

**MICROINSURANCE OF HEALTH
: THEORY AND EMPIRICS**

SYNOPSIS

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The main objective of the present thesis is to investigate various issues related to microinsurance of health (hereafter MHI). MHI is a financial provision which aims primarily at informal sector. People working in informal sector are often belong to low-income strata as they are deprived of getting higher than survival wage and any type of social security from the employer. Due to their low income these people cannot afford the private insurance available. In this scenario risk-hedging provision in the form of MHI is highly recommended. A typical MHI scheme offers limited coverage at a low premium in exchange of small contribution. MHI scheme is distinct from the health insurance in many ways such as (1) in case of MHI, the size or the extent of insurance coverage is not a choice variable. Individuals are offered a simple contract (package) that includes price, benefits and defines the method of paying premium and settling claims) and on the basis of it all that they decide is whether or not to buy the scheme; (2) premium of MHI scheme is based on community rating and not on individual rating and (3) MHI is generally a group contract/ individual contract initiated or managed by a nodal agency. In order to accomplish the objective, the thesis focuses on mainly three aspects: informal sector households' financial risk coping mechanism with health shocks, financial sustainability of MHI scheme and demand for MHI among informal sector workers. The first and third issues mentioned are addressed empirically whereas the second issue is analysed theoretically. The first three chapters of the present thesis contains introduction, literature review and research objectives respectively.

Chapter-4: Distress Financing of Healthcare among Informal Workers: An Investigation in West Bengal

In this chapter we explored the issue of distress healthcare financing among the informal sector households in West Bengal (a state in India). Out-of-pocket (hence after OOP) healthcare payments financed through borrowings with interest or selling of household assets are referred as distress healthcare financing. Borrowing from informal money lender, selling of assets or livestock can potentially push the households into a vicious circle of economic vulnerability in the long run since poor health exhausts merge savings, assets and resort to borrowing; while low levels of assets lead to worsening health and an inability to cope with future illness.

Research Objective:

The target group of the present study is informal workforce. Initially we examined the determinants of OOP average monthly healthcare expenditure of the sample households. Next, we investigated the factors influencing the incidence of distress healthcare financing of those households. To our knowledge there is a dearth of studies on distress healthcare financing of informal households in West Bengal. Thus, the present study is an attempt in that direction to complement the existing literature of OOP healthcare expenditure.

Sample Selection:

The present study is based on a household survey conducted in Purulia (a backward district of West Bengal). The selection of households was based on a two-stage random sampling method. At the first stage, three blocks (viz. Purulia-I, Purulia-II and Hura) were selected randomly under Purulia Sadar sub-division. Then from each block, two villages were selected randomly and finally eighty households were selected from each village through random sampling procedure. For the analysis we considered the households which sought healthcare at least once during the reference period. During this period, we found that thirty households did not seek any healthcare, so, the present study is based on 450 households. From each household, the head of family was questioned. The survey questionnaire accommodated questions on healthcare utilization and cost, household income, expenditure on food and fuel, household size, total working members, education level of the head, age of head, working status of members, incidence of outpatient care seeking, hospitalisation for any member during reference period. Respondents were asked to estimate total medical expenditures of the household period and also asked about the sources of healthcare financing during the entire reference period.

Data Description:

We found that average monthly income of the sample households was around Rs. 7144. The principal working member in most of the households were involved in casual wage employment. The average family-size was 5.08. The mean size of the vulnerable age group (defined as total number of household members in the age group ≤ 5 and ≥ 55 years) was 3. The average years of schooling of household heads was 5 years with 10.14 per cent had no formal schooling.

The monthly average healthcare expenditure incurred by sample households was around Rs 800 which represent nearly 11.20 per cent of average monthly household income. We found that less than 9 per cent of households had health insurance (RSBY). During reference period, 30.86 per cent households experienced at least one hospitalisation episode while 54.05 percent households faced at least one illness episode without hospitalisation. Around 44 per cent households sought healthcare from private provider along with public provider. In our study sample 35.59 per cent households resorted to distress healthcare financing and around 45 per cent households incurred catastrophic OOP payments for healthcare. Among the households that incurred catastrophic health payments nearly 57 per cent faced distress financing.

Econometric Specification and Empirical Findings:

The study considered two distinct models to address two research questions. The Model-I examined the factor(s) determining households' average monthly OOP healthcare expenditure and the Model-II investigated the factors responsible for incidence of distress healthcare financing among sample households.

