for a household of eight or nine members and eight visits for a household of more than nine members (Table1).[6]

[6] It is important to note that access to field level paramedics/doctors will remain unrestricted to all beneficiaries 24/7.

**Table 1**

**Benefits, Co-payments and Premium Structure of Niramoy MHI Scheme**

| No. of total insured persons in the household (hh) | Eligible no. of total outpatient care visits per hh | Eligible no. of total inpatient stays per hh | Eligible no. of maternity cases per hh | Co-payment on drugs and injectables[7] | Total premium per hh (380 X no. of members) |
|---|---|---|---|---|---|
| 2 | 3 | 2 | 1 | 20% | 760 |
| 3 | 3 | 2 | 1 | 20% | 1,140 |
| 4 | 5 | 2 | 1 | 20% | 1,520 |
| 5 | 5 | 2 | 1 | 20% | 1,900 |
| 6 | 6 | 2 | 1 | 20% | 2,280 |
| 7 | 6 | 2 | 1 | 20% | 2,660 |
| 8 | 7 | 2 | 1 | 20% | 3,040 |
| 9 | 7 | 2 | 1 | 20% | 3,420 |
| 10 | 8 | 2 | 1 | 20% | 3,800 |

Each eligible household is entitled to receive one complete maternal care including four ANCs, delivery (normal or C-Section), two PNCs and neonatal care. Note however that a household is considered eligible for the maternity component of the package if the pregnancy develops after enrolment in the MHI scheme by a mother *who is at least 18 years old and does not have more than two children*.

In addition, each household is entitled to receive up to two episodes of inpatient care (surgical or non-surgical) available at CBMCHB. However, if a household avails the maternal care, this household would be entitled to receive only one additional hospitalisation benefit. As explained more fully in the premium determination exercise below, the primary purpose of the quantitative restrictions on the level of service provisions is merely to contain moral hazard.

The benefit norms laid down above are of course much higher than the actuarially predicted incidence of illnesses and related health exigencies, which is reviewed in section 4 below. This implies that the sum assured (SA) per insured member is many times greater than the expected cost of care, namely the gross premium rate. The maximum range of eligible services is meant to account for most eventualities, except possibly the very extreme outcomes, which are typically not predictable by standard scientific means. To illustrate the point further, we find that even if we retain elementary illnesses like common cold and fever in the database, the nationally representative survey of 3,791 households conducted by the research team in 2011 shows that about 70 per cent of households utilised no more than five (5) visits to a provider.[8] But this needs to be interpreted with caution. Actually a good share, indeed 18.6% of such visits were just to the corner drugstore, presumably

[7] Co-payments also apply to hospitalisation (both surgical and non-surgical including Caesarean births) as described below.

[8] Focussing on the 743 households drawn from the Mymensingh district (part of the 3,791sample hhs) yields an almost identical picture as seen in columns 4 and 5 of Table 2. The table excludes observations that relate to chronic conditions (asthma and diabetes) as well as cancer, mental disorder, kala-azar and stroke. While kala-azar is treated by a publicly funded programme through all hospitals in the country (including CBMCHB), this is outside of insurance. There are however some chronic conditions (e.g., cancer) that are not treated in the proposed provider's facility and hence these have been excluded in Niramoy, though other chronic conditions (e.g., asthma and diabetes) have been retained within the terms and limits of the benefit package.

without a prescription in most cases. Since the proposed scheme under review allows for unlimited outpost medical consultation, it is expected that the need for hospital visits will be significantly lower than Table 2 illustrates. There lies the role of a modest co-payment as has been incorporated in the scheme to be explained more fully below.

**Table 2**

**Distribution of the Number of Visits**

| Number of visits | All sampled districts (N = 3,791) | | Mymensingh (n = 743) | |
|---|---|---|---|---|
| | Percentage of hhs having the corresponding number of visits | Cumulative percentage of hhs having the corresponding number of visits | Percentage of hhs having the corresponding number of visits | Cumulative percentage of hhs having the corresponding number of visits |
| 0 | 9.18 | 9.18 | 8.48 | 8.48 |
| 1 | 11.42 | 20.60 | 10.90 | 19.38 |
| 2 | 15.40 | 36.00 | 14.40 | 33.78 |
| 3 | 12.85 | 48.85 | 14.00 | 47.78 |
| 4 | 10.84 | 59.69 | 12.65 | 60.43 |
| 5 | 9.15 | 68.84 | 8.48 | 68.91 |
| 6 | 6.33 | 75.17 | 5.52 | 74.43 |
| 7 | 5.41 | 80.58 | 5.79 | 80.22 |
| 8 | 4.12 | 84.70 | 4.85 | 85.07 |
| 9 | 3.30 | 88.00 | 4.58 | 89.65 |
| 10 | 2.29 | 90.29 | 2.29 | 91.94 |
| >10 | 9.71 | 100 | 8.08 | 100 |

**Source:** Authors' calculation based on the 2011 household survey.

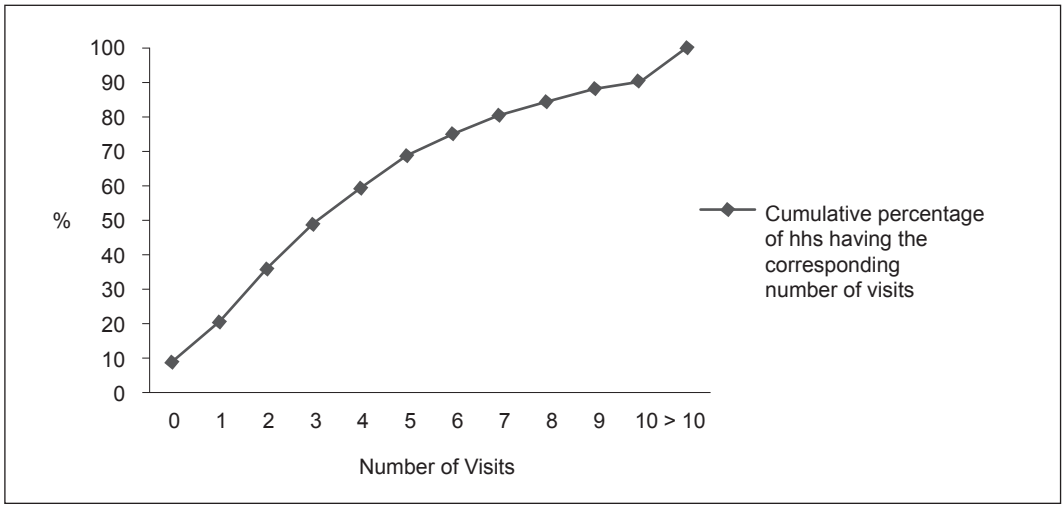
Turning to inpatient care, we note that of the 3,791 households cited above, only five (5) utilised three or more inpatient stays at a hospital/clinic, where it so happens that majority, i.e., 3 out of those 5 households were from Mymensingh district, the latter sample size being 743. The overall incidence of inpatient visit (both surgical and non-surgical, but excluding heart disease) was 494 cases reported by 439 households, i.e., one episode per 7 households. These figures are well within the projected benefit range as outlined in Table 1.

**Co-payment:** The system is designed to work on minimal co-pay. A 20 per cent (or at least BDT 20) co-payment on drugs and injectables has been set (Table 1). The other co-payments are for Caesarean Section (BDT 400, which is about 3% of the average cost of the procedure), hospitalisation without surgery including child delivery (BDT 100) and for general surgery (BDT 200, about 2.5% of the average cost of inpatient surgery at CBMCH). This structure of co-payments is again designed just to curb moral hazard, although as seen below, it is expected to raise a non-negligible amount of revenue so long as an adequate number of households may be brought under insurance coverage.

**Inclusion Criteria:** Unlike formal health insurance, household has been selected as the unit of enrolment. The implementation design calls for the inclusion of a significant number of households from each microcredit group, or *samity*, (average size varying between 18

**Figure 2**

**Cumulative Density of Visits to the Provider (N=3,791)**




and 22) and the compulsory purchase of insurance by all members in the household of five or fewer. Family coverage is preferred because of both risk-pooling and curbing adverse selection within the household. A household however needs to be an active member of a *samity* attached to a partner MFI. Subscription by a majority or most members in a group also mitigates the adverse selection problem beyond the household level (Ahuja *et a*l., 2003).

## 4. Premium Setting Procedures

### 4.1 Method

Health insurance is often cited as compensation/reimbursement policy and not the benefit policy and for this reason the insurer tends to set a high premium (Mittal, 2009). As the scheme is directed to the poorer people in society, it is imperative to set an affordable premium for them. Progressive premium rate is sometimes espoused in view of the cross subsidy. But here we are applying the community rated premium for all beneficiaries, most of whom are either poor or near-poor as per our measure of poverty based on the cost of basic needs (CBN) methodology. It is also advised not to float any subsidy as this causes adverse selection on one hand (Zhang, 2012) and hampers the goal of long-term financial sustainability on the other. Besides, rate differentiation creates confusion among the population who already display apathy towards insurance over and above adding on to managerial and accounting chores. Rather subsidy in the form of not counting the high operational cost is implicit in the design proposed here.

