Distress Healthcare Financing among Informal-sector Workers: A Study in Purulia District, West Bengal, India

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Abstract

Based on a micro-level field investigation conducted in the Purulia district of West Bengal (a state in India), the present paper investigates the factors influencing the incidence of distress healthcare financing among the households whose principal earning members are working as informal workers. Distress healthcare financing is defined as a situation when a household has to borrow money with interest, and/or sell assets/livestock to pay its out-of-pocket healthcare expenses. It was found that distress healthcare financing was highly influenced by catastrophic healthcare expenditure, the proportion of working members & occupation of principal earning members.

Keywords: Catastrophic healthcare expenditure, Distress healthcare financing, Informal worker, Instrumental variables estimation

1. Introduction

The out-of-pocket (hence after, OOP) payment is the principal source of financing for healthcare among the major proportion of households in low and middle-income countries (LMICs) where most of the households are economically poor and vulnerable. It is observed that in most of the less developed countries around 11.7 per cent of households devote more than 10 per cent of their non-food spending to healthcare (Wagstaff, 2018). The healthcare financing system in LMICs is weak and at the same time due to the low level of per-capita income, savings of the major portion of the population is also low. The high OOP healthcare expenditure exposes households to face substantial financial risk and often pushes them below the poverty line (Shahrawat and Rao, 2011; Berman et al., 2010; van Doorslaer et al., 2006; Garg and Karan, 2009). The burden of OOP healthcare expenditure in India is very high among Asian countries (van Doorslaer et al., 2006). The public health expenditure as a per cent of total health expenditure was 29 per cent whereas the OOP expenditure as per cent of total health expenditure was 62.6 per cent in 2014-15 (NHSRC, 2017). The public spending on health[1] in India was only 1.02 per cent of GDP in 2015-16 (CBHI, 2018)[2]. In the literature, there are mainly two measures frequently used to capture the economic hardship associated with health payments viz. catastrophic OOP spending and impoverishment due to health expenditure incurred. Both these measures generally bypass indirect health care costs like, transportation, loss of work etc. which can be a substantial proportion of healthcare expenditure. The coping strategies of a household provide important insight into how it

responds to health shocks. Often to meet the healthcare expenses, poor households have to rely on expensive coping mechanisms like borrowing money with interest mainly from informal sources, selling assets and getting contributions from friends and relatives. As a result, the health crisis rapidly becomes financial crisis. OOP health care payments financed through borrowings or selling of household assets are referred to as distress healthcare financing. Although coping strategies such as disposing of assets and borrowing with interest from local informal sources may help households to ensure coverage of their healthcare needs in the short run, the long-term consequences of these coping strategies can be substantial (Flores et al.,2008). Borrowing from informal money lenders and (or) selling off assets or livestock to get instant cash to meet the OOP medical expenses 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 for borrowing; while low levels of assets lead to worsening health and an inability to cope with future illness. Loans from moneylenders in developing countries often carry a high rate of interest rates causing households to carry the burden of debt for a long period (Banerjee and Duflo, 2007). Households also have to adopt some other riskier coping strategies, like working more than the normal working hours or reducing expenditure to finance healthcare payments. The former involves household members working overtime or sending children to work while the latter involves reducing expenditure on food[3], other necessary industrial products and education[4]. So, there is a need to investigate the impact of high OOP healthcare expenditure on the incidence of expensive coping mechanisms among informal-sector households. The rest of the paper is organised as follows. In the next section, we have presented a survey of literature briefly. In section 3, we have narrated the basic research objectives. In section4 we have discussed the survey design and give the descriptive statistics of data. We have presented the econometric models and discussed corresponding empirical findings in section 5. Finally, we draw the conclusion and provide some relevant policy implications in section 6.

2. Brief Survey of Literature

Cross-country studies like Leive and Xu (2008), Kruk et al. (2009), Bonfrera and Gustafsson-Wright (2015), and Mitra et al. (2016) examined sources of financing health expenditure in LMICs. Estimates by Kruk et al. (2009) had shown that 25.9 per cent of households across forty LMICs (comprising 58 per cent of the world population) borrowed money or sold assets to finance healthcare. In the case of India, Binnendijk et al. (2012) estimated that about 25 per cent of households in Orissa had to incur hardship financing on healthcare. Among households that experienced hospitalization, this percentage was nearly 40 per cent and among households with outpatient or maternity-related care, it was 25 per cent. Joe (2014) had found that, in India, about 60 per cent and 40 per cent of hospitalization cases from rural and urban areas respectively, used coping strategies like borrowing, selling household assets and seeking contributions from friends and relatives. The study also had shown a significant socioeconomic gradient in the distribution of distressed financing. Dhanraj (2014) found that economic vulnerability due to health shocks and coping strategies is high among households in low-income strata poorer, with elderly, chronically ill or disabled members and belongs to Scheduled Castes in Andhra Pradesh. The study also reported that the state insurance scheme failed to provide adequate protection against health-related financial shocks. The study by Quintussi et al. (2015) found that households in Bihar and Uttar Pradesh frequently resorted to utilising savings, borrowing and selling assets to meet their healthcare expenditures. Few households also reported that they had to reduce food consumption in response to medical expenses. John and Kumar (2017) estimated that about 14.9 per cent of the total households

