



Disease-Specific Out-of-Pocket Payments, Catastrophic Health Expenditure and Impoverishment Effects in India: An Analysis of National Health Survey Data

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Abstract

Background In India, more than two-thirds of the total health expenditure is incurred through out-of-pocket expenditure (OOPE) by households. Morbidity events thus impose excessive financial risk on households. The Sustainable Development Goals Target 3.8 specifies financial risk protection for achieving universal health coverage (UHC) in developing countries. This study aimed to estimate the impact of OOPE on catastrophic health expenditure (CHE) and impoverishment effects by types of morbidity in India.

Methods Data came from the 75th round of the National Sample Survey (NSS) on the theme ‘Social consumption in India: Health’, which was conducted during the period from July 2017 to June 2018. For the present study, 56,722 households for hospitalisation, 29,580 households for outpatient department (OPD) care and 6285 households for both (OPD care and hospitalisation) were analysed. Indices, namely health care burden, CHE, poverty head count ratio and poverty gap ratio using standard definitions were analysed.

Results Households with members who underwent treatment for cancers, cardiovascular diseases, psychiatric conditions, injuries, musculoskeletal and genitourinary conditions spent a relatively high amount of their income on health care. Overall, 41.4% of the households spent > 10% of the total household consumption expenditure (HCE) and 24.6% of households spent > 20% of HCE for hospitalisation. A total of 20.4% and 10.0% of households faced CHE for hospitalisation based on the average per capita and average two capita consumption expenditure, respectively. Health care burden, CHE and impoverishment was higher in households who sought treatment in private health facilities than in public health facilities.

Conclusion Our study suggests that there is an urgent need for political players and policymakers to design health system financing policies and strict implementation that will provide financial risk protection to households in India.

1 Introduction

India is currently experiencing a triple burden of disease, that is, rising non-communicable diseases (NCDs), the unfinished agenda of infectious and communicable disease control and diseases arising due to climate change [1, 2]. Approximately 4.7 million deaths (49% of all-cause mortality) occurred in India in 2017 due to NCDs [3]. Communicable diseases contribute to 27.5% of all the deaths as per the Global Burden of Disease Study [1]. Climate change is expected to affect human health in India through factors such as infectious diseases (malaria, chikungunya etc.) and water-borne illnesses. In India, for the year 2016–17 as per the National Health Accounts, the government health expenditure (GHE) including capital expenditure was 1.2% of GDP, household out-of-pocket

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Key Points for Decision Makers

Findings from this study show that the out-of-pocket expenditure (OOPE) in health care has exposed households with morbidity conditions to catastrophic health expenditure (CHE) and impoverishment.

Along with access to health insurance, there is greater need for price regulations for treatment in private health facilities in order to reduce the financial risk among poorer populations.

Policy makers need to design and strictly implement suitable health system financing policies that will provide financial risk protection to households.

expenditure (OOPE) on health represents 63.2% of the total health expenditure (THE), and health insurance expenditure is only around 7.6% of current health expenditure [4]. The overall burden of these diseases coupled with low public health spending, high OOPE and lack of protection against catastrophic health expenditure (CHE) could lead to devastating effects on human lives in India [5, 6]. An estimated 32–39 million people are pushed into poverty due to health care expenditure in India each year [7–9].

The impact of the financial burden across various disease categories in India is poorly researched. One of the main gaps is the impoverishment impact of OOPE on households due to utilisation of outpatient care, hospitalisation or both, across various disease categories. A few studies have studied disease-specific OOPE on hospitalisation [5]. Other studies have focused on CHE and impoverishment effects of OOPE. However, these studies are either focused on maternal health [10], or specific disease categories such as NCDs [11, 12], cancer [13], disability [14], or for a specific state [15]. One study did look into all morbidities (NCDs and infectious

diseases) but used data from a previous round of National Sample Survey (NSS) 2004 and did not report financial burden on households for outpatients and hospitalised cases separately [6].

This study aimed to estimate the impact of OOPE on CHE and impoverishment effects by various disease types in India. This information would be helpful in formulating social protection strategies to increase financial risk protection for households affected by various disease ailments in India.

2 Methods

2.1 Data Source

The current study uses national representative cross-sectional survey household data from the 75th round of the NSS on the theme ‘Social consumption in India: Health’, which was conducted during the period July 2017–June 2018 [16]. NSS 75th round covered 14,258 village/urban blocks (8077 rural villages, 6181 urban blocks), 113,823 households (64,552 rural, 49,271 urban) and 555,115 individuals (325,883 rural; 229,232 urban). This study utilised data from all of the 56,722 households whose family members sought treatment from a hospital (any member hospitalised in the last 365 days), the 29,580 households receiving outpatient department (OPD) care (any member treated in an OPD in the last 15 days) and the 6285 households that reported both (i.e. reported treatment of disease conditions from OPDs and hospitals). The NSS adopted a stratified multi-stage sampling design. In rural areas, sample villages and in the urban areas urban blocks were chosen with Probability Proportional to Size with Replacement (PPSWR) as the first stage. The sample households were chosen by Systematic Random Sampling without Replacement (SRSWOR) as the second stage. The details of the survey methodology are described in the NSS report [16]. Box 1 provides the disease conditions identified using self-reporting in the study samples [16].