The morbidity rates prevalent in the relevant area obtained from household surveys were employed for setting the premium as that in the CHAT model in India (Danis *et al*. 2007). In Rwanda, premium calculation allowed for a small increase in the health care utilisation rate (Schneider *et al*., 2000). After reviewing the formula proffered by different authors (STEP-ILO 2005, Zweifel *et al.* 2007), we set the premium excluding the operational cost but keeping the loadings. This premium is strictly tailored to reflect the discounted FFS

price schedule offered by the provider hospital and pharmaceutical companies. However the procedure is general enough so that a different price regime maybe utilised to figure out the appropriate premium in a different context (e.g., over time and space).

**(i) Probability of Illness:** In order to determine the expected cost of coverage and therefore the break-even premium, we first need to determine the cost of risk that the population being covered by MHI is exposed to. The relevant dataset was collected by the Microinsurance Research Unit (MRU) at the Institute of Microfinance (InM) in 2009 that covered 3,941 randomly selected households comprising of 19,424 individuals. The survey covered rural population living in 120 villages drawn from 7 districts (i.e., Brahmanbaria, Comilla, Dhaka, Gazipur, Manikganj, Mymensingh and Tangail) in the central region of Bangladesh, drawn from the administrative divisions of Dhaka and Chittagong. The above context would be a good fit for the target population of the proposed MHI project, which happens to be the catchment area of Winnerpar village/Churkhai Bazar of Mymensingh Sadar Upazila, the location of the service provider, Community Based Medical College Hospital (CBMCH). The above data was cross-checked with a more recent and nationally representative MRU survey (of 18,303 individuals comprising 3,792 hhs) carried out in June-July of 2011 covering eight districts including Mymensingh itself.

It is important to note that a majority of the households included in these surveys were members of the microcredit programme. In a similar vein, the MHI packages described above are being marketed through microfinance institutions (MFIs) active in the catchment area of the hospital, all of which are registered with the Microcredit Regulatory Authority (MRA).

**Table 3**

**Probability of Seeking Health Services**

| Column Variable | 2009 data | Mymensingh data (2011) |
|---|---|---|
| | No. of cases (per person) | No. of cases (per person) |
| (a) Number of surveyed households | 3,941 | 743 |
| (b) Number of surveyed population | 19,424 | 3,513 |
| (c) Total Number of illness episodes per year (i.e., pre-insurance benchmark)* | 6,474 (0.3333) | 1,713 (0.4876) |
| (d) Predicted number of total episodes once insured (1.20 × row c), i.e., a 20% increase in reported illness episodes by the same population (e.g., inclusive of repeat visits, which are effectively being treated as new episodes) | 7,769 (0.40) | 2,056 (0.5851) |
| (e) Predicted insured episodes per household of 5 members (row d × 5) | **2.0** | **2.93** |

**Notes:** *Row (c) includes all events of illnesses regardless of whether (i) any care was sought or not, (ii) the type of provider, and (iii) inclusive of both inpatient and outpatient services.

The premium construction methodology described below is based on the above-cited surveys. First let us focus on Table 3, which enumerates the actual incidence of illness in the subject population. This data is then transformed by augmenting the above illness

incidence data by 20 per cent in order to account for a host of possible lapses, including moral hazard, misrepresentation, and a spike in actual outbreak of illnesses on account of adverse climate and other natural events ('acts of god'). It ought to be noted that there will be adequate safeguards against moral hazard by a structure of simple as yet effective co-payments.

Further note that the raw illness figures have not been adjusted down in view of the role of *distance*, which would ordinarily be justifiable given that most care-seekers visit the *nearest* facility in the first instance. Over 50% of those seeking care visit either a drugstore or an informal 'doctor' in the village, some of whom may be thwarted by the co-payment or the inconvenience of the commute to the hospital in case of minor illnesses. An effective preventive campaign may also lower the tendency to make a trip to the provider. On the other hand, the very access to a quality care provider may induce additional visits, but our records show that the proportion of those not seeking care for whatever reason are very few (e.g., less than 2%). Besides we have already added all who claimed to be ill in the raw data regardless of whether they sought care or not.

In the 2009 dataset, 18.6% of all episodes (i.e., 1,184 cases) required a second visit for the same episode. However of these 358 (i.e., 30.2 per cent) had switched out of informal care into formal care, the remainder continued to move from one informal to another. In the construction above we have already taken all of that adjustment already into account in row (c), albeit in the pre-insurance context. Therefore the 20% augmentation is expected to take care of any such phenomenon.

The final figure that emerges from the above exercise (Table 3) is that we would expect somewhere between 2 and 2.93 visits per insured family of 5 on an annual basis. It is useful to observe that the above figure is inclusive of both inpatient and outpatient services. The large increase in the incidence of illness between 2009 and 2011 figures call for an analysis. Interestingly, the data for Mymensingh closely matches the overall national data for 2011 obtained from 8 districts covering all 7 administrative divisions of the country, which however includes several remote and challenging geographic locations such as coastal, *char* and *haor* areas. Thus the higher incidence cannot be explained away very easily even if one agrees that morbidity data ought to be recorded over a large sample as well as over a longer period of time. In the calculation below, we therefore take the predicted number of episodes for the premium calculation at 3 visits per family of 5 annually (i.e., 0.6 per member), which may be a little too high but it is safer to err on the side of caution.

It is apparent from the preceding analysis that the morbidity data has been calibrated on a per-person basis, which is utilised to scale it up to a standard family consisting of five (5) members. Hence this is the standard unit, namely a household of 5, and the premium is actuarially determined at that level. However for the sake of practical considerations we have extrapolated this information to suit the cases where a household is made up of either fewer or greater than five members (as stated in Table 1). Thus to the extent we end up registering many households of smaller or larger than 5, there may be a room for measurement error (in either direction) confounding the premium calculus. This would seem unavoidable in an exercise as this, since otherwise a different per-person premium would apply to households who differ in size.

**(ii) Premium Structure:** We are now ready to start analysing the premium structure of MHI package. We have settled on just one comprehensive package inclusive of both inpatient and outpatient care with full maternity. Let us begin the discussion of the premium

determination for each major element of the MHI package, namely, outpatient, maternity and new-born and hospitalisation services, respectively.

*(a) Outpatient Cost:* Since every time an insured person visits the hospital, she/he will have to go through the outpatient window. The only exception would be those who arrive at the hospital via the emergency system, who may be either discharged after preliminary check-up or admitted as an inpatient. Even in the latter cases, the treatment procedures would typically involve 'outpatient' services such as consultation, medication and diagnostic tests.

**Table 4**

**Average Cost of Each Episode of Outpatient Visit**

| Components of care (i) | Probability ($p_i$) | Average Cost ($x_i$) | Expected Costs ($p_i.x_i$) |
|---|---|---|---|
| Drug only | 0.50 | 150 | 75 |
| Drug + Pathology | 0.40 | 300 | 120 |
| Drug + Pathology + ECG/X-ray/USG | 0.10 | 750 | 75 |
| **Total per visit** | | | **BDT 270** |

**Notes:** (i) The probabilities of various components of care are based on an extensive survey of public and private hospitals in districts and upazilas.

(ii) The cost is based on the agreed upon price structure with the service provider, CBMCHB.

(iii) The drug cost reflects an average discount of 25% as the minimum discount assured by the empanelled group of pharmaceutical companies.

Table 4 focuses strictly on outpatient services per visit to the hospital. As explained in the notes to the table, these figures are based on actual treatment pattern prevalent in the present hospital system of the country, utilising the relevant price schedule explained above. The probability figures in column two of Table 3 may be interpreted as stating that out of 100 visits to the hospital, 50 would require only drugs, another 40 would also require pathological tests, while only the remaining 10 would in addition be asked to undergo diagnostic tests such as ECG, X-rays or ultra-sonogram (USG). A great many of the latter group may be required to seek hospitalisation as we shall examine below. The above procedures lead to a total cost of BDT 270 per outpatient visit.