surveyed in the four blocks of Rajnandgaon district in Chhattisgarh were exposed to hardship financing related to OOP expenses for healthcare. Using the NSSO 71st round data, Kastor and Mohanty (2018) had found that for all of those who resorted to distress financing, 76 per cent had catastrophic health expenditure. From the NHFS-4 data, Mishra and Mohanty (2019), had estimated that one in four mothers resorted to borrowing assets to meet the OOP expenditure on institutional delivery. Their study also showed the extent of distress financing was higher among less educated and poor in private health centres.

3. Research Objectives

The present study lays emphasis on the financial risk coping mechanism of informal-sector households due to high OOP healthcare payments, which hitherto not much of a studied dimension of healthcare financing. So, here the main focus is given in the following two research objectives: Initially the major factors responsible for the average monthly OOP healthcare expenditure of the sample informal household will be identified. Next, the factors which can influence the likelihood of the incidence of distress healthcare in the financing of those sample households will be investigated. In addition, the literature on healthcare financing at a large ignores the issue of endogeneity of regressor(s). The present work addresses the research questions after considering the endogeneity problem by adopting the instrumental variable estimation technique. The target group of the present study is households whose principal earnings come from different types of informal work. The informal worker(s) of the households are mainly deprived of getting any social security benefits in the less developed economy, the informal sector encompasses small-scale, self-employed activities (with or without hired workers), typically unrecorded, unregistered and conducted without proper integration with the administrative machinery responsible for enforcing laws and regulations (Dror and Firtha, 2014). People working in the informal sector often belong to the low-income class as they most of the time are getting subsistence and mostly deprived of getting any health care protection or supplementation of any health-related expenditure from their employers. In India, the informal workforce constitutes more than 90 per cent of the total workforce (National Statistical Commission, 2012; Government of India, 2019) and the sector contributes about 50 per cent of the national product (National Statistical Commission, 2012). Due to unhygienic living and/or working conditions, their possibility of illness is very high and they are often exposed to various kinds of health problems which in turn can reduce their productivity and income. Against this backdrop, the present study attempts to analyse whether informal sector households can cope with the health shocks or not.

4. Survey Design and Data Description

The present study is based on a household level survey conducted in the Purulia district of West Bengal India, from January 2018 to June 2018. Purulia is an economically backward district[5]. Among the five 'Paschimanchal' districts[6] of West Bengal, Purulia district has the lowest per-capita income[7] and has the third-lowest compared to all districts of West Bengal. Purulia district comprises four subdivisions: Purulia Sadar, Jhalda, Raghunathpur and Manbazar. For the study, Purulia Sadar subdivision was purposively selected initially since it has the highest population according to the Census of India, 2011[8]. There are five blocks inthis subdivision: Arsha, Balarampur, Hura, Purulia-I and Purulia-II. Hura has highest number of GPs (10) followed by Purulia-II (9), Purulia-I , Arsha (both 8) and Balarampur (7).

We selected Hura, Purulia-II and Purulia-I blocks based on the number of GPs. Since the number of inhabitant villages is higher in Purulia-I than that of in Arsha we selected the former even if both have same number of GPs. Then from each block, two villages were selected randomly and finally, eighty households were selected from each village through a random sampling procedure[9]. It was found that 30 households reported that they had not sought any healthcare between January 2017 to December 2017 (the reference period in this investigation). For this analysis, the households which sought healthcare at least once during the entire reference period are considered. Thus, the present study is based on 450 households. From each household, the head of each family was the respondent. After conducting a pilot survey, the final questionnaire was designed on the basis of our research objectives. 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 and other social information like caste religion etc. The head of the sample household was asked whether there was any incidence of outpatient care-seeking or hospitalisation for any member of his/her family during the entire reference period or not. Hospital admittances reflect cases with inpatient stay exceeding 24 hours. Stays in the hospital for less than 24 hours together with consultations with a healthcare practitioner, and payment for medicines or tests in an outpatient setting were counted under outpatient care. Respondents were asked to estimate total medical expenditures for the household period and were also asked about the sources of healthcare financing during the entire reference period.