Box 1 Disease conditions and reported diagnosis in NSS 75th Round

S. no.	Disease condition/s	Reported diagnosis in NSS 75th round
1	Infections	Fever with loss of consciousness or altered consciousness; Malaria fever due to diphtheria; Whooping cough; All other fevers (includes typhoid, fever with rash/ eruptive lesions and fevers of unknown origin, all specific fevers that do not have a confirmed diagnosis); Tuberculosis; Filariasis; Tetanus; HIV/AIDS; Other sexually transmitted diseases; Jaundice; Diarrhoea/dysentery/increased frequency of stools with or without blood and mucus in stools; Worm infestation
2	Cancers	Cancers (known or suspected by a physician) and occurrence of any growing painless lump in the body
3	CVDs	Hypertension and heart disease: chest pain, breathlessness
4	Respiratory	Acute upper respiratory infections (cold, runny nose, sore throat with cough, allergic colds included); Cough with sputum with or without fever and NOT diagnosed as TB; Bronchial asthma/recurrent episode of wheezing and breathlessness with or without cough over long periods or known asthma)
5	Gastro-intestinal	Diseases of mouth/teeth/gums; Pain in abdomen: gastric and peptic, ulcers/acid reflux/acute abdomen; Lump or fluid in abdomen or scrotum; Gastrointestinal bleeding
6	Blood disorders	Anaemia (any cause); Bleeding disorders
7	Endocrine	Diabetes; Under-nutrition; Goitre and other diseases of the thyroid; Others (including obesity)
8	Psychiatric	Mental retardation; Mental disorders; Headache; Seizures or known epilepsy; Weakness in limb muscles and difficulty in movements; Stroke/hemiplegia/sudden onset weakness or loss of speech in half of body; Others including memory loss, confusion
9	Injuries	Accidental injury, road traffic accidents and falls; Accidental drowning and submersion; Burns and corrosions; Poisoning; Intentional self-harm; Assault; Contact with venomous/harm-causing animals and plants
10	Eye	Discomfort/pain in the eye with redness or swellings/boils; Cataract; Glaucoma; Decreased vision (chronic) NOT including where decreased vision is corrected with glasses; Others (including disorders of eye movements—strabismus, nystagmus, ptosis and adnexa)
11	Ear	Earache with discharge/bleeding from ear/infections; Decreased hearing or loss of hearing
12	Skin	Skin infection (boil, abscess, itching) and other skin disease
13	Musculoskeletal	Joint or bone disease/pain or swelling in any of the joints, or swelling or pus from the bones; Back or body aches
14	Genitourinary	Any difficulty or abnormality in urination; Pain the pelvic region/reproductive tract infection; Pain in male genital area; Change/irregularity in menstrual cycle or excessive bleeding/pain during menstruation; Any other gynaecological and andrological disorders including male/female infertility
15	Obstetrics	Pregnancy with complications before or during labour (abortion, ectopic pregnancy, hypertension, complications during labour); Complications in mother after birth of child; Illness in the newborn/sick newborn
16	Others	Symptom not fitting into any of above categories; Could not even state the main symptom

2.2 Measuring Out-of-Pocket Expenditure (OOPE) for Health Care

The NSS collected data on expenditure on medicine, consultation fees, hospital stay charges, other medical expenses such as physiotherapy, blood, oxygen, attendant charges and other non-direct costs included transport for patients and other accompanying persons, food-related expenses, lodging charges and others. In this study, OOPE for health expenditure was calculated by deducting any reimbursement amount from total health expenditure (direct medical costs, direct non-medical costs and other indirect costs for health care expenditure), a method used by many previous studies [4, 9, 10]. The NSS captures OPD care for the last 15 days and hospitalisation expenditure for last 365 days preceding the survey period. This was converted to monthly OOPE by multiplying OPD care OOPE by a factor of 2 and by

dividing hospitalisation OOPE by 12. Respective sample weights were then applied in the calculation of the results.

2.3 Share of OOPE on Household Consumption Expenditure

The cost of treatments for households as a share of total consumption expenditure of households was calculated, as indicated by many of the previous studies [13, 14]. The expenses incurred for treatment at OPDs, hospitals and both were used for analysis using the following formula:

$$\begin{aligned} &\text{Share of OOPE on HCE} \\ &= \frac{\text{Household's Monthly Health Care Expenditure}}{\text{Household's Monthly Consumption Expenditure}} \\ &\quad \times 100 \end{aligned}$$

2.4 Measuring Catastrophic Health Expenditure (CHE)

A household was considered to be exposed to CHE if OOPE on health care exceed $\alpha\%$ threshold of households' income [17]. In existing literature, there is no consensus on the threshold of $\alpha\%$ threshold [18, 19]. Most studies have defined CHE as OOPE on health expenditure exceeding 40% of a household's total non-food consumption expenditure or health expenditure exceeding 10% of a household's total consumption expenditure [20–26].

We used the ratio method for estimating CHE. In this method a household faced CHE if the net OOPE exceeded 10% or 20% of the total household consumption expenditure (HCE).

2.4.1 First Approach

CHE = 1 if OOPE > 10%HCE_i and CHE = 0 if OOPE ≤ 10%HCE_i,

CHE = 1 if OOPE > 20%HCE_i and CHE = 0 if OOPE ≤ 20%HCE_i

When OOPE exceeded 10% and 20% of an HCE, it was considered CHE, which is a standard benchmark used in literature [27, 28].

2.4.2 Second Approach

The second approach uses average HCE per person and per two persons of the household. We found this approach relevant since household sizes may vary although HCE may remain the same. Thus, a household with more members may face higher CHE than a household with fewer members, although the HCE is the same [29].

CHE = 1 if OOPE > α and CHE = 0 if OOPE ≤ α ,

CHE = 1 if OOPE > β and CHE = 0 if OOPE ≤ β ,

where α is the average household consumption expenditure per person and β is the average household consumption expenditure for two members of the household [29].

