

Demographic Change, Catastrophic Health Spending and Impoverishment in India

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Abstract

This paper focuses on the magnitude and change in out-of-pocket health care spending and its impact on poverty by using two rounds of NSS data on health survey. With very high levels of out-of-pocket (OOP) health care spending, there has been increase with greater magnitude among rural people and those belonging to poorer section of economic strata. The similar picture has also been observed for the impact of OOP spending on poverty; it has increased with greater magnitude in rural area. This paper concludes with substantiating the existent fact that new policies adopted in the health sector reform have significant impact on the increased health care cost and impoverishment. However, demographic transition has had a significant impact; a substantial portion of change in OOP spending and impoverishment is found to be the result of age structure change over the two survey periods.

Introduction

Health care in India is provided by both public and private sector. Of the total health expenditure, the share of private sector is maximum with 78.05%, public sector at 19.67% and the external flows contribute 2.28%. In the contribution of private sector, households contribute a significant portion at 95%, constituting 71.13% of total health expenditure (Government of India, 2005). This out-of-pocket (OOP) health spending is found to have increased further, particularly in the post reform period i.e. after 1990s (Selvaraj and Karan, 2009; Ghosh 2011).

The economic reforms introduced fiscal discipline in the state expenditures during the 1990s gets reflected in the form of reduction in the non-salary components of the social and health sector led to changes in the organization, structure and health financing, particularly in OOP expenditure. And this increase has negative consequences on increasing catastrophic health spending and impoverishment (Wagstaff and van

Doorslaer 2003; O'Donnell et al 2007; Chaudhuri and Roy 2008; Garg and Karan 2009; Ghosh 2011).

While studies attempted to analyze the impact of policy changes to health care cost, attempt has not been taken how demographic transition would influence health spending as well as poverty. With demographic transition age structure changes where proportion of population in the early age group declines and proportion of old aged population increase. This change in the age structure could have strong impact on health care cost since health care cost is expected to be higher among old aged population with the higher burden of disease. Therefore, when analyzing the catastrophic expenditure as a ratio of health expenditure to total household consumption expenditure, it is essential to take into account of age structure change. This adjustment will enable decomposing the impact of policy and demographic change to the catastrophic health spending and household impoverishment.

With the above backdrop, this paper first presents changes in health care expenditure and its impact on impoverishment using NSSO data collected in 52nd and 60th round during the year 1995-96 and 2004 respectively. Further, analyses have been made to understand the impact of demographic transition that has taken place between the two time periods on OOP spending and impoverishment. It also attempts to explore variation in magnitude and impact of OOP spending at the disaggregated level; across consumption expenditure quintiles and between rural and urban settings.

Data and Methodology

This paper is based on 52nd and 60th rounds of health survey data, collected by National Sample Survey Office (NSSO) during the period 1995-96 and 2004 respectively. These surveys covered samples of 120942 and 73868 households respectively. The purposes of these health surveys were to understand status of health and health care cost for each treatment episode of an individual in a household. The unit of analysis in this paper is household, total household expenditure of health care cost is estimated by adding up health spending for each individual for both inpatient and out-patient care. The recall

period was ‘last one year’ for inpatient care and ‘last 15 days’ for out-patient care. Total health expenditure combining both inpatient and out-patient care include the following expenditure categories;

- (a) All medical expenditure towards treatment which includes doctors’ fee, purchase of medicine, diagnostic charges, hospital charges etc.
- (b) other expenses incurred by a household which includes transportation charge, lodging charges and others.

The measures of impact of OOP payment on poverty and catastrophic health payments for healthcare has been discussed below adopted from paper by Wagstaff and van Doorslaer (2003). The impact of OOP payment on poverty is defined as the difference between the average level of poverty before the OOP payment and after the OOP payment. Catastrophic health payment is defined as certain percentage of health care cost to total consumption expenditure a household bears; it could be 10%, 15% or more. The prepayment poverty head count ratio is calculated using the poverty line given by planning commission for the corresponding years. The family per-capita OOP spending (OOP^f) is measured as:

$$OOP^f = \frac{\sum_{i=1}^m n_i^f y_i^f}{\sum_{i=1}^m n_i^f}$$

Where n_i^f denotes the number of members of family f in the age group i and y_i^f the average health care spending of family members in this age group.