Table 1 presents the summary statistics of the variables used in the present study. The average monthly income of the sample households was around Rs. 7144. The households consisted on average of 5.08 members. The mean size of the vulnerable ages (i.e., members with ages ≤ 5 and ≥ 55 years) was 3 and the average years of schooling for household

Table1: Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
Average monthly income (INR)	7144.511	3451.733	2000	20000
Household size	5.08	1.56	3	14
Household size in age groups ≤ 5 and ≥ 55	3	1.633	0	7
Total working-members in household	1.694	0.983	1	8
Education of head (in years)	5.331	3.480	0	11
Average monthly OOP health expenditure (INR)	800.987	622.998	35	9000
	In terms of total households (in %)			
Household with outpatient care	54.05			
Household with hospitalisation	15.86			
Households seeks care from a private provider	43.92			
Households incurred catastrophic health expenditure	44.82			

Households faced distress in health financing	35.59
Household having health insurance	8.78
Working status (principal earning member)	
Regular wage earner	10.13
Casual wage labour	67.57
Self employed	22.30

Source: Own calculation

heads were 5 years with 10.14 per cent having no formal schooling. We found that principal working members in most of the households were involved in casual wage employment. The monthly average healthcare expenditure incurred by sample households was around Rs 800 which represents nearly 11.20 per cent of average monthly household income. We found that around 9 per cent of households had health insurance (RSBY)[10]. During the reference period, 15.86 per cent of households experienced at least one hospitalisation episode while 54.05 per cent of households faced at least one illness episode without hospitalisation. Around 44 per cent of households sought healthcare from private providers along with the public provider.

5. Model Specifications and Empirical Findings

The study develops two distinct models to address two research questions. To investigate the factor(s) determining households' average monthly OOP healthcare expenditure it considers the following regression model:

$$\text{LOGHCE}_i = \gamma_0 + \gamma_1 \text{LOGINCOME}_i + \gamma_2 \text{OUTPATIENT}_i + \gamma_3 \text{HOSP}_i + \gamma_4 \text{OUTPATIENT}_i.\text{HOSP}_i$$
$$+ \gamma_5 \text{VULNERSIZE}_i + \gamma_6 \text{PROVIDER}_i + \gamma_7 \text{CASUAL}_i + \gamma_8 \text{REGULAR}_i + \gamma_9 \text{EDUC}_i$$
$$+ \varepsilon_i \qquad \dots (1)$$

The variables considered in (1) are narrated below with theoretical justification:
LOGHCE: It is the dependent variable of equation (1), denoting the logarithm of a household's average OOP monthly healthcare expenditure. From sample households, we collected health expenditure data on medicines, consultation fees, hospital bed charges, transportation costs and expenditure incurred on food, and lodging for companion(s) of ailing household member(s) during the reference period[11]. Healthcare expenditure information of a sample informal household was collected on the basis of the mixed reference period. A recall period of a year was set for hospitalization care and one month was set for outpatient care. The annual OOP healthcare expenditure on inpatient care is divided by 12 to obtain the corresponding average OOP monthly healthcare expenditure on inpatient care and further, it was added to the monthly expenditure on outpatient care to derive the average OOP monthly healthcare expenditure (HCE) of a particular sample household.
LOGINCOME: It denotes the logarithm of the average monthly income of a household. For any household, the earnings of all its working members from different sources during the reference period are considered and then aggregating their annual income of the household was derived. Dividing annual income by 12, we got the average monthly income of the household. It is expected that households with higher average monthly incomes are more

capable of making higher expenditures on healthcare needs for their ailing household member(s).

OUTPATIENT: It is treated here as binary in nature. We define OUTPATIENT =1, if the household incurred at least one incidence of consultation with a healthcare provider, and (or) payment for medicines and/or tests in an outpatient setting and hospital stay only for day-care treatment in the entire reference period; otherwise OUTPATIENT = 0. Here we consider the situation in which any type of illness of any household member did not require hospitalization with an overnight stay.

HOSP: It is also considered as a dummy variable where it will take the value 1 if a household experienced at least one hospitalisation episode[12] i.e., an inpatient stay of a household member has exceeded 24 hours at any time during the reference period and otherwise it is coded as 0.

OUTPATIENT.HOSP: This variable captures the interactive effect of hospitalisation and outpatient care incidences. It takes the value of 1 if a household experienced at least one episode of hospitalization as well as incurred an incidence of outpatient care during the entire reference period; otherwise, its value will be zero.

VULNERSIZE: It represents the total number of members consisting of children aged five or less five and adults aged fifty-five or more of a sample household. The healthcare expenditure of a household is likely to increase with the presence of children and old age members since these two age categories mainly suffer from health shocks.

