Health Shocks and the Urban Poor: A Case Study of Slums in Delhi

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Abstract

Morbidity is a shock, and its treatment, potentially burdensome or even catastrophic particularly amongst poor households. The problem is more acute among the urban poor mostly residing in slums. Uncertain nature of job, low wage, deplorable lack of basic necessities and dearth of fallback options add to the burden and make them certain candidates for the "medical poverty trap". The current hypothesis is tested on data collected through a household survey of two slums in South Delhi. The degree and variation in the catastrophic impact of household health spending is computed through a distribution of households by share of health payment in total income, and the average degree by which the share exceeds/overshoots a specified threshold, across socio-economic and disease categories. Furthermore, impoverishment due to out of pocket health expenditure is computed by enumerating the number of individuals who fall below poverty line after paying for health care. The paper also looks into the distribution of these cases of impoverishment across socio-economic and disease characteristics within the sample. Applying binomial logistic regression the paper then tries to find out the household level determinants of this "medical poverty trap". From a policy perspective the significance of this work emerges from the fact that it successfully identifies the vulnerable sections even within the urban poor who need financial protection in view of escalating cost of essential health care, especially in cities like Delhi.

Health expenditure as a proportion of gross domestic product of a country is a decent indicator of the importance accorded to this dimension of human development. However public expenditure on health as a proportion of total health expenditure is a more crucial indicator of a Governments' commitment to the health of its citizens. This is simply because lower the proportion of government expenditure higher is the possibility that a person's ability to pay determines her health seeking behaviour.

Although India spends about 6 per cent of its GDP on health, public (Central, State and Local Governments combined) expenditure as a percentage of total health expenditure amounts to a meagre 20 per cent which is among the lowest in the world. Households account for almost 70 per cent of the total health expenditure[1], almost all of which is in the form of out-of-pocket spending. Reimbursement in any form is availed by households whose members are employed in the formal sector and such cases are a minority in India. Given that good health is the most basic of all necessities, such high levels of out-of-pocket spending by the households have certain adverse implications. While for some, access to health care is reduced considerably[2], others who opt for treatment face catastrophic burden of health care expenditures and are in consequent danger of becoming impoverished.

Burden of Illness: The case of the Urban Poor

The financial burden of health care is a universal issue, cutting across socio-economic co-ordinates of households. However, health has often been perceived as a luxury good. The perception of illness in general and severity of illness in particular has been found to be affected by socio-economic and psychological characteristics of an individual. This therefore means that the definition of ailment is not universal. Simply put, a rich person may identify a relatively minor indisposition as ailment and go for treatment, while the poor might perceive an ailment only when it is work-disabling in nature. Their subsequent choice of service providers is often in conformity with their respective financial status. The resultant burden of illness therefore is inherently asymmetrical as far as its nature and origins are concerned. If we incorporate the

[1] Estimates obtained from National Health Accounts 2001-02, Ministry of Health and Family Welfare, Government of India.

[2] Three consecutive NSS Rounds (42'nd, 52'nd and 60'th) on Morbidity and Health care have shown that financial difficulties are one of the most oft-cited reasons for no treatment of ailment and the phenomenon is showing a rising trend.

largely urban elite specific instances of life-style diseases and cosmetic surgeries catering to aesthetic makeovers, the issue of asymmetry only gains further credence. This should remove any doubt whatsoever about the group that deserves special attention when we discuss economic burden of illness. It has to be the poor, who often continue to bear the burden of illness, long after it has been cured.

Prevalence of this alarming phenomenon is invariant of the place of residence of the poor households – rural or urban. However, it might be contended that the extent and severity of the burden of disease is more in the case of the urban poor vis-à-vis his rural counterpart. Apart from the higher cost of living and an extremely competitive informal job market, the burden of disease among the urban poor is enhanced, thanks to unhygienic living conditions, deplorable status of basic necessities like water and sanitation, increased exposure to accidents and poor environmental condition that increases the vulnerability to indispositions and hence the economic burden. High rate of growth of urban population and consequent increase in population residing in slums has lead to over straining of infrastructure and deterioration in public health and wide inequalities in accessing services. Such hostile circumstances coupled with the lack of social network and fall back options, arguably leads them to the "medical poverty trap".

Against this backdrop and based on a primary survey of 150 slum households in South Delhi, with at least one history of ailment within a specific recall periods, this paper does a dis-aggregated analysis of the patterns in household health expenditure across socio-economic and ailment categories and attempts to establish the impoverishing impact of health shocks on the urban poor. The paper is divided into seven sections. Section 1 presents a literature review on financial implications of out of pocket health care spending. Section 2 presents a general description of the sample along with the pattern of morbidity and health service utilisation prevailing in the slums. Section 3 attempts to quantify catastrophic expenditure and medical poverty and its variation. Section 4 explores the determinants of catastrophic burden of illness. Section 5 concludes.

1. Review of Literature

Health care can be expensive. In the absence of insurance cover, households with severe and immediate medical needs can be forced to expend a large fraction of the household budget on health care. Such spending must be accommodated by cutting back on consumption of other goods and services, by accumulating debt, by running down savings or by selling assets. Whichever the financing strategy adopted, the household suffers a cost that may be labeled "catastrophic". The concept of catastrophic payments has been out into operation by defining them as occurring once OOP payments cross some threshold share of household expenditure and is considered as a major concern in the health financing system of any country. (Berki 1986; Wyszewianski 1986; Whitehead, Dahgren et al. 2001; CMH, 2001; Pradhan and Prescott 2002; Kawabata, Xu et al. 2002; Meesen, Zang et al. 2003; OECD and WHO 2003; Wagstaff and Van Doorslaer 2003; Xu, Evans et al. 2003 World Bank 2004). While it is acknowledged that the choice of threshold is somewhat arbitrary, 10% of total expenditure has been a common choice (Pradhan and Prescott 2002; Ranson 2002; Wagstaff and Van Doorslaer 2003); with the rationale that this represents an approximate threshold at which the household is forced to sacrifice of other basic needs, sell productive assets, incur debt, or be impoverished (Russell 2004).

High medical expenses are associated with other negative economic effects. Poor health, a lower life-expectancy and lost income from illness correspond to reduced wealth and savings due to lower lifetime earnings. For example, one cost of illness study finds that treatment of a single episode of malaria in Tigray, Ethiopia costs the affected household $0.80 to $1.60, and results in about 12-26 days of work lost. Therefore, the annual private cost of malaria in this region amounts to an average of 5-8% of household income (Cropper et. al. 2000). Mead Over (1992) and others estimate the average total cost of treatment and foregone productivity in Tanzania resulting from a single HIV infection to be about $2462-$5316 in 1985 dollars, or about 8.5%-18.3% of per capita income (Over 1992,). Similarly, a study of multiple sclerosis in the United States suggests an annual cost in terms of lost earnings and treatment expenses to each affected household of $5336 per year in 1976 dollars; aggregated, these costs amounted to about 0.04% of total US GDP in 1976 (Inman). In most countries, at least some of the costs of health care are

subsidized by the government; therefore, treatment and prevention costs are also borne by the public sector.