The pre-payment headcount poverty ratio is calculated by comparing households’ monthly per-capita consumption expenditure with poverty line defined by planning commission of India for respective periods. Poverty head count estimates for the year 1995-96 and 2004 are done comparing with poverty line of year 1993-94 and 2004 respectively. The prepayment head count ratio (Pre H_p) can be measured as:

$$\text{Pre } H_p = 1/n \sum 1 (X_i \leq PL) \dots\dots\dots 1$$

Where X_i is per capita consumption expenditure, PL is the poverty line and n is the number of individuals.

The post-OOP payment ‘poverty headcount’ is computed by netting out health care payments from households’ consumption expenditure and then comparing with the poverty line, i.e.

$$\text{Post } H_p = 1/n \sum 1 (X_i - \text{OOP}^f) \leq \text{PL}) \dots\dots\dots 2$$

Similarly, intensity of poverty, also known as poverty deepening, is measured by calculating the average ‘poverty gap’ as defined by,

$$\text{Pre } G = 1/n \sum P_i (\text{PL} - X_i) \dots\dots\dots 3$$

And

$$\text{POST } G = 1/n \sum P_i (\text{PL} - (X_i - \text{OOP}^f)) \dots\dots\dots 4$$

Where

$P_i = 1$ if $X_i \leq \text{PL}$ and is zero otherwise.

OOP being positive, equation (2) results in a higher head count ratio and greater number of individuals below the poverty line (PL) compared with that for equation (1).

The additional number of individuals moving below the poverty line because of OOP expenditure is provided by:

$$H_p = \text{POST } H_p - \text{Pre } H_p$$

The average poverty gap or poverty deepening in terms of the average amount by which people go below the poverty line because of OOP expenditure, is measured by:

$$G = \text{POST } G - \text{Pre } G$$

To compare poverty gaps estimated using different poverty lines (between rural-urban and time periods), normalized poverty gap is used. The normalized poverty gap is defined as $NG = GP/PL$

The impact of demographic transition on health care spending and on poverty has been estimated using counter-factual simulations. The aim of the counter-factual simulation is to compare the level of actual OOP spending with the level of OOP that would prevail if per-capita family OOP spending were estimated by

$$OOP_t^f = \frac{\sum_{i=1}^m n_{it}^f y_i^f}{\sum_{i=1}^m n_{it}^f}$$

Where $n_{it}^f = \frac{n_i^f N_{it}}{N_i}$

Where N_i is the number of members in age group per family today and N_{it} is the corresponding average t years ago.

Results

OOP expenditure and catastrophic health spending

The analysis of share of monthly OOP spending to consumption expenditure (MPCE) by rural-urban and consumption expenditure quintiles reveal that the mean share has increased marginally from 8.18 in 1995-96 to 8.46 in 2004 (Table-1). The share was greater in rural areas than in urban areas. There has been variation between rural-urban and across MPCE quintiles. The increase has been observed for first two quintiles and it is found to have decreased for rest of the quintiles. Particularly, the reduction was much steeper for the highest 20% quintile. Further the progressive nature of share of OOP to MPCE observed for the year 1995-96 and it has undergone changes in 2004, particularly in urban areas. While the share of OOP is found to be increasing with the higher MPCE quintiles in rural areas for both the periods, the same picture is observed for 1995-96 only in urban area.

Table 1: Average OOP share (%) to per capita consumption expenditure by quintile groups for rural, urban, combined in India, NSS 52nd and 60th round.