Specification of Model-I: to address the first research question we considered the following regression equation

$$\begin{aligned} \text{LOGHCE}_i = & \gamma_0 + \gamma_1 \text{LOGINCOME}_i + \gamma_2 \text{OUTPATIENT}_i + \gamma_3 \text{HOSP}_i + \gamma_4 \text{VULNERSIZE}_i \\ & + \gamma_5 \text{PROVIDER}_i + \gamma_6 \text{CASUAL}_i + \gamma_7 \text{REGULAR}_i + \gamma_8 \text{EDUC}_i + \varepsilon_i \quad \dots (1) \end{aligned}$$

The variables considered in (1) are narrated below:

- i) LOGHCE: It is the dependent variable of Model-I, which denotes the logarithm of household i's average OOP monthly healthcare expenditure. From every households we collected annual health expenditure data on medicines, consultation fees, hospital bed charges, transportation costs and expenditure incurred on food, lodging for companion(s) of ailing household member(s) during the reference period¹. The annual OOP healthcare expenditure figure of every household is then divided by 12 to obtain the corresponding average OOP monthly healthcare expenditure

¹ If a household had taken medical loan(s) (either from informal lender or SHG or from both sources) during reference period and also repay that with interest – either full or partial during the same period, then that particular amount is also included in its OOP health expenditure. Repayment of any earlier medical-loan during January-December, 2017 period is not considered in OOP health expenditure calculation. Likewise, if a loan taken during January-December, 2017 period but not repaid (full or partial), then also the loan capital and interest is not considered as components of OOP health expenditure in our estimation.

- ii) LOGINCOME: It denotes the logarithm of average monthly income of a household. For any household we considered the earnings of all its working members from different sources during reference period and then aggregated them to reach annual income of the household. Thereafter dividing that by 12 we got average monthly income of the household.
- iii) OUTPATIENT: We define OUTPATIENT =1, if household incurred at least one incidence of consultation with a healthcare provider, payment for medicines and/or tests in an outpatient setting and hospital-stay only for day-care treatment during the reference period; otherwise OUTPATIENT =0.
- iv) HOSP: It is also considered as dummy variable where it will take the value 1 if a household experienced at least one hospitalisation episode² i.e., an inpatient stay exceeding 24 hours at any time during the reference period and otherwise it is coded as 0.
- v) VULNERSIZE: It represents total number of children aged five or less than five and number of members aged fifty-five or more in a household.
- vi) PROVIDER: It is coded as '1' if the household took medical care from private healthcare provider (including traditional healer) besides from public provider during reference year, and 0 otherwise.
- vii) CASUAL: It is equal to 1 if the principal earning member of a household is casual worker or 0 otherwise.
- viii) REGULAR: It is coded 1 if the principal earning member is regular salaried worker and coded 0 otherwise³.
- ix) EDUC: It denotes years of education of the household-head.

Since the proportion of households with health insurance is very low in our sample, it is not considered as an explanatory variable in Model-1.

Estimation Results of Model-I and Discussion:

To allow for the possibility that unobserved determinants of LOGHCS and unobserved determinants of LOGINCOME are correlated we treat LOGINCOME as an endogenous regressor. Total number of working-members in a household, (denoted as 'WORKINGSIZE') is considered as an instrument for LOGINCOME to address the (probable) endogeneity problem.

²The correlation between the variables OUTPATIENT and HOSP is very low (around 7.37%).

³ To avoid dummy variable trap we have not taken all the three categories as dummy regressors in equation 1.

Result of the Wu-Hausman test for endogeneity suggested that the instrumental variable (IV) estimation is required to have unbiased estimates of model (I) parameters.

It was found that except incidence of outpatient care, regular salaried activity status and formal education level of household head, the remaining explanatory variables had significant impact on average monthly healthcare expenditure of sample households. The signs of the parameter estimates are also as expected. Average monthly income had emerged as an important factor in our study. A household was willing to spend more on healthcare for the ailing members if it's capable.

Specification of Model-II: Model-II investigated the impact of high OOP healthcare expenditure on incidence of expensive coping mechanism among sample households.

To investigate the factor(s) influencing distress healthcare financing of sample households the following functional relationship is defined:

$$DHF_i = \beta_0 + \beta_1 CHE_i + \beta_2 CASUAL_i + \beta_3 REGULAR_i + \beta_4 SHG_i + \beta_5 WORKINGSIZE_i + \beta_6 EDUC_i + u_i \quad \dots (2)$$

The regressors included in (2) are narrated below:

DHF: It is the outcome variable of model-II, coded as 1 if the household incurred distress financing and 0 otherwise. We defined it as a situation when a household required to borrow money with interest and/or sell assets/livestock for its healthcare expenditure.