*(b) Maternity Care Cost:* In case of maternity and new-born care, it has been determined that if a pregnancy is terminated by normal delivery then the cost is BDT 4,202 and if instead a Caesarean Section (C/S) is needed then the total cost is BDT 12,782. From the 2009 survey cited above, it is seen that a total of 44 C/S were done out of a total of 317 pregnancy episodes among 19,424 population. Thus we can calculate the average cost per pregnancy by giving 86% weight to normal delivery and 14% to C/S. The average cost per pregnancy therefore is BDT 5,404. Several points require highlighting. First let us note that the above figures relate to the no-insurance situation, and once insured the tendency to go for C/S would increase. On the other hand, if we look at hospital data on the incidence of C/S among all births, the latter is rather high. This can in part be explained by the observation that the pregnancy cases that the hospitals get to treat are generally more complicated than 'all pregnancies' as we have in the general population as for example captured in the 2009 survey data described above. Thus the hospital data is biased upwards if it is to serve as an indicator of the likely probability of C/S. However it should also be noted that we do not expect to see an enhanced frequency of pregnancy

on account of insurance due to various exclusions (such as non-eligibility of those already with two children).

In light of the above discussion we propose to rationalise the above information and transform the C/S data by augmenting the ratio of C/S by about 40%, so that instead of 44 events out of 317, we would work with 62. In other words, the enhanced figure translates to about 20% of all pregnancies to be concluded by C/S. This would lead to an average cost of an episode of child delivery to BDT 5,918.

*(c) Inpatient Cost:* In case of inpatient care, two modalities were taken into account, e.g., surgical cases and non-surgical cases. The average cost for non-surgical inpatient care was calculated as BDT 1,316 per episode and for surgical cases the average cost was calculated as BDT 6,662, inclusive of the cost of drugs and diagnostic fees as relevant. The probability of admission of these cases was 0.6 for non-surgical and 0.4 for surgical cases as found in our study. Indeed, there were 194 non-surgical and 127 surgical cases, i.e., a total of 321 hospitalisations among 19,424 persons. Thus the average cost of hospitalisation per event would come to BDT 3,454.

However, as explained above, we intend to adjust the pre-insurance data to the post insurance environment by using a transition factor of 1.33, i.e., by inflating the morbidity rate by an additional 33%. This leads to an enhanced incidence of 427 episodes of hospitalisation (instead of 321 as above), comprising of 258 non-surgical and 169 surgical events, the ratio remaining unaffected. However the cost per episode of hospitalisation would still remain unaffected at BDT 4,256, except these events would occur a little more frequently than before as seen below in the premium determination.

### 4.2 Premium Determination

*(a) Gross Premium:* This is defined exclusively to be the cost of risk. We proceed to work out the per-person (household, hh) gross premium for each component of coverage, and thus for the whole package. Given the calculations in Tables 3 and 4, we immediately see that the cost of outpatient services alone comes to BDT 162 per person (i.e., 270 times 0.6) or 810 per household (i.e., 270 times 3.0).

Next, taking the maternity care, we see that the cost of maternal & new-born care would be BDT 97 per person or BDT 485 per insured household of 5 members (based on prevalent pregnancy rates cited earlier).

Similarly the cost of inpatient care would come to BDT 76 or BDT 380 for a family of 5 (again based on projected 427 episodes per 19,424 persons). *Therefore the gross cost of carrying the risk of comprehensive care inclusive of outpatient, maternity/new-born and hospitalisation services, namely Niramoy package, comes to BDT 335 (i.e., 162 plus 97 plus 76) per person or 1,675 per household*. Below we present the above information in the form of a table (Table 5, column b).

*(b) Premium Loading:* As standard in any insurance scheme we next add a couple of elements of premium loading, first a 'reserve' component (consisting of 10 per cent of gross premium) due to concern for safety. The other component is provisioning for an eventual reinsurance facility, also at 10% of gross premium, which may be incurred by the risk carrier. "Actuaries India" proposed for 30% to 200% safety loading on premium but that is an over-reaction which would lead to an unaffordable premium structure.[9] This exercise is

[9] Actuaries India. *Premium calculation in micro health insurance, Data Resource and (Actuarial) Pricing Assumptions*. http://www.actuariesindia.org/micb/Premium_Calculation.pdf (accessed January 15, 2013).

carried out in column (d) of Table 5, and the 'total premium' in column (e) reflects the sum of gross premium and the loading factors.

*(c) Co-payment Revenue and Its Utilisation:* A modest co-payment, preferably as low as viable, is necessary in any insurance arrangement primarily to contain moral hazard. Here we propose the following structure.

(i) Outpatient Services: Dispensation of drugs and injectables would entail a co-payment of 20% of MRP (subject to a minimum charge of BDT 20 per visit). There will be no other co-payment for any other outpatient services. Thus for each hh brought under insurance, the co-payment on account of drugs, given the average figure of 3 outpatient visits per household, is expected to be BDT 90, a little over 10% of the gross premium.

(ii) Maternity: Since maternity is an integral component of the proposed insurance scheme, there is a distributional issue beyond risk-pooling. Given that many households would have no scope of inflicting this part of the expenditure on the proposed health financing mechanism, a modest co-payment is proposed for all pregnancies (BDT 100 per NVD episode and 400 in case of C/S). At the same time, it would be prudent not to make it much higher in order to encourage institutional birthing, a public health priority. The higher figure for C/S therefore is in part to guard against moral hazard. For NVD one has to pay BDT 100 just to keep consistency with the co-pay structure for non-surgical hospitalisation.

The co-payment figures for maternity maybe calculated as follows. For each thousand insured hhs, we expect the number of eligible pregnancies to be about 80, where the C/S:NVD ratio is taken to be 20:80; thus one would expect 16 C/S and 64 NVDs in this illustration. Total co-payment revenue on account of hospitalisation would thus amount to BDT 12.8 per hh (or, 2.56 per person). Though the figure is rather negligible, as already explained, the idea is one of principle. Note that these patients would also be subjected to the 20% co-payment on account of drugs as also cited above [column (c) in Table 5].

(iii) Inpatient care: The per hh expected co-payment revenue for in-patient care can be easily figured out using the augmented morbidity figures cited earlier, namely 427 episodes for a population of 19,424, i.e., about 22 per thousand hhs covered. The probability facing an insured person to require an inpatient care is therefore 0.022, while that for a household it is 5 times greater at 0.11. Using the 60:40 ratio of non-surgical: surgical split as explained above, we expect there to be 13 non-surgical and 9 surgical events per thousand hhs. Given the proposed co-payment structure (BDT 100 for nonsurgical and BDT 200 for each surgical stay), the expected per hh revenue from this source would amount to BDT 21.08. Co-payment due on the sale of relevant drugs may also be calculated given these probabilities (as explicitly shown in column (c) of Table 5).

## Table 5
## MHI Premium Structure (BDT)

| (a) Type of coverage | (b) Cost of risk, i.e., gross premium per person [per hh of 5] | (c) Co-payment revenue per person [per hh] | (d) Premium loading | | (e) Total Premium = (b) + (d) per person [per hh] | (f) Net premium = (e) – (c) per person [per hh] |
|---|---|---|---|---|---|---|
| | | | Reserve (10% of gross premium) | Re-insurance cover (10% of gross premium) | | |
| Outpatient care | 162 [810] | Drug: 0.6×150×0.2 = 18 [90] Net of handling costs = 9 [45] | 16.2 [81] | 16.2 [81] | 194.4 [972] | 194.4 - 9 = 185.4 [927] |
| Maternity & new-born | 97 [485] | **CS:** *Hosp:* 0.016×400×0.2 = 1.28 [6.4] *Drug:* 0.016×3,425×0.2×0.2 = 2.19 [10.96] Net of handling costs = 1.10 [5.48] **NVD:** *Hosp:* 0.016×100×0.8 = 1.28 [6.4] *Drug:* 0.016×905×0.2×0.8 = 2.32 [11.58] Net of handling costs = 1.16 [5.79] | 9.7 [48.5] | 9.7 [48.5] | 116.4 [582] | 116.4 - 4.8 = 111.6 [558] |
| Inpatient care | 76 [380] | **NS:** *Hosp:* 0.022×100×0.6 = 1.32 [6.6] *Drug:* 0.022×930×0.6 ×0.2 = 2.46 [12.28] Net of handling costs = 1.23 [6.14] **S:** *Hosp:* 0.022×200×0.4 = 1.76 [8.8] *Drug:* 0.022×2,451×0.4× 0.2 = 4.31 [21.57] Net of handling costs = 2.15 [10.78] | 7.6 [3.8] | 7.6 [3.8] | 91.2 [456] | 91.2 - 6.5 = 84.7 [423.5] |
| **Niramoy Package** | **335 [1675]** | **(Drug: 14.64, Hosp: 5.64) Total: 20.28 [101.40]** | **33.5 [167.5]** | **33.5 [167.5]** | **402 [2010]** | **381.7 [1908.5]** |

**Notes:** (i) Cost of drug has been estimated as follows: Outpatient (150 per visit), NVD (905, over the entire period of pregnancy), C/S (3,425, over the entire period of pregnancy), IP (NS: 930) and IP (S: 2,451), all figures in BDT.