PROVIDER: It is a dummy regressor, which is coded as '1' if the household seeks any type of medical care for any purpose (inpatient care/ outpatient care/ chronic disease) from a private healthcare provider including a traditional healer along with public provider during the reference year, and 0 otherwise. Since many times medical facilities given by public providers is not sufficient, people have to seek medical care from private sources. This variable is expected to increase the average healthcare expenditure of the household.

CASUAL: It is a dummy explanatory variable and it is equal to 1 if the principal earning member of a household is a casual informal worker or 0 otherwise.

REGULAR: It is also a dummy regressor, coded 1 if the principal earning member is the regular salaried worker and coded 0 otherwise. We have considered usual activity status during the reference period: broadly classified as casual labourer, self-employed and salaried worker in the informal sector. To avoid the dummy variable trap, we have not taken all the three categories as dummy regressors in equation 1.

EDUC: It denotes years of education of the household head. We account for the characteristic of the household head since, usually the head is responsible for taking vital decisions like getting healthcare and consequently making healthcare expenditures.

To investigate the factors influencing the monthly average OOP healthcare expenditure of households, we can do an OLS estimation of equation (1). But the OLS estimates of parameters will be biased if at least one explanatory variable becomes endogenous. We know that the method of instrumental variables (IV) estimation gives a general solution to address the problem of an endogenous regressor. In equation (1) we treat the household income (i.e., LOGINCOME) as an endogenous regressor to allow for the possibility that the unobserved determinants of LOGHCS and the unobserved determinants of a LOGINCOME are correlated. To address the (probable) endogeneity problem, the total number of working members in a household, (denoted as 'WORKINGSIZE') is considered an instrument ofLOGINCOME. Now, WORKINGSIZEwill be a valid IV if it satisfies two conditions. First, it should be exogenous in equation (1) i.e., $Cov\,(LOGINCOME, \varepsilon) = 0$. The second condition requires that $\theta \neq 0$ in the equation (2).

$$\text{LOGINCOME}_i = \pi_0 + \pi_1 \text{OUTPATIENT}_i + \pi_2 \text{HOSP}_i + \pi_3 \text{OUTPATIENT}_i.\text{HOSP}_i + \pi_4 \text{VULNERSIZE}_i$$
$$+ \pi_5 \text{PROVIDER}_i + \pi_6 \text{CASUAL}_i + \pi_7 \text{REGULAR}_i + \pi_8 \text{EDUC}_i + \theta \text{ WORKINGSIZE}_i$$
$$+ \eta_i \qquad \dots (2)$$

The study further has done the Wu-Hausman test for endogeneity to check whether LOGINCOME can be treated as an exogenous variable or not. Table 2 reports the parameter estimates of IV (2SLS) regression of (1) and the result of Wu-Hausman test for endogeneity. The null hypothesis of the Durbin and Wu–Hausman test is that LOGINCOMEcan be treated as exogenous. The test statistic is found to be highly significant, so we reject the null hypothesis of exogeneity[13]. This suggests the OLS estimation is not consistent, and an IV estimation is required to have unbiased estimates of parameters mentioned in Eq.(1).

Factors influencing OOP expenditure for healthcare
As reported in Table 2, the overall fit of the model is highly significant. Except for the incidence of outpatient care and regular salaried activity status, the remaining explanatory variables had a significant impact on the average monthly healthcare expenditure of sample households. The signs of the parameter estimates are also as expected. The results show that during the reference period, the average monthly OOP healthcare expenditure was highly significant in the size of the vulnerable age group in the household. This implies that children and the elderly group in our sample tend to suffer more often from vulnerable health status. It is also observed that high user cost i.e., the incidence of healthcare-seeking from the private provider has increased the average OOP healthcare expenditure of households quite significantly. Households that experienced hospitalization episodes and both inpatient and outpatient care tend to bear higher OOP health expenditure. Lastly for informal households,` another important factor that emerged in our study was average monthly income. Actually, a household can spend more on healthcare for the ailing members if its income supports it.

Table 2: Determinants of average OOP expenditure

	Coefficient	Robust Std. Error	P value
Log of average monthly OOP health expenditure (LOGHCE)	(Dependent variable)		
Log of family income (LOGINCOME)	2.187***	0.853	0.010
Incidence of outpatient care (OUTPATIENT)	0.109	0.123	0.374
Incidence of hospitalisation episode (HOSP)	0.322**	0.141	0.022
OUTPATIENT.HOSP	1.102*	0.430	0.012
Vulnerable member size (VULNERSIZE)	0.182***	0.038	0.000
Private Provider(PROVIDER)	0.257**	0.125	0.040
Casual worker (CASUAL)	0.326**	0.155	0.036
Regular salaried(REGULAR)	0.323	0.226	0.153
Education of head(EDUC)	-0.003	0.017	0.876
constant	-14.061**	7.525	0.062