CHE: It is a binary regressor denoting catastrophic healthcare expenditure incurred by a household. An OOP healthcare payment is considered catastrophic when the expenditure exceeds certain threshold proportion of total household expenditure or capacity to pay (Wagstaff and Doorslaer, 2003; Xu et al., 2003). In literature, the threshold level is set arbitrarily. We have used the non-food expenditure as a proxy measure for a household's capacity to pay and consider any OOP healthcare spending exceeding 10 per cent of household's non-food consumption expenditure including interest payment on loan taken for medical purposes in the entire reference period⁴ as catastrophic. The share of healthcare

⁴The household survey was conducted during January to June of 2018 in which respondents were asked about total medical expenditures of the household and sources of healthcare financing in the year preceding the survey i.e., from January 2017 to December 2017. If a household has taken loan(s) (either from informal lender or SHG or from both sources) during this period and also repay that with interest – either full or partial during the same period, then that particular amount is also included in its OOP health expenditure. Repayment of any earlier medical-loan during January-December, 2017 period is not considered in OOP health expenditure calculation.

expenditure in non-food expenditure (S_i) was derived as follows: $S_i = \frac{HCE_i}{NFE_i} \times 100$, where, NFE denotes the average monthly non-food expenditure⁵. This implies the household i ($i = 1, 2, \dots, 450$) would have been faced catastrophic healthcare expenditure during the reference period if $S_i > 10$. So, $CHE_i = \begin{cases} 1, & \text{and } S_i > 10 \\ 0, & \text{and } S_i \leq 10 \end{cases}$.

SHG: This is a dummy regressor and is taking value 1 if at least one person in the household was a member of a Self-Help Group (SHG) and 0 otherwise.

WORKINGSIZE: This regressor denotes the number of total working members in a household.

EDUC: As mentioned earlier, it denotes years of education of the household-head.

The variables CASUAL and REGULAR are included as regressors to check whether there is any influence of activity status on probability of distress healthcare financing.

Estimation Results of Model-II and Discussion: We suspected that for a household unobservable factors influencing the incidence of distress financing also affect the probability of incurring catastrophic healthcare expenditure. So, CHE was treated as endogenous. We found that variables HOSP, VULNERSIZE and PROVIDER were not determining incidence of distress financing but influencing incidence of catastrophic healthcare expenditure. We assume that CHE is defined as

$$CHE_i = \delta_0 + \delta_1 HOSP_i + \delta_2 VULNERSIZE_i + \delta_3 PROVIDER_i + v_i \quad \dots (3)$$

Since both the outcome variable (DHF) and endogenous explanatory variable (CHE) are dichotomous, we estimate a Seemingly Unrelated (SUR) Bivariate Probit model. In the present study equations (2) and (3) define the SUR Bivariate Probit model, where $E(u) = E(v) = 0$, $\text{var}(u) = \text{var}(v) = 1$, and $\text{Corr}(\mu, \eta) = \rho_2$ ⁶.

The result showed that χ^2 statistic corresponding to Wald test of exogeneity (i.e., null hypothesis of $\rho_2 = 0$) is significant (precisely at 7.30 per cent), validating our choice of estimating the SUR Bivariate Probit model. The overall fit of the model is highly significant.

The ML estimation results can be summarized as follows:

- i) Variable CHE, REGULAR and WORKINGSIZE were found to be significant

Likewise, if a loan taken during January-December, 2017 period but not repaid (full or partial), then also the loan capital and interest is not considered as components of OOP health expenditure in our estimation.

⁵ We have collected data for food, clothing, medical and other expenditures. Reference period for food expenditure was last one month and that for all other expenditures was last one year. Dividing the annual data by 12 we got monthly data. Adding up all monthly expenditure except expenditure on food we get average monthly non-food expenditure.

⁶When $\rho_2 = 0$, u and v are uncorrelated; so, CHE becomes exogenous in the equation (2) of this model.

- ii) households that incurred CHE were more likely to face distress healthcare financing.
- iii) if principal earning member of household was in regular-salaried job, the family had a lower risk of borrowing (with interest) to finance healthcare compared to the households with self-employed principal earning member.
- iv) the probability of distress financing was low for the households that had considerably higher working members' size.
- v) there was no statistically significant difference in probability of distress healthcare financing due to presence of SHG membership among the household members and with education level of household-head.