Consumption expenditure quintiles	1995-96			2004-05		
	Rural	Urban	Total	Rural	Urban	Total
First 20%	5.98	6.48	6.26	9.26	8.81	8.70
Second 20%	7.31	8.39	7.39	8.82	7.66	8.95
Third 20%	7.30	6.79	8.25	10.07	7.54	8.07
Fourth 20%	8.38	7.82	8.83	9.11	6.07	8.79
Fifth 20%	13.08	8.30	11.48	11.55	7.80	7.40
Total	8.40	7.54	8.18	9.70	7.70	8.46

The catastrophic health expenditure, expressed as a percentage of households spending a certain percentage on health care to total household expenditure, has increased across all quintile groups (Table-2). Since there is no standard threshold level to define catastrophic health expenditure analysis has been carried out at 5%, 10%, 5% and 20%. However, in many studies 10% as a threshold level has been considered to measure catastrophic head counts. At this 10% level, the incidence catastrophic health expenditure has increased from 14.8% in 1995-96 to 19.0% in 2004-05. Catastrophic health spending also found to have varied with the consumption expenditure quintiles. Across the all threshold levels the incidence of catastrophic health expenditure increases with the higher quintiles and the picture remained similar for the two time points.

Table 2: Percentage of households incurring catastrophic payment for health care by quintile groups

Consumption expenditure quintiles	1995-96				2004			
	5%	10%	15%	20%	5%	10%	15%	20%
First 20%	14.6	12.1	9.9	8.1	21.7	17.3	14.1	12.0
Second 20%	16.5	13.4	11.0	9.0	24.4	18.9	15.1	12.4
Third 20%	18.9	15.4	12.7	10.5	25.5	19.9	15.5	12.3
Fourth 20%	20.6	16.7	13.9	11.8	27.6	20.8	16.4	12.9
Fifth 20%	21.8	18.3	15.9	13.4	27.9	21.8	16.9	13.1
Total	18.1	14.8	12.3	10.3	24.7	19.0	14.9	12.1

Poverty impact of OOP spending

The increase of poverty head count ratio after accounting for OOP payment is an expected incidence. At both the time periods and both in rural and urban areas, OOP spending pushed a significant percentage of households into the below poverty line with greater magnitude in rural than in urban areas. There has also been change in the poverty head counts between the period 1995-96 and 2004. In total, the change in poverty head counts due to OOP spending increased from 6.0 in 1995-96 to 6.8 in 2004. While it has increased from 6.1% to 7.7% in rural areas, there was decline from 5.4% to 4.6% in urban areas.

The poverty gap showing the amount by which below the poverty line households dips the poverty line remains almost same at both the time points and in rural and urban areas. This poverty gap increases substantially after accounting for OOP payment. In 1995-96, the gaps were increased by Rs. 8.1 and Rs. 9.2 in rural and urban areas respectively. And in 2004, the gaps jumped to Rs. 19.75 and Rs. 15.68 in rural and urban areas respectively.

Table 3: Poverty increase after accounting for oop payments: poverty headcounts and poverty gaps, India, NSS 52nd and 60th round.

Poverty measures	1995-96			2004		
	Rural	Urban	Total	Rural	Urban	Total
Poverty headcounts (in %)						
Pre-payment headcount (pre-HP)	39.1	27.9	33.6	28.1	21.4	26.2
Post-payment headcount (post-HP)	45.3	33.3	39.6	35.8	26.0	33.0
Poverty impact (post HP – Pre HP)	6.1	5.4	6.0	7.7	4.6	6.8
Poverty gap (in Rs.)						
Prepayment gap (pre-G)	23.2	21.4	20.1	24.81	20.90	21.99
Post-payment gap (post-G)	31.3	30.6	29.3	44.56	36.58	38.81
Poverty impact-gap (post G-pre G)	8.1	9.2	9.2	19.75	15.68	16.82
Normalised poverty gaps (in %)						
Pre-normalised gap (pre-NG)	8.92	7.72	8.4	5.9	4.8	5.5
Post-normalised gap (post-NG)	10.64	8.84	9.94	7.78	6.12	7.4
Normalised poverty impact (post-NG-pre NG)	1.72	1.12	1.54	1.88	1.32	1.9

The comparison of poverty gaps between two time points is more meaningful when compared with normalized poverty gaps, divided by the poverty lines (Wagstaff and Van Doorslaer 2003, Ghosh 2011). It can be observed that the increase in the normalized poverty gap after accounting for OOP payment has moved from 1.54 percentage points in 1995-96 to 1.9 percentage points in 2004. The change was greater in rural than in urban areas and it has increased over the period in both the places.