Number of observations = 450	Wald chi2(9) = 56.86	Prob > chi2 = 0.0000

Tests of endogeneity
Ho: variables are exogenous
Robust regression: F(1,439) = 11.1667 (p = 0.0009)

Note: ***=> Significant at 1% or less than 1%, ** =>Significant at less than 5%

Next, to investigate the factors influencing the incidence of distress healthcare financing among sample households the following functional relationship is defined:

$$DHF_i = \beta_0 + \beta_1 CHE_i + \beta_2 CASUAL_i + \beta_3 REGULAR_i + \beta_4 SHG_i + \beta_5 WORKINGSIZE_i + \beta_6 EDUC_i + u_i \quad \dots (3)$$

The outcome variable of (3) is distress healthcare financing (DHF). In the present study, it is defined as a situation when it is required for a household to borrow money with interest or sell their assets/ livestock or when it gets contributions from friends/relatives to pay OOP healthcare expenses. DHF is treated here as a binary variable. The value of DHF is 1 if the household incurred distress financing and 0 otherwise. The regressors included in (3) are narrated below with theoretical justification:

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 a certain threshold proportion of total household expenditure or capacity to pay (Wagstaff and Doorslaer, 2003; Xu et al., 2003). In the existing literature, the threshold level is set arbitrarily. The present study used 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 the household's non-food consumption expenditure including interest payment on loans taken for medical purposes in the entire reference period as catastrophic. The percentage share (S_i) of healthcare expenditure (HCE) and the non-food expenditure is defined as $S_i = \frac{HCE_i}{NFE_i} \times 100$, where, NFE denotes the average monthly non-food expenditure[14].This implies the household i ($i = 1,2, \dots 450$) would have faced catastrophic healthcare expenditure during the reference period if $S_i > 10$. So, $CHE_i = \begin{cases} 1, & S_i > 10 \\ 0, & S_i \leq 10 \end{cases}$.

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. This regressor is here considered to examine whether the households with SHG members rely more often on microfinance as a source of borrowing than non-member households to pay for healthcare or not[15].

WORKINGSIZE:This explanatory variable denotes the number of total working members in a household. With the higher working size, the family income is expected will be higher and probability of borrowing for healthcare will be lower. Hence for a household it is expected that probability of distress financing will be negatively influenced by its working member size.

EDUC: As mentioned earlier, it denotes years of education of the household-head. Since, mostly head is the key decision maker, it is expected that his/ her level of education can influence decisions like provider choice for treatment, borrowing/ selling assets for financing healthcare of members etc.

The variables CASUAL and REGULAR are included as regressors[16] to check whether there is any influence of activity status on probability of distress healthcare financing. For casual wage labourers and self-employed, sufficient seasonality and irregularity is observed in their

income stream which is almost absent among regular salaried informal workers. Hence former two groups are likely to be more vulnerable to health shocks than the regular salaried group.

In the household survey, we found that during the reference period, the main sources of household healthcare financing were (the then) current period income, savings, money borrowed with interest, financial help received from relatives/neighbours and health insurance. Among the total sample households, 35.59 per cent resorted to distressed healthcare financingand around 45 per cent of households incurred catastrophic OOP payments for healthcare. Among the households that incurred catastrophic health payments nearly 57 per cent faced distress financing. So, there is no one to one correspondence is observed between the incidence of catastrophic health expenditure and the incidence of distress financing.

Since the outcome variable of (3), viz. DHF, is binary in nature, the empirical strategy can rely on estimating a Probit model. However, parameter estimates of the simple Probit model will be biased if at least one explanatory variable becomes endogenous. We suspect that for a household, unobservable factors influencing the incidence of distress financing also affect the probability of incurring catastrophic healthcare expenditure. Therefore, catastrophic healthcare expenditure is treated as endogenous. The variables $HOSP$, $VULNERSIZE$ and $PROVIDER$ are possible factors which may influence CHE. The variables have already been narrated in model-1's specification part.