2.5 Measuring Impoverishment Impact of OOPE on Health Care

Households with net total expenditure on OOPE less than the poverty line (PL) are measured using poverty head count. To calculate the poverty line, we used per capita household monthly expenditure at 972 Indian Rupees (INR) in rural areas and INR 1407 in urban areas as per recommendation by the Rangarajan committee [30]. The following formula was used for the *i*th household:

$$\begin{aligned} \text{Poverty head count (PHC}_i) \\ = 1 \text{ if } HCE_i \geq PL_i \text{ and } (HCE_i - OOPE_i) < PL_i \end{aligned}$$

Otherwise 0, where HCE_i is monthly consumption expenditure of *i*th household

The poverty head count ratio (PHCR) is the percentage of households who fall below the poverty line due to OOPE [25–27].

$$\text{Poverty head count ratio (PHCR)} = \frac{\sum_{i=1}^N \text{HH impoverishment}_i}{\text{Total households (N)}} \times 100$$

(*N* = number of households)

The percentage deficit from the poverty line of those households that have become poor due to OOPE is quantified using the poverty gap, and the poverty gap ratio measures the percentage deficit from the poverty line of households that have become poor due to OOPE as a proportion of all the households in the population [19, 26–28].

$$\begin{aligned} \text{Poverty gap (PG}_i) &= \text{HH impoverishment}_i \\ &\times \{PL_i - (HCE_i - OOPE_i)\} / PL_i \end{aligned}$$

$$\text{Poverty gap ratio (PGR)} = \frac{1}{\text{Total HH(N)}} \sum_{i=1}^N \text{Poverty gap}_i \times 100$$

(*N* = number of households)

All the expenditures were converted to December 2019 prices with inflation adjustments using the consumer price index including poverty line thresholds [31, 32].

Cost in December 2019

$$\begin{aligned} &= \frac{\text{Consumer price index for December 2019}}{\text{Av. consumer price index of December, 2017 and January, 2018}} \\ &\times \text{amount of treatment} \end{aligned}$$

2.6 Statistical and Econometric Model

Descriptive statistics, bivariate estimates and multivariate models were performed on expenditure data. In the first part of the analysis, descriptive analysis was carried out to describe morbidity distribution in households. In the second step, bivariate analyses were carried out to discover the impact of OOPE, health care burden (share of OOPE on total HCE), CHE and impoverishment effect by type of morbidity and health facilities (public and private). In the third step of the analysis, logistic regression analysis

was carried out to estimate the effect of different morbidity conditions on CHE and the impoverishment impact. In order to take into account the survey design (i.e. sampling weights with clustering and strata), while estimating bivariate and multivariable statistics, the SVY command was used in STATA 13.1. All expenditures are reported in Indian Rupees (INR). The NSS captured the monthly consumption expenditure (MCE) based on the components of household consumption expenditure including food, beverages, durable, semi durable and non-durable household goods and other frequently purchased goods and services. For this study we have converted the MCE into an adult equivalent household consumption expenditure. This study used the adult equivalent scale that has been used in many previous studies [17, 33, 34] (Table 1).

3 Results

3.1 Distribution of Households by Type of Morbidity

Table 2 reports the percentage distribution of households whose family members sought treatment from hospitalisation care, OPD care and both by type of morbidity. Nearly 31% of households sought hospitalisation care, 35% consulted for OPD care and 20% of the households had undergone both due to various morbidities. The proportion of households with members with injuries (12.4%) was the second highest cause for hospitalisation care after infections (31.4%), followed by gastro-intestinal conditions (10.4%) and cardiovascular disease (CVD) (8.4%). For OPD, households with endocrine disorders (15.3%) were the second most common reason for seeking treatment after infections (33.2%), followed by CVDs (11.6%) and musculoskeletal conditions (10.1%). CVD (18.4%) was the second highest cause after infections (20.3%) for households who sought treatment from both, followed by endocrine (10.4%) and psychiatric disorders (9.7%).

3.2 OOPE on Health Care by Type of Morbidity

Table 3 reports the average monthly OOPE of households from hospitalisation, OPD care and both by type of morbidity. Overall, only 9.15%, 0.64% and 5.57% of the total OOPE were reimbursed for hospitalisation, OPD care and both, respectively. Cancer was the highest cause of OOPE for health care across hospitalisation, OPD care and both, followed by CVDs for hospitalisation, genitourinary conditions for OPD care and gastro-intestinal issues for both.

3.3 Share of OOPE on Households' Consumption Expenditure

The proportion of OOPE on health care of total household consumption expenditure and the estimated health care burden by type of morbidity is reported in Table 3. The highest health care burden was reported by households with any member suffering from cancer across hospitalisation, OPD care and both. For hospitalisation, psychiatric (25.8%) and musculoskeletal (25.8%) conditions were the second highest causes for health care burden followed by CVDs (24.9%) and injuries (23.7%). Genitourinary issues (44.0%), obstetrics (42.9%), injuries (34.6%) and blood disorders (38.0%) were the top conditions after cancer contributing to health care burden in households for OPD. Households where one or more members received treatment in both (hospitalisation care and OPD care) were highest for cancer (123.8%), followed by gastro-intestinal conditions (98.8%), obstetrics (90.8%), injuries (81.8%) and musculoskeletal complaints (68.4%). Health care burden was higher in the households that sought treatment in private hospitals compared with public hospitals (Fig. 1). Health care burden was about five times higher for hospitalisation care, two times higher for OPD care and more than two times higher for both (hospitalisation and OPD care) among those households whose family members sought treatment in private hospitals compared with public hospitals (Supplementary Appendix Tables 1, 2 and 3, see Electronic Supplementary Material [ESM]).