However the evidence of the effects of healthcare expenditure on consumption and poverty at the national level in low- and middle-income countries has been growing over the past decade. Gertler and Gruber (2002), for instance, studied the impact of health shocks on households' consumption patterns in Indonesia, providing evidence that illness reduced labor supply and household income. Similarly Wagstaff (2005) finds evidence that health shocks are associated with a reduction in consumption in Vietnam, in particular for uninsured and better-off households. Dercon and Krishnan (2000) show that in Ethiopia the consumption risks associated with health shocks are not borne equally by all household members. In addition, estimates are available for at least six Latin American countries (Baeza and Packard 2005), China (Lindelow and Wagstaff, 2005), Thailand (Limwattananon 2007), and fourteen Asian countries and territories (Van Doorslaer et al. 2007). A recent WHO article, using survey data from 89 countries, finds that 3% of households in low-income countries, 1.8% of households in middle-income countries and 0.6% of households in high-income countries incur catastrophic health expenditures (Xu et al. 2007).

From the above discussion it can therefore be inferred that illness leads to poverty through two major pathways:

- The first is through the death or disability of a household income earner. This reduces future income generation and may jeopardize basic household consumption. Depleted of wealth, the household may invest less on children's education creating a vicious intergenerational poverty cycle.
- The second pathway is through prohibitive treatment cost. When a member falls ill, the household faces several different costs (treatment cost, transportation cost, opportunity cost of care giving etc.) and takes recourse to diverse strategies to finance the same. These coping strategies very often turn out to be potential poverty traps.

This chain of events has often been termed as the "poverty ratchet" (Chambers, 1983) or the "medical poverty trap" (Whitehead *et. al.*, 2001).

2. A Description of the Sample, Morbidity Characteristics and Health Service Utilisation

The current study explores the patterns in non-hospitalised morbidity, health care utilisation and treatment cost of the urban poor, represented by a total of 150 households from two slums in South Delhi. The first slum viz. Vasant Vihar Coolie Camp is a non-notified "jhuggi-jhonpri" colony located awkwardly close to the up market Priya Complex, one of the busiest commercial establishments in South Delhi. The second, Kusumpur Pahari is a notified slum, located in interior Vasant Kunj, adjacent to a residential block consisting of Government quarters. Responses were collected from 150 households with a history of ailment within specific recall periods (365 days for inpatient treatment and 30 days for outpatient treatment).

Table 1: Distribution of the selected sample

	Coolie Camp	**Kusumpur Pahadi**	**All**
No. of Households surveyed	40	110	150
No. of individuals surveyed	207	664	871
No. of Hospitalisation cases	14	39	53
No. of Ailment cases	47	111	158

The rationale behind the selection of these slums arises from the fact that South Delhi hosts two of the largest public health institutions in India viz. the All Indian Institute of Medical Science (AIIMS) and the Safdarjang Hospital that caters to patients not only from Delhi and its neighbours but from the whole of India and even abroad. Again, the selected slums are situated at a distance of 7-10 kms from these institutions which can hardly be termed as proximal, especially when the case in question is that of a medical emergency involving the poor. Presumably, these observations do have a bearing on the health care utilisation pattern of the slum dwellers. So in a way, the selected sample brings in an element of randomness in the choice of medical provider which again has a direct bearing on the financial burden of treatment.

While there is rarely any doubt regarding the service provider (public or private) that suits the pockets of the urban poor, the randomness in choice of service provider is further enhanced when we consider some other factors like presence of private health institutions in the vicinity and

their rates, the quality/efficacy and quantity of services provided by both types of service providers, the general health awareness level of the household, the occupational pattern and hence presence or absence of any formal health insurance, etc.

2.1. Design of the Case Study

We proceeded to estimate the economic burden of illness among the urban poor by canvassing a questionnaire designed to elicit responses on the type of morbidity, cost 121 (direct as well as indirect) of treatment as well as the coping mechanisms adopted to finance the same. Responses were collected from 150 households with a history of ailment within a brief recall period (365 days for inpatient treatment and 30 days for outpatient treatment). Thus, this was a case of non-probabilistic purposive sampling[3] whereby the detailed questionnaire was canvassed only to the households with ailment. The methodology adopted for selection of the sample was as follows. Firstly, a complete house listing of the slums were obtained from the local councilor in case of Kusumpur Pahadi and from an NGO working on maternal health issues in the Coolie Camp slum. Both the slums were found to be demarcated into blocks (5 in case of Kusumpur Pahadi and 2 in case of Coolie Camp) for administrative purposes. As is often the case, the blocks were different from each other in terms of the places of origin of the residing households. For example, Block A in Kusumpur Pahadi largely consisted of people from Haryana. Secondly, a total of 44 and 40 households were randomly identified from each block for Kusumpur Pahadi and Coolie Camp respectively, which had a case of treated ailment within the specified recall period. Thus in effect, 300 households with ailments i.e. 220 from Kusumpur Pahadi and 80 from Coolie Camp were isolated and numbered. Thirdly, every odd numbered household out of these 300 households were selected for canvassing of the full questionnaire. So finally we had 150 households, 40 from the smaller Coolie Camp and 110 from the larger Kusumpur Pahadi, with at least one history of ailment, who were approached to divulge details on general household characteristics as well as specific information on the type of morbidity, health service utilisation and treatment cost.

[3] The reason was that Delhi displayed a very low incidence of morbidity (around 1.6 percent) as per the 60th round of NSS. Purposive sampling can be very useful for situations where we need to reach a targeted sample households with ailments, in this case) quickly and where sampling for proportionality is not the primary concern. With a purposive sample, we are likely to get the opinions of our target population, but we are also likely to overweight subgroups in our population that are more readily accessible.

2.2 A Description of the Slums

The non-notified jhuggi-jhonpri colony at Coolie Camp, Vasant Vihar is built on land owned by the Delhi Development Authority. The slum hosts approximately 350 households mostly from the neighbouring states of Uttar Pradesh and Rajasthan. The slum is located along a *nullah* fed by sewerage from the nearby commercial and residential establishments. The major problem for the inhabitants of this colony has been the access to water. There are just two taps with a very infrequent supply, for the entire slum. Supplementary arrangements of water tankers arrive at odd hours when the male members of the household are at work. It is often not possible for women to carry filled jerry-cans of water into their jhuggi from the main road where the tanker is parked. Many of the jhuggis are of the unserviceable kutcha variety and measures six by six feet, roughly. There is no toilet and the inhabitants defecate in the forest nearby. The community toilet that had been built ceased to function due to lack of water. The drains inside the slum are open kutcha and filthy. Although there is electricity in all the jhuggis the slum dwellers complain of disproportionately high meter (newly installed) readings. The nearest private hospital, doctor or chemist shop is located within a distance of 1.5 km. However the nearest government hospital or health centre is relatively far from the slum.