HOSP, VULNERSIZE and PROVIDER will be valid instruments, if they are determinants of the incidence of CHE, but do not influence the incidence of DHF. In a Probit model, which explains the probability of incurring CHE, the regression coefficients (robust standard errors) of HOSP, VULNERSIZE and PROVIDER are 0.278(0.139), 0.298(0.041) and 0.503 (0.128) respectively. This suggests a statistically significant (all at less than 1%) relation between CHE and of all of its three instrumental variables. In a simple Probit model where DHF is regressed on $HOSP$, VULNERSIZE and $PROVIDER$, the regression coefficients (robust standard errors) are 0.144(0.134), 0.057 (.038) and 0.147 (0.126) respectively implying all three are statistically insignificant. So, the instruments for CHE (viz. HOSP, VULNERSIZE and PROVIDER)are not influencing the distress financing incidence but play an important role in determining the incidence of catastrophic healthcare expenditure among sample households. We assume that CHE is defined as

$$CHE_i = \delta_0 + \delta_1 HOSP_i + \delta_2 VULNERSIZE_i + \delta_3 PROVIDER_i + v_i \quad ...(4)$$

Since both the outcome variable (DHF) and endogenous explanatory variable (CHE) are dichotomous, the estimation is done on the basis of Seemingly Unrelated Bivariate Probit model. In the present study equations (3) and (4) define the Seemingly unrelated Bivariate Probit model[17], where (u,v) is distributed as $E(u) = E(v) = 0, var(u) = var(v) = 1$, and $Corr(u,v) = \rho_2$[18].

Factors influencing the incidence of distress healthcare financing
Table 3 summarised the maximum likelihood (ML) estimation results of Seemingly unrelated Bivariate Probit model which treats the catastrophic healthcare expenditure as an endogenous variable. Theχ^2 statistic corresponding to Wald test of exogeneity (i.e., null hypothesis of $\rho_2 = 0$) is significant at less than 10 per cent level (precisely at 7.30%). Thus, the null hypothesis of no endogeneity is rejected. This proves the simple Probit analysis is

inapplicable here and validates our choice of estimating the Seemingly unrelated Bivariate Probit model. The overall fit of the model is highly significant.

Table-3: Determinants of probability of distress healthcare financing

	Coef.	Robust Std. Error	P value	ME
Distress healthcare financing(DHF)	(Dependant variable)			
Catastrophic healthcare expenditure(CHE)	0.680**	0.299	0.023	0.221
Casual worker(CASUAL)	-0.258	0.158	0.103	-0.084
Regular salaried (REGULAR)	-1.992***	0.527	0.000	-0.648
SHG membership(SHG)	0.071	0.141	0.617	0.023
Number of working members(WORKINGSIZE)	-0.210***	0.067	0.002	-0.068
Education of head (EDUC)	-0.012	0.019	0.530	-0.004
constant	-0.060***	0.251	0.812	
$\hat{\rho}_2$	0.352	0.197	0.044	
Wald test of $\rho_2 = 0$: $\chi^2(1) =$ 3.21331 Prob $>\chi^2(1) = 0.0730$				
Number of observations	450			
Wald chi2(8)	96.49			
Prob > chi2	0.0000			
Log pseudolikelihood	-492.54376			

Note: *** => Significant at less than 1%, ** => Significant at less than 5%; ME => Marginal Effects

The ML estimation result suggests the following factors significantly affect the likelihood of distress healthcare financing among sample households:

First, the households that incurred CHE were more likely to face distressed healthcare financing. The estimated marginal effect shows that the probability of distress healthcare financing was more than 22 per cent higher for households that incurred catastrophic healthcare expenses compared to households that did not incur such expenses. Secondly, if we consider the activity status of the principal earning member, it is evident that REGULAR was significantly negative with reference to the base category of SELF i.e., self-employment. This suggests if the principal earning member of the household was in a regular-salaried job, the family had a lower risk of borrowing (with interest) to finance healthcare compared to the households with a self-employed principal earning member. From the estimated marginal effect, it is observed that households whose principal earning members were regularly salaried employment, had around 65 per cent lower chance of facing distress financing compared to households in which principal earning member was self-employed. Third, the total number of working members in the household is found to be highly significant in determining the probability of incurring distress healthcare financing. It is also observed that the possibility of distress financing was low for the households that had

considered more members of working members' size. The estimated marginal effect indicates that if the size of working members was raised by one unit, the likelihood of incurring distress financing will decrease by 68 per cent. Table 3 also suggests that there was no statistically significant difference in the probability of distress healthcare financing due to the presence of SHG membership among the household members and the education level of the household head.