3.4 Exposure to CHE

Table 4 provides analysis of CHE by type of morbidity using 10% and 20% thresholds as well as the average household consumption expenditure per person and the average household consumption expenditure per two members of the

Table 1 Adult equivalence scale

Age (years)	Equivalence scale ^a
1	0.273
1–2	0.383
2–3	0.450
3–5	0.517
5–7	0.617
7–10	0.700
10–12	0.733
12–14	0.800
14–16	0.883
16–18	0.950

Source authors' computation

^aMore than 18 years equivalence as 1

household. Results show that 41.4% and 24.6% of the households incurred CHE due to hospitalisation based on 10% and 20% thresholds, respectively. For OPD care, 22.5% of the households' OOPE exceeded the PHCE of one household member, and in 9.8% of households, of two household members. Eighty-one percent of households at the 10% threshold and 64.6% of households based on a 20% threshold were exposed to CHE due to both hospitalisation and OPD care. OOPE exceeded PHCE of one or two household members in 58.5% and 38.7% of households, respectively. Households containing members with cancer reported the highest exposure to CHE, while those with infections reported the lowest. CHE was about seven times higher for hospitalisation care and two times higher for OPD care and both for family members who sought treatment in private health facilities compared with those who visited public health facilities (Supplementary Appendix Tables 1, 2 and 3, see ESM).

3.5 Odds of Households Incurring CHE Due to OOPE in Health Care

The odds of incurring CHE for cancer was significantly higher for hospitalisation care (odds ratio [OR] 11.49; 95% confidence interval [CI] 9.21–14.25) and both (hospitalisation and OPD care) (OR 9.16; 95% CI 4.74–17.7) when compared with infections (reference value) (Table 5). The likelihood of CHE due to CVDs was three times higher for hospitalisation care (OR 2.96; 95% CI 2.55–3.44). Further, odds of incurring CHE were significantly higher among households where any member received treatment for injury from hospitalisation care (OR 3.98; 95% CI 2.61–6.05), OPD care (OR 3.24; 95% CI 1.94–5.41) and both (OR 1.68; 95% CI 0.98–3.25) in comparison with communicable diseases.

3.6 Impoverishing Effects of OOPE in Health Care

About 14.1%, 16.4% and 39.1% of the households fell below the poverty line due to health care expenditure for hospitalisation care, OPD care and both, respectively (Table 6).

Table 2 Percentage distribution of households whose family members sought treatment from hospitalisation care, OPD care and both

Disease category	Hospitalisation		OPD care		Both (hospitalisation and OPD care)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Infections	17,488	31.4	7519	33.2	1223	20.3
Cancers	824	1.4	671	1.4	256	4.3
CVDs	4651	8.4	4026	11.6	1107	18.4
Respiratory	2039	3.6	2744	9.1	352	5.9
Gastro-intestinal	5946	10.4	1300	4.6	401	6.7
Blood disorders	979	1.9	296	0.9	90	1.5
Endocrine	1457	2.5	5363	15.3	627	10.4
Psychiatric	2839	5.2	1690	4.8	582	9.7
Injuries	7055	12.4	631	1.4	332	5.5
Eye	1885	4.0	352	1.3	94	1.6
Ear	321	0.5	140	0.5	15	0.3
Skin	556	1.0	616	2.2	49	0.8
Musculoskeletal	2627	4.7	2886	10.1	382	6.4
Genitourinary	3473	6.3	642	1.6	280	4.7
Obstetrics	1612	3.9	176	0.4	52	0.9
Others	1227	2.4	528	1.5	175	2.9
Major category						
Communicable	20,909	38.4	9944	33.6	1448	24.1
NCD	22,299	40.4	16,384	55.4	3839	63.8
Injuries	7055	12.4	631	2.1	332	5.5
Others	4716	8.6	2621	8.9	398	6.6
Total	54,979	100	29,580	100	6017	100

Source Authors' c computation based on NSS 75th round data. All 'n' are unweighted. Percentages are weighted with multiplier

CVDs cardiovascular diseases, *NCD* non-communicable disease, *OPD* outpatient department

Table 3 Household average OOPE on health care and health care burden by type of morbidity

Disease category	Hospitalisation			OPD care			Both		
	OOPE (INR)	MCE (INR)	Health care burden, %	OOPE (INR)	MCE (INR)	Health care burden, %	OOPE (INR)	YCE (INR)	Health care burden, %
Infections	1023	12,387	8.3	1527	10,505	14.5	4036	11,682	34.5
Cancers	7997	14,713	54.4	3571	14,993	23.8	17,701	14,304	123.8
CVDs	3729	15,005	24.9	1954	13,670	14.3	7210	14,704	49.0
Respiratory	1646	13,414	12.3	1406	11,785	11.9	5735	12,883	44.5
Gastro-intestinal	2266	12,470	18.2	2703	10,541	25.6	11,297	11,430	98.8
Blood disorders	1762	13,553	13.0	4801	12,645	38.0	6353	9924	64.0
Endocrine	1977	14,430	13.7	2218	14,734	15.1	4818	14,794	32.6
Psychiatric	3265	12,673	25.8	3069	11,896	25.8	8597	12,705	67.7
Injuries	2933	12,371	23.7	3829	11,067	34.6	9962	12,184	81.8
Eye	1332	12,336	10.8	2405	9985	24.1	4548	12,605	36.1
Ear	1708	13,849	12.3	1704	9153	18.6	5206	11,663	44.6
Skin	2147	12,918	16.6	2095	11,883	17.6	5933	11,787	50.3
Musculoskeletal	3479	13,485	25.8	2748	12,246	22.4	10,212	14,923	68.4
Genitourinary	2809	13,116	21.4	5222	11,873	44.0	8797	13,150	66.9
Obstetrics	1902	12,109	15.7	4774	11,122	42.9	10,601	11,670	90.8
Others	3196	12,804	25.0	4316	11,386	37.9	11,561	15,829	73.0
Major category									
Communicable	1100	12,401	8.9	1536	10,774	14.3	4095	11,711	35.0
NCD	2931	13,376	21.9	2441	13,086	18.7	8346	13,770	60.6
Injuries	2933	12,371	23.7	3829	11,067	34.6	9962	12,184	81.8
Others	2948	13,401	22.0	4358	11,372	38.3	10,210	13,943	73.2
Total	2234	12,879	17.3	2152	12,029	17.9	7547	13,199	57.2