Situated alongside the remnants of the endangered Delhi Ridge Area around Vasant Kunj, Kusumpur Pahadi is a slum cluster more in the form of an urban village. It has a population of more than fifty thousand. The settlement came into being almost 35 to 40 years back and the first settlers were labourers who built the Jawahar Lal Nehru University. The inhabitants are more diverse vis-à-vis the Coolie Camp, having settled from UP, Punjab, Haryana and MP, Himachal Pradesh, Bihar and even West Bengal. There exists substantial disparity in access to basic services especially water and very alarmingly the division is along the lines of political leaning, economic status and even place of domicile. However there exists a pucca motorable road within the slum that allows for water tankers among other vehicles to serve the farthest corner of the colony. Majority of the houses are of the serviceable kutcha variety but without own toilet. Drainage within the clusters is of open kutcha type. The slum is self sufficient as far as services such as provision store, chemist shop, grocery shop, stationery shop, jewellery shop, tea stalls etc is concerned. However medical facility available within the slum is of a rather dubious nature.

There are a number of shady clinics run by the "Bangali Daaktar"s who reportedly charge meagre amounts and are not adequately trained in medicine. The slum dwellers are aware of the limitations, inefficacies and in certain cases fatality of the treatment offered by these men. Still they approach them since the direct cost and opportunity cost incurred on treatment from their formal counterparts is often high and burdensome. However, the dearth of genuine medical facility, public or private has also allowed entry points to some NGO's who are doing a commendable job in this area.

2.3 A Statistical Summary of the Sample

The households have been living in the selected slums for 18 years on an average and a majority (95 per cent) of them have migrated from the rural areas of a different state, predominantly a neighbouring one. The average and modal household size was 5.66 and 5 respectively. The mean age of the respondents was 23 while 4.5 per cent of the total population was aged i.e, more than 60 years old. 48 per cent of the sample population was females while almost 3 per cent were infants (less than equal to one year of age). The married accounted for around 41 per cent of the population while 4 per cent were widowed or divorced. A look into their general educational level suggests that as high as 30 per cent were illiterate. Majority of the literate respondents quit studies after the fifth standard. However, there were very few instances of "no-where"[4] children and not a single reported case of child labour within the selected sample. Their economic condition notwithstanding, most of the children in the school going age were found to attend schools. Out of the 871 individuals surveyed, 303 (around 35 per cent) were currently employed, 58 per cent of whom worked as daily wage earners. Only 14 per cent of the working population were salaried employees. A considerable difference in the incomes of the main earner and that of the entire household indicates the existence of multiple income sources for many of the households, if not all. The median of the income variables is consistently lower than the average implying the presence of outliers at the upper end of the income ladder. A distribution of the households across income class shows that the lower two income classes accounted for almost 70 per cent of the sample and a majority of the sample households belonged to the per capita expenditure class of Rs 500 to Rs 1000. Only 36 percent of the individuals in the sample were

[4] Defined as children who neither go to school nor engaged in economic activity.

found to have a monthly per capita income less than the official poverty line for urban Delhi (Rs 612.91)[5]. Academic debates regarding poverty lines notwithstanding, a visit to these slums and a study of living standard of the inhabitants are bound to raise serious doubts regarding official poverty estimates.

2.4 Characteristics of Morbidity and Health Service Utilisation within the Slum

Table 3 presents the characteristics of non-hospitalised morbidity and health service utilisation within the sample of slum households.

Table 3: Frequency distribution of treated ailment cases (only outpatient) by treatment source and nature of ailment

	Coolie Camp			Kusumpur Pahadi			Total		
	Male	Female	All	Male	Female	All	Male	Female	All
Source of Treatment									
Public	21.4	10.5	17.0	10.9	10.8	10.8	14.9	10.7	12.7
Private Registered	71.4	68.4	70.2	65.2	80.0	73.9	67.6	77.4	72.8
Private Unregistered	7.1	21.1	12.8	23.9	9.2	15.3	17.6	11.9	14.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ailment Category									
Accident and injury	3.6	0.0	2.1	8.7	0.0	3.6	6.8	0.0	3.2
Anaemia and generalized weakness	0.0	5.3	2.1	0.0	9.2	5.4	0.0	8.3	4.4
Cardiological	0.0	5.3	2.1	6.5	4.6	5.4	4.1	4.8	4.4
Fever and ENT infection	39.3	36.8	38.3	21.7	18.5	19.8	28.4	22.6	25.3
Gastro-intestinal	25.0	10.5	19.1	21.7	24.6	23.4	23.0	21.4	22.2
Gynaecological and obstetric	0.0	10.5	4.3	0.0	4.6	2.7	0.0	6.0	3.2
Nephrological disorder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nervous system	0.0	0.0	0.0	6.5	4.6	5.4	4.1	3.6	3.8
Ophthalmological disorder *	0.0	0.0	0.0	2.2	0.0	0.9	1.4	0.0	0.6
Orthopaedic	7.1	10.5	8.5	2.2	9.2	6.3	4.1	9.5	7.0
Respiratory including asthma	10.7	15.8	12.8	17.4	4.6	9.9	14.9	7.1	10.8
Skin disease and infection	14.3	0.0	8.5	10.9	3.1	6.3	12.2	2.4	7.0
Tuberculosis	0.0	5.3	2.1	0.0	3.1	1.8	0.0	3.6	1.9
Others	0.0	0.0	0.0	2.2	13.8	9.0	1.4	10.7	6.3
All	100	100	100	100	100	100	100	100	100

[5] Press Release, Perspective Planning Division, Planning Commission of India, March 2007

People displayed a marked preference for private sources of treatment. In about 80 per cent of the cases a private doctor was approached for treatment. The most appalling finding however is that almost 15 per cent of the ailing sample opted for treatment from an unregistered private practitioner. These are none other than "quacks", locally known as the "bangali daaktar" who are quite conspicuous within the slums. They attract a lot of patients oweing to their locational utility and low charges which would be made clear in the following section on expenditure. The status of and the lack of confidence on public institutions is amply demonstrated by the fact that as low as 12 per cent of the ailing individuals opted for that mode of treatment. Fever, gastro-intestinal diseases and respiratory diseases including asthma were the three major causes, together constituting around 60 per cent of all ailments.

3. Out of Pocket Spending-- Catastrophe and Impoverishment

Table 4: Average cost of treatment as outpatient

	Medical Expenditure				Associated Expenditure				Total Expenditure			
Slum	Min	Max	Med	Avg	Min	Max	Med	Avg	Min	Max	Med	Avg
Coolie Camp	0	3000	300	490	0	500	0	43	50	3000	350	533
Kusumpur Pahadi	0	4300	300	608	0	500	0	42	30	4800	300	651
All	0	4300	300	573	0	500	0	43	30	4800	305	615

The average and median expenditure on treatment for the entire sample were Rs. 615 and Rs. 305 respectively. Medical expenditure and total expenditure on outpatient treatment was considerably higher for the Coolie Camp as compared to Kusumpur Pahadi. The average associated expenditure incurred mostly on account of transport amounted to Rs. 43 per capita per month.