Impact of demographic transition on health care spending and poverty

This section presents to what extent demographic change, expressed through the age structure change, played a role over the two time points to the increased OOP spending as well as increased impoverishment. India has been going through demographic transition and resulted in age structure change. The proportion of people belonging to lower age groups have reduced and increased for the higher age groups, particularly for the old age group. This demographic transition is also visible between the time points 1995-96 and 2004. The table 4 shows that while average member in a family for the lower age group has reduced it has increased for the higher age groups from the year 1995-96 to 2004.

With the age structure change between the two time points, it is expected that some proportion of higher average health care spending in a family observed in 2004 could be reduced if age structure of 1995-96 was prevailed. The age structure of 2004 characterized with higher proportion of old aged population as compared to age structure of 1995-96 and that is expected to result in higher average health care spending of a family since rate of hospitalization as well as per episode hospitalization cost is higher for the old aged population than that of younger age groups (NSS 52nd round, NSS 60th round).

The impact of demographic transition on OOP spending is derived through the estimation of counter-factual OOP spending. This approach has made possible to understand the direct impact of demographic change to the increased OOP payment as well as resultant impoverishment.

Table 4: Average members per family by age groups for the year 1995-96 and 2004

Age groups	1995-96	2004	Ratio
0-14	1.91	1.7	0.89
15-29	1.42	1.39	0.98
30-44	0.97	0.99	1.02
45-59	0.61	0.62	1.02
60+	0.28	0.47	1.68
All	5.19	5.17	1.00

It can be seen that (Table 5) mean OOP spending has reduced by Rs. 9.96 when counterfactual measure is adopted. This indicates that demographic change caused increase of mean OOP health spending by Rs. 9.96 between the two time points. This difference is greater in urban areas with Rs. 13.74 than in rural areas with Rs. 8.29. Analysis based on consumption expenditure quintiles shows that differences expand with the moving from lower to higher consumption quintile. In rural area the difference varies from Rs. 3.94 for the first 20% quintile to Rs. 18.71 for the top 20% quintile. Similarly, it varies from Rs. 5.48 for the first quintile to Rs. 30.79 for the top quintile in urban area.

Table 5: Counterfactual OOP spending and change from actual OOP spending for the year 2004

Consumption expenditure quintiles	Counterfactual OOP			Change from actual		
	Rural	Urban	Total	Rural	Urban	Total
First 20%	20.16	30.32	21.9	3.94	5.48	4.02
Second 20%	28.97	41.38	35.76	4.4	6.57	6.47
Third 20%	41.74	56.8	42.1	5.93	9.5	7.93
Fourth 20%	46.45	59.32	63.56	7.23	12.34	10.48
Fifth 20%	102.6	135.24	111.42	18.71	30.79	23.35
Total	45.2	66.55	51.02	8.29	13.74	9.96

The reduction in the share of OOP spending to the MPCE is an inevitable outcome when calculated with counterfactual OOP-spending and that can be seen in Table 6. There has been around 1% reduction in the mean share of OOP spending with marginal variation between rural and urban areas. In total, the reduction has been greater in urban areas than

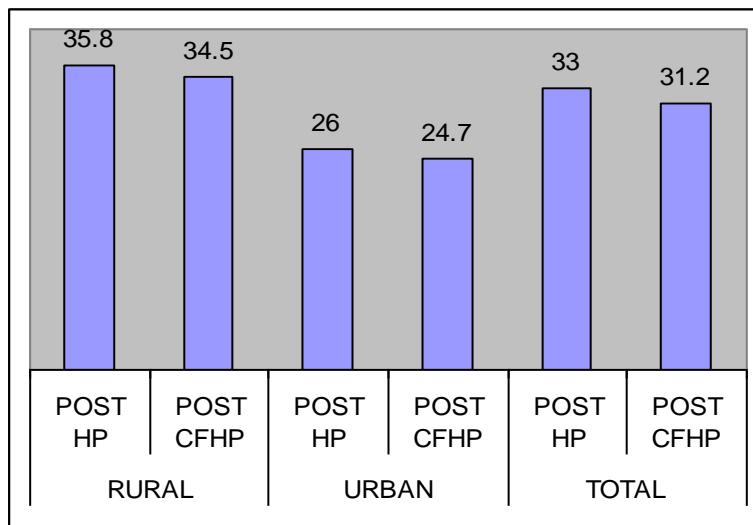
in rural areas. The reduction is also found to be varying with the MPCE quintiles. It increases from lower to higher MPCE quintiles.