6. Conclusions and Policy Implications

On the basis of a micro-level field investigation, the study analysed the determinants of OOP healthcare expenditure and the factors the influencing incidence of distress healthcare financing of the informal-sector households in the Purulia district of West Bengal. It defined "distress healthcare financing" as borrowing with interest and/or selling assets or when seeking contributions from friends/relatives to pay healthcare needs. During the reference period, a substantial number of sample households had to rely on coping mechanisms such as borrowing with interest and/or selling assets to meet their OOP healthcare expenditure. It is found that the factors like the incidence of hospitalisation, healthcare-seeking from private sources, the total number of children aged five or less than five and the number of members aged fifty-five or above in the household significantly increase the OOP health expenditure of sample households. Consequently, factors like the incidence of hospitalization, size of vulnerable group and incidence of healthcare-seeking from private providers increase the probability of incurring catastrophic health expenditure. Our result also highlights that the probability of distress financing is strongly influenced by the incidence of catastrophic healthcare expenditure. Households that incurred catastrophic healthcare spending experienced higher chances of using expensive (health) risk coping mechanisms. The other factors that influence the likelihood of distress in healthcare financing are: the size of working members in the household and the occupation of the principal earning member. These two factors are self-explanatory. Regular salaried employment gives a stable income in contrast to the seasonality and irregularity of self-employment, so it is comparatively easier for them to address expenses. On the other hand, the household income tends to rise with the size of its earning members and consequently higher income may abstain the household from using the riskier coping strategies like borrowing and/or selling assets. To avoid the distress financing of informal households, it is required to reduce high out of pocket healthcare expenditure (catastrophic healthcare expenditure). For the low-income group, micro-insurance of health is considered an important instrument to reduce impoverishing effects of large OOP health expenditures. This micro health insurance programme is a financial instrument which gives limited healthcare coverage to poor households at a low premium. It helps to smooth household expenditures, reduces the dependence on borrowing/ selling assets and also increases the quantity of care sought to lead to better health outcomes. There is substantial evidence that micro-health insurance schemes initiated in LMICs have a positive impact in mobilizing resources to finance the healthcare needs of the poor households[19] and even supplementing the existing benefits under public facilities by including additional services, such as outpatient benefits, coverage for additional expenses such as transportation, lost wages, or child care etc[20].Besides, the coverage of public health facilities must be increased and if there is a shortfall in such facilities, that must be addressed. As care-seeking from private provider tend to increase OOP health expenditure and the probability of catastrophic payments, public healthcare facilities can be an important instrument for reducing borrowing/ selling assets among the informal sector households.

References

Ahuja, R. (2005) 'Health Insurance for the poor in India: an analytical study', *Working Paper 161*, ICRIER, New Delhi

Banerjee, A. V., and Duflo, E. (2007). 'The economic lives of the poor', *Journal of Economic Perspectives*, *21*(1), 141-168.

Berman, P., Ahuja, R. and Bhandari, L. (2010) 'The Impoverishing Effect of Healthcare Payments in India: New Methodology and Findings', *Economic and Political Weekly,* Vol. 45, No. 16, pp. 65-71.

Binnendijk, E., Koren, R., and Dror, D. M. (2012) 'Hardship financing of healthcare among rural poor in Orissa, India' *BMC Health Services Research*, *12*(1), 23.

Bonfrer, I., & Gustafsson-Wright, E. (2017). Health shocks, coping strategies and foregone healthcare among agricultural households in Kenya. *Global public health*, *12*(11), 1369-1390.

Bureau of Applied Economics & Statistics (2016), *'State Domestic Product and District Domestic Product 2014-15'*, Government of West Bengal

Central Bureau of Health Intelligence. (2018). National health profile 2018.Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India, New Delhi.

Dhanaraj, S. (2014). Health shocks and coping strategies. In *WIDER Working Paper 2014/003* (pp. 1-28). World Institute for Development Economics Research, United Nations University.

Duryea, S., Lam, D., & Levison, D. (2007). Effects of economic shocks on children's employment and schooling in Brazil. *Journal of Development Economics*, *84*(1), 188-214.

Flores, G., Krishnakumar, J., O'Donnell, O., and Van Doorslaer, E. (2008). Coping with health-care costs: implications for the measurement of catastrophic expenditures and poverty. *Health Economics*, *17*(12), 1393-1412.

Garg, C. C., & Karan, A. K. (2009). Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India. *Health Policy and Planning*, *24*(2), 116-128.

Gertler, P., & Gruber, J. (2002). Insuring consumption against illness. *American economic review*, *92*(1), 51-70.

Government of India. (2019). Economic Survey 2018-19.

Greene, W. H. (2018). *Econometric analysis*. Pearson Education India.

Joe, W. (2015). Distressed financing of household out-of-pocket health care payments in India: incidence and correlates. *Health Policy and Planning*, *30*(6), 728-741.

John, D., and Kumar, V. (2017). Exposure to hardship financing for healthcare among rural poor in Chhattisgarh, India. *Journal of Health Management*, *19*(3), 387-400.

Kastor, A., and Mohanty, S. K. (2018). Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? *PloS one*, *13*(5), e0196106.

Kruk, M. E., Goldmann, E., & Galea, S. (2009). Borrowing and selling to pay for health care in low-and middle-income countries. *Health Affairs*, *28*(4), 1056-1066.