Table 5 gives the average expenditure of outpatient treatment across age-group of the ailing, occupation of the main earner of the household and income quintiles to which the household belongs. The average total expenditure was highest for 60 plus age group. The median total expenditure was also substantially higher for the two higher age groups. The median expenditure was highest for the pensioners followed by the salaried. Also, the average expenditure on outpatient treatment demonstrates a slightly positive income gradient.

Table 5: Average expenditure on outpatient treatment by socio-economic characteristics

	Medical Expenditure		Associated Expenditure		Total Expenditure	
Age-Group	Mean	Median	Mean	Median	Mean	Median
Less than equals 1	320	250	28	0	348	300
2 to 4	262	230	42	0	305	300
5 to 14	431	315	56	25	486	400
15 to 24	438	250	40	0	478	300
25 to 39	715	280	35	0	749	300
40 to 59	755	550	49	0	804	570
More than equals 60	963	400	43	0	1005	420
Occupation of Main Earner	Mean	Median	Mean	Median	Mean	Median
Salaried	744	500	38	0	782	500
Wage earner	547	300	39	0	586	300
Shop/trade/business	233	100	100	0	333	300
Self-employed	329	230	50	25	379	325
Domestic servant	487	110	42	25	528	160
Pensioner	950	800	133	0	1083	800
Income Quintile	Mean	Median	Mean	Median	Mean	Median
I	526	300	41	0	567	300
II	656	375	38	0	693	425
III	384	250	34	0	417	300
IV	706	250	67	0	773	300
V	669	450	39	0	708	450
All	573	300	43	0	615	305

Table 6: Average expenditure (Rs) on outpatient treatment by disease category and treatment source

	Medical Expenditure		Associated Expenditure		Total Expenditure	
Ailment type	Mean	Median	Mean	Median	Mean	Median
Accident and injury	1512	1000	40	0	1552	1200
Anaemia and generalized weakness	404	465	0	0	404	465
Cardiological	697	500	3	0	700	500
Fever and ENT infection	243	198	10	0	252	198
Gastro-intestinal	887	450	69	0	956	500
Gynaecological and obstetric	612	300	40	0	652	300
Nervous system	517	500	115	75	632	550
Ophthalmological disorder *	100	100	50	50	150	150
Orthopaedic	960	260	75	100	1035	460
Respiratory including asthma	446	500	41	0	486	500
Skin disease and infection	308	200	40	50	348	300
Tuberculosis	400	500	133	100	533	700
Others	551	425	40	0	591	475
Source of Treatment						
Public	174	200	88	75	262	245
Private Registered	741	500	43	0	785	500
Private Unregistered	78	80	0	0	78	80
All	573	300	43	0	615	305

A disease specific summary of treatment cost shows that persons with accidents and injury incurred the highest average expenditure followed by tuberculosis and diseases of the nervous system. The most common ailment i.e., fever and ENT infection accounted for an average cost of Rs. 252. The fact that a visit to a quack ("private unregistered" formally) costs around Rs. 80 on an average probably explains why the urban poor opt for treatment of such dubious quality, in spite of being aware of the often limited efficacy of the medicines sold by these units. The corresponding figures for the registered private and even the public counterparts are much higher.

3.1 Methodology for Measuring Catastrophe and Impoverishment on account of Household Health Care Payments

3.1.1 Catastrophic Impact of Out of Pocket Health Expenditure

In this section we discuss in detail the methodology applied for computing the extent and depth of catastrophic expenditure and impoverishment.

Catastrophic Payment: The data required is at the household/individual level containing information on both health care payment (say H) and living standards (e.g. per capita income or consumption expenditure, say I). Living standards may also be measured by an "ability to pay" variable (say Y) such that,

Y = I - D (I), where D (I) represents necessary or non-discretionary expenditure on items such as food.

The sample of households/individual is said to have incurred catastrophic payments on healthcare when the fraction H/I or H/Y exceeds a pre-specified threshold, say Z. This sample of individuals represents the *catastrophic payment headcount.* Now we define an indicator E such that E=1 if $H_i / I_i > Z$ and zero otherwise

The catastrophic payment headcount, $HC = \frac{1}{N}\sum_{i=1}^{n} E_i$, where N is the sample size.

Incidence and intensity of catastrophic impact:

Another measure, the *catastrophic payment gap* captures the average degree by which payments as a proportion of income exceeds the threshold, Z.

Now we define the excess or overshoot as $O_i = E_i ((H_i/ I_i)-Z)$, i.e., the amount by which the payment fraction H_i/ I_i exceeds the catastrophic threshold Z.

The catastrophic payment gap is given by, $G = \frac{1}{N}\sum_{i=1}^{N} O_i$

Thus while H only captures the incidence of any catastrophes occurring, G also captures the intensity of the occurrence.

3.1.2 Impoverishing effects of Out-of-Pocket Health Expenditure

The methodology used for calculating illness induced impoverishment is based on the following argument. The poverty line consists of the food and non-food component. Household health expenditure forms a part of the non-food component. This implies that a non-poor household may cease to remain so once we deduct the health expenditure component that is paid out-of-pocket. Impoverishment due to out-of-pocket health expenditure is computed by enumerating the number of individuals who fall below poverty line after paying for health care. In effect therefore, monthly per capita out of pocket expenditure on treatment as outpatient is deducted from monthly per capita total consumption expenditure of each household. Poverty head count and gap is then recalculated by applying the poverty line on the distribution of consumption expenditure net of health care payments. This provides the post payment poverty head count and gap. The difference between the post-payment and pre-payment head count and gap gives us a measure of illness induced impoverishment or 'medical poverty'.

The methodology is an adaptation of Wagstaff and van Doorslaer's (2003) attempt to estimate illness induced impoverishment for Vietnam at two points of time.

Consider a household 'i'. Suppose,

'S_i' = size of the i^{th} household.

'MPC_i' = monthly per capital total consumption expenditure of the i^{th} household,

H_i = monthly per capita health expenditure of the i^{th} household.

Also let 'L' be the poverty line that the household faces. In order to measure poverty gross of health care payment, we define

$P_i^{gross} = 1$ if $MPC_i < L$

$= 0$, otherwise. ……. (1)

Now if N is the number of households in the sample, an estimate of poverty headcount ratio gross of health payments is given by,

$$HC^{gross} = \frac{\sum_{i=1}^{N} S_i P_i^{gross}}{\sum_{i=1}^{N} S_i} \quad \text{…….. (2)}$$

Again, individual poverty gap gross of health payment is given by,

$$G_i^{gross} = P_i^{gross}(L - MPC_i) \text{ …….. (3)}$$

The mean of this gap in rupee terms is given by,

$$G^{gross} = \frac{\sum_{i=1}^{N} S_i G_i^{gross}}{\sum_{i=1}^{N} S_i} \quad \text{…….. (4)}$$

In order to estimate poverty net of health payments we first define P_i^{net} such that,

$P_i^{net} = 1$ if $(MPC_i - H_i) < L$

$= 0$, otherwise. …… (5)

Finally, the head count net of health payments is obtained by replacing P_i^{gross} in equation (2) with P_i^{net} such that,

$$HC^{net} = \frac{\sum_{i=1}^{N} S_i P_i^{net}}{\sum_{i=1}^{N} S_i} \quad \text{…….... (6)}$$

The individual poverty gap net of health payments is given as,

$$G_i^{net} = P_i^{net}\{L - (MPC_i - H_i)\} \text{ …… (7)}$$

Although the methodology is simple there is a need to clarify certain conceptual issues regarding the ensuing analysis. When we consider households as the unit of analysis, 'H' stands for the total (or per capita) expenditure incurred on all ailment cases within the households while 'I' stands for the total (or per capita) monthly income. However when we look into the economic burden of illness across disease categories or type of service providers it is the ailing individual who becomes the unit of analysis and not the household per se. So in this case 'H' stands for expenditure incurred on a particular case of ailment and not the total household expenditure while we assume 'I' to be the total income of the household. This is intuitively agreeable since expenditure on morbidity treatment is made out of the total financial resources at the disposal of the household and is obviously independent of the occupational or earning status of the ailing member.