(ii) Since drugs are to be dispensed out of dedicate stock maintained at the Niramoy project unit office at the hospital, there is the risk of spoilage etc., and it is assumed that half the co-payment on this score, i.e., about BDT 73 per household, has been set aside to account for that.

**(d) Break-even (or net) Premium:** Even though the amount of co-payment revenue generated by the scheme proposed above is modest, this may nevertheless be utilised to adjust the total premium due from the insured. For the total drug co-payment revenue of about BDT 146 per household, as already explained, half the amount (namely BDT 73 per hh) may be earmarked against the handling cost, namely in wastage or breakage etc., and therefore the balance may be feasibly utilised in adjusting the net premium payable as seen in columns (c) and (f) in Table 5. The entire co-payment for the other categories, i.e., various hospitalisation charges, may be similarly utilised to lower the total premium, which leads to the concept of 'net premium' which by design is to be interpreted as the *break-even* premium. The latter is shown both per person and per household in column (f) of Table 5.

It ought to be noted that we did not include the operational expenses at the field level as an additional loading factor for a number of reasons. Foremost among these is that administration costs are a scale issue, and thus full inclusion of such an element at the pilot stage would render the experiment unaffordable to the beneficiary. Some pilots add in a 'notional' figure rather than the actual, but that is neither here nor there. Instead, as elaborated above, we have provisioned for safety loading of two types, a reserve element and a reinsurance charge (that the risk-carrier would have to incur eventually). Both these elements are commonly absent in pilots. Thus while the relative significance of administration costs will diminish once a successful pilot is scaled up, the reserve and reinsurance costs would however continue to serve to safeguard the long-term viability of the programme.

**(e) Final Premium:** As it stands, the break-even cost of the package is BDT 382 per insured person. Given that this is a research undertaking, the team would like to experiment with a rounded down price in order to attract the insured. A second practical concern relates to the ease of calculation; each figure ought to be divisible by 4 so that a payment by quarterly instalments may be implemented if so desired by the NGO partners as per their members' wishes. In view of these issues it is proposed that the *final premium for the package be set at BDT 380 per person (i.e., 95 per instalment). Per household (of five members) this would translate to BDT 1,900 (i.e., 475 per instalment)*. The above figures are being referred to below as the *final* premium.

*Sum-assured (SA)*: While the premium determination is based on the expected cost of care, the sum-assured calculation takes into account the maximum feasible expense given the benefit schedule described by the insurance coverage. On a per household basis (of 5 members), the SA comes to about BDT 34,500 annually, not counting the value of outpost medical consultation, which is unlimited. The maximum of 5 outpatient visits (inclusive of a large number of diagnostics tests and related medication) can cost up to BDT 1,500 per visit, while the maximum cost of the two surgeries can run to BDT 13,500 each, yielding the total sum-assured.

*Affordability*: A word on the affordability of the annual premium is in order. From the 2011 household survey cited above, it is seen that per sampled household (consisting of 4.5 members on average), the annual direct OOP Payment comes to 5,494. Adding in the modest co-payment on drugs and hospitalisation (about BDT 175 per hh, see column [c] in Table 5) to the proposed premium of BDT 1900 per household of 5, the expected cost of Niramoy scheme would amount to BDT 2,075 per household. The latter figure is about 38% of the actual expense of BDT 5,494. Put another way, the above cost of the Niramoy package to the beneficiary amounts to about 1.6% of annual household expenditure (inclusive of

both food and non-food) as opposed to current outlay of 4.3%.[10] Hence it would seem that if the potential beneficiaries are made fully conversant with the details of benefits and costs of Niramoy and they take the insurance promise at face value, affordability cannot stand in the way, except for transitory cash-flow issues.

## 5. Study Design for Evaluating the Pilot Scheme

We are using Cluster Randomised Controlled Trial (CRCT), or for brevity, cluster randomised trial (CRT) method to evaluate the pilot scheme. The point is that the impact of an intervention in a given population cannot simply be determined by comparing the outcome variables for the 'treatment' vis-à-vis the 'control' group before and after the intervention (as for example by conducting pre- and post-surveys). Possible existence of differences between the control and the treatment population serve as the 'villain of the piece', commonly known as the 'selection bias'. The essential idea of a randomised trial is first to identify a population (or groups therein) who are similar *ex-ante* in terms of the outcome indicators relevant to the potential intervention. And the research design calls for randomly assigning the intervention (i.e., the 'treatment') to a subset of the population (or, subset of groups), 'the treatment group' and *not* to others, 'the control group'. This in theory eliminates the selection bias, and thus any difference in outcome between the two groups can be attributed to the impact of the programme.

This is a highly regarded study design ('the gold standard') among the scientist community because it is less prone to various biases by virtue of its innate characteristics. Although such randomisation is common in medical research, especially in pharmacological product evaluation, this was not much popular in the social sciences until the recent past. There are however some inherent difficulties in conducting CRTs in social science research. Assigning an intervention to an individual and not to the neighbour is neither ethically acceptable nor preventable from its spill-over effects. Restricting the spill-over effects of the intervention is a key concern in CRT design.

*(a) The Study Zone:* The study zone actually consists of 59 villages situated within a radius of 5-8 kilometres of the provider hospital (Figure 3), all of which share the same Dhaka-Mymensingh highway as the principal corridor. The actual numbers of MFI member households in six large villages (out of 59) happen to range between 194 to 377, the average figure being 275. For the risk pooling aspects to work, it was deemed that the intervention ought to be offered in such locations. Hence these villages have been dropped from the experimental design in order to ensure a sufficient number of enrolees in the risk-pool. We have also dropped two other villages each of which has relatively small number of MFI members (36 and 23). Moreover these villages were non-contiguous vis-à-vis the principal intervention zone which violates the continuity norm of CRT. The experimental design therefore encompasses 51 villages (essentially leaving out the outliers).

*(b) Objective and Outcome Measures:* The prime objective of this holistic insurance model is to examine the change in out of pocket (OOP) payments for healthcare for acute ailments and in overall health seeking behaviour. It is anticipated that members of the insured households will increase their utilisation of formal care and the process will reduce

[10] The 2011 per capita expenditure (inclusive of OOPP on healthcare) in the sample turns out to be BDT 29,829, which is a little over a dollar-a-day. The above figure is well below (about 55 %) the national per capita income in 2011. This is very plausible since the MFI members are much poorer than general population. Incidentally the total OOPP (i.e., inclusive of both direct and indirect costs) came to BDT 6,130 per household (or, 4.8% of expenditure).

the healthcare costs compared to those who are not included in the insurance programme. To be specific, this trial targets several primary outcome measures: (a) incidence of healthcare seeking from formal provider (especially hospital care), (b) the level of OOP payments for acute illness (inclusive of consultation fees, diagnostic test, hospitalisation and drug costs[11]), (c) the incidence of catastrophic (at 5% threshold level) health events in the household, and (d) the dependence of OOPP financed through borrowing and asset depletion.[12] Besides these, there is a wide gamut of additional outcome measures that may be considered to evaluate the trial. A detailed set of survey instruments were prepared to capture the data in this regard.

*(c) Cluster Construction:* The 51 villages comprising the study area are distributed over six unions in greater Mymensingh district of Bangladesh. The eligible size of the risk pool, i.e., number of distinct member households of the three partner MFIs add up to 2,822 households, which constitutes about 11,900 individuals.[13] The MHI scheme is designed primarily for the microcredit member households living in these villages. Typically, these credit programmes are group-based, where groups are formed by the households within the village. In each village, there is often more than one borrower group, or *samity* (made up of about 18-22 members on average), affiliated to the same or different MFIs. It is a common observation that multiple MFIs operate in the same village, thanks to the amazing growth of microfinance over the last three decades. Another recent feature of the micro lending is that some households (or individuals) borrow from different MFIs at the same time through different groups. On average, there are three credit groups per village in our study area served by our partners MFIs.[14] However, there is significant variation in the average group size (total member hhs/total groups) across MFIs. Interestingly, the average group size changes monotonically with the size of the MFI.[15]

What would be an ideal cluster design in the present case? Ideally each cluster should be as independent as possible to restrict the spill-over effect of the intervention and thus there ought to be a meaningful demarcation between any two clusters. Considering the nature of the MHI scheme, targeted beneficiaries and location of the programme placement, it appears that the appropriate design is village level cluster randomisation with households nested in the villages. Another possibility is constructing from the smallest unit, e.g., individual, household, *samity* (MFI-group) level clustering. However, the latter procedure will be more problematic than the former one. Firstly, individuals and households are inappropriate for the unit of randomisation since communication of product awareness and marketing are being done primarily through the group leaders of *samity*. Secondly, *samity* of the borrowers is generally formed by some form of self-selection procedures leading to low variability within the *samity*, whereas greater variability exists between groups. Thirdly, the existence of the multiple groups in most of the study villages may generate inter-cluster spill-over effect via the sharing information pertaining to the programme thus pointing to the inappropriateness of designing clusters at the level of the MFI groups.