Chapter-5: A Model of Microinsurance of Health

In chapter 5 we tried to develop a simple theoretical model of MHI scheme. The model laid emphasis on financial sustainability aspect of a for-profit insurance firm, which does not operate in rural localities of LMICs, in providing health insurance to low-income households with low awareness and information asymmetry. The MHI schemes often face the risk of insolvency. At the same time, realizing there is a large untapped market of low-income households, the commercial insurers are becoming interested to provide health insurance to informal-sector households but are likely to face challenges in this initiative. The literature on financial sustainability issue of MHI schemes is rather thin. The previous research works mainly emphasized on the role of reinsurance of MHI units and capital loading in maintaining financial sustainability of such schemes. Impact of the presence of a nodal agency (any local organization) in this issue remain still largely unexplored.

Baseline Model of MHI scheme:

Consider a single-period model in which a risk-neutral insurance firm initiates an MHI scheme for the low-income informal-sector workers living in a geographically proximate area. The scheme provides a maximum loss-cover of D for a set of illness at a premium $\pi (< D)$. An individual joins the MHI scheme if post-insurance payoff exceeds his reservation utility. To operate the scheme the insurance firm hires a risk-neutral NGO which is working among the low-income households of that locality for sometimes. Such an NGO usually enjoys the trust of the local households and has better local information. The NGO was assigned (by firm) to execute two tasks:

- i) enrolling potential beneficiaries in the scheme (in stage-1) and,
- ii) encouraging and monitoring their preventive efforts (in stage-2).

Individuals of the target group are supposed to be risk averse with same level of initial wealth and identical risk type. A representative beneficiary faces a risk of income loss due to the health shock which are covered under the MHI scheme. The probability of facing bad state (i.e., illness) is decreasing and convex in individual's preventive effort(e). Individual has an endowed probability of facing health shock and exerting effort is costly. In this model, level of preventive care (or effort) taken by the individual influences only the probability of illness, but not the absolute size of income loss due to illness. Without loss of generality assume, $e = \{e^*, 0\}$, $0 < e^* < 1$.

At the 1st stage, the firm aims to increase its membership, which is a prerequisite for the scheme's sustainability. Enrolment under the scheme depends on NGO's effort in creating awareness of individuals and in providing inputs to improve the insurer's familiarity with their preferences, and affordability (so that the firm can design a customised MHI product). In the second stage, the firm's objective is to cope with moral hazard on the part of beneficiaries, which has implication on scheme's financial sustainability. It cannot design a compensation scheme for any beneficiary based on occurrence of an illness episode, since even taking the maximum possible prevention, a beneficiary can experience a health shock. Since the NGO has access to local informal network and also enjoys trust of local people it can influence the preventive effort level of beneficiaries under the scheme (which again influence the number of claims) through monitoring. The firm cannot monitor the NGO's effort level in both stages.

Firm-NGO interaction: Stage-1:

Firm's optimal contracting problem in Stage-1 solves: $\max_{\alpha} [K + N\pi - t - \alpha N]$

subject to

Participation constraint (PC) of NGO: $\lambda vN + t + \alpha\beta z - \frac{1}{2}\delta z^2 \geq \bar{y}$

Incentive-compatibility constraint (IC) of NGO: $\max_z \left[\lambda vN + t + \alpha N - \frac{1}{2}\delta z^2 \right]$

Limited-liability constraint (LL) of NGO: $t \geq 0$

Here,

N : enrolment in the MHI scheme. Here, $N = \beta z$, $\beta \in (0,1)$. z is NGO's effort in stage-1.

$(t + \alpha N)$: linear incentive contract offered to NGO. $\alpha \in (0,1)$ is the performance related component of compensation and t is the fixed compensation level.

$\frac{1}{2}\delta z^2$: cost incurred by NGO in stage-1.

K: initial capital invested by the insurance firm

v: utility gain of an individual from joining the scheme

λ : intensity of altruism of the NGO

$\bar{y}$: reservation utility of NGO

If, $\bar{y} < \frac{\beta^2}{8\delta}(\pi + \lambda v)^2$, we found that:

- i) Variable compensation component and the enrolment thus go down when NGO's cost of effort goes up.
- ii) Optimal bonus decreases with the higher altruism of NGO.
- iii) Optimal effort increases with the altruism of the NGO.

However, if, $\bar{y} \in \left(\frac{\beta^2 \lambda^2 v^2}{2\delta}, \frac{\beta^2 (1+\lambda v)^2}{2\delta}\right)$, we found that

- i) Variable compensation component and the enrolment thus go down when NGO's cost of effort goes up.
- ii) Optimal bonus decreases with the higher altruism of NGO but optimal effort does not depend on the altruism of the NGO.

