

# OUT-OF-POCKET EXPENDITURE IN HYPERTENSION RELATED CARE IN INDIA: ESTIMATES FROM NATIONAL SAMPLE SURVEY 2017-18

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## ABSTRACT

### BACKGROUND:

Studies estimating treatment cost associated with hypertension care in the Indian context are limited and show considerable variations.

### OBJECTIVE:

To estimate the extent of out-of-pocket expenditure (OOPE) for hypertension care at the population level and its financial impact on households in India.

### METHODS:

We analysed the data of the 75th round of the of NSSO survey (India) on the social consumption of health care conducted in 2017-18. OOPE was assessed after deducting the amount reimbursed by insurance from the total medical expenditure per episode of hypertension-related hospitalisation and outpatient visit during the survey period. OOPE for hypertension care was considered catastrophic if exceeding 10% of the household's monthly per capita expenditure. The determinants of catastrophic health expenditures were examined using a multivariate logistic regression analysis.

### RESULTS:

A total of 1,351 and 6,379 individuals reported hypertension-related hospitalization and outpatient care, respectively, in the survey. The overall hypertension-related hospitalization rate was 54 per 100,000 persons. OOPE associated with hypertension-related hospitalisation were on an average INR 3,491 (SD 6,176) and INR 24,565 (SD 37,343) in public hospitals and private hospitals, respectively. The OOPE for hypertension related to outpatient visit was INR 277 (SD 571) in public facilities but was in the range of INR 457 (SD 556) – INR 695 (SD 1,431) based on the type of private hospitals/clinics. OOPE on medicines constituted on an average 43% (95% CI: 32-52%) and 66% (95% CI: 54-64%) of public sector hospitalisation and outpatient care respectively. The risk of catastrophic expenditure due to hypertension care was 41% among the poorest households.

### CONCLUSION:

Direct expenses on drugs and diagnostic tests contribute significantly to OOPE. The on-going public health efforts towards controlling hypertension need to ensure better access to essential hypertensive drugs and diagnostic tests in public facilities.

## KEYWORDS

health expenditure, household survey, India, cost of illness, catastrophic expenditure.

## INTRODUCTION

Uncontrolled hypertension is one of the predominant risk factors that cause fatal and non-fatal cardiovascular events across the world. The global prevalence of hypertension is 31.1% in 2010 i.e., nearly one in every three adults who have hypertension. [1] An estimated 1.28 billion adults worldwide have hypertension, with two-thirds living in low and middle-income countries (LMIC). [2] Raised blood pressure causes an estimated 7.5 million deaths globally, about 12.8% of the total deaths, which accounts for 57 million disability adjusted life years (DALYS) or 3.7% of total DALYS.[3] In India, only 15% (95% CI: 12-19%) of hypertensive patients have their blood pressure under control and among those under treatment the proportion of controlled hypertension was 46% (95% CI: 40-52%) in the reference period from 2013 to 2021. [4] Around 1.63 million deaths in India were attributed to hypertension and cardiovascular disease and the total DALYs attributable to hypertension increased from 21 million in 1990 to 39 million in 2016. [5]

Hypertension (HTN), being a chronic condition with high risks of CVD events, entails substantial economic burden to households, especially across low- and middle-income countries (LMIC) such as India. Prior studies in the Indian context have attempted to provide economic estimates for the treatment of HTN and CVD, but these are mostly single centre retrospective cost studies conducted in secondary care settings and the variations across estimates was found to be high. [6] A study based on the Indian Human Development Survey (2011–12) data found that the mean annual expenditure on doctor's fees and hospitalisation incurred by people suffering from chronic diseases like HTN and coronary heart disease was around INR 7,033 in rural areas and that INR 6,119 in urban areas. [7] Another cost of illness study in a primary care setting found that the average monthly direct cost of HTN care was INR 223. [8] A multi-country Prospective Urban and Rural Epidemiology (PURE) Study collected data on out-of-pocket expenditure (OOPE) for NCDs between 2005 and 2014 found that the presence of non-communicable diseases such as HTN in a household increases the percentage of effective income spent on healthcare in

LMICs like India, with NCD households spending on average 3.55% and HTN-only households 0.94% more than non-NCD households. [9] Existing evidence on the economic burden of HTN in India are limited and outdated, showing inconsistent estimates of economic and financial burden related to HTN care in India. An updated population level estimates of the magnitude of HTN-care related economic burden in India are not readily available to inform policy priorities of reducing OOPE, catastrophic health expenditure and financial risk protection against illness.