[11] Out-of-pocket payments, as interpreted here are direct costs and therefore do not include transportation, food and lodging costs, unofficial fees, etc.

[12] See, for example, Levine *et al.* (2007) and Doyle *et al.* (2011).

[13] While the total number of members in the three partner MFIs (POPI, ASPADA & SSS), respectively, were 398, 1294 and 1414 (i.e., 3106 in total), due to some members signing up with multiple MFIs, in our census we discovered the actual number of distinct member households served by the three to be 2822 only.

[14] It is possible that there are other MFIs operating in these villages, for which we do not have any information and are therefore not reflected in these statistics.

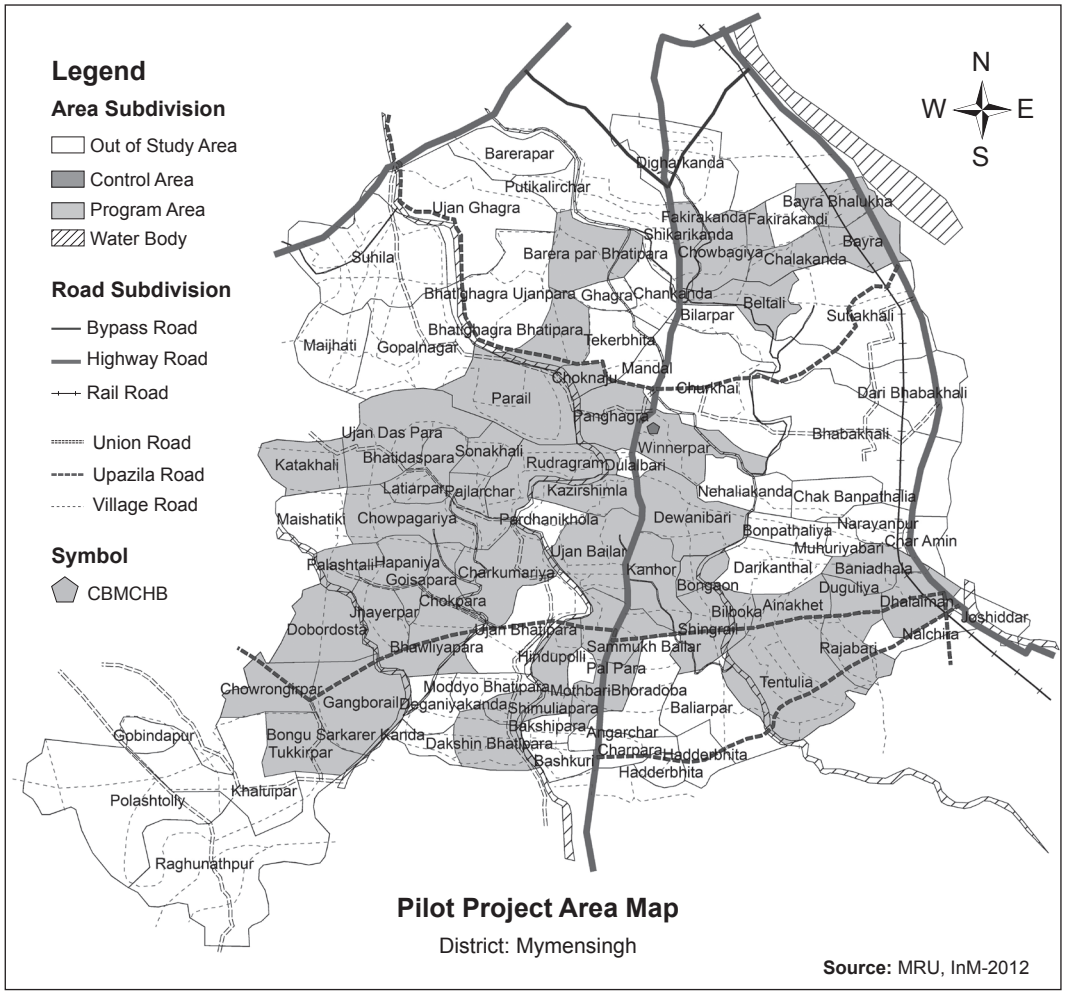
[15] The average *samity* size of the three MFIs were 12, 18 and 30, respectively, reflecting the same ranking as the relative strength of membership of each.

Separating the treatment and control households within villages may also be problematic due to their membership in multiple groups. In addition, exclusion of some households within the village for the sake of randomisation is likely to create adverse impression among the community. Therefore, village level clustering by aggregating all groups of microcredit members served by different MFIs within the same village will eliminate the problem posed by self-selection into groups.

While the village appears to emerge as a natural unit of a cluster, on occasion we have merged two or more villages in building a cluster as there is large variation in the number of MFI members among villages, indeed from 4 to 171, the average being 61. Effectively therefore several characteristics had to be fulfilled by a cluster: (a) each cluster contains at least one village, and, no village can be divided into different clusters, (b) the villages in each cluster must be contiguous with no external village lying between the villages, (c) if the cluster contains more than one village, there must be at least a single common road (i.e., village road) connecting these villages, (d) there be no inter-cluster road connectivity

**Figure 3**

**Distribution of Intervention and Control Clusters**




**Pilot Project Area Map**

District: Mymensingh

**Source:** MRU, InM-2012

between clusters, and (e) each cluster to have its own road which is connected to a nearby union, upazila road and/or the Dhaka-Mymensingh highway leading to hospital, and (f) where possible, each cluster be endowed with natural demarcation lines, e.g., canal, water body, crop fields and barren land which may serve as buffer zones. Details of each cluster demarcation are described below in Annexure-1. The above procedure has led to 36 distinct clusters in our study area, where the number of member households per cluster varies from 37 to 171, the average being 86 (Figure 3).

In randomisation, it is important to ensure that there is no significant difference along important observable characteristics between the treatment and control groups. This feature is also met in the present case as Table 6 illustrates. While the rate of electricity connection is little lower in the treatment vis-à-vis the control clusters (i.e., 74 vs. 78, the average being 75%), the difference is a mere fraction of one standard deviation in the overall rate for the experimental zone.[16]

It is critical to ensure adequate power of the respective targeted outcomes in CRT (De Allegri *et al*., 2011). Based on the outcome if there is 80% power this is taken as an acceptable level for this kind of research. Given the commonly employed value of type-I error rate of 5% (α), the average cluster size in the present case (n = 86), correlation between baseline and follow-up measurements (default is 0.5), the maximum number of clusters required to get the noise free impact of the intervention comes out to be 33. The cluster design methodology adopted in this study, which yielded 36 distinct clusters, therefore meets the requirements of a valid trial and evaluation thereof. Of these 36 clusters, 24 have been randomly assigned as treatment and 12 as control. Details of the power calculation are given in Annexure-2 which indicates that the above design and allocation of treatment and control clusters is sufficient to conduct all tests.

In RCT usually the intervention is placed in about half the clusters and the remaining half is treated as control. However in a step-wedge system, usually all clusters are given the treatment in sequence (typically in annual cycles over three years). In our case, the programme is being placed in two-thirds of the clusters in phase-1, and the rest in phase-2. Thus during phase-1, there will be 24 intervention clusters and 12 control clusters. These are highlighted in green in Figure 4. As stated already, these would be brought under treatment in phase-2 as part of a step-wedge cluster design.

*(d) Long-term Impact of Intervention:* In order to assess the long term impact of the MHI scheme, we have randomly selected another 12 clusters as part of the non-experimental set of clusters (i.e., not part of the step-wedge pattern). The latter clusters each consist of a village randomly drawn from a list of 37 villages of Trishal upazila and where the three MFI partners are also active. Thus post phase-2, when the trial is over, we can analyse the longer-term impact of the intervention in the 36 step-wedge clusters with the non-experimental set of 12. Accordingly, all MFI member households of the latter 12 clusters from Trishal have been included in this base-line survey. Insofar as these 12 clusters are concerned, the physical distance from the intervention zone is anticipated to result in few indirect ('spill-over') effects of the intervention.[17]

[16] The apparent significance in the number of expatriate members within a household cannot be of any consequence either as both figures are small. While in control clusters, there is practically no expatriate in the household, there is only one such member for every 7.5 households in the treatment clusters.

[17] Note that Figures 3 and 4 do not yet illustrate the 12 non-experimental clusters from Trishal upazila that lie farther to the south of the hospital as the detailed boundary demarcation work is still in process. Hence these two figures contain only 36 clusters designed for the experiment.