Table 6: Comparison of actual OOP share and counter-factual OOP share to MPCE, 2004

Consumption expenditure quintiles	Counter-factual			Change from actual		
	Rural	Urban	Total	Rural	Urban	Total
First 20%	8.37	7.75	8.4	0.89	1.06	0.67
Second 20%	7.95	6.6	8.65	0.87	1.06	0.85
Third 20%	8.95	6.41	7.77	1.12	1.13	0.98
Fourth 20%	7.89	4.86	8.49	1.22	1.21	1.13
Fifth 20%	9.73	6.09	7.1	1.82	1.71	1.46
Total	8.54	6.46	8.16	1.16	1.24	0.98

Figure 1 shows to what extent demographic change has had impact on the increase of impoverishment after accounting for OOP spending. Comparison between poverty head count ratio after accounting for OOP spending and counter factual OOP spending shows that there is around 2% reduction in the poverty head count ratio and the picture is found to be almost similar both in rural and urban areas.

Figure1: Poverty measure (head counts) after accounting for OOP payments and counter factual OOP payments, 2004



Note: POSTHP= poverty head counts after accounting for OOP payment; POSTCFHP= poverty head counts after accounting for counter-factual OOP payment.

Discussion and conclusions

The results of this paper reiterate the earlier fact that OOP spending is the prime source for health care in India. In average a household spends around 8.5 percent of total consumption expenditure for health care. This proportion of health spending is greater in comparison to developed and even to many developing nations (WHO 2006).

The share of OOP spending to consumption expenditure has further increased with greater extent among people belonging to higher consumption expenditure quintiles. This indicates well-off class spends greater proportion of their income for accessing quality health care with greater health seeking behaviour, greater awareness as compared to poorer groups. However, the burden of health care cost has increased with greater magnitude among poorer section of population even though richer families spend higher amount. The change in the share of OOP spending to consumption expenditure has been greater among the poorer groups as compared to richer groups.

The increasing burden of OOP spending is also reflected through the analysis of catastrophic health care expenditure. The incidence is found to be very high (14.8% at 10% level) and it has increased to 19 % over the two time points. There is also marked differences across consumption expenditure quintiles. The catastrophic health spending increases from lower to higher consumption expenditure quintile. However, the change over the period has been steeper among lower quintiles than the higher quintiles.

With the evidence of high OOP spending as well as incidence of catastrophic health expenditure, the increase of poverty head count ratio after netting out OOP spending is an inevitable outcome. Analysis of poverty head counts before and after netting out OOP spending indicates that a substantial proportion of households are pushed below the poverty line. The increase of ratio accounts as high as 6% in 1995-96 and 6.8% in 2004. Therefore, the increase of OOP spending over the two time points is reflected in the head count poverty estimates too; it has increased by 0.8%. There has been noticeable variation although in OOP spending and the poverty head counts between rural and urban

areas. The impact of OOP spending on head count poverty ratio and its change were greater in rural area than that of in urban area.

There are various reasons as pointed out in various papers earlier for the observed high OOP spending and its increase over the periods. It is a fact that OOP health spending is not an efficient health financing strategy and there are many adverse impacts on households in terms of pushing households into poverty (Peters et al. 2002; Wagstaff and van Doorslaer 2003; van Doorslaer et al. 2006) . OOP spending many times force households to borrow to meet their medical expenses and that lead them to indebtedness and chronic poverty. Among the various reasons for the increased OOP spending the new reform policy which mainly introduced during the late 1990s is considered to be one of the main reasons. With the introduction of reform the public sector health spending has come down substantially and that amount is passed on to patient parties. In many states user charges have been introduced, distributions of free medicines have been stopped and price of generic medicines has increased due to the liberalization in pharmaceutical markets. Another important reason which can be attributed for the increase of health care spending is that medical inflation has been relatively higher than the overall price level of other goods and services.