Recent studies highlight the rising economic burden due to non-communicable diseases (NCDs) in India at the household level using the nationally representative survey [10,11]. The present study intends to extend this existing line of evidence by focusing on estimation of OOPE for HTN-related treatments in India, which can prevent CVD episodes and consequent impoverishments. India has the highest 15-month OOP expenditures on CVD-related hospitalizations in comparison to other LMIC. [12] Estimation of HTN-related cost of care at the household level is relevant in informing policy makers and administrators on aspects such as: who uses what type of health services? how much do they pay for them? how these OOPE impact their respective household financial condition? and which households specifically experience catastrophic expenditure? Such household expenditure patterns on HTN care would inform risk protection policies as well as policy actions related to effective and multisectoral interventions to reduce economic burden.

We estimated the magnitude and extent of OOPE and catastrophic health expenditure due to HTN related outpatient care and hospitalizations. The study adopts a societal perspective to compute the direct and indirect OOP expenditure related to hospitalization and outpatient visits for HTN care. It utilizes the nationally representative household survey to give latest estimates of economic burden related to HTN care in India.

## METHODOLOGY

### STUDY DESIGN AND DATA SOURCE

We have utilized the 75th round of NSSO Health survey for the study [13]. The survey covered all districts in the country using stratified multistage sampling design that covered 113,823 households and 555,351 individuals. The survey utilized a stratified multi-stage design, the detailed methodology of the survey has been published elsewhere. [13] The survey reported a total of 91,449 hospitalization episodes and 43,219 outpatient visits for all kinds of ailments. After applying a selection at the question 'nature of ailment for which hospitalisation/ outpatient care was received', we found the OOPE data of 1,351 individuals in the survey who reported HTN-related hospitalization episodes and 6,379 individuals who reported outpatient visits. In the survey, the OOPE for HTN related hospitalization and outpatient visits were assessed for the last 365 days and 15 days, respectively. The survey also reported disease-specific expenditure on drugs, diagnostic tests, and professional fees for doctors, other medical expenses and other indirect expenses incurred on food, lodging and transportations, apart from the socio-economic demographic information of the respondents. The 'source of finance' for hospitalization-related expenses such as household income or savings, borrowings, sale of physical assets, contributions from friends and relatives and others was available.

The dependent variables for the study were the OOPE on HTN related care and associated catastrophic health expenditure. This study adopted the budget share approach, which defines health expenditure as catastrophic if the household's OOPE to household consumption expenditure exceeds a pre-defined (threshold) limit. [14] HTN-related hospitalization expenditure that exceeded 10% of annual household consumption was regarded as catastrophic health expenditure. [15] We also determined the association of various socio-demographic characteristics such as age, education, and contextual factors such as number of days of hospitalization, type of medical institution of seeking care (public/charitable/private), and consumption expenditure quintile, with the catastrophic health expenditure. Consumption expenditure quintiles were determined using Usual Monthly Consumption Expenditure (UMCE) of respondents which reflected their economic status. UMCE was converted into per capita measure by dividing the 'Usual Monthly Per-Capita Consumption

Expenditure' (UMPCE) by the household's size, which was classified into quintiles.

### DATA ANALYSIS

Data were analysed using STATA software.[16] Continuous variables such as age, OOPE and categorical variables such gender, place of residence, religion, education, contextual variables of HTN care were reported as median (IQR) and proportions (95% CI) respectively.

HTN-related hospitalisations were computed after summing up the expenses of multiple episodes of each patient. Prevalence rate of hospitalization with respect to gender and place of residence were computed by taking the weighted average of corresponding hospitalization rates per 100,000 population, where the weights were the proportion of population in the respective groups.

We also estimated the following indicators: proportion of out-of-pocket hospitalisation expenditure as a proportion of annual household consumption expenditure, proportion of OOP expenditure leading to catastrophic expenditure, proportion of hospitalisation episodes whose expenditure was sourced from borrowings/ sale of physical assets and the utilisation of public sector facilities for HTN related hospitalisation.

The difference in the median hospitalisation expenditure for each episode of hospitalisation across consumption expenditure quintiles and type of medical institution was assessed using Kruskal-Wallis test<sup>1</sup>. Multivariate logistic regressions were performed to examine the socio-economic factors associated with catastrophic expenditure due to HTN related hospitalisation. Sensitivity analysis was done to examine the factors associated with different thresholds (5%, 10% and 15%) of catastrophic spending using regression models. All relevant cost estimates have been expressed in 1 US\$= INR 74.58 as on 14th July 2021. A P- value  $\leq 0.05$  was considered statistically significant.

### ETHICAL APPROVAL

Ethical approval for the study was not sought since it is based on household survey collected by the Government of India and freely available in the public domain for research purposes.

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<sup>1</sup>. Kruskal-Wallis test, proposed by Kruskal and Wallis in 1952, is a nonparametric method for testing whether samples are originated from the same distribution.