3.2 Discussion of Results:

3.2.1 Catastrophic burden of out-of-pocket health expenditure across socio-economic and disease categories

Applying the methodology discussed above, an attempt has been made to compute the incidence and intensity of households for which treatment expenditure is of a catastrophic nature. There were a total of 124 households with at least one case of ailment requiring treatment as an outpatient, in the preceding month. It might be recalled that the sample of households/individual is said to have incurred catastrophic payments on healthcare when the fraction H/I or H/Y exceeds a pre-specified threshold, say Z. The percentages of such cases are given by the c*atastrophic payment headcount.* The *catastrophic gap* on the other hand reflects the amount by which the households exceed or overshoot the threshold. The thresholds selected where not entirely arbitrary. The median and mean of the share of out of pocket health expenditure to total income was 10 per cent and 15 per cent respectively.

Table 7: Catastrophic impact of out-of-pocket payments within the sample households

	Catastrophic Threshold (more than)			
	10% (Median)	15% (Mean)	20%	40%
No. of Households	64	38	21	11
Head-count (%)	50.0	38.7	26.6	6.5
Mean Gap (%)	7.9	5.6	3.9	0.9

Table 7 presents the aggregated results of the analysis. As high as 39 per cent of the households, spent more than 15 per cent of their income on healthcare, that also happens to be the mean for the entire sample of households with at least one treated ailment. The average overshoot amounted to 8 per cent of total income which means that the 64 households spending more than one-tenth of their income on health care, exceeded the threshold by 8 per cent on an average. Although the headcount and gap decreases significantly for higher thresholds, what is alarming is that it is not unnatural for a household to have spent 40 or even 50 per cent of its monthly income on treatment of morbidity not as inpatient of any hospital. A limitation of Table 7 is that it is not distribution sensitive i.e. we are unable to make any judgement on whether the economic burden of disease is disproportionately more for the poor or for the rich. Also, it is unable to portray the variation of this burden across household characteristics. Capturing this variation is extremely important especially from a policy perspective since it would allow us to make certain crucial generalizations required to identify the truly vulnerable lot.

Therefore in order to demonstrate the regressivity of out of pocket health care payments we divide the sample into five expenditure quintiles and look into the distribution of economic burden of treatment. Each specified quintile displays the value below which 20 per cent of the cases fall. Thus the first (I) quintile in our analysis implies lowest 20 per cent of the household in terms of per capita expenditure. Table 8 presents the distribution of illness burden across expenditure quintiles. As is evident the burden of disease or the catastrophic headcount declines as we move from a lower to a higher expenditure quintile for the 10 percent threshold. The other thresholds also demonstrate a similar pattern except for the highest category for which the results are somewhat mixed.

Thus generally a person belonging to the lower rungs of the income ladder bears a disproportionately higher burden of medical treatment. The depth of burden presents a more or less similar picture.

Table 8: Catastrophic Headcounts and Gaps at different thresholds across income quintiles

Expenditure quintiles	Average OOP Share	Household Out of Pocket Expenditure as Percentage of Total Income							
		10% (Median)		15% (Mean)		20%		40%	
		Head Count	Gap	Head Count	Gap	Head Count	Gap	Head Count	Gap
I	20.3	79.2	11.2	58.3	7.6	45.8	5.0	4.2	0.6
II	20.2	66.7	11.8	61.1	8.7	27.8	6.2	16.7	2.5
III	13.0	43.8	6.4	31.3	4.6	25.0	3.1	3.1	0.7
IV	15.4	38.1	8.7	28.6	7.0	28.6	5.6	9.5	1.4
V	10.1	31.0	3.7	24.1	2.2	10.3	1.3	3.4	0.1
All	15.2	50.0	7.9	38.7	5.6	26.6	3.9	6.5	0.9

Table 9: Catastrophic headcounts and gaps at different thresholds across sex and occupation of household head

Household Characteristics	Average OOP Share	Out of Pocket Expenditure on Treatment as Percentage of Total Income							
		10% (Median)		15% (Mean)		20%		40%	
		Head count	Gap	Head count	Gap	Head count	Gap	Head count	Gap
Sex Of Household Head									
Male	15.3	49.6	8.0	37.2	5.8	27.4	4.1	7.1	1.0
Female	14.2	54.6	6.9	54.6	4.2	18.2	2.0	0.0	0.0
Occupation of Main Earner									
Permanent Employee	13.2	40.7	6.2	33.3	4.4	18.5	2.9	7.4	0.6
Casual and contractual labour	16.3	53.2	8.8	39.2	6.4	31.7	4.6	7.6	1.2
Others	13.1	50.0	6.3	44.4	3.8	16.7	2.4	0.0	0.0
All	15.0	50.0	7.9	38.7	5.6	26.6	3.9	6.5	0.9

Table 9 makes a similar comparison across sex of household head and occupation of the main earner. In order to make a significant comparative analysis we have reclassified the six occupational categories into three. Thus, “others” include the self-employed, domestic servants, shop owners and pensioners. More female headed households incur a health expenditure of 10 and even 20 per cent of total income in percentage terms, vis-à-vis male headed households. For still higher thresholds however male headed households dominate. The catastrophic gap is also

consistently higher for the male headed household at all thresholds. The average share of out-of-pocket (OOP) health expenses in total income is highest for households whose main earner is a casual labour. They were also found to bear a disproportionate economic burden of illness both in terms of headcount as well as gap at almost all thresholds.

These observations are particularly alarming and needs to be considered appropriately while designing any targeted affirmative policy involving the urban poor. It is not only a question of mere number of burdened households but also the depth of their burden and vulnerability that often undermine their resilience.

Catastrophic expenditure across disease categories and source of treatment

It might be recalled that a hundred years back, tuberculosis was referred to as the "*raaj-rog*" or the royal disease implying an ailment that only to the royal ones could afford to suffer from. The reason behind such a nomenclature was an intensely high cost of treatment associated with the disease. This was a time when research on tuberculosis was nascent and consequently the price of drugs and the associated necessities were sky-high. With the passage of time and devotion of resources however, tuberculosis treatment made tremendous progress and the costs fell to an affordable level. The Government in many countries had also played an important role by recognizing the disease as a public epidemic and accordingly allocated huge sums of public money towards its mitigation. However that did not bring an end to diseases requiring expensive medical interventions. Tuberculosis might have been replaced by some other disease but the travails of the poor and ailing continues unabated. Thus the cost of treatment among other things crucially depends on the nature of ailment.