**Table 6**

**Mean of Different Variables across Treatment and Control Clusters**

| Category | | Treatment | Control | Total | p-value |
|---|---|---|---|---|---|
| Average age of the household head | | 41.40 | 41.66 | 41.49 | 0.89 |
| Average education of the household head | | 3.09 | 2.97 | 3.06 | 0.86 |
| Male-female ratio | | 52:48 | 52:48 | 52:48 | 0.93 |
| Average age of the members of three designated MFIs | | 34.15 | 34.72 | 34.34 | 0.77 |
| Average education of the members of three designated MFIs | | 3.52 | 3.37 | 3.47 | 0.84 |
| Percentage receiving any formal training from MFIs (%) | | 5.42 | 3.47 | 4.79 | 0.79 |
| Occupation of the MFI beneficiaries | Agricultural sector (%) | 2.30 | 1.85 | 2.15 | 0.92 |
| | Service sector (%) | 1.86 | 1.50 | 1.75 | 0.93 |
| | Housewife (%) | 94.09 | 94.56 | 94.24 | 063 |
| Occupation of the Household Head | Agricultural sector (%) | 29.65 | 25.52 | 28.32 | 0.24 |
| | Construction sector (%) | 10.70 | 13.81 | 11.70 | 0.40 |
| | Transportation sector (%) | 17.72 | 12.49 | 15.63 | 0.24 |
| | Business sector (%) | 17.12 | 20.88 | 18.96 | 0.28 |
| | Service sector (%) | 12.94 | 12.27 | 12.73 | 0.86 |
| Average household size | | 4.43 | 4.44 | 4.43 | 0.98 |
| Average number of total expatriates in the household | | 0.027 | 0.008 | 0.021 | 0.001 |
| Percentage of households with electricity | | 73.88 | 78.10 | 75.23 | 0.034 |

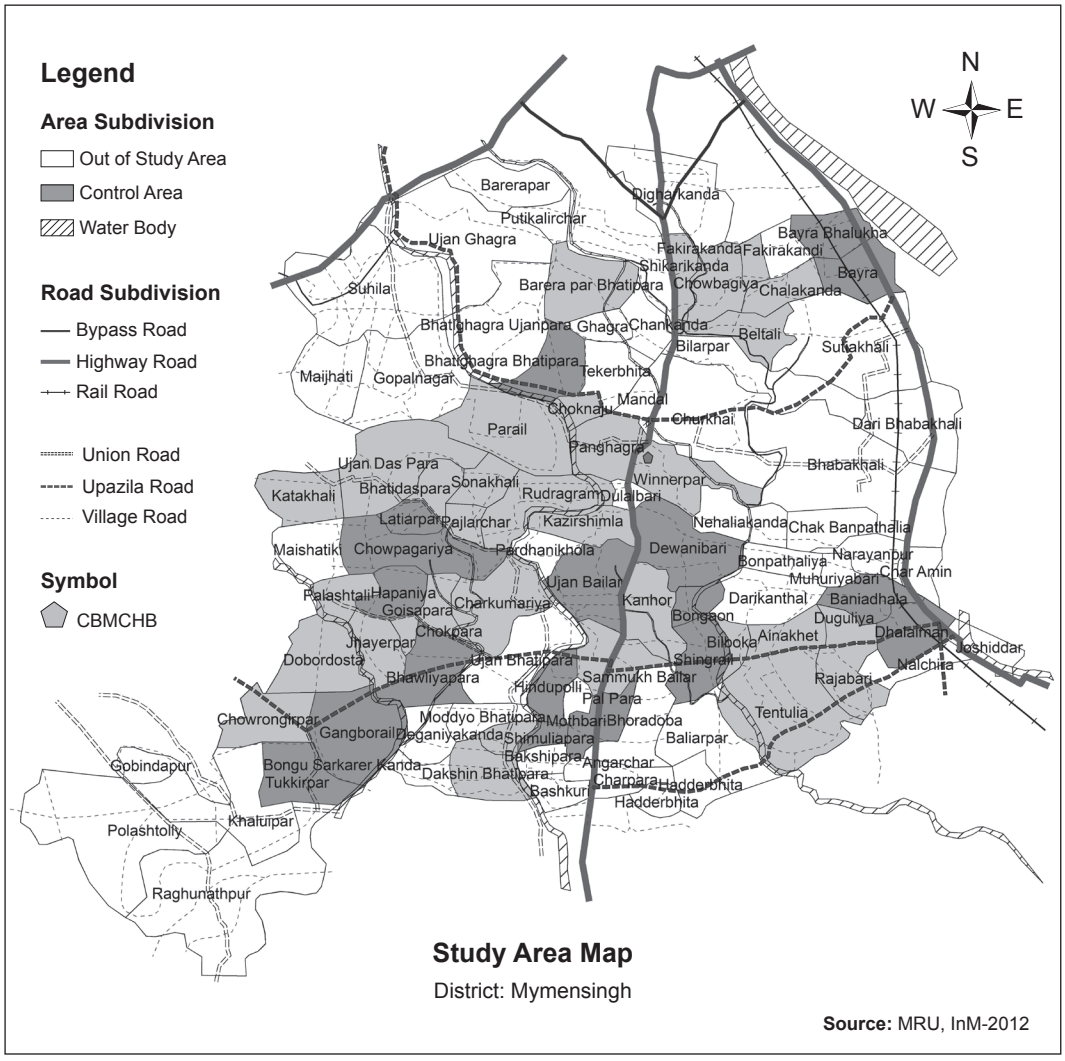
**Source:** Pre-baseline survey data (n= 3,106)

*(e) Household Enumeration and Survey:* A village-wise enumeration of active member households of the respective MFIs in the pilot intervention area was made first. This list contains the name of all individuals in the household, their age, gender, occupation and so on. The instruments for the baseline survey were then finalised and made precise in order to capture the information necessary for illustrating all targeted and peripheral outcomes as analysed above.

A group of 54 experienced individuals were trained up (through a comprehensive training programme lasting for four days). During the sessions each and every question was thoroughly discussed and any confusion was resolved during the first two days. In addition to question and answer sessions, mock surveys were conducted by the enumerators during last two days. On the basis of the performance of question and answer sessions and mock surveys, 50 individuals were selected and variously employed (40 as field investigators, 5 as field supervisors and 5 as data editors). The survey commenced in September 2012 targeting a total of 4,056 households of which 2,155 belonged to the 24 treatment clusters, 951 to the 12 control clusters (and another 950 to the 12 non-experimental clusters lying

**Figure 4**

**Cluster Map of Study Area**




**Study Area Map**

District: Mymensingh

**Source:** MRU, InM-2012

farther to the south).[18] However due to multiple events of borrowing by the same household from different MFIs (about 10% of total hhs in the present study zone), the survey process yielded data on 3,646 distinct hhs.[19] This process was duly completed by the end of October 2012.

[18] The survey design was to interview *all* member households of the three MFIs in the study zone.

[19] Thus while we had received MFI-wise household listing that yielded the number 4,056, while attempting to survey these hhs, we found out that actually there were 3,646 distinct MFI borrower households in these 48 clusters, broken down as 1,921 in the 24 treatment, 901 in 12 control and another 824 in the non-experimental 12 clusters.

## 6. Groundwork for Rolling out the Intervention

*(a) Congregating the Partners:* It is imperative to prepare the groundwork for successful implementation of the proposed MHI. Let us start by reviewing the logistics that was relied upon to congregate all partners who were targeted to complete the holistic design as described above. The first task was to conduct due diligence in identifying a provider hospital. This was commenced at about the same time as the team was running a scientific audit of all health care providers (in public, private or NGO sectors) at district, upazila and union levels, which was carried out in 10 purposively selected districts in the country. After some trial and error, we settled on the 600-bed Community Based Medical College Hospital Bangladesh (CBMCHB), which is one of the oldest and the largest *private* medical colleges in Bangladesh successfully operating for the last eighteen years. Its rural location was ideal from the perspective of being able to serve the rural poor of the area. We were able to come to an agreement on the modalities of collaboration fairly quickly and an MoU was duly signed in June 2011.

While the search for the provider was still in process, another parallel due diligence was conducted among the various MFIs that were active in the catchment area of the provider hospital. After some initial discussions, we narrowed down the list to just three MFIs cited earlier and focussed on building a relationship with them. These MFIs were operating in their respective locations for a considerable period of time and thus they each had earned the trust of a strong base of clientele. Here the process of induction to the platform took some time; it took several sessions so that each were made familiar with the product that the research team had been deliberating upon, the likely benefit schedule, the associated cost structure, the responsibility and risks to be borne by each party and the like. In some meetings the hospital management was also present in discussions with the MFIs; indeed some formative meetings were actually held in the hospital premises with MFI representatives present as full participants where the pricing and required level of hospital service issues were discussed in total transparency of all. Meetings were held individually and severally with all partners to get to the point where each partner could sign their respective MoUs with InM. The MFI agreements were all completed by March 2012.

