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Contents

PART-I

TECHNICAL PAPERS

Issues and Challenges in Estimating Catastrophic Health spending in India

Sanjay K Mohanty[1], Anshul Kastor[2] and Laxmi Kant Dwivedi[3]

Abstract

Estimates on catastrophic health spending (CHS) in India is usually derived from the consumption survey (schedule 1.0) or health survey (schedule 25.0) carried out by the National Sample Survey Organisation (NSSO). These estimates are not consistent and suffer from at least two implicit limitations. While the health surveys used a single/ a few questions on consumption expenditure that tends to affects the estimates of CHS, data on household health spending collected in the consumption expenditure survey is limited and tend to lower the CHS. In economic literature, a large number of studies documented that a single question on total monthly consumption expenditure is more likely to underreport the expenditure as compared to those with disaggregated categories. This paper use four rounds of NSS data (both consumption and health surveys) and outlined the issues and challenges in estimating the CHS in India. The CHS is estimated based on 10% thresholds of household consumption expenditure and 40% of household capacity to pay (WHO recommended methodology). Results confirm underestimation of consumption expenditure in health surveys. The consumption survey appeared to underestimate the household health expenditure. An estimate of CHS varies to large extent under alternative method. The correlation of CHS derived from alternative method was weak. Given the importance of estimation of CHS, we suggest to integrate an abridged version of consumption expenditure in NSS health survey and undertake longitudinal study on health financing to provide evidence for health policy in India.

Key words: catastrophic health spending, out-of-pocket expenditure, NSS, India, data.
JEL Codes: C1, C18, I10, I14, I18

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[1] Professor, Department of Fertility Studies, International Institute for Population Sciences, Govandi Station Road, Deonar, Mumbai- 400088, India., Email: sanjayiips@yahoo.co.in

[2] Research Scholar, International Institute for Population Sciences, Govandi Station Road, Deonar, Mumbai- 400088, India, Email: ansulkastor@gmail.com

3 Assistant Professor, Department of Fertility Studies, International Institute for Population Sciences, Govandi Station Road, Deonar, Mumbai- 400088, India., Email: laxmikdwivedi@gmail.com

1. Introduction:

Estimation of out-of-pocket (OOP) expenditure and catastrophic health spending (CHS) are gaining increasing research and programmatic attention in developing countries (Xu etal. 2003; van Doorslaer etal. 2007;Arsenijevic, Palova and Groot 2013; Rashad and Sharaf 2015; Amaya-Lara 2016). The high OOP reduces access to health care, increase untreated disease and irrational use of drugs, reduced consumption of food and basic necessities, increase poverty and long-term impoverishment and makes poor poorer (Liu, Rao and Hsiao 2003; Wagstaff and Doorslaer 2003; Pannarunothaiand Mills 1997; Hjortsberg, 2003; Garg and Karan 2009; Bonu etal 2007; Whitehead, Dahlgren and Evans 2001). Theoretical perspective and systematic review on adverse economic consequences of health shock have been documented (Malntyre etal 2006; Alam and Mahal 2016). The CHS link OOP with capacity to pay, usually measured by the economic well being of the household (Xu etal. 2003; van Doorslaer etal. 2007). While income data in developing countries suffers from under-reporting and unreliable, the consumption expenditure data are generally recommended and used to reflect the economic well-being of household (World Bank 2000; Van Doorslaer etal 2006). Data on consumption expenditure is preferred to income for conceptual (long term prospects, less fluctuation, capture differentials in consumption due to accumulation of assets and credits) and economic reasons (under-reporting, net tax and capture government transfer) in low resources setting (Meyer and Sullivan 2003).

Data quality on consumption expenditure, household health spendings and use of appropriate method is paramount in estimation of catastrophic health spending and impoverishment due to health payment. Estimates of consumption expenditure vary due to survey designs and survey priorities (consumption surveys, living standard survey, health surveys etc.). In economic literature, a large number of studies documented that a single question on total monthly consumption expenditure is more likely to underreport the expenditure as compared to those with disaggregated categories (Winter 2004;Browing, Crossley and Weber 2003) while extensive list of expenditure items yield reliable consumption data (Deaton 1997; Pradhan 2001; Lanjouw and Lanjouw 2001). The number of questions canvassed to estimate consumption expenditure varies from a single question to over 400 questions depending on the type of surveys and context. Besides, the recall periods (7 days/30 days/365 days) vary within and among countries. For example, in India, the National Sample Survey (NSS) in their health survey (71^{st} round, 2014-15) canvassed a single question on consumption expenditure while the consumption expenditure survey (68^{th} round, 2011-12) canvassed over 340 items to derive a single variable on consumption expenditure. Further, the quality of consumption data depends on recall periods and structure of consumption questions (Lu etal 2009; Battisin, Miniachi and Weber 2003). With respect to method, the estimates of CHS are derived using two alternative approaches, both based on ability to pay but estimates vary largely due to the type of method used (Berki 1986, Xuetal. 2003).