Leive, A., & Xu, K. (2008). Coping with out-of-pocket health payments: empirical evidence from 15 African countries. *Bulletin of the World Health Organization*, *86*, 849-856C.

Mishra, S., & Mohanty, S. K. (2019). Out-of-pocket expenditure and distress financing on institutional delivery in India. *International Journal for Equity in Health*, *18*(1), 99.

Mitra, S., Palmer, M., Mont, D., &Groce, N. (2016). Can households cope with health shocks in Vietnam? *Health Economics*, *25*(7), 888-907.

National Health Systems Resource Centre. (2017). National health accounts estimate for India (2014–15). Ministry of Health and Family Welfare, Government of India, New Delhi.

National Statistical Commission. (2012). Report of the committee on unorganised sector statistics.

Pal, R. (2010).Borrowing for hospitalization in India. Munich Personal RePEc,Archive Paper No. 29404.

Quintussi, M., Van de Poel, E., Panda, P., & Rutten, F. (2015). Economic consequences of ill-health for households in northern rural India. *BMC health services research*, *15*(1), 1-11.

Shahrawat, R., & Rao, K. D. (2012). Insured yet vulnerable: out-of-pocket payments and India's poor. *Health policy and planning*, *27*(3), 213-221.

Srinath, P., Kotasthane, P., Kher, D., &Chhajer, A. (2018). A Qualitative and Quantitative Analysis of Public Health Expenditure in India: 2005-06 to 2014-151

Van Doorslaer, E., O'Donnell, O., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Garg, C. C., ... and Karan, A. (2006). Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. *The lancet*, *368*(9544), 1357-1364.

Wagstaff, A., Flores, G., Hsu, J., Smitz, M. F., Chepynoga, K., Buisman, L. R., ... &Eozenou, P. (2018). Progress on catastrophic health spending in 133 countries: a retrospective observational study. *The Lancet Global Health*, *6*(2), e169-e179.

Wagstaff, A., &Doorslaer, E. V. (2003). Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. *Health economics*, *12*(11), 921-933.

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. (2003). Household catastrophic health expenditure: a multicountry analysis. *The lancet*, *362*(9378), 111-117.

NOTES:

1. The benefit of which accrues mostly to the poor.
2. Except Rajasthan the public health expenditure for all other major states is less than 2 percent of their respective GSDPs in 2014-15 (Srinath et al., 2018).
3. Gretler and Gruber (2002) had shown that serious illness has reduced household consumption by 38 percent in Indonesia.
4. Children can be pulled out of school to enter the labour force and therefore fail to advance in school which can lead to long-term negative outcomes such as low educational attainment and lower future earnings (Duryea, Lam, and Levison, 2007).
5. According to the India Rural Development Report 2013-14 districts of West Bengal are segregated into two groups – relatively developed and relatively less developed. Among 19 districts of West Bengal eight are relatively developed and rest are relatively less developed.
6. PaschimanchalUnnayan Parshad Area consists of 74 (seventy-four) blocks of Bankura, Birbhum, Burdwan, Paschim Medinipur and Purulia districts.
7. As per the report of Bureau of Applied Economics & Statistics, Government of West Bengal (2016), per capita income of Purulia in 2013-14 at constant (2004-05) prices was Rs. 24749.26 whereas, for Birbhum,

Paschim Medinipur, Bankura and Burdwan the figures were Rs 25426.29, Rs 27575.49, Rs 28345.12 and Rs 40634.07 respectively.

8. As per the Census 2011, the total population in Purulia Sadar subdivision was 878373 comprising nearly 30 per cent of district population.

9. We met the respective village Panchayats for identification of informal-sector households. The sample for our study consisted of farmers, landless labourers, vendors; toto drivers, rickshaw pullers, security guards etc.

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

11. 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.

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

13. Consequently LOGINCOME can be treated as endogenous explanatory variable in (1)

14. 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.

15. Binnendijk et.al, (2012) found households where someone is a member of an SHG have a higher propensity to have distress financing.

16. Alike equation (1), to avoid the dummy variable trap, we have not included SELF as a separate dummy regressor in equation (3).

17. We can ignore the simultaneity of this model and the endogenous nature of CHE does not require special consideration in formulating the log likelihood as the terms in the log likelihood function are:$P(DHF = 1, CHE = 1), P(DHF = 1, CHE = 0), P(DHF = 0, CHE = 1)$ and $P(DHF = 0, CHE = 0)$. (Greene, 2018)

18. When $\rho_2 = 0$, u and v are uncorrelated; so, CHE becomes exogenous in the equation (3) of this model.

19. For details, see Jakab and Krishnan 2001, Preker et al. 2002, Ekman 2004, Wagstaff et al. 2009

20. See Kimball et al. (2013)