The team had thought of inducting a commercial risk carrier in the proposed MHI scheme. In this vein, some exploratory discussions were held with a few companies in the early part of 2010, though a formal request was not made till February 2012, essentially by the time we had the provider and the MFIs on board, and indeed the eventual product was taking a concrete shape. Green Delta Insurance Company (GDIC) with their established heritage in the non-life insurance sector in Bangladesh, responded to the call and accepted the modalities that have been employed to price the product, and hence an agreement was initialled in April of 2012.

The role of the final set of partners relate to lowering the costs of care, where both drugs and technology adaptation figure prominently. Drugs use up upwards to 60 per cent of all OOP healthcare payment by households, a stubborn fact that is borne out by both national level statistics (e.g., the Bangladesh National Health Accounts, HEU, 2008) as well as large household surveys that InM has carried out in 2009 and 2011. Hence unless the use of drugs can be rationalised (e.g., via proper diagnostics) and the unit prices kept compressed, the total costs of care, be it in the insurance or in the post-payment mode, cannot be lowered significantly. Further the product we had been developing could not be priced

with precision without knowing the cost of drugs. While the process of contacting several reputed pharmaceutical companies had begun in the summer of 2011, actual agreements had thus far been signed with General Pharmaceuticals (October 2011) and Sanofi Aventis (March 2012), and agreement-in-principle have also been reached with ACI, Delta Pharma and GlaxoSmithKline Bangladesh. Each of these drug providers have agreed to release drugs at a suitable discount on the retail and/or the 'trade price' as appropriate for the dedicated use of the insured patients. This is an on-going process and further discussion is in progress with several other manufactures.

As cited above, Grameen Intel Social Business Limited (GISB) of Oregon, USA has been a partner in the Mymensingh pilot since early 2012, and an MoU had been signed in June 2012. Here MRU in collaboration with GISB is employing an innovative mobile application 'Shumata' designed by GISB for the Niramoy pilot in order to track the pregnancy complication cases ahead of reaching an emergency, thus leading to lower costs of care as well as increasing the prospect of maternal safety. The services offered by GISB, as per the MoU, would be on a gratis basis.

*(b) Orientation and Training of Stakeholders:* A major component of the preparatory work consists of a sequence of training sessions conveying insurance education as well as orientation to the specific terms and conditions of Niramoy to the key stakeholders. The field officers of the participating MFIs were the first and priority targets for the training sessions as they are the focal persons to disseminate the idea of MHI to the target beneficiaries. These people will also collect insurance premium in instalments so that the poor can avoid the burden of large up-front premium money in one go. 'Group Leaders', selected from each *samity* (i.e., 'credit group'), were the next set of individuals targeted from the potential beneficiaries and given due attention in order to garner peer persuasion among members of the respective credit group.

In each session, MRU started with the concept of pooling health risks (i.e., health insurance), how it works and how the benefits would materialise to the insured. Afterward an interesting game was played whereby each participant starts off with a fixed number of tokens (i.e., *ex-ante* equitable distribution of resources) that is earmarked for health expenses (according to a set fee schedule for various health services, including catastrophic ones). A lottery was drawn that assigned the type of service (e.g., from no exigency, or doctor visit to inpatient surgery) one may require in a given period. The OOP payment level and consequent budget balance of tokens were contrasted for both when the participant has to pay upfront for each service utilised with the case where the community's resources (i.e., all tokens from all) were pooled and utilised to pay whoever was struck with illness (as per the same lottery). This provided a clearer notion of the benefit of pooling health shocks among the participants.[20] Then the details of the Niramoy package, its benefits, exclusion criteria, premium payment modalities, coverage and co-payments were explained. In view of the role of trust in the process among beneficiaries, this element was also embedded in the training activities. Thus, MFI field officers and group leaders have been fully informed about the benefit package and the premium structure.

In addition, MRU organised an orientation session in August 2012 for the chairmen and members of all the Union Councils in the catchment area, local school teachers and religious leaders and the like on the ground that it would be necessary to secure solid support and empathy of the 'locally influential persons' as the general public always look

[20] The beneficiary orientation modalities employed by the Micro Insurance Academy (MIA) of Delhi involve such exercises.

up to them for their judgement and opinion. The category of the trainees is described in Table 7. Each of these activities played a key role in creating a congenial environment for the start of Niramoy promotional activities.

**Table 7**
**Training and Orientation Sessions**

| Stakeholder Type | Number of participants |
|---|---|
| Training of MFI field officers (Session-I) | 26 |
| Training of MFI field officers (Session-II) | 26 |
| Orientation of group leaders | 35 |
| Orientation & training of group leaders | 162 |
| Orientation of local stakeholders | 120 |

*(c) How was the training appreciated by the participants?* The ill-conceived life insurance schemes of the past, often poorly managed by commissioned sales agents, have left behind a negative image of the insurance idea among the rural poor of Bangladesh. This phenomenon is not uncommon in the developing context (Wang *et al.* 2010), which acts as a major barrier in promoting a health insurance scheme as there is virtually no endowment after the tenure period. The motivation for insuring the contingent is quite difficult conceptually. Moreover education and socioeconomic status of the poor population also do not coexist with sound health insurance literacy (McCormack *et al*., 2009). Despite these handicaps when referring to their own predicament during the latest incidence of health shock, the potential beneficiaries could articulate the MHI benefits in concrete terms. The risk-pooling insurance game also clearly demonstrated the functioning of a health insurance scheme as all the collected premiums are spent for the purpose of treatment of the sick members and no one had to face any catastrophic expenses beyond their capability to endure. The benefit package's service contents were highly appreciated by the participants and they appeared to welcome this programme as very relevant for their well-being. But the main contention is always the amount of money to be paid up-front rather than securing a safe deposit, which people tend to analyse critically.

While the MFI field officers seemed to catch most of what was communicated to them in these sessions and took these in stride, group leaders appeared to have mixed reaction. While, most acknowledged the beneficial side of MHI if ill health becomes a reality, but doubted the 'relative value' of the up-front premium. Nevertheless they also remembered the key points of the benefit package and raised intelligent queries during the sessions. Local influential persons also expressed their whole-hearted support for this innovative project. Though some were sceptical about log-run prospects of the project's survival, they ardently called for future expansion of the project encompassing a wider area.

*(d) Primary orientation and the willingness-to-join study:* An innovative product orientation protocol and willingness to join study has been introduced in piloting Niramoy following the completion of the baseline survey. In order to accomplish this task, 10 enumerators were engaged to conduct the primary orientation and willingness to join the MHI product (Niramoy) in two stages. In the first stage they contacted all the potential beneficiaries and one-to-one sessions on insurance education as well as a detailed introduction to Niramoy were held in their homes. In the next stage, the same information was provided in the

gatherings (of groups of potential beneficiaries) in a more formal way using flow charts, risk-pooling games and so on. The first stage helped the potential clients to be acquainted with the product and the latter guided them to a more thorough understanding. This component of the study was also completed by the end of October 2012.

*(e) Enrolment Status in MHI Pilot Project:* The formal promotional activities along with enrolment were started in mid-November, 2012; however the process was hampered by the difficulty in identifying medical professionals to service the two health outposts located by the MFI branch offices in order to promote the health advisories and to provide basic consultation services. In view of the relative scarcity of trained paramedics, it was eventually decided to engage new MBBS doctors in these positions, where the recruitment process took more time than anticipated. Finally these outposts were up and running by 15 January 2013, and the phase-1 registration process was jump-started about this time, which will close on 31 March 2013 by that time all eligible beneficiaries are expected to join the scheme. By the mid-February, 507 households (i.e., 26% of eligible) had already joined the scheme by starting to pay the premium in instalments. Out of a total of 1,921 eligible households in the 24 treatment clusters, we expect a majority to volunteer to join (say about 1,500) by end of enrolment on 31 March 2013.

*(f) Challenges faced during the implementation of Niramoy:* The principal challenges encountered to date can be summed up under a few headings as follows. Clearly these can be overcome with greater community participation in the MHI scheme from the conceptualisation stage.

(i) Awareness and insurance education: Overcoming prior misconception and lack of trust in the insurance mechanism from direct or indirect interactions with commissioned agents of commercial life insurers appeared among the hardest of obstacles.

(ii) Changing the mind-set: Since the pre-payment mode of health finance is new to the participants, many were too timid to take the plunge and preferred the 'wait and see' strategy before making the decision.

(iii) Comprehending risk-pooling: While playing the treasure pot game if anyone did not experience any illness, they raised concern about having to pay premium for the health insurance, which reveals a lack of conceptualisation.

(iv) Trust in the provider: Most members raised their concern regarding the quality of health care services and the availability of the doctors in the outpost clinics.

(v) Cash-flow constraints: It has been difficult for the poor to provide the total premium in one lump-sum. Thus they proposed to pay the premium in *eight equal instalments* over two months.

(vi) Exclusion criteria: Some members were hesitant to join the scheme after being informed of the *exclusion criteria* for maternal services as these members had a family member who was already pregnant. This reveals misinformation about the benefit package as well as the need to control adverse selection.