Again, the source of treatment has a direct relation with the burden of treatment. It might be generally assumed that treatment from a public source costs relatively less as compared to a private source. This assumption however might be untenable if we consider the indirect cost of treatment in terms of foregone man days and hence income. Cost of treatment has been found to be a fundamental but not the only determinant of health seeking behavior and provider choice among people in general and the poor in particular. In what follows therefore we attempt a repeat of the previous analysis but under a different context of ailment categories and source of treatment. One needs to be aware that a particular household may have had multiple cases of

different ailments and the sources of treatment might also be dissimilar. Thus, in the current exercise the unit of analysis is the individual instead of a household.

Table 10: Catastrophic impact of treatment cost across nature of ailments

Ailment Category	Average OOP Share	Out of Pocket Expenditure on Treatment as Percentage of Total Income							
		10%		15%		20%		40%	
		Head count	Gap	Head count	Gap	Head count	Gap	Head count	Gap
Accident and injury	18.1	50.0	10.3	50.0	7.8	25.0	5.7	25.0	0.7
Anaemia and generalized weakness	8.3	28.6	2.0	14.3	1.2	14.3	0.5	0.0	0.0
Cardiological	12.2	28.6	3.6	14.3	2.3	14.3	1.6	0.0	0.0
Fever and ENT infection	6.0	22.5	0.9	7.5	0.1	0.0	0.0	0.0	0.0
Gastro-intestinal	17.3	51.4	9.9	42.9	7.5	31.4	5.6	8.6	1.5
Gynaecological and obstetric	17.5	40.0	9.5	20.0	8.1	20.0	7.1	20.0	3.1
Nervous system	16.2	33.3	8.6	33.3	6.9	33.3	5.3	0.0	0.0
Ophthalmological disorder *	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Orthopaedic	13.7	44.4	6.6	44.4	4.4	22.2	2.6	0.0	0.0
Respiratory including asthma	13.3	58.8	5.6	41.2	3.0	23.5	1.2	0.0	0.0
Skin disease and infection	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuberculosis	11.5	66.7	3.2	33.3	0.2	0.0	0.0	0.0	0.0
Others	19.2	50.0	11.6	40.0	9.1	30.0	7.5	20.0	3.0
All	12.2	37.4	5.4	26.5	3.8	16.8	2.7	4.5	0.6

*There was just one reported case under this category

Table 10 shows the depth of burden across ailment categories. Fever and ENT infection and gastrointestinal disorders were the most common form of ailments within the slum. A look into the disease wise average OOP share shows that treatment of accidents and injuries required the highest financial resources as proportion of income. This was closely followed by gynaecological and gastro-intestinal diseases. This is not unnatural since pre-natal and post-natal checkups are included in the mentioned category that involves expensive and unavoidable diagnostic tests and prolonged medication. People suffering from these ailments had to expend around 18 per cent of their household income on treatment. More than half the households with cases of tuberculosis, respiratory diseases including asthma, gastro-intestinal diseases and accidents and injury had to expend more than 10 percent of their total income on treatment. The

average depth of financial burden was however highest for patients with tuberculosis. The issue of major concern is therefore that even the most common and apparently inexpensive diseases such as fever and diarrhoea are imposing a major financial burden on the lives of the urban poor.

Table 11: Catastrophic impact of treatment cost across source of treatment

Source of Treatment	Average OOP Share	Out of Pocket Expenditure on Treatment as Percentage of Total Income							
		10%		15%		20%		40%	
		Head count	Gap	Head count	Gap	Head count	Gap	Head count	Gap
Public	6.3	15.0	0.7	5.0	0.2	0.0	0.0	0.0	0.0
Private Registered	15.3	49.1	7.4	35.7	5.2	23.2	3.8	6.3	0.9
Private Unregistered	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	12.2	37.4	5.4	26.5	3.8	16.8	2.7	4.5	0.6

Average OOP share across treatment sources exhibit wide disparity. Share of health expenditure in household budget was highest for people who opted for treatment from a registered private source. The average share was more than double in comparison to those who opted for a public mode of treatment i.e. a government hospital or dispensary. Those who were treated by the unregistered or unqualified private practitioners i.e. the quacks within the slum had presumably incurred the lowest OOP share. In terms of extent and depth of catastrophic burden too, people who went for private medical treatment had to bear a relatively greater economic burden of illness. Ailing persons who were treated by unqualified medical practitioners were not found to experience economic burden of illness as per our definition. This only goes to show that the possibility of impoverishment via treatment cost is forcing the urban poor to opt for treatment of dubious quality which might be having a long term impact on their bodies and future earning potential.

3.2.2 Out of pocket health expenses and impoverishment

Out-of-pocket expenditure on health raised poverty levels within the slums by around 13 per cent. The gap also rises by Rs. 50. The female headed and the contractual labour households were the most vulnerable in terms of the number of individuals in the respective group who were

impoverished due to health payment. The poverty gap however was higher for the male headed households and those whose main earner was a permanent employee. A similar analysis across ailment categories and source of treatment makes for some interesting observations.

Table 12: Increase in Poverty due to Ill Health related Expenditure across sex of household head and occupation of the main earner

	Head Count (%)			Gap (Rs)		
Sex of Household Head	Pre-Pay	Post-Pay	Difference	Pre-Pay	Post-Pay	Difference
Male (90.9)*	36.31	48.41	12.10	42.69	93.99	51.29
Female (9.1)	59.26	76.54	17.28	97.77	143.71	45.93
Occupation of the main earner	Pre-Pay	Post-Pay	Difference	Pre-Pay	Post-Pay	Difference
Permanent Employee (19.5)	46.14	58.46	12.32	54.38	117.49	63.11
Casual and contractual labour (67.5)	42.48	59.29	16.81	83.36	124.91	41.55
Others (13)	9.04	19.77	10.73	1.73	16.11	14.38
All (100)	38.38	50.95	12.57	47.66	98.47	50.81

Table 13: Increase in Poverty due to Ill Health related Expenditure across ailment categories and source of treatment

	Head Count (%)			Gap (Rs)		
Ailment categories	Pre-Pay	Post-Pay	Differ	Pre-Pay	Post-Pay	Differ
Anaemia and generalized weakness (4.5)	52.94	52.94	0.00	128.40	150.95	22.55
Cardiological (4.4)	31.43	51.43	20.00	6.92	40.35	33.44
Fever and ENT infection (25.3)	31.28	36.49	5.21	25.84	60.49	34.65
Gastro-intestinal (22.2)	42.61	62.17	19.57	56.81	122.85	66.05
Gynaecological and obstetric (3.2)	62.86	100.00	37.14	56.69	168.91	112.22
Nervous system (3.8)	17.86	17.86	0.00	2.31	59.45	57.14
Orthopaedic (7.0)	25.00	59.09	34.09	50.95	113.54	62.58
Respiratory including asthma (10.8)	56.60	70.75	14.15	62.02	135.72	73.69
Skin disease and infection (7.0)	18.75	18.75	0.00	13.36	22.26	8.91
Tuberculosis (1.9)	44.44	83.33	38.89	50.18	124.65	74.46
Others (9.9)	37.25	37.25	0.00	83.04	130.10	47.06
Source of Treatment	Pre-Pay	Post-Pay	Differ	Pre-Pay	Post-Pay	Differ
Public (12.7)	38.46	38.46	0.00	53.04	78.62	25.58
Private registered (72.8)	39.85	55.77	15.91	49.95	110.82	60.87
Private unregistered (14.6)	29.09	32.73	3.64	28.30	40.32	12.01
All (100)	38.38	50.95	12.57	47.66	98.47	50.81

*Figures in parentheses indicate percentage under each category

Note: Based on poverty line for urban Delhi equal to Rs. 612.91 according to the press release by the Perspective Planning Division, Planning Commission of India, March 2007.