## RESULTS

### SOCIO-DEMOGRAPHIC AND MEDICAL CARE RELATED CHARACTERISTICS

The survey reported 1,351 individuals were hospitalised in the last 365 days due to HTN. Most hospitalised individuals were in the age group 35-59 years (53%) and from rural areas (57%). Nearly 64% were women and most patients (85%) reported hospitalization for less than or equal to 7 days and sought care in the private health sector (54%).

6,379 episodes of outpatient visits were reported in the last 15 days due to HTN. The majority were women (56%) and more than half were aged 60 years and above (53%) and 61% were treated in the private sector (Table 1).

### HOSPITALISATION RATES AND EXPENDITURE

The overall HTN related hospitalisation rate was 54 per 100,000 persons in the year 2017-18. Figures 1 show that HTN-related hospitalization rates among women were higher than among men in both rural and urban areas.

**TABLE 1 SOCIO-DEMOGRAPHIC AND MEDICAL CARE RELATED CHARACTERISTICS OF PATIENTS WHO WERE HOSPITALISED OR RECEIVED OUTPATIENT CARE DUE TO HYPERTENSION, INDIA, 2017 - 18**

Characteristics	Hospitalisation related N = 1351 (%)	Outpatient related N = 6379 (%)
<b>Sex</b>		
Males	482 (36.65)	2828 (44.34)
Females	869 (64.35)	3550 (55.65)
Transgender	--	1 (0.01)
<b>Age-group (Years)</b>		
0-14	6 (0.44)	2 (0.03)
15-34	115 (8.52)	156(2.45)
35-59	710 (52.55)	2864(44.89)
> 60	520(38.50)	3357(52.62)
<b>Number of days of hospitalisation</b>		
<=7	1150 (85.13)	NA
>7	201(14.87)	NA
<b>Type of Medical Institution</b>		
Govt/Public	598(44.26)	2201(34.50)
Charitable Trust/NGO run	26(1.91)	73(1.14)
Private hospital	727(53.83)	1946 (30.50)
Private doctor/clinic	NA	1962(30.75)
No care or informal care	NA	197 (3.09)
<b>Place of residence</b>		
Rural	765(56.62)	3222(50.51)
Urban	586(43.38)	3157(49.49)
<b>Social Group</b>		
SC/ST	263(19.46)	880(13.80)
OBC	584(43.21)	2637 (41.35)
Others	504(37.33)	2861 (44.85)
<b>Education</b>		
Not literate	512(37.90)	2083(32.65)
Informal education	18(1.33)	41(0.64)
<b>Formal education</b>		
Up to Primary level	304 (22.49)	1489(23.35)
Up to Secondary level or equivalent	296 (21.93)	1586(24.87)
Up to Higher Secondary or equivalent	119(8.84)	451(7.07)

Up to Graduation or equivalent	78(5.77)	554 (8.69)
Post-Graduation and above	24(1.75)	174(2.72)
<b>Consumption expenditure quintile</b>		
I MPCE quintile (Poorest)	151(11.15)	369(5.78)
II MPCE quintile	168 (12.47)	895(14.03)
III MPCE quintile	316(23.43)	962 (15.09)
IV MPCE quintile	302(20.08)	1605 (25.17)
V MPCE quintile (Richest)	413 (30.59)	2547 (39.93)

Source: NSSO, 2017-18 [13]

Note: MPCE, monthly per capita consumption expenditure. Household monthly per capita consumption expenditure limits (in INR) for the five quintiles are as follows: I MPCE quintile (918 -1280), II MPCE quintile (1500 -1667), III MPCE quintile (1967-2125), IV MPCE quintile (2500-3000) and V MPCE quintile (4000-5250).

**FIGURE 1 HOSPITALISATION RATES FOR HYPERTENSION REPORTED PER 100 000 PERSONS DURING THE LAST 365 DAYS IN INDIA, 2017-18 BY GENDER AND LOCATION OF RESIDENCE**