The aim of this paper is to outline the issues and challenges in estimating catastrophic health spending in India. Reliability of consumption expenditure and data on medical care across surveys and over time have been examined. The paper has been conceptualized with the following rationale. First, the out-of-pocket health spending in India remained high over time

(71% in 2004 and 69% in 2014) and leading to distress financing and increasing the poverty level (Joe 2015; Garg and Karan 2009). The recently released National Health Policy, 2017 aimed to reduce the extent of catastrophic health spending by 25% by 2025 from its current level by increasing public spending on health. Second, the increasing prevalence of non-communicable diseases, increasing use of technology, and the demographic transition lead to increase household health spending across socio-economic groups. The household health spending is growing at least twice faster than the overall economic well being of the household (Mohanty etal 2016). Third, the estimate of CHS varies across and within the survey owing to type of method used and the data quality. While the health surveys that provides detailed information on health expenditure, it used a single/few question on consumption expenditure. Similarly, the consumption expenditure surveys use detailed question on consumption expenditure but limited information on morbidity and health care. Understanding merits and limitations of these surveys are a prerequisite to arrive reliable estimates of CHS in India.

2. Data and Method

2.1. Data

The National Sample Survey (NSS) is the official statistical system of Government of India that has been conducting large-scale population based surveys on various socio-economic and health issues in the country since its inception in 1950. Till date, 74 rounds have been completed and these data are largely used among researchers, government and various organization. Among various rounds of the survey, the morbidity and health care surveys in 60^{th} round (carried out during January-June 2004), the social consumption in 71^{st} round (carried out during January-June 2014) referred as health surveys, and the consumption expenditure survey of the 61^{st} round (July 2004-June 2005), 66^{th} round (July 2009-June 2010) and 68^{th} round (July 2011-June 2012) have been largely used in estimating the catastrophic and impoverishment effect of health spending in India. The consumption surveys aimed to provide the economic well-being of the population including estimation of poverty and inequality and the health surveys intended to provide morbidity and health care spending of households. These surveys were nationally representatives and provide comprehensive information on morbidity and health care expenditure on outpatient and inpatient visit for every member of the population.

Two rounds of health surveys are similar in instrument, design and provide changes in health and health spending. A large number of scientific publications, research reports and the policy documents have been published using data from these two rounds of the surveys. Studies derived from these surveys often used the consumption expenditure in understanding the economic gradient of health care. Though health surveys covered extensive information on morbidity, health spending for each member by episode but there is only one/ a few questions on consumption expenditure in these surveys. On the other hand, the consumption expenditure surveys collect Five questions (expenditure on medicine, test, doctor's fees, hospital charges and other medical expenses) of household institutional health spending (hospitalization) in a reference of one year and five question on non-institutional health

spending as a part of consumption surveys. Questions on consumption are extensive and similar over time. Findings from these surveys are available in reports of respective rounds (NSS $2006_{a;}$ NSS $2006_{b;}$ NSS 2014; NSS 2016). We have used the unit data from 60^{th} and 71^{st} round of health surveys and the 61^{st} and 68^{th} round (type 1) of consumption survey to examine the similarities and variation in health and consumption variables across surveys and over time.

2.2. Method

Annual per capita consumption expenditure (APCE) and annual household health expenditure (AHHE) are two key variables used in the analyses. The APCE has been derived from the monthly per capita consumption expenditure (MPCE). Since surveys were carried out at different point of time between 2004 and 2014, we have converted the consumption and health expenditure of 2011-12 and 2014 at 2004-05 prices (constant prices). Descriptive statistics, kernel density curve and ordinary least square regression are used in the analyses. In literature there are two methods used in estimating the CHS. In the most simplistic approach, out-of-pocket health spending exceeding fixed proportion of health spending (>10%) is termed as CHS (Berki 1986). Mathematically, health spending is defined as catastrophic if $T/x \geq 10$ ……..(1)

where T is the OOPE, x is the consumption expenditure

The second approach defined CHS based on the capacity to pay (CTP) and defined as

$T / [x\text{-}f(x)] \geq 40$ ……(2)

where f(x) is the subsistence expenditure (Xu etal. 2003). The cut-off of 10% or 40% is a normative decision. Estimates from these two approaches are not consistent.

3. Results

Fig1 shows the plot of the kernel density curve of MPCE from four rounds of health and consumption surveys during 2004-14 at 2004-05 prices. All these curves had a single mode at about 400-500 rupees. In general, the patterns of density function of MPCE from consumption surveys and health surveys are similar. However, the density curve from consumption survey has shifted rightward over time, possibly due to improved standard of living. Also, the MPCE from consumption survey is smoother than the health survey. On the other hand, the MPCE from health survey is also similar and had shown heaping to the right in both the periods. Since MPCE from health surveys are derived using few questions, there are humps suggesting evidences of digit preference at 1000, 1500, 2000 etc. A higher proportion of the households in health surveys reported lower level of consumption expenditure as compared to that from consumption surveys over time. The estimates of consumption expenditure from consumption survey appeared to be reliable.

Fig 1: Kernel density curve of monthly per capita consumption expenditure from consumption and health survey in India, 2004-14