For individuals suffering from gynaecological ailments, the pre-payment headcount ratio of 62.86 percent changes to 100 percent post payment (Table 26). What this means is that while 62.86 percent of the individuals who had this ailment were poor even before payment, all of them were impoverished post payment. Although the head-count remained unchanged for individuals suffering from certain kind of ailments, poverty gap increased post-payment for all the ailment categories. For example in the case of those suffering from anaemia, 52.94 percent of individuals suffering from the ailment were poor even before incurring treatment cost (i.e. on the basis of their consumption expenditure). After paying for treatment the absolute number of anaemia patients who are poor remains unchanged (no new entrant into poverty due to treatment cost). However the net income (income net of treatment cost) of the poor anaemia patients is lower with respect to the poverty line. Hence the post payment gap is more than the pre-payment gap. Individuals suffering from tuberculosis were the worst affected in terms of the impoverishing impact of health care payment due to the high cost of treatment associated with the disease. It seems little has changed in terms of burden of the disease in spite of the conscious effort of the Government to allocate resources and raise public awareness towards its eradication. The other burdensome diseases within the slums were gynaecological, orthopaedic, cardiological and gastro-intestinal ailments.

Private sources of treatment contributed largely to the impoverishing effects of out of pocket payments for health care. The worst condition is probably that of those who are impoverished after treatment from an unqualified private source. Apart from the adverse financial implications of the health shock, the quality of treatment meted out to them makes them more susceptible to future health shocks. Poverty headcount increased by around 16 percent for those individuals who availed of a private source for treatment of their ailments. The corresponding figures for the private unregistered source and the public source were 3.6 percent and zero percent respectively. One interpretation of this result may be that preference for the public source was largely prevalent among those who are already poor and therefore there were no new entrants into poverty on account of treatment cost incurred. However once we consider the indirect cost of such treatment in terms of workdays lost, they might ultimately prove to be more burdened. On the other hand individuals who opted for a private registered source were those who were predominantly above the poverty line. Given the higher expenditure incurred in case of treatment from a private source, there were more cases of medically induced poverty within this group.

4. Determinants of Catastrophic Expenditure

The analysis of household health expenditure has produced certain stylized facts regarding the incidence of economic burden on the urban poor, oweing to health care payments. The burden, though universal as far as the urban poor is concerned has got distinct socio-economic variations even within the poor. In other words, there are certain individual, household as well as behavioural factors that determine whether health spending is catastrophic. Our next objective is therefore to identify these determinants of catastrophic expenditure by applying the binomial logistic technique to the sample of ailing individuals. Our larger objective therefore is to isolate those sections or sub-groups within the urban poor who are slightly more vulnerable to the "medical poverty trap". In the current analysis we assume a health expenditure of 10 per cent or more of total household income to be catastrophic.

Let P be the estimated probability that a household/individual spends at least 10 percent of its income on health care.

Now, the basic form of a logistic function implies

$$P = \frac{1}{1+e^{-z}} \quad \text{…….. (1), where Z is the predictor variable or a linear function of}$$

a set of predictor variables and e is the base of natural logarithm.

From (1) it follows that $1 - P = 1 - \frac{1}{1+e^{-z}} = \frac{e^{-z}}{1+e^{-z}}$ ……. (2)

Dividing (1) by (2)

$$\frac{P}{1-P} = e^{z} = \Omega(say) \quad \text{…….. (3)}$$

Taking the natural logarithm of both sides of (3),

$$\log \frac{P}{1-P} = Z \quad \text{……. (4)}$$

The quantity P/ (1-P) is called the odds denoted more concisely as Ω and the quantity log P/(1-P) is called the log-odds or the logit of P

$$\text{Odds} = \frac{P}{1-P} = \Omega \quad \text{…… (5)}$$

$$\text{logit P} = \log\frac{P}{1-P} = \log\Omega \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Now suppose that Z is a function of a set of predictor variables as is so often the case.

So, $Z=\alpha+\beta_1 X_1 + \beta_2 X_2 + ...\beta_k X_k$ …….. (7)

Then, logit P $=\alpha+\beta_1 X_1 + \beta_2 X_2 + ...\beta_k X_k$, and …….. (8)

$$\log\frac{P}{1-P} = \log\Omega = \alpha+\beta_1 X_1 + \beta_2 X_2 + ...\beta_k X_k \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

This leaves us with the task of specifying the group of predictor variables that we intend to incorporate in the model. We hypothesize that the probability of health expenditure being catastrophic to a household/individual depends on the following factors:

a) Household size (Z)
b) Number of members reporting ailment (N)
c) Source of treatment (Public, Private etc.) (S)
d) Income quintile to which the individual/household belongs (Q)
e) Gender of head of the household (G)
f) Vulnerable dependents within the household defined as percentage of members below 5 years and above 60 years of age. (V)
g) Highest educational attainment by any member of the household (E), and
h) Occupation of the household head. (O)

Variables c, d, e and h are dummy variables designed to capture the differential impact of these heterogeneous categorical variables on the estimated probability.

From (9) therefore we have,

$$\log\Omega=\alpha+\beta_1 Z+\beta_2 N+\beta_3 D_{3S}+\beta_4 D_{4S}+\beta_5 D_{5Q}+\beta_6 D_{6Q}+\beta_7 D_{7G}+\beta_8 V+\beta_9 E+\beta_{10} D_{10O}+\beta_{11} D_{11O}$$

…….. (10)

Where,

1) D_{3S} = 1, if treatment taken from a private registered source
   = 0, otherwise.
   D_{4S} = 1, treatment taken from a private un-registered source
   = 0, otherwise.
   Treatment from public source being the reference category.

2) D_{5Q} = 1, if the household/individual belongs to the lower income quintiles
   = 0, otherwise

D_{6Q} = 1, if the household/individual belongs to the middle income quintile
= 0, otherwise
Households/individuals belonging to the upper income quintiles being the reference category.