Accepting the strong influence of policy changes and inefficient ways of health care financing, the role of demographic change to the increased OOP spending can not be ruled out. India is going through demographic changes and that is even noticeable between the study periods, 1995-96 to 2004. The age structure has under gone changes between the two time points. While the average members in a family for the early age groups has come down, the average members for the old age group has increased. As analysis of this paper suggests, the age structure change has had noticeable impact on OOP health spending as well as on incidence of poverty. Considering the higher incidence of morbidity, hospitalization and associated higher medical expenses (NSS 52nd round, 1995-96; NSSO 60th round, 2004), it is expected that population with higher proportion of old aged population has to bear higher medical cost than the population with lower proportion of old aged population. The analysis based on counter factual estimate of OOP spending has shown that in average Rs. 10 could be reduced in 2004 if

age structure was prevailed for the year 1995-96. Therefore, the impact of demographic change to the increased OOP spending has been Rs. 10 and it counts to around 1% in terms of share to consumption expenditure. There has been rural-urban divide although. The change in OOP spending after counterfactual estimates has been greater in urban areas than that of rural areas and that is expected due to comparatively rapid demographic change in urban areas as compared to rural area. The increase in poverty head count ratio could be lower by around 2% if counterfactual estimates of OOP spending is netted out from the consumption expenditure than the actual OOP spending in 2004.

In conclusion, it can be noted that OOP health care spending remained very high where richer people spend higher proportion of their consumption expenditure than poorer counterparts with rural-urban divide. Richer quintiles in rural areas bear greater burden of OOP spending than their urban counterparts. This OOP spending has also increased over the two time points and that increase has been greater in rural areas and among poorer quintiles than their respective counterparts. It indicates there has been reallocation in the OOP spending across quintile groups and between rural and urban areas where rural and poorer section of population have become marginalized and burden of increased health care spending has passed on to poorer section of population. This phenomenon is also reflected with the greater increase of poverty due to OOP spending. The increase of poverty head count ratio has been substantially greater in rural than in urban areas. This high health care spending and resultant impact of increased poverty head count ratio reiterates the facts drawn out from earlier researches that new policy introduction has had an important impact on increased OOP spending, but a significant portion of increase also caused by demographic changes. A substantial portion of OOP health care spending has increased for a household to meet health care expenses for the increased number of old aged population those need greater health care than the younger groups of population. In this context, new government programme may be suggested in which not only rural poor people will be provided subsidized drugs, attention must be paid to the old aged population both in rural and urban areas who needs frequent health care causing increased burden of health care cost to a household.

At last, it is required to be mentioned here that estimates of OOP spending as well as associated measures of poverty are found to be greater than the estimates based on other rounds of NSS data. For example, estimates of share of OOP spending to consumption expenditure is around 3% higher in this paper than the estimate in Ghosh (2011) based on NSS 61st (2004-59). Even, using same data (NSS 52nd round), my estimate of share of OOP spending (8.18%) differs from estimate (6.83%) in Peters et al. (2002). The main reason for this difference is how health expenditure is recorded in CES and health survey. The CES captures OOP payment as a part of total household consumption expenditure, where as health survey captures OOP payment for those households reported any ailment/hospitalization with a higher fraction of their household expenditure than the CES. This is further accentuated by the lower household consumption expenditure reported in the Health survey. Further, Peters et al. (2002) estimated OOP spending using 52nd round NSS data including medical expenses for both institutional and non-institutional care; associated medical cost incurred for traveling, lodging and others were not taken into account. Naturally, an estimate of OOP spending in this paper turns out greater since any cost incurred by a household relating to illness/hospitalization is included in the estimation. With the knowledge of differences in OOP spending across various data sets, this paper uses health survey data to get estimate of counterfactual OOP spending. To get the counterfactual estimate of OOP spending one need to have age specific health care cost which is available in health survey data; CES data collects health spending at the household level, it does not collect information of health care cost for each individual of a household. Nevertheless, it can be said that although there is variation in estimates of OOP spending as well as resultant poverty estimates with other data sources, the conclusion of this paper resembles with earlier researches and made contribution by showing how demographic transition has played a significant role for the increased OOP spending as well as impoverishment.

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