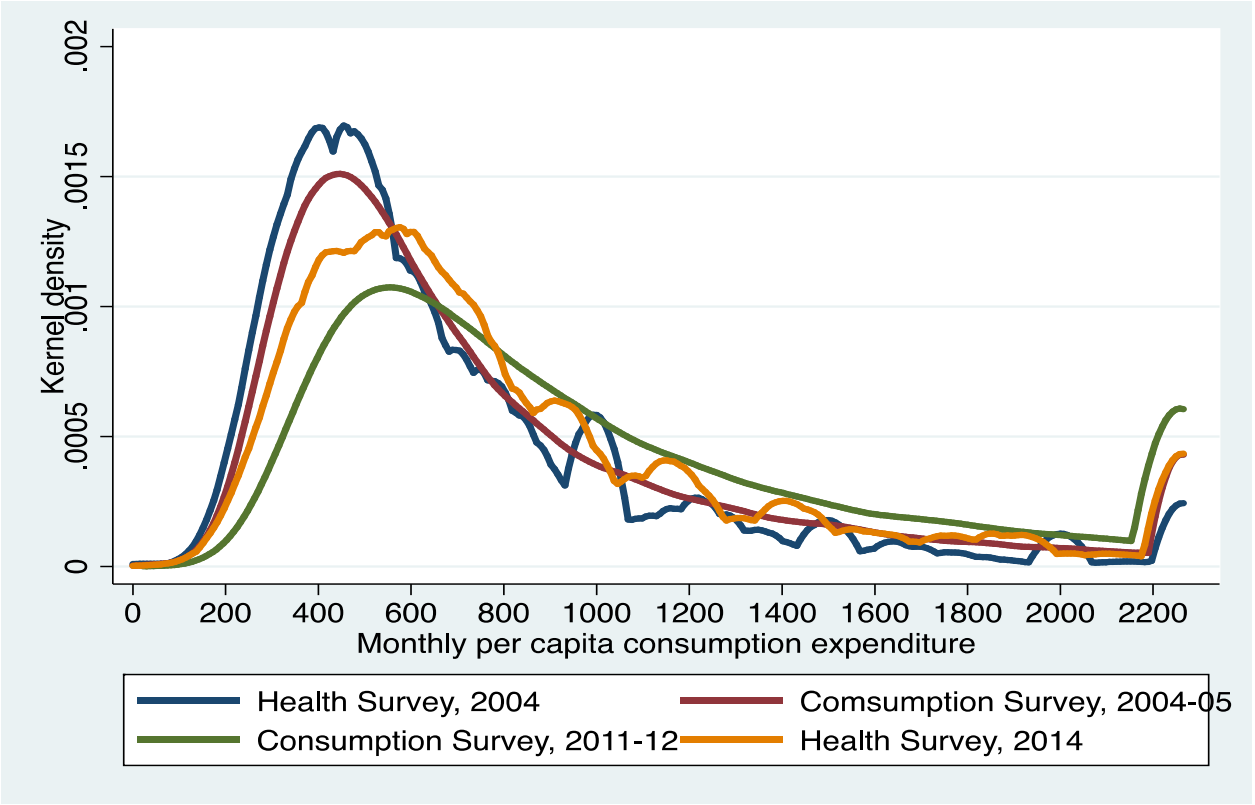

Fig 2 (a) gives the plot of kernel density curve of household annual health expenditure on hospitalization (annual institutional health expenditure) from consumption survey (2004) and health survey 2004-05. The modal points from both surveys are at about 2000 rupees. The patterns of health expenditure from both the surveys are opposite to that of MPCE. The annual institutional health expenditure from health survey is smoother than the consumption survey. There is evidence of digit preference at 5000, 10,000, 15,000 etc. in consumption survey. A higher proportion of the households in consumption survey is at lower level of health spending as compared to health surveys. Fig 2 (b) plot of kernel density curve of household annual health expenditure on hospitalization (annual institutional health expenditure) from consumption and health surveys of 211-12 and 2014 respectively. The general pattern of density curves remained similar but the curve shifted rightward suggesting increased health spending over time.

Fig 2 (a): Kernel density curve of health expenditure on hospitalization from consumption and health survey, 2004-05

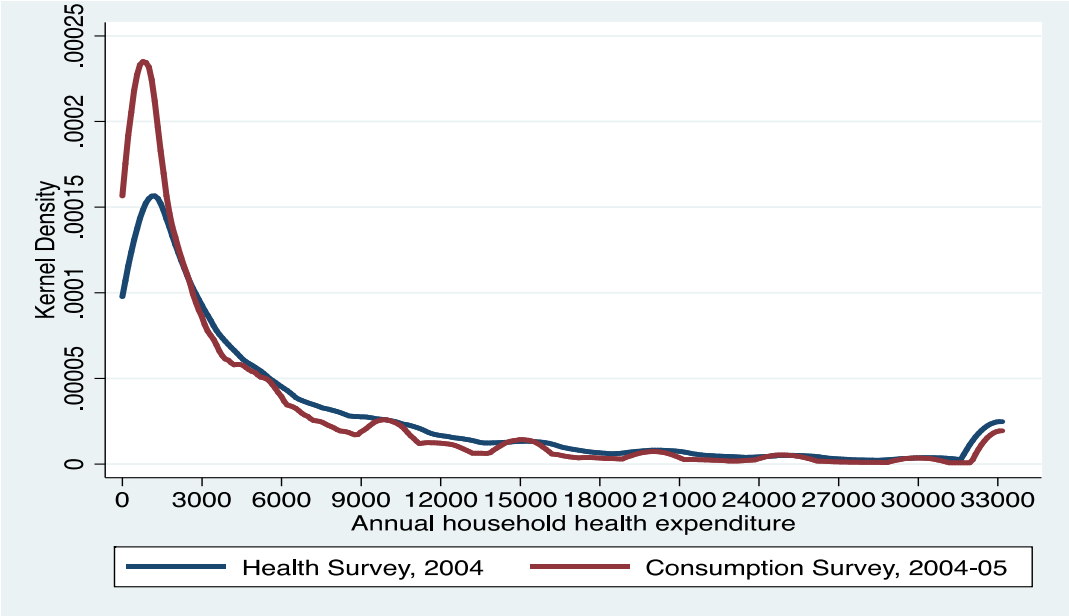

Fig 2 (b):Kernel density curve of health expenditure on hospitalization from consumption and health survey, 2011-12 and 2014 at 2004-05 prices