3) D_{7G} = 1 if the household head is a female
= 0, otherwise
Households with a male head being the reference category

4) D_{10O} =1, if the main earner is a casual/wage labourer
= 0, otherwise
D_{11O} = 1, if the main earner belongs to the others (self-employed, domestic servants, shop owners and pensioners) category.
= 0, otherwise
Household with its main earner employed as a permanent employee being the reference category.

The rest of the explanatory variables i.e. Z, N, V and E are quantitative and continuous and have already been specified. Equation (10) therefore constitutes the basic econometric model that we intend to test on the available data. The proposed model is first run with share of out-of-pocket (OOP) expenditure on total income as the dependent variable. This is a simple multivariate regression exercise since the dependent variable is continuous and not categorical. The explanatory variables are the same as in equation (10). In the next section we discuss the results in detail.

4.1 Results

Table 12 presents the result of the analysis for both the models. We have five qualitative regressors in our models. In view of the base (reference) categories for each regressor that have been discussed earlier, we can arrive at a composite reference category. All comparisons will be made in relation to that category. Thus the composite reference category for the models represents an individual who opts for a public source of treatment, belongs to a male headed household in the high income category, the head having attained ten plus level of education and working as a permanent employee. The average OOP share of this category is 15.12 per cent, which is the constant term for model 1.

Table 14: Regression results

	Model 1		Model 2		
Dependent Variables →	**Share of OOP expenses in total income**		**Probability of household health expenditure being catastrophic**		
Explanatory Variables ↓	**β**	**Std. Error**	**β**	**Std. Error**	**Exp(β)**
Constant	15.12*	7.047	-2.379	1.852	0.093
Household size	-0.827	0.514	-.229*	0.121	0.795
Earning Members as Percentage of Total Members in Household	-1.455	6.97	-1.029	1.53	0.357
Vulnerable Dependents (Percentage of members below 5 and above 60 yrs of age)	-0.082	0.058	0.006	0.012	1.006
Household Head					
Female Headed Households	0.11	1.949	1.709	1.018	5.522
Education of Household Head					
Illiterate or Literate without Formal Schooling	-8.273*	4.841	-0.791	0.981	0.453
Low Education (Up to Standard V)	-4.92	5.051	-0.639	1.015	0.528
Medium Education (VI to X)	-5.519	4.792	-0.443	0.969	0.642
Occupation of the Main Earner					
Casual/Contractual Labourer	2.252	2.631	0.158	0.548	1.172
Others (Self Employed, Domestic Help, Pensioner, etc.)	4.118	3.729	1.448	0.861	4.254
Household per capita Income					
Low	5.35*	2.769	1.259*	0.632	3.523
Medium	1.53	2.738	0.551	0.599	1.735
Source of Treatment*					
Private Registered	9.216*	3.055	2.185*	0.766	8.887
Private Unregistered	-5.744	3.774	-7.616	19.792	0

*significant at 5 % level of confidence

The interpretation of Model 1 is relatively straightforward. Household size and ratio of earning members to total members is found to have a negative impact on share of health expenditure. With close to 60 per cent of the sample being in the age group 15-59 (as seen in Chapter 4), this result is not surprising. Bigger the household, more therefore is the chance of an additional income earner, higher the household income and hence lower the out of pocket (OOP) share. Precisely, a one percent increase in the working members to total members of the household reduces OOP share by 1.5 percent. The proportion of vulnerable dependents (individuals less than 5 years and more than 60 years old) also had a negative effect on share of health expenditure. This is possibly due to the unusually lower relative share of morbidity of these groups for our selected sample.

Compared to the reference category, the average OOP share of female headed households was slightly higher by 0.11 percent. Households with heads who are illiterate were likely to have a lower (by around 8.3 percent) share of health expenditure in the household budget and the result was found to be statistically significant. Households whose main earners were casual or contractual labourers, self-employed, pensioners etc where found to have a 2 to 4 percent higher share of health care payment in their household income vis-à-vis those households whose main earners were permanent employees. Ailing individuals whose household belonged to the lower income class had an OOP share 5.5 percent more than the one belonging to a high income category. The differential impact of treatment source presents by far the more interesting case.

With respect to a public source of treatment, individuals who opted for a private registered practitioner had to expend 9 per cent more of their income on treatment. For the private unregistered (and unqualified) sources the figure stood at 6 percent less than the base category average OOP of 15.12 percent.

Model 2 explores how a unit change in the predictor variables affects the probability of a household incurring catastrophic expenditure on account of treatment of non-hospitalised ailment. While coefficient β represents the additive effect of a one-unit change in a predictor variable on the log-odds of catastrophic headcount, the odds ratio $E(\beta)$ represents the multiplicative effect of a one unit change in N on the odds of an individual experiencing catastrophic impact of health care payment. Technically, the antilog of β yields $E(\beta)$. The percentage change in the odds for a unit change in the regressor is obtained by subtracting 1 from $E(\beta)$ and multiplying the result by 100.

The 4th column of Table 8 shows that household size, income and source of treatment were the statistically significant explanatory variables in the model. The other variables although not statistically significant, demonstrated a largely expected direction of association with the regressand. If household size increases by one keeping other variables intact, the probability that it incurs catastrophic health expenditure decreases by 20.5 per cent. Similarly a unit increase in proportion of vulnerable dependents increases the possibility of catastrophic burden by 0.6 percent. Likewise, female headed households, households with a casual labourer as its main earner, low income households and individuals who opt for private formal sources of treatment are more likely to experience catastrophic burden of treatment cost as compared to their respective reference categories.

Thus, income, occupation and choice of service provider emerge as principal determinants of economic burden of illness. Expected policy response should therefore comprise of a suitable blend of targeted health insurance intervention as well as regulation and eventual streamlining of price structures across public and private providers of health service. The best way forward however would be to turn a deaf ear to the pro-liberalisation clamours for fiscal stringency emanating from our international political masters and pump more monetary and human resources into the overtly ailing public health sector of ours. Apart from the cost aspect this would go a long way in ensuring quality of service, which currently seems to be a luxury of some sorts, especially to the urban poor.

A well functioning public health system involving preventive as well as curative health care can also reduce the indirect costs of illness that are largely hidden or are indirectly manifested in terms of choice of service provider. In other words, the time involved in availing medical service from a public source often act as a huge disincentive and forces the poor to go for unqualified doctors if they are unable to finance treatment from a private source.

5. Conclusion

The study proves that morbidity is an economic burden amongst the poor and that the burden has got distinct socio-economic variations. A household facing a health shock often do not have the resources to seek formal sources of treatment and fall in the hands of unqualified medical

practitioners who charge less but provide services of dubious quality. This seems to be the most alarming finding of the study especially since none of these households were found to experience economic burden of illness according to our definition. This shows how the cost of service determines choice of provider. Although the cost is less in public sources of treatment the indirect costs (in terms of waiting time and the resultant workdays lost) are very high and therefore the poor have been found to avoid them. The problem of economic burden of illness can be approached in two distinct ways--enhancing public investment in health and regulating the operational anomalies of the private sector or/and designing an efficient insurance mechanism for the general population. Independent of the path followed, the analysis identifies the sections of the population who need to be specially focused upon.

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