(vii) Adverse selection: Many wanted to include only the elderly and sick members of their households in the insurance scheme. Again this indicates a lack of familiarity with the risk-pooling concept. Consequently, they criticised the scheme because it required that all households consisting of five or less individuals must be included.

(viii) Gender and decision-making: As most MFI members were women and typically the husbands were the primary decision maker of these particular households, it was awkward for the women to commit to join the scheme on their own.

## 7. Conclusion

In a developmental setting, where there is much apathy even for two organisations to work together; however, in the present context, it has been possible to congregate multiple organisations including a health care provider, microfinance institutions, a commercial insurance company and prominent drug manufacturers to facilitate the offering of micro health insurance services to the poor. The active involvement of a third-party organisation adds a new dimension to the standard partner-agent model of delivering microinsurance. Innovations in designing the benefit package signify that even chronic illnesses and maternal conditions can be insured. Innovations in the premium determination may be handy in designing the new products. Bringing novelty in insurance marketing (for surmounting the obstacles appeared in advancing insurance literacy and awareness in a setting where there are enormous misconceptions about insurance) may also be useful for the sector. Use of randomised control trial to assess the impact is also a new dimension in the microinsurance research in Bangladesh. Finally this model anchored on the premise that adequate risk protection is possible while maintaining an affordable premium structure.

Health insurance is still a dormant chapter even in the formal sector in Bangladesh although life insurance has gained some footing. The present scheme attempts to involve for the first time in Bangladesh a commercial insurance company in a health insurance scheme outside the formal sector. The partner-agent model of delivering health insurance has thus been debuted in Bangladesh through this initiative. This innovation may encourage other insurance companies into designing similar or other innovative products to serve the huge population of the informal sector.

Finally let us focus on the necessity to optimise the use of available facilities. The most critical among the latter is the health care provider. Given the relative scarcity, one must design a variety of schemes suitable for each type of facility since a brand new facility à-la-carte would not come up by waving a magic wand. This issue is critical in a county as populous as Bangladesh where a great many people lack access to formal healthcare. The same is true of regions where the population are scattered in far-flung locations or of regions varying greatly in topography and climatic conditions (i.e., geo-climatically challenged). Hence experimentation ought to proceed in many fronts in all aspects of design, namely benefit regime, the price, delivery modality, co-payments, and evaluation. We have put forward a scheme in the same spirit, not in the claim that this is the ‘ideal’ one. Only effective implementation and follow-up evaluation will tell us if this would survive the test of time.

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## Annexure 1

## Description of Clusters

1. **Baniadhala and Dhalaiman (75):** These two villages are connected by a single village road.
2. **Duguliya (52):** An upazila road crosses over the village.
3. **Rajabari and Tentulia (41):** These two villages are connected by an upazila road and village roads.
4. **Bilboka (40):** An upazila road and a village road pass by the village.
5. **Aynakhet (47):** An upazila road cross over the village and all village roads are connected with the upazila road.
6. **Bonogram and Shingrail (61):** These two villages are connected by a single village road. Bonogram residents use the road to reach the upazila road which is crosses over to Shingrail.
7. **Winnerpar (95):** This is located by the highway. A single village road connects the village with the highway.
8. **Dewanibari (105):** This is close to the highway and several village roads connect the village with the highway.
9. **Kanhor (107):** This is located by the highway and several village roads connect the village with the highway.
10. **Sammukh Boilor (165):** The highway passes over the village and several upazila roads and village roads connect it with the highway.
11. **Hindupolli, Boilor Munshipara and Mothbbari (48):** These villages are inter-connected by several village roads. Hindupolli and Boilor Munshipara are separated by a river with the rest of the study area.
12. **Ujan Boilor (113):** This is located by the highway and is separated by the river from the rest of the study area. Several village roads are connected to the highway.
13. **Shimuliapara and Dokkhin Bhatipara (128):** These two villages are connected by a union road and both the villages are separated by a river with the rest of the study area. Several village roads also connect the villages with the union road.
14. **Charkumariya (126):** It is separated from nearby clusters by a river. A union road and a village road cross over the village.
15. **Goishapara (86):** This village is connected by a union road.
16. **Chakpara and Jayerpar (90):** These villages are connected by village road and several village roads connect with the upazila and union roads.
17. **Bhawaliapara (94):** An upazila road crosses in the middle of the village and several village roads are connected with the upazila road.
18. **Dobordosta and Chowrongirpar (47):** These two villages are connected by a village road. An upazila road and a union road pass across Chowrongirpar and Dobordosta, respectively.

19. **Gangborail and Tukkirpar (49):** These two villages are connected with the upazila road and are separated by the river from the rest of the study area.
20. **Polashtoli (44):** This village is connected with the union road and several village roads are also connected to the union road.
21. **Hapaniya (123):** This village is connected by a union road.
22. **Chowpagaria and Latiarpar (37):** These two villages are inter-connected by several village roads, which also connected with the union road.
23. **Ujan Das Para and Katakhali (65):** These two villages are mutually connected by a union road and several village roads.
24. **Bhati Das Para (108):** This village is nearby a union road and is connected by a village road.
25. **Sonakhali and Pajlarchar (131):** Pajlarchar is located by the union road and both the villages are connected by a village road, which is linked to the union road.
26. **Rudragram (110):** This village is connected by several village roads which are connected with the highway and union roads. Rudragram is also separated by the river form the rest of the study area.
27. **Parail (46):** This village is connected by a union road which directly leads to the highway.
28. **Choknaju and Panghagra (65):** These two villages are connected with the upazila road and are separated by upazila and union roads. Panghagra is also separated by the highway.
29. **Bhatighagra Bhatipara (66):** Besides the upazila road, a village road passes through the middle of the village from the upazila road.
30. **Bharerapar Bhatipara (171):** This village is connected by several village roads to the highway.
31. **Shikarikanda and Choybhagiya (95):** This is located by the highway and village roads are directly connected to the highway.
32. **Beltoli (103):** This village is close to the highway and is connected by village roads.
33. **Boyra (99):** This village is connected by village roads which are linked to the highway.
34. **Boyra Bhaluka (81):** The highway passes by the village and several village roads are directly linked to the highway.
35. **Fakirakanda and Chalakanda (136):** These two villages are connected by several village roads to the highway.
36. **Kazirshimla (57):** The village road is directly connected to the highway. The village is also separated by the river from the rest of the study area.

* Number of MFI member households in each cluster is mentioned in the parentheses.

## Annexure 2
## Power Calculations

| Parameter | Different Outcome Measurements | | | |
|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) |
| Alpha ($\alpha$) (two-sided) | 0.05 | 0.05 | 0.05 | 0.05 |
| Power (1-$\beta$) | 0.80 | 0.80 | 0.80 | 0.80 |
| Mean | 0.49 | 0.185 | 903.79 | 0.21 |
| Expected mean | 0.65 | 0.08 | 450 | 0.07 |
| Std. Dev. of the present mean | 0.49 | 0.38 | 3187.27 | 0.41 |
| Ratio of the Sample Size | 2.00 | 2.00 | 2.00 | 2.00 |
| Number of baseline measurements | 1 | 1 | 1 | 1 |
| Number of follow-up measurements | 1 | 1 | 1 | 1 |
| Correlation between baseline & follow-up | 0.50 | 0.50 | 0.50 | 0.50 |
| Method | Change | Change | Change | Change |
| Relative efficiency | 1.00 | 1.00 | 1.00 | 1.00 |
| Adjustment to Std. Dev. | 1.00 | 1.00 | 1.00 | 1.00 |
| Adjusted Std. Dev. | 0.49 | 0.380 | 3187.27 | 0.41 |
| **Estimated required sample sizes** | | | | |
| Control | 108 | 155 | 581 | 101 |
| Programme | 216 | 310 | 1162 | 202 |
| **Sample size adjusted for cluster design** | | | | |
| Control (uncorrected) | 108 | 155 | 581 | 101 |
| Programme (uncorrected) | 216 | 310 | 1162 | 202 |
| Intra-class correlation | 0.05 | 0.05 | 0.007 | 0.096 |
| Average observation per cluster | 86 | 86 | 86 | 86 |
| Minimum number of clusters | 20 | 29 | 33 | 33 |
| Number of total clusters | 36 | 36 | 36 | 36 |
| **Estimated sample size per group** | | | | |
| Control (corrected) | 561 | 814 | 927 | 926 |
| Programme (corrected) | 1,134 | 1,628 | 1854 | 1852 |

**Note:** The first row of the table denotes different outcome measurements, i.e., (i) seeking healthcare from formal provider, (ii) catastrophic (at 5% threshold level) health events in the households, (iii) average OOP payments for acute illness and (iv) health care financing through borrowing and asset depletion.

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