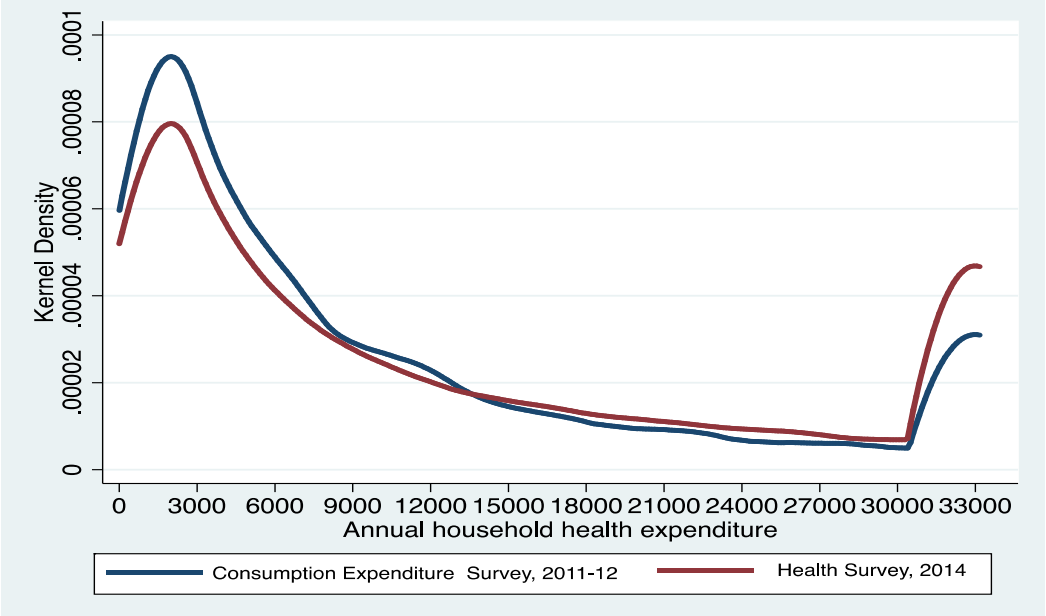

Table 1 presents the distribution of APCE and annual household health expenditure on hospitalization at 2004-05 prices from health surveys and consumption expenditure surveys during 2001-14. The APCE from health survey was lower than that from consumption survey over time. For example the APCE was 8319 rupees from consumption survey as compared to 7282 rupees from health survey during 2004-05. The mean values of consumption expenditure from health surveys were lower at all level of distribution. Ratio of MPCE from

consumption and health survey suggests that the underestimation of consumption expenditure was relatively higher among richer population. In the case of annual household health expenditure on hospitalization, the mean spending was lower from consumption survey compared to health surveys except 5th and 10th percentile.

Table 1: Descriptive statistics of annual per capita consumption expenditure and annual health expenditure of household on hospitalization (in Indian rupees) at 2004-05 prices from consumption and health surveys in India, 2004-14

Annual per capita consumption expenditure/annual health expenditure on hospitalization	Period 1		Period 2		Ratio of annual per capita consumption and health expenditure from consumption and health surveys	
	Consumption survey, 2004-05	Health Survey 2004	Consumption survey 2011-12	Health Survey 2014	Period 1	Period 2
Annual per capita consumption expenditure						
5th Percentile	3387	3072	4309	3618	1.10	1.19
10th percentile	3975	3650	5092	4344	1.09	1.17
25th percentile	5255	4867	6841	5791	1.08	1.18
50th percentile	7447	6692	10023	8267	1.11	1.21
75th percentile	11667	10139	15861	12410	1.15	1.28
95th percentile	25374	20278	34010	27509	1.25	1.24
Mean	8319	7282	10984	9160	1.14	1.20
N	124644	73863	101662	65925		
Annual health Expenditure on hospitalization						
5th Percentile	200	150	278	214	1.33	1.30
10th percentile	315	350	426	395	0.90	1.08
25th percentile	775	1045	1084	1156	0.74	0.94
50th percentile	2200	3150	2880	3570	0.70	0.81
75th percentile	6000	8774	7399	10193	0.68	0.73
95th percentile	24000	32000	28800	38080	0.75	0.76
Mean	7262	6234	8096	9785	1.16	0.83
N	13359	31510	16009	46688		

Monthly per capita consumption expenditure and annual household health expenditure on hospitalisation from consumption and health surveys, 2014-15 : Table 2(a) presents result of regression analysis by using the MPCE at 2004-05 prices as dependent variables. The MPCE has been regressed over time and across surveys and the MPCE from consumption expenditure survey in 2004-05 is taken as the refernce. The rationale is to understand to what extent the MPCE has changd across surveys / over time. We found that the MPCE from health survey in 2004 (simillar time period) was lower by 136 rupees as compared to consumption survey in same year. The MPCE from same surveys over time (2004-05 and 2011-12) has increased by 310 rupees and suggesting increase in standard of

living of the population. However, MPCE from health survey of 2014 has only increased by 41 rupees suggesting underestimation of consumption expenditure in 2014 health survey. If the reportings of cosnumption expenditure were true in both surveys, the estimates would have been simillar or higher than that of 2011-12.