In addition, regarding surplus fund (S_1) with the firm at the end of stage-1, we showed that:

When $\bar{y} < \frac{\beta^2}{8\delta}(\pi + \lambda v)^2$, S_1 will increase with incentive bonus offered to NGO if $\eta > \frac{\pi - \lambda v}{\pi + \lambda v}$

where, $\eta \left(\equiv \frac{\alpha^*}{z^*} \frac{dz^*}{d\alpha^*} \right)$ is the incentive bonus elasticity of effort.

Firm-NGO interaction: Stage-2:

Aggregate Claim Analysis: At the end of the stage-2 the scheme yields a binary output to the firm: high or low. The firm considers its output as 'high' if it earns a non-negative financial profit; otherwise, it considers the output as 'low'. In case of high output, the firm gets a non-negative utility $\theta_H (\geq 0)$, otherwise it gets no utility. The firm can financially sustain if its expected payoff is non-negative ($\Theta \geq 0$). In stage-2, the NGO is assigned to encourage the beneficiaries to practice preventive measures and overall monitor their preventive efforts. It can monitor and encourage the preventive effort of beneficiary with some cost. As a result, NGO's effort, $a \in [\underline{a}, \bar{a}]$, such that, $0 < \underline{a} < \bar{a} < 1$, stochastically improves the probability of

high output, $\gamma(a)$. Without loss of generality we assume, $\gamma(a) = a$. The disutility cost of NGO is $\frac{1}{2}a^2$ for exerting an effort a . NGO's income in any state of the world must be above a certain minimum level, $F (> 0)$. We assume that probability of an individual under the MHI contract will exert high effort depends on the effort put by the NGO in motivating and monitoring preventive care of community. This assumption gives us a lemma which states that presence of an NGO (local organization) reduces the average probability of illness. Using this lemma, we arrived to another important result which states that: if the individual claims are independent and identically distributed random variables, for any fixed level of coverage the level of aggregate expected claims is decreasing in the NGO's effort level.

Optimal Contract: The insurance firm offers a state contingent contract to the NGO, such that, firm will pay $\bar{q}$ if the outcome is 'high' and, will pay $\underline{q}$ if it is 'low'. If NGO's income in any state of the world must be above a certain minimum level, $F (> 0)$, the insurance firm's optimal contracting problem under moral hazard solves: $\max_{\bar{q}, \underline{q}} \{ [\theta_H - (\bar{q} - \underline{q})] a - \underline{q} \}$

subject to

$$\text{PC of the NGO: } a(\bar{q} - \underline{q}) + \underline{q} - \frac{a^2}{2} \geq \bar{y}$$

$$\text{IC of the NGO: } a^* = \operatorname{argmax}_a \{ a(\bar{q} - \underline{q}) + \underline{q} - \frac{a^2}{2} \}$$

$$\text{LL of the NGO: } \bar{q} \geq F, \underline{q} \geq F$$

If, $b \equiv (\bar{q} - \underline{q})$ denotes the incentive bonus payment to NGO, under this framework, we showed that the insurance firm remains financially sustainable for the incentive contract as follows:

$$\{a, b\} = \left\{ \frac{\theta_H}{2}, \frac{\theta_H}{2} \right\} \text{ if } \bar{y} - F < \frac{\theta_H^2}{8} \text{ and}$$

$$\{a, b\} = \left\{ \sqrt{2(\bar{y} - F)}, \sqrt{2(\bar{y} - F)} \right\} \text{ if } \bar{y} - F \in \left(0, \frac{\theta_H^2}{2} \right)$$

In addition, we can say that the insurance firm prefers an intermediary local organization which has a much lower outside option.

Risk loading: Any MHI scheme operating with an insufficient or no capital is exposed to a substantial insolvency risk. Hence, the insurer offering MHI requires a risk loading as a cushion against insolvency. In this model, number of claims is decreasing in NGO's monitoring effort. We found that the firm can set a lower threshold level of risk-loading (i.e., the minimum risk loading that an insurance firm will use to remain solvent in business) with the higher

monitoring effort of the NGO. To reduce the insolvency risk, the insurer can increase the risk loading but that will lead to a higher premium which in turn dampens the insurance demand among them. With the help of NGO, the insurer can set risk loading at a lower level.