Source Authors' c computation based on NSS 75th round data. Health care burden = [Average monthly out-of-pocket expenditure (in INR)/MCE in (in INR)] × 100

CVDs cardiovascular diseases, INR Indian rupees, MCE monthly consumption expenditure, NCD non-communicable disease, OOPE out-of-pocket expenditure, OPD outpatient department, YCE yearly consumption expenditure

The highest PHCR was seen among cancer patients across all types of treatment. The percentage of households falling below the poverty line was higher among those households where any member had one of the following conditions: cancers (31.4%), other (19.6%), psychiatric (22.9%), CVD (19.2%) and injuries (20.3%) for hospitalisation care while the percentage of households falling below the poverty line was higher among those with cancers (15.5%), obstetrics (49.0%), genitourinary (32.8%), blood disorders (32.4%), other conditions (24.3%) and injuries (19.9%) for OPD care. PHCR was highest among households with members treated for cancers (235.5%), genitourinary (71.9%), blood disorders (70.2%), gastro-intestinal (155.7%), injuries (96.2%) and psychiatric conditions (53.1%) for both hospitalisation care and OPD care. The poverty gap ratio is significantly higher in cancers, injuries, gastro-intestinal, obstetrics and genitourinary conditions irrespective of mode of treatment. PHCR and the poverty gap ratio were found to be high among households whose sought treatment in private health care facilities in comparison

with those utilising public health facilities (Supplementary Appendix Tables 1, 2 and 3, see ESM).

3.7 Odds of Falling Below the Poverty Line Due to OOPE in Health Care

Table 7 presents the results of logistic regression for predicting the effect of different morbidity conditions on impoverishment due to OOPE on health care. The odds of falling below the poverty line due to health care expenditure for cancer were significantly higher for hospitalisation care (OR 7.670; 95% CI 5.878–10.008), OPD care (OR 1.348; 95% CI 1.014–1.791) and both (OR 6.359; 95% CI 3.754–10.774) compared with infections. Odds of falling below the poverty line were significantly higher for households with members receiving treatment for gastro-intestinal, blood disorders, psychiatric, injurious-skeletal, genitourinary, obstetrics and other disease conditions for hospitalisation care, OPD care and both (hospitalisation care and OPD care) compared with infections.

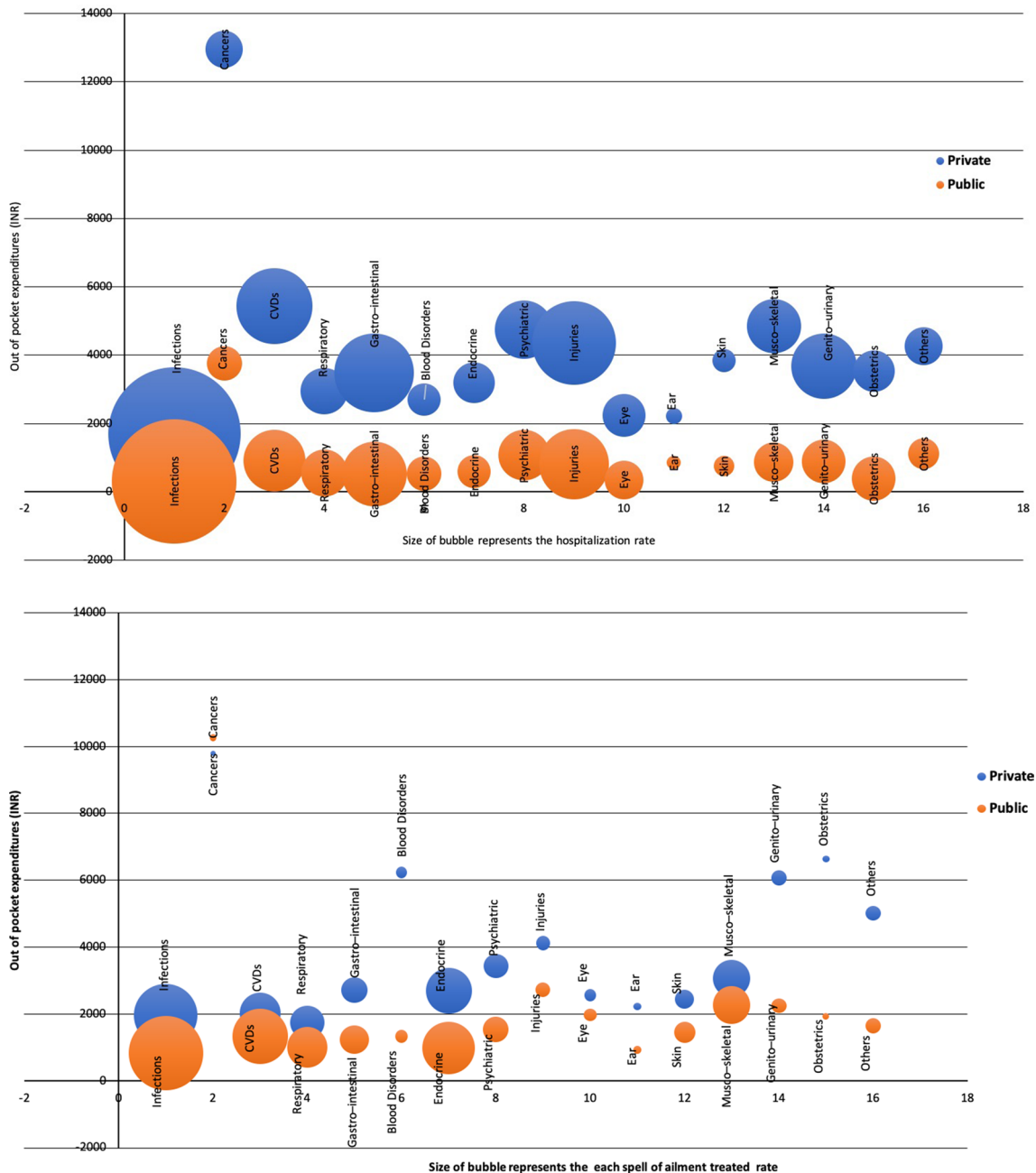


Fig. 1 a OOPE vs hospitalisation rate and b OOPE vs each spell of ailment treated rate for OPD across public and private health facilities. *INR* Indian rupees, *OPD* outpatient department, *OOPE* out-of-pocket expenses