Table 2 (a): Regression result of trends in monthly per capita consumption expenditure from consumption and health surveys in India, 2004-14

	Coefficient	t-statistics	95% CI	
Consumption expenditure survey, 2004-05 (Reference)			Lower Limit	Upper Limit
Health expenditure survey, 2004	-136	-19.59	-149	-122
Consumption expenditure survey, 2014	310	49.17	298	323
Health expenditure survey, 2014	41	5.67	27	55
Constant	852	201.27	843	860

Table 2(b) presents the result of regression analysis by using annual household health expenditure on hospitalisation (AHEH) from health survey, 2004 as dependent variables. The AHEH has been regressed over time and across surveys and the AHEH from health survey in 2004 is taken as the refernce. We found that the annual household health expenditure from consumption survey in 2004-05 was lower by 136 rupees than the health survey in 2004. The annual health expenditure on hospitalisation during 2004 and 2014 (health survey) has increased by 1584 rupees. The annual household expenditure on hospitalisatin from cosnumption survey in 2011-12 showed 804 rupees lower than health survey 2004 suggesting underestimation of health expenditure in consumption expenditure surveys.

Table 2 (b): Regression result of trends in annual household health expenditure on hospitalisation from consumption and health surveys in India, 2004-14

	Coefficient	t-statistics	95% CI	
Health expenditure survey, 2004 (R)			Lower Limit	Upper Limit
Consumption expenditure survey, 2004-05	-2196	-8.61	-2696	-1696
Consumption expenditure survey, 2014	-804	-3.35	-1274	-334
Health expenditure survey, 2014	1584	8.79	1231	1937
Constant	8904	63.99	8631	9177

Studies on catastrophic health spending: How are they affected?

Increasing number of studies are estimating catastrophic health spending and impoverishment effect of health spending. Table 3 presents list of eight studies that provide estimates of CHS/ discuss methodological limitation of such estimates in India. We have classified these studies into two categories; five studies estimated CHS using consumption expenditure survey (Bonu, Bhushan and Peter 2007; Selvaraj and Karan 2009; Ghosh 2010; Pal 2012; Raban, Dandona and Dandona 2013), b) three studies estimated CHS from health surveys (Bonu etal 2009; Goli etal 2016; Tripathy etal 2016). The estimates from these studies differ not only due to varying time and nature but also due to method used within the same data set. Studies derived from consumption expenditure surveys had underestimated the extent of catastrophic health spending because the health expenditure in these surveys are underestimated. On the other hand, studies based on health survey are more specific than a particular service uses. These findings have specific relevance on methodological limitations in estimating CHS (Bonu etal 2009). Estimates derived under method 1 is not suitable and method 2 yields more reliable estimates. The correlation coefficient of CHS under alternative method was weak (0.69).

Table 3: Studies on catastrophic health spending in India based on NSS data

Authors	Data Source, round and type (NSS)	Title	CHS is defined as fixed proportion of household consumption expenditure (> 10%) (Method 1)	CHS is defined as higher than 40% of capacity to pay/non-food expenditure (Method 2)
1.Bonu, Bhushan and Peter, 2007	NSS consumption survey (61st round), 2004-05	Incidence, intensity and correlates of catastrophic out-of-pocket health payments in India	CHS was estimated at 13.1%	CHS was estimated at 5.1%
2. Selvaraj and Karan, 2009	NSS consumption survey, 1999-2000 and 2004-05	Deepening health insecurity in India: evidence from national sample surveys since 1980s.	Catastrophic health spending has increased from 10.8% in 1999-200 to 15.4% by 2004-05	Not computed
3. Ghosh (2010)	NSS consumption survey, 1993-94 and 2004-05	Catastrophic payments and impoverishment due to out-of-pocket health spending: The effects of recent health sector reforms in India, *EPW*	OOP payment expenditure exceeding 10% of total household consumption expenditure was 13% in 1993-94 and 15.4% by 2004-05	Not computed

4. Raban, Dandona, R., and Dandona, L. (2013).	NSS consumption survey 2004-05 and 2009-10,	Variations in catastrophic health expenditure estimates from household surveys in India, WHO Bulletin	CHS was estimated at 3.8% in 2004-05 and 3.5% in 2009-10	CHS was estimated at 14.0% in 2004-05 and 13.9% in 2009-10
5. Bonu etal. (2009)	NSS, Health survey 2004	Incidence and correlates of catastrophic maternal health care expenditure in India, *Health Policy and Planning*	are better than measures based on proportion of health expd (16%)	CHS estimates based on capacity to pay (51%)
6. Goli etal. (2016)	NSS, Health survey 2014	High Spending on Maternity Care in India: What Are the Factors	CHS on maternal care in 2014 was 51% compared to 16% in 2004	Not computed
7. Tripathy etal. (2016)	NSS, Health survey 2014	Cost of hospitalisation for non-communicabe diseases in India: are we pro-poor	52% of hospitalisation episode due to non-communicable diseases were carastrophic	Not computed
8. Mohanty and Kasor (2017)	NSS, Health survey 2004 and 2014	Out-of-pocket expenditure and catastrophic health spending on maternal care in public and private health centres in India: a comparative study of pre and post national health mission period	Not computed	CHS on institutional delivery had declined from 56% in 2004 to 25% by 2014
9. Mohanaty, Kim, Khan and Subramanium (2018)	NSS consumption survey 2011-12	Geographical variation in household and catastrophic health spending in India:Assessing the relative importance of villages, districts and states, 2011-12	Not computed	CHS was estimated at 23% and varies enoromusly across states of India
10.Pandey etal (2018)	NSS consumption survey 1993-94, 1999-2000, 2004 and 2011-12. NSS health survey 1995-96, 2004 and 2014	Trends in catastrophic health expenditure in India: 1993 to 2014	Both consumption and health surevy showed increase in CHS in India over time	Not computed

Fig 3 presents the estimates of CHS under alternative methods for bigger states of India. In every state, the estimate of CHS based on method 1 (10% of households consumption expenditure) is lower than that of method 2 (40% or more households capacity to pay). The differences were highest in the state of Andhra Pradesh and lowest in Delhi. The CHS uder both the method were highest in Kerala and lowest in Assam.