Chapter -6: Demand for Microinsurance of Health among Informal Workers: A Discrete Choice Experiment

In chapter 6 we investigated the demand for MHI among the informal sector workers using a Discrete Choice Experiment (DCE) in the state of West Bengal, India. In any DCE application we can determine the characteristics that describe a product and to what extent the respondent is willing to trade-off one characteristic to another. In the absence of actual MHI scheme in the market, the demand for insurance can be estimated by using a DCE. Evidence confirms that MHI schemes have succeeded in enrolling a small proportion of their target population. However, studies also revealed that presence of public sector health insurance did not dampen the demand for MHI schemes suggesting there is a potential for further development of market for MHI through designing products beyond the existing ones.

Theoretical framework:

We have constructed a simple model of MHI to examine the importance of scheme-characteristics in generating its demand. The analysis of this section was done as a theoretical background for our empirical exercise on the issue of demand. The results of theoretical analysis suggested that demand for MHI scheme depends not only on premium level but also on the other characteristics of the product. Some interesting results found can be narrated as follows:

- i) under certain condition the investment (effort) of the insurer to increase the efficiency of the MHI scheme will increase the welfare of the beneficiary. The efficiency of the scheme will increase by containing the hazard cost which is incurred by the individual for claim settlement since long delays, complex terms and conditions etc in settling claims create disutility and exacerbate negative perception about insurance.
- ii) willingness to join the scheme increases (as welfare rises) with the rise in the coverage level. In other words, a broader set of benefits covered under the scheme will induce the demand for the scheme.
- iii) a policy of cash-back will increase the welfare of the individual so the demand for MHI.

Overview of Discrete Choice Experiment:

Design of a DCE: There are mainly three main components in choice experiment methodology:

- (i) identification of appropriate attributes and realistic levels- prior to the experiment, focus group discussion must be conducted to ensure appropriate attribute and levels are presented to the decision makers (respondents).
- (ii) Design of experiment- A full factorial design is usually very large and thus asking the decision maker (respondent) to choose from all the possible choices (emanated from full factorial design) may put a substantial burden on them. So, we need to reduce the possible choices from full factorial design. Orthogonal design has been usually used to select the optimal choice sets for conducting DCE.
- (iii) an appropriate econometric model must be determined

Theoretical foundation: The theoretical foundation for any DCE is derived from the 'random utility maximization model. In the m-choice (alternative) model, the utility of an individual i from the jth alternative is given by: $U_{ij} = V_{ij} + \epsilon_{ij}$, $j = 1, \dots, m$. V_{ij} is defined as: $V_{ij} = \mathbf{x}_{ij}\boldsymbol{\beta}$, where, $\mathbf{x}_{ij}$ is the vector of attributes of the product and $\boldsymbol{\beta}$ is the vector of associated preference parameters. ϵ_{ij} is unobservable error term. The alternative j is chosen if

$$\Pr(y = j) = \Pr(U_{ij} \geq U_{ik}, \text{ all } k \neq j)$$

Description of DCE conducted in Present Study:

DCE Data: The study was conducted in the Purulia district of West Bengal. The target group of our analysis is informal workforce. The experiment was undertaken along with the household survey mentioned in the chapter-4. Initially 450 households were considered for the study in which 47 households had enrolled in public health insurance schemes (like RSBY). We considered the households without any health insurance in our DCE. So, the sample size of our DCE was 403. The sample for our DCE consisted of farmers, landless labourers, vendors; Toto drivers, Rickshaw pullers, security guards etc. Prior to the experiment we made a pilot survey and focus group discussion. On the basis of the responses, the final design of experiment was designed. The average monthly income of the sample households (sample size=403) was approximately Rs. 8700 and the average monthly OOP healthcare expenditure was nearly Rs. 865.

Attributes and Levels: In the present study the attributes and the levels were derived from the literature as well as from the pilot survey and focus group discussion in the study area. We identified five attributes with three levels for each in our study. The description of the attributes and their levels are in table 6.a.

Table-6.a: Description of Attributes and levels

Attribute	Attribute-Level		
Unit of Enrolment	Individual	Maximum 3 members	Maximum 5 members
Premium (quarterly)	150	250	300
Coverage (in Rs p.a.)	25000	45000	60000
Benefit	Drug, Free consultation	Drug, Lab test, 50per cent of Transportation cost	Drug, Lab test (including one preventive test), Transportation cost, less-costly in-patient surgical
Cash-back	No	25 per cent in case of claim less than 5000 p.a.	50 per cent in case of claim less than 5000 p.a.