4 Discussion

Overall, 41.4% and 24.6% of the households faced CHE for hospitalisation care at the 10% threshold and 20% threshold, respectively, while 20.4% and 10.0% of the households had a catastrophic impact based on the modified approach of average per capita and average two capita monthly consumption expenditure, respectively. Our study results

relating to financial catastrophe are similar to those of a previous study by Joe and Rajpal [29], which used similar methods to those reported in this paper. Their study indicated that 49.8% and 30.6% of the households faced CHE for hospitalisation at 10% and 20% thresholds, and 29.0% and 14.1% of the households faced CHE based on the average per capita and average two capita household consumption approach [29].

Table 4 Percentage of households exposed to CHE due to health care expenditure by type of morbidity

Disease category	Hospitalisation				OPD care				Both			
	At 10%	At 20%	At α	At β	At 10%	At 20%	At α	At β	At 10%	At 20%	At α	At β
Infections	23.1	9.8	7.4	3.0	43.5	24.9	19.5	7.7	70.9	48.6	43.4	26.4
Cancers	70.0	54.1	49.6	33.6	44.2	29.3	30.0	17.8	87.8	80.9	76.8	58.2
CVDs	50.9	33.6	29.6	16.9	43.2	23.3	19.1	8.1	79.8	65.2	56.6	34.8
Respiratory	36.3	17.5	12.6	5.6	39.3	21.0	14.7	6.5	78.0	56.4	48.1	25.6
Gastro-intestinal	44.4	28.4	24.8	11.4	58.0	37.0	30.8	14.7	84.0	70.6	68.3	44.8
Blood disorders	45.3	21.6	17.3	5.5	64.3	49.8	48.5	26.6	82.2	74.4	60.3	36.4
Endocrine	42.1	23.9	19.0	7.0	48.9	29.9	20.5	7.7	75.8	52.6	45.0	23.2
Psychiatric	58.1	40.1	34.3	15.9	55.7	35.5	26.9	14.6	89.3	75.6	70.3	42.4
Injuries	52.7	33.9	29.3	15.4	72.4	49.3	39.3	19.5	93.4	85.6	69.0	52.1
Eye	38.4	19.0	10.2	3.0	52.1	32.5	20.7	10.7	81.8	48.2	36.3	12.8
Ear	45.3	20.4	20.1	6.8	46.2	26.5	28.5	10.8	96.3	80.0	80.0	52.4
Skin	40.1	20.0	21.7	9.2	53.0	30.7	28.3	11.1	87.3	64.2	55.0	43.4
Musculoskeletal	53.9	34.4	29.8	17.6	54.6	34.0	24.8	9.9	85.6	74.5	70.8	55.1
Genitourinary	60.2	39.3	31.7	14.8	74.6	61.1	52.6	35.5	89.0	76.3	72.7	58.2
Obstetrics	39.9	24.7	20.2	7.7	78.3	65.2	67.9	39.4	61.2	53.5	51.1	31.7
Others	59.7	37.6	31.1	16.4	68.6	50.6	38.2	18.4	90.2	76.1	74.0	55.5
Major category												
Communicable	25.7	11.7	8.9	3.4	42.2	24.1	18.7	7.7	71.5	49.9	44.3	26.2
NCD	48.8	30.9	26.0	13.4	50.8	30.9	23.7	10.3	82.2	66.6	60.1	38.3
Injuries	52.7	33.9	29.3	15.4	72.4	49.3	39.3	19.5	93.4	85.6	69.0	52.1
Others	59.7	38.1	32.1	14.9	67.6	51.5	41.9	24.0	92.6	79.8	78.0	60.6
Total	41.4	24.6	20.4	10.0	48.2	29.1	22.5	9.8	81.0	64.6	58.1	37.8

Source Authors' computation based on NSS 75th round data.

At 10% 10% threshold of household's total consumption expenditure, At 20% 20% threshold of household's total consumption expenditure, At α average household consumption expenditure per person of the household, At β average household consumption expenditure per two members of the household, CHE catastrophic health expenditure, CVDs cardiovascular diseases, NCD non-communicable disease, OPD outpatient department

Our study results reveal that NCDs such as CVDs, cancers, injuries etc. have a higher catastrophic burden and resultant impoverishment in India. Catastrophic expenditure was found to be highest for cancer at 10% thresholds (70.0%) and at 20% thresholds (54.1%) for hospitalisation care. A similar finding was observed in a previous study where CHE was found to be higher (79%) due to cancer at 10% thresholds [13]. Households where one or more member received treatment for any type of morbidity, especially for cancers, CVDs, injuries and psychiatric, musculoskeletal and genitourinary conditions, spent an extensive amount of their income with comparable results shown in various previous studies [35–37]. The level of catastrophic expenditure varied across morbidity conditions and types of treatment by health care provider. In households with cancer and infectious patients, the catastrophic impact due to OPE on health care was found to be higher for OPD care compared with hospitalisation.

Our study indicates that the health care burden, CHE and impoverishment effect was higher for patients seeking

treatment in private health facilities than in public health facilities, as shown in various studies from India [5, 27], and the share was higher if patients were treated for cancers in India and Vietnam [4, 35]. Our analysis indicates that health care burden was almost five times higher for hospitalisation care and two times higher for OPD care if patients sought treatment in private health facilities rather than public health facilities. The impoverishment effect among the cancer patients irrespective of type of treatment was significantly higher if patients sought the treatment in a private health facility rather than a public health facility, which is consistent with findings from previous studies [6].