Fig 3: Percentage of households incurring catastrophic health spending under alternative methods of estimation, 2011-12

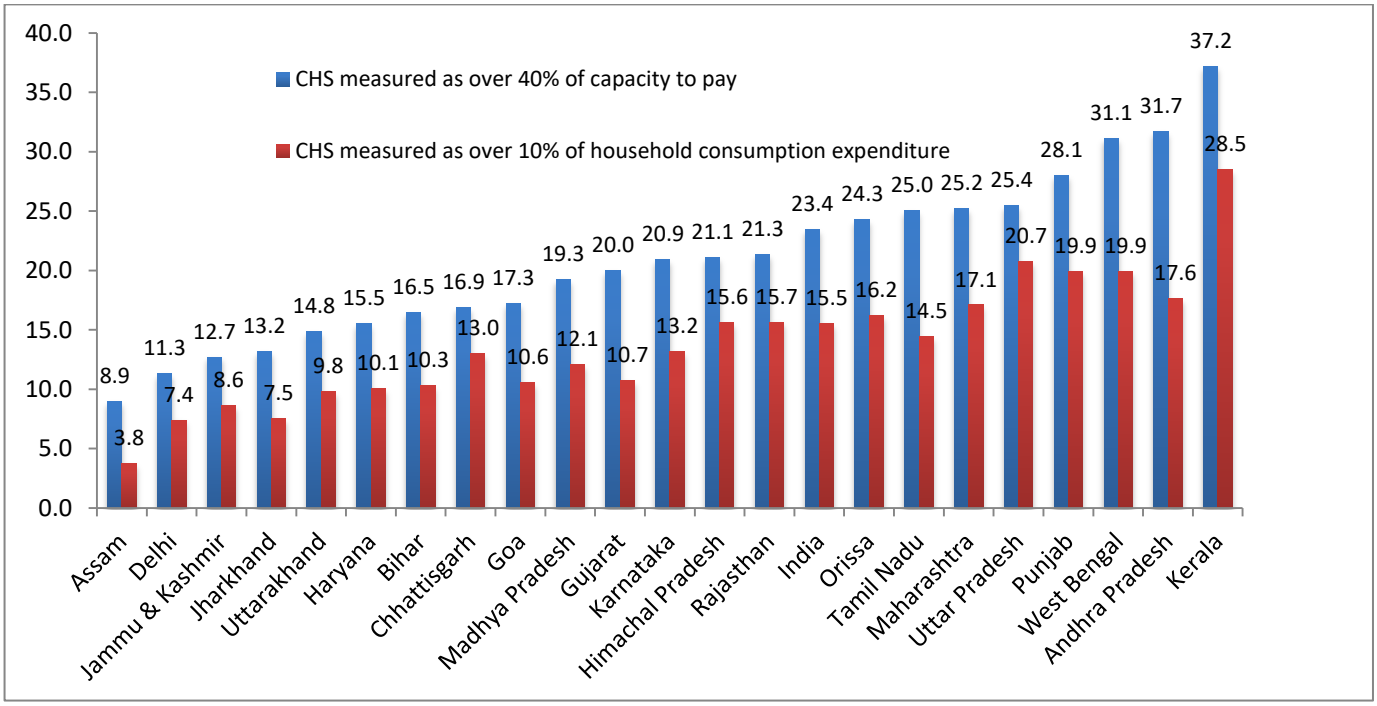

Table 4 present the cross classification of CHS by two alternate methods. About 62% households classified as catastrophic under method 2 were also classified as catastrophic under method 1 while 33% classified as catastrophic under method 1 were not captured in method 2. Similarly, about 2% households were not classified as incurring catsrophic health spending were classified as incurring catastrophic health spending in method 1.

Table 4 : Percentage of households incurring catastrophic health spending by alternative methods in India, 2011-12

Method 2	Method 1		Total Percent	N
	Catastrophic	Non-catastrophic		
Catastrophic	62.28	32.72	100	81475
Non-catastrophic	2.02	97.98	100	20176

4. Discussion and conclusion: Estimation of catastrophic health spending is useful exercise for multiple stakeholders; academia, researchers, policy makers, international organizations etc. and a key input in designing and implementing the health policy. Such estimates are of immense use in India as the out-of-pocket expenditure accounts more than two-third of health spending and remained unchanged over time. The recent National Health Policy, 2017 aimed at increasing the central government spending on health to 2.5% of GDP by 2025 and reducing the catastrophic health spending by 25% from its current level. However, the

estimates of the CHS in India mostly used data from the consumption survey or health survey carried out by the National Sample Survey Organisation (NSSO) during 2004-2014. The estimates from these studies vary largely across and within survey owing to data and methodological limitations.The aim of this paper is to outline the data limitations and challenges in estimation of catastrophic health spending in India. The unit data from four rounds of NSS is used in the analysis. We have chosen to limit the focus to NSS data as these data are mainly used in estimation of CHS in India. The main issues pertaining to estimation of CHS and availability of variables are given below.