Since, most public Health insurance schemes for the poor usually do not cover outpatient care; this became the purview of the health service benefit in our hypothetical MHI scheme. While determining the levels, we abided by the IRDA Micro-insurance regulations 2015 which allow enrolment of maximum 7 individuals (family), a maximum premium of Rs. 6000 p.a. and the maximum sum assured of Rs. 250,000. In case of MHI schemes the premium should be at community-rated level. So, to fix the levels of premium and coverage, we used the relative frequency of the cases in which the households have to incur recurring healthcare expenditure. As we found in our healthcare expenditure data, this value is around 0.4. According to the NHFS-4, 45% of the households those do not generally use government facilities reported the distance as the prime reason. Moreover, from our focus group discussion we found transportation cost (and time lost) is a vital factor for avoiding healthcare seeking. So, we incorporate the “Transportation cost” as one of the levels of Benefit attribute. Finally, people in the lower income strata use to view the premium of insurance as a sunk cost and thus a cash back offer would induce them to join the MHI scheme. In turn, it would help the participating households to take proper care of their health.

Experimental Design: As we have five attributes with three levels each, there were 3^5 i.e., 243 possible combinations of MHI products which was impractical to consider for our study. The number of orthogonal combinations was found to be 16. These 16 alternatives were used to make eight choice sets of two alternatives each. We included an opt-out alternative since forcing to make a choice on MHI schemes can lead to overestimation of preference. So, in the

final design we had eight choice sets with two alternatives and one opt-out option. But given five attributes and different levels, choosing eight alternatives would be burdensome on the respondents. So, each respondent was asked to choose only one alternative from the only choice set shown to him/her. The choice sets were randomly assigned to them. The options were placed before the respondents in such a way that they could understand clearly. Then the question asked was “What will you do?”

Dummy Coding: All the attributes except premium and coverage were dummy-coded to allow for non-linear effects in the levels of attributes. It was presented in table 6.b.

Table 6.b: Dummy Coding of Attributes

Attribute	Level	Dummy-coded variable	
Unit of enrolment		unit1	unit2
	Individual	0	0
	Maximum 3 members	1	0
	Maximum 5 members	0	1
		Dummy-coded variable	
Benefits		benefit1	benefit2
	Drug, Free consultation	0	0
	Drug, Lab test, 50per cent of Transportation cost	1	0
	Drug, Lab test(including one preventive test), 25per cent of Transportation cost, less-costly in-patient surgical	0	1
		Dummy-coded variable	
Cash-back		cashback1	cashback2
	No	0	0
	25per cent in case of claim less than 5000 p.a.	1	0
	50per cent in case of claim less than 5000 p.a.	0	1

Econometric Model: In our DCE, each respondent was presented one randomly selected choice set with 3 alternatives (including one opt-out alternative) and given this he/she was asked to choose an alternative. Hence, a Conditional Logit (CL) model is the appropriate model for our analysis. To analyse the heterogeneity of preferences among the respondents, we include interactions of household characteristics(case specific regressors) with the alternative-specific attributes in the utility function and estimated a conditional logit model with interactions. The household characteristics considered here are: average monthly income, average monthly OOP healthcare expenditure, dependency and awareness. The regressor dependency implies the dependency of a household members on its working members. For any household it is defined as household size divided by its total working members. It is found that average dependency level of our sample is approximately 2.71 In our analysis awareness is considered as a dummy

variable. The variable awareness is coded as 1 if the respondent has basic knowledge about any insurance of any kind, and is coded as 0 otherwise. In our sample approximately 57 per cent of respondents are found informed about insurance. Since the household characteristics remain constant across the MHI alternatives, they are multiplied with the monetary value, (in our case premium) prior to the estimation of this model (CL model with interactions).

Results and Discussion:

Conditional Logit Model (without interaction) Results:

- i) The model results showed all the attributes levels were significant at less than 5% level of significance with premium and both the levels of cash-back attribute were highly significant at less than 1% level of significance.
- ii) The results suggested that all the attributes were very relevant to the respondents in their decision making for choosing the MHI scheme. Moreover, all the levels had the expected sign.
- iii) The negative sign of the parameter estimate of premium implies, an increase in the premium of the one alternative decreases the probability of choosing that alternative and increases the probability of choosing other alternative.
- iv) Similarly, the positive sign of the parameter estimate of coverage implies an increase in the coverage amount of the one alternative increases the probability of choosing that alternative and decreases the probability of choosing other alternative MHI scheme.
- v) The positive signs (of both the levels) of cashback, unit of enrolment and benefits attribute suggest (respectively) that cash-back in an MHI scheme is preferred over no cash-back, family coverage is preferred over individual coverage and schemes providing diagnostic expenditure, transportation coverage are preferred to the MHI schemes with only drugs coverage.
- vi) Other things remaining same, probability that one MHI scheme is preferred over the other is more than 2 times higher if it provides a cash-back of 25% (of total premium given) in case of claim less than 5000 p.a. compared to no cash-back at all. If the scheme backs 50% of the total premium deposited in case of claim less than 5000 p.a., the probability to choose the scheme will be more than 3 times higher compared to the schemes with no cash-back provision. Thus, a cash-back offer can encourage them to join the MHI scheme.
- vii) For the benefit attribute, the results show if the MHI provides the cost of diagnostics and 50% of transportation cost of them along with drugs, the probability of joining the