It is important to highlight the fact that even after the introduction of government social health insurance schemes, there is high prevalence of catastrophic expenditure due to hospitalisation in the public sector as per our study findings. There is therefore a need for customised disease-specific insurance packages designed for patients attending public health facilities.

Table 5 Odds ratios and 95% confidence intervals for households exposed to CHE at a 10% threshold by type of morbidity

Disease category	Hospitalisation		OPD care		Both	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Infections [®]	1.00		1.00		1.00	
Cancers	11.459***	[9.213–14.253]	0.935ns	[0.760–1.151]	9.159***	[4.74–17.696]
CVDs	2.962***	[2.548–3.443]	0.548***	[0.471–0.638]	2.78***	[1.682–4.593]
Respiratory	1.7***	[1.500–1.927]	0.718***	[0.647–0.797]	2.087***	[1.316–3.311]
Gastro-intestinal	2.258***	[1.949–2.615]	0.966ns	[0.808–1.154]	3.23***	[1.88–5.551]
Blood disorders	2.263***	[1.957–2.616]	1.337**	[1.038–1.721]	2.184***	[1.236–3.859]
Endocrine	2.288***	[1.951–2.683]	0.690***	[0.599–0.796]	2.067***	[1.257–3.399]
Psychiatric	3.994***	[3.411–4.677]	1.103ns***	[0.931–1.307]	6.681***	[3.853–11.586]
Injuries	0.871ns	[0.571–1.330]	1.009ns	[0.587–1.735]	2.652***	[1.956–4.356]
Eye	1.845***	[1.560–2.181]	0.936ns	[0.725–1.209]	2.483***	[1.244–4.957]
Ear	1.512***	[1.153–1.983]	0.728 ns	[0.494–1.075]	1.574ns	[0.388–6.382]
Skin	1.675***	[1.336–2.099]	1.007***	[0.813–1.247]	5.442***	[2.03–14.591]
Musculoskeletal	2.799***	[2.388–3.281]	0.911ns	[0.779–1.066]	4.169***	[2.39–7.273]
Genitourinary	3.213***	[2.705–3.753]	1.607***	[1.274–2.027]	5.752***	[3.071–10.774]
Obstetrics	2.296***	[2.044–2.577]	2.799***	[1.990–3.937]	1.956**	[0.978–3.911]
Others	2.674***	[2.205–3.243]	1.116 ns	[0.833–1.495]	3.379***	[1.523–7.5]
Major category						
Communicable [®]						
NCD	1.181**	[1.033–1.350]	1.736***	[1.520–1.983]	0.662*	[0.415–1.056]
Injuries	3.979***	[2.617–6.050]	3.241***	[1.941–5.412]	1.685***	[0.985–3.254]
Others	1.923***	[1.655–2.234]	2.136***	[1.706–2.674]	1.107ns	[0.58–2.115]
Constant	0.208***	[0.189–0.229]	0.943ns	[0.836–1.064]	0.056***	[0.039–0.089]

Source authors' c computation based on NSS 75th round data. Results are adjusted for age, education and sex of the patients, religion, wealth index, caste and place of residence of households (not available in tables)

CHE catastrophic health expenditure, CI confidence interval, CVDs cardiovascular diseases, NCD non-communicable disease, OPD outpatient department

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, ns not significant

[®]Indicates reference category

Apart from cancer, care for injury leads to higher OOPE, catastrophic expenditure and impoverishment in households. Other studies have also reported higher OOPE for injuries compared with other diseases and ailments [11]. In view of the high burden of health care expenditure by households on injuries, there is need for effective implementation of preventive interventions such as regulations for vehicle and road safety, installation of speed bumps, breath testing and drowning prevention programmes, thus leading to significant cost savings through establishing preventive strategies [37].

The strength of our study derived from its use of national representative cross-sectional data from NSS 75th round. The NSS followed the standardised study design, and in particular, this survey focussed on health surveys based on the theme 'Social consumption in India: Health'. The sample

was very large, covering all the states and union territories of India, which offers generalisability to the study results. We have used monthly household consumption expenditure as a proxy variable for household income, as has been used in many previous studies [5, 6, 27, 29], which is a preferred measure because it is less prone to variation with less probability of being underreported or overreported when compared with income [35]. Besides the ratio approach of CHE, we also used the per capita household consumption expenditure approach, which is more likely to offer an improved estimate of household well-being [38].

While this study has several strengths, there are some limitations as well. First, since our study was based on household consumption expenditure, it could not measure the impact of indirect costs such as wage loss due to illness

Table 6 Poverty headcount ratio and poverty gap ratio due to OOPE on health care by type of morbidity

Disease category	Hospitalisation		OPD care		Both	
	Poverty headcount ratio (%)	Poverty gap ratio (%)	Poverty headcount ratio (%)	Poverty gap ratio (%)	Poverty headcount ratio (%)	Poverty gap ratio (%)
Infections	7.4	2.9	13.5	5.6	26.6	23.7
Cancers	31.4	67.5	15.5	22.1	58.5	235.5
CVDs	19.2	20.3	13.6	8.9	39.5	53.8
Respiratory	9.4	4.5	12.9	4.6	34.1	35.9
Gastro-intestinal	15.4	11.3	23.9	21.8	47.1	155.7
Blood disorders	10.5	6.6	32.4	38.2	40.3	70.2
Endocrine	12.5	6.4	15.6	6.1	29.6	20.9
Psychiatric	22.9	18.4	21.4	13.7	50.2	53.1
Injuries	20.3	16.2	19.9	19.4	52.6	96.2
Eye	10.6	3.6	23.6	16.0	27.9	24.7
Ear	9.1	3.5	24.8	11.4	1.9	0.4
Skin	13.6	6.6	21.5	7.6	29.8	36.8
Musculoskeletal	18.0	14.4	18.6	13.8	40.1	54.3
Genitourinary	19.6	13.6	32.8	41.4	54.4	71.9
Obstetrics	10.2	5.1	49.0	30.8	28.4	89.6
Others	19.6	16.1	24.3	29.9	42.6	63.5
Major category						
Communicable	7.7	3.0	13.4	5.8	26.9	24.6
NCD	16.9	15.2	17.8	11.3	41.1	69.4
Injuries	20.3	16.2	19.9	19.4	53.2	96.2
Others	20.2	13.6	28.2	32.9	50.9	60.8
Total	14.1	10.5	16.4	9.9	39.1	59.4