4.1. Issues in estimation of CHS from consumption expenditure survey

4.1.1. Underestimation of health expenditure of the household: The annual health expenditure on hospitalization collected in NSS consumption surveys are underestimated compared to health surveys. This is possibly due to recall lapse on various type of health spending (hospital charges, medicine, test etc.) for all members of the household by the respondent in consumption survey. The underestimation of health spending in consumption expenditure leads to lower estimates of catastrophic health spending.

4.1.2. No disaggregated information on health spending by members of the household: The household health expenditure in consumption expenditure survey are collected by asking aggregate questions on health spending of the household. The health surveys record detailed questions on episode of hospitalization for each member in the household and more likely to collect reliable data on health expenditure.

4.1.3. No information on morbidity of members of household: The consumption survey does not provide information on morbidity of members of the household. The focus of the consumption survey is on estimating economic well-being and so the morbidity data are not recorded. Hence, it is not possible to relate the health spending to disease unlike health surveys.

4.1.4. No information on repayment: In consumption survey, there is no question on repayment of health spending. Estimation of out-of-pocket expenditure and consumption expenditure required excluding repayment from total health expenditure of the household. Such information is not collected in health surveys.

4.1.5. No data on health spending of the deceased: Literature suggests that health spending in terminal year of life is significantly higher than rest of the life (Seshamani and Gray 2004; Zweifel etal. 1999; Ladusingh and Pandey 2013). The mean expenditure of a deceased was three times higher (54,637 rupees) than survivors (17, 737 rupees). The consumption surveys do not collect the health care cost of deceased. Hence, the estimates of catastrophic health spending derived from these surveys are underestimated.

4.2. Issues in estimation of CHS from health survey

4.2.1. Consumption expenditures are under-estimated: Evidences and literature suggest the limitations of a single /few questions in capturing true consumption expenditure of the household. The MPCE derived from health surveys is significantly lower than that from consumption surveys over time. Hence, the estimates on CHS derived from health surveys are largely affected.

4.2.2. No segregation on food and non-food expenditure that is used to estimate catastrophic health spending: Estimates of CHS using WHO recommended method required data on food expenditure. Since such variables are not available in these surveys, there is difficulty in using this method in estimating CHS.

4.2.3. Limited information on health expenditure of the deceased: The NSS data provides expenditure of deceased who are hospitalized. However, a large proportion of population, particularly, deceased elderly spent on medicare as out-patient services. Such information is not captured in health surveys.

4.2.4. Reference period of out-patient is small, only 15 days: Reference period for out-patient services is 15 days. This reference period is relatively shorter which does not capture the household spending on out-patient visit.

4.3. Methodological Limitations: The choice of method directly affects the estimates of CHS. In literature two methods are used and it has been established that the estimates based on fixed proportion of consumption expenditure is not suitable as it is not sensitive to poor and low-income groups. A small amount of health spending to those who are below poverty line is catastrophic. The method suggested by Xu (2003) is by far the best practiced methodology in literature. However, in this method, the adjustment to economies of scale by size of household needs to be reworked in Indian context.

4.4. Conclusion: We suggest that the data and methodological challenges should be addressed before arriving at reliable estimates of catastrophic health spending. Because such estimates have larger relevance for health policy, we suggest the followings to derive reliable estimates of catastrophic health spending in India:

4.4.1. An abridge version of consumption schedule should be integrated in health surveys. Since health surveys provide comprehensive information on health expenditure, Integrating an abridge version of consumption expenditure would be useful. It may provide close estimates of MPCE and estimate on food and non-food expenditure.

4.4.2. Longitudinal study to track the health spending of the households: It is suggested to undertake a longitudinal study that will periodically collect data on health spending (say in three months). Because, one year period is long to recollect the health spending on hospitalization. Similarly, outpatient health expenditure in 15 days reference period may not be suitable for deriving estimates of health spending for one year. Regular collection of data in an interval of three months may provide robust estimate of household health spending.

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References

Alam, K., and Mahal, A. (2014). Economic impacts of health shocks on households in low and middle-income countries: a review of the literature. Globalization and health, 10(1), 21. Amaya-Lara, J. L. (2016).Catastrophic expenditure due to out-of-pocket health payments and its determinants in Colombian households. International Journal for Equity in Health, 15(1), 182.

Arsenijevic, J., Pavlova, M. and Groot, W. (2013). Measuring the catastrophic and impoverishing effect of household health care spending in Serbia. Social Science and Medicine, 78, 17-25.

Battistin, E., Miniaci, R, and Weber, G. (2003). What do we learn from recall consumption data?. Journal of Human Resources, 38(2), 354-385.

Berki SE. A look at catastrophic medical expenses and the poor. Health Aff. 1986;5:138–45.

Browning, M., Crossley, T. F. and Weber, G. (2003). Asking consumption questions in general purpose surveys. The Economic Journal, 113(491), F540-F567.

Bonu, S., Bhushan, I. Rani, M. and Anderson, I. (2009).Incidence and correlates of 'catastrophic'maternal health care expenditure in India. Health policy and planning, 24(6), 445-456.

Bonu S, Bhushan I, Peters DH: Incisence, Intensity, and correlates of Catastrophic Out-of-Pocket Health payment in India. (2007). In ERD Working paper No. 102.Manila. Asian Development Bank

Cutler DM and Meera E (1998) The medical cost of the young and old: a forty-year perspective. In: Wise DA (ed) Frontiers in the economics of aging. University of Chicago Press, Chicago, IL, pp 215–246.