scheme is more than 1.55 times higher than the schemes which do not bear diagnostics cost, transportation cost. This probability becomes around 2 times higher than the schemes with no diagnostics cost, transportation cost if along with lab test, transportation (25%) costs, quite a few (less costly) in-patient surgical costs are covered.

- viii) The transport coverage component is the important most determinant in the benefit attribute of an MHI scheme among the respondents since they use to get free healthcare services from the public facilities in West Bengal.
- ix) The respondents have higher preferences for the MHI scheme in which the unit of enrolment is family coverage with 5 members followed by the family coverage with 3 members compared to the individual coverage.

Conditional Logit Model (with interaction) Results:

- i) The goodness of fit for this model (with interaction) is better than the model (without interaction).
- ii) Except dependency all other variables are statistically significant at less than 1% level.
- iii) Households with higher out of pocket healthcare expenditures are more likely to join the MHI than the households with comparatively less expenditure on health,
- iv) respondents with a (elementary) knowledge of insurance are also more likely to join the MHI schemes than the respondents who have no insurance related knowledge

Chapter-7: Thesis Summary and Conclusions

We observed that factors like incidence of hospitalization, total number of children aged 5 or less than 5 and number of household members aged 55 or more in a household, seeking medical care from private sources were considerably contributing the OOP health expenditure of sample households. The households incurring catastrophic healthcare expenditure had significantly higher chance of facing distress healthcare financing. The other factors proved to be responsible for distress healthcare financing were: high dependency on earning-members and absence of any regular wage employment among the members. From our theoretical framework we found that the presence of a local voluntary organization (NGO) makes a positive impact on the financial sustainability of commercial insurer. If the individual claims are independent and identically distributed random variables, under certain conditions the expected claims are decreasing in the NGO's effort level. The firm can set a lower risk-loading

with the higher monitoring effort of the NGO. Now, as far as the demand for MHI is concerned, the evidence emerging from our DCE shows that there is a high preference for an MHI scheme in rural WB i.e., given the hypothetical choices (based on experimental design) offered there is a market of MHI. Based on the preferences expressed for the specific features of MHI, we recommend that, in order to maximize consumer utility and encourage enrollment in MHI, potential schemes should include coverage for transport costs, offer a comprehensive benefit package, define the core family as the unit of enrollment, avoid high premium and ensure a (conditional) cash-back provision. Lastly, we found that the demand for MHI is considerably high for the insurance-aware individuals. So, to encourage the participation, the prerequisite is to penetrate awareness regarding the importance of insurance.

Chapter-8: Policy Implications

The importance of the MHI in the context of LMICs is mainly to complement the tax-funded health system for the financial risk protection and access to healthcare within a specific local context. Target group for most of the publicly sponsored health insurance schemes is the bottom of the income-pyramid. The population in 'near-poor' income group is usually remained excluded from the domain of all health insurance schemes. In India, MHI schemes like VimoSEWA, Yeshasvini, Uplift is providing the health insurance to the poor individuals, who fall outside the target group of government health insurance schemes. MHI can contribute to government efforts to serve large numbers of informal workers. In Ghana, MHI schemes were consolidated into a government scheme, which is managed at district level. In Thailand, the government incorporated lessons from early MHI schemes in the design of a voluntary scheme for informal workers. Governments can also form partnerships with MHI schemes to deliver key insurance functions, such as marketing, identification of eligible clients, distribution of insurance, premium collection and even claims processing and risk-carrying. As a whole such collaboration can potentially reduce duplicative or competing models of health insurance for informal sector. Again, we found that demand for MHI is considerably high for the insurance-aware individuals. So, to encourage the poor individuals to join, the prerequisite is to penetrate awareness regarding the importance of insurance. Lastly, for the sustainability a commercial insurer can make a partnership with any organization working in the local proximity.

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