Source authors' computation based on NSS 75th round data

CVDs cardiovascular diseases, NCD non-communicable disease, OOPE out-of-pocket expenditure, OPD outpatient department

and wage loss of caregivers. Second, the NSS is a cross-sectional survey design and cross-examined expenditure data for 365 days preceding the survey time for hospitalisation care, hence recall bias could be a major limitation for expenditure data [39].

5 Conclusions and Future Research

Our study used the recent NSS survey for the year 2018 using household data, and reports OOPE, CHE and impoverishment effects for outpatient care, hospitalisation and

both across all morbidities. We observed significant variation across morbidity conditions in health care burden, catastrophic expenditure and impoverishment effects due to out-of-pocket payments including those utilising private and public health facilities in India. Further research is needed to identify the unmet needs and coping strategies of people with various morbidity conditions due to financial limitations to seeking health care in India.

Table 7 Odds of becoming poor compared to non-poor due to OOPE in health care by type of morbidity

Disease category	Hospitalisation		OPD care		Both	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Infections [®]	1.00		1.00		1.00	
Cancers	7.670***	[5.878–10.008]	1.348**	[1.014–1.791]	6.359***	[3.754–10.774]
CVDs	2.943***	[2.336–3.709]	0.695***	[0.554–0.871]	2.384***	[1.485–3.826]
Respiratory	1.238**	[1.004–1.526]	0.785***	[0.668–0.923]	1.325ns	[0.857–2.047]
Gastro-intestinal	1.861***	[1.48–2.339]	1.185ns	[0.926–1.517]	2.657***	[1.614–4.377]
Blood disorders	1.659***	[1.319–2.088]	1.921***	[1.403–2.631]	2.231***	[1.362–3.656]
Endocrine	1.902***	[1.485–2.435]	0.803**	[0.649–0.993]	1.606***	[1.002–2.573]
Psychiatric	3.197***	[2.522–4.053]	1.281**	[1.010–1.624]	3.701***	[2.276–6.018]
Injuries	1.049ns	[0.653–1.686]	1.266ns	[0.710–2.257]	0.542ns	[0.043–6.89]
Eye	1.266*	[0.973–1.648]	1.467**	[1.048–2.054]	1.851**	[0.953–3.593]
Ear	1.094ns	[0.717–1.669]	0.726ns	[0.419–1.257]	0.461ns	[0.092–2.309]
Skin	1.834***	[1.312–2.564]	1.061ns	[0.792–1.422]	1.938*	[0.896–4.19]
Musculoskeletal	2.224***	[1.744–2.835]	1.031ns	[0.822–1.293]	2.881***	[1.74–4.77]
Genitourinary	2.179***	[1.72–2.76]	1.963***	[1.475–2.613]	3.076***	[1.82–5.201]
Obstetrics	2.001***	[1.665–2.406]	2.825***	[1.939–4.117]	2.43***	[1.295–4.561]
Others	1.985***	[1.502–2.624]	1.134ns	[0.784–1.640]	2.613***	[1.389–4.917]
Major category						
Communicable [®]						
NCD	1.248**	[1.012–1.538]	1.402***	[1.153–1.704]	0.828ns	[0.537–1.278]
Injuries	2.942***	[1.845–4.69]	2.371***	[1.375–4.091]	4.884***	[2.629–11.893]
Others	1.780***	[1.42–2.232]	1.746***	[1.319–2.311]	1.237ns	[0.73–2.097]
Constant	0.033***	[0.029–0.039]	0.022***	[0.018–0.028]	0.06***	[0.041–0.086]

Source authors' c computation based on NSS 75th round data. Results are adjusted for age, education and sex of the patients, religion, wealth index, caste and place of residence of households (not available in tables)

CI confidence interval, CVDs cardiovascular diseases, NCD non-communicable disease, OOPE out-of-pocket expenditure, OPD outpatient department

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, ns not significant

[®]Indicates reference category

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40258-021-00641-9>.

Declarations

Ethics statement The present study utilised household-level data from current NSS 75th round survey on the theme 'Social consumption in India: Health'. The NSS is a countrywide large-scale population-based survey organisation under the Ministry of Statistics and Programme Implementation (MoSPI), Government of India. The NSS obtained ethical consensus from the review committee of the project while in the second stage, consent was taken from the respondents and duly undersigned, and only once he/she had agreed to participate in the study was any data collected. This study utilised secondary data that is accessible in the public domain and this dataset does not include any personal information of respondents.

Conflict of interest None declared.

Consent The study results presented here do not involve human subject research, hence consent was not required.

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Data availability statement Our study utilised the NSS 75th round survey data, which is publicly accessible to individuals both countrywide and worldwide on <http://www.mospi.gov.in/>.

Author Contributions JY conceived the idea for the study and developed the analysis plan. JY led the analysis and organised the first draft of manuscript. JY, DJ and GRM conducted data interpretation and manuscript writing. GRM, DJ and JY read and approved the preliminary manuscript. All authors approved the final version of the manuscript.

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