Deaton, A. (1997). The analysis of household surveys: a microeconometric approach to development policy. World Bank Publications.

Garg CC and Karan AK (2009) Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural–urban and state level in India. Health Policy and Planning 24:116–128.

Ghosh S. Catastrophic payments and impoverishment due to out-of-pocket health spending: The effects of recent health sector reforms in India. Economic and Political Weekly.2011; 46: 63-70.

Goli, S., Rammohan, A. and Pradhan, J. (2016). High Spending on Maternity Care in India: What Are the Factors Explaining It? PLoS ONE, 11(6), e0156437.

Govt. of India (2006a) "Morbidity, Health Care and the Condition of the Aged". Report No 507 (60/25.0/1). New Delhi: Ministry of Statistics and Programme Implementation, Government of India: 2006.

Govt. of India (2006b)."Level and Pattern of Consumer Expenditure, 2004-05".Report No. 508 (61/1.0/1). New Delhi: Ministry of Statistics and Programme Implementation, Government of India: 2006.

Govt. of India (2014). Level and Pattern of Consumer Expenditure, 2011-12, NSS Report No 555(68/1.0/1), Ministry of Statistics and Program Implementation

Govt. of India (2016).Health in India, NSS Report No 574 (71/25.0), Ministry of Statistics and Program Implementation

Hjortsberg, C. (2003). Why do the sick not utilise health care? The case of Zambia. Health economics, 12(9), 755-770.

Holahan J, Blumberg LJ, McMorrow S, Zuckerman S, Waidmann T and Stockley K (2011) Containing the growth of spending in the US health system. The Urban Institute Health Policy Center, Washington DC.

JoeW (2015) Distressed financing of household out-of-pocket health care payments in India: incidence and correlates. Health Policy and Planning 30: 728–741.

Lanjouw, O J., and Lanjouw, P. (2001). How to compare apples and oranges: Poverty measurement based on different definitions of consumption. Review of Income and Wealth, 47(1), 25-42.

Lu, C., Chin, B., Li, G. and Murray, C. J. (2009). Limitations of methods for measuring out-of-pocket and catastrophic private health expenditures. Bulletin of the World Health Organization, 87(3), 238-244D.

McIntyre, D., Thiede, M., Dahlgren, G., and Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low-and middle-income country contexts?. Social science and medicine, 62(4), 858-865.

Meyer, B. D., and Sullivan, J. X. (2003). Measuring the well-being of the poor using income and consumption (No. w9760). National Bureau of Economic Research.

Mohanty SK Singh LL, Kastor A, Chauhan RK and Bloom D.Pattern. Growth and Determinant of Household Health Spending in India, 1993-2012.Journal of Public Health. 2016. DOI 10.1007/s10389-016-0712-0.

Mohanty, SK., & Kastor, A. (2017). Out-of-pocket expenditure and catastrophic health spending on maternal care in public and private health centres in India: a comparative study of pre and post national health mission period. Health economics review, 7(1), 31.

Mohanty, SK., KIM R., Khan, P K. and Subramanian, S.V. (2018). Geographic Variation in Household and Catastrophic Health Spending in India: Assessing the Relative Importance of Villages, Districts, and States, 2011-2012. The Milbank Quarterly, 96(1), 167-206.

Pal, R. (2012). Measuring incidence of catastrophic out-of-pocket health expenditure: with application to India. International journal of health care finance and economics, 12(1), 63-85.

Pannarunothai, S., and Mills, A. (1997). The poor pay more: health-related inequality in Thailand. Social Science and Medicine, 44(12), 1781-1790.

Pradhan, M. P. (2001). Welfare Analysis with a Proxy Consumption Measure Evidence from a repeated Experiment in Indonesia.

Pandey, A., Ploubidis, G. B., Clarke, L., and Dandona, L. (2018). Trends in catastrophic health expenditure in India: 1993 to 2014. World Health Organization. Bulletin of the World Health Organization, 96(1), 18-28.

Rashad AS and Sharaf MF. Catastrophic and Impoverishing Effects of Out-of-Pocket Health Expenditure: New Evidence from Egypt. Am. J. Econ. 2015;5:526–33.

Seshamani M and Gray AM (2004) A longitudinal study of the effects of age and time to death on hospital costs. J Health Econ23:217-235

Singh, A., Padmadas, S. S., Mishra, U. S., Pallikadavath, S., Johnson, F. A., and Matthews, Z. (2012). Socio-economic inequalities in the use of postnatal care in India. PloS ONE, 7(5), e37037.

Ladusingh, L. and Pandey, A. (2013). The High Cost of Dying. Economic and Political Weekly, 48(11), 45.

Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, etal. Catastrophic payments for health care in Asia. Health Econ. 2007;16:1159–84.

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

Whitehead, M.Dahlgren, G., and Evans, T. (2001). Equity and health sector reforms: can low-income countries escape the medical poverty trap?. The Lancet, 358(9284), 833-836.

Winter, J. (2004). Response bias in survey-based measures of household consumption. Economics Bulletin, 3(9), 1-12.

Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJL. Household catastrophic health expenditure: a multi country analysis. The Lancet. 2003; 362(9378):111-17.

Zweifel P, Felder S, Meiers M (1999) Ageing of Population and Health care Expenditure: A Red Herring. Health Econ 8:485-496