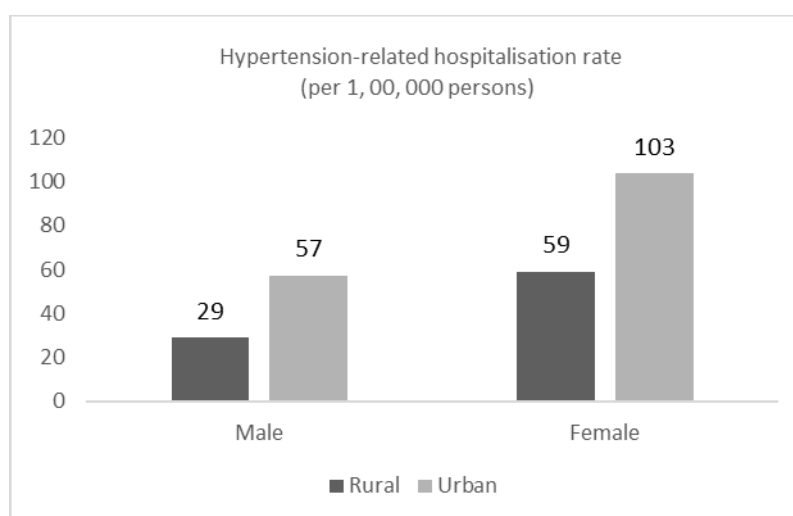


Table 2 shows the median expenditure per episode of HTN-related was INR 5,500 (US\$74), and it was INR 7,750 or US\$104 among the richest quintile compared with the poorest quintile (INR5,000 or US\$67). Out-of-pocket hospitalisation expenditure as a proportion of annual household consumption expenditure on average is highest among Q2 quintiles (18%), followed by the poorest quintile (8%). About 41% of individuals within the poorest quintile spend more than 10% of their annual consumption expenditure for HTN-related hospitalisation. Public sector utilisation by the poorest quintile (60%) was twice more than the richest quintile (29%) ( $p < 0.001$ ). Median private sector OPE for HTN related hospitalisation expenditure (INR 12,230 or US\$ 164) was more than six times higher than the public sector (INR 1,800 or US\$ 24). Medical expenses were covered through borrowing or sale of assets in 21% HTN related hospitalisation episodes on an average, with highest distress financing of 32% among those seeking care in the non-profit private sector. No significant difference

was found for distress financing of HTN related hospitalization across income quintiles.

The average expenditure for HTN related hospitalization in Indian rupees is shown in Table 3. Direct medical expenditure on an average is INR 15,105 (US\$ 202). Persons seeking HTN care in public hospitals incur only one-tenth of the direct medical expenditure incurred in the private hospitals. Indirect medical expenditure were almost two times higher in private hospitals than that of public medical institutions. Total medical expenditure were almost eight times higher in private hospitals as compared with public medical institutions. The amount reimbursed by insurance coverage ranged between INR 80 and INR 2,981, resulting in high OOP expenditure on HTN care of about INR 15,176 (US\$ 203) on an average. Loss of household income due to hospitalization reported by patients is around INR 1,592 (US\$ 21) on an average.

**TABLE 2 OUT-OF-POCKET HOSPITALISATION EXPENDITURE, PREVALENCE OF CATASTROPHIC EXPENDITURE AND UTILISATION OF PUBLIC SECTOR FACILITIES FOR EVERY EPISODE OF HOSPITALISATION DUE TO HYPERTENSION BY INCOME QUINTILES AND TYPE OF HEALTH FACILITY IN INDIA, 2017-18**

Characteristics	Median hospitalisation expenditure in INR for each episode of hospitalisation (IQR)#	Out-of-pocket hospitalisation expenditure as a proportion of annual household consumption expenditure (%)	Proportion of Out of pocket hospitalisation expenditure leading to catastrophic expenditure * (%)	Proportion of hospitalisation episodes whose expenditure was sourced from borrowings/ sale of physical assets (%)	Utilisation of public sector facilities for hospitalisation due to hypertension (%)
<b>Consumption expenditure quintile</b>					
I MPCE quintile (Poorest)	5000 (2000- 12000)	8	41	25	60
II MPCE quintile	4650 (2010 - 17110)	18	34	21	56
III MPCE quintile	7150 (1590 - 13900)	4	30	22	46
IV MPCE quintile	5200 (2060- 12230)	2	18	22	51
V MPCE quintile (Richest)	7550 (2510- 26200)	6	26	18	29
<b>Type of Medical Institution</b>					
Public	1800 (770 -3650)	2	4	20	-
Non-Profit private	10110 (5600- 32140)	5	10	32	-
Private	12230 (6283 - 27000)	13	22	23	-
Overall	5500 (2000 - 15700)	8	14	21	48

Source: NSSO, 2017-18 [13]

Note: # Kruskal-Wallis H test significant at 1%, \*More than 10% of annual household consumption expenditure

**TABLE 3 AVERAGE EXPENDITURE (RS.) PER HOSPITALISATION CASE OF HYPERTENSION AND ITS BREAKUP, INDIA, 2017-18**

Components	Public (n=653)	Charitable (n=31)	Private (n=667)
<b>Direct Medical expenditure</b>	<b>2473 (5384)</b>	<b>19725 (22162)</b>	<b>25326 (41099)</b>
Doctor's/surgeon's Fee	92 (1564)	3478 (4985)	3515 (9136)
Medicines	1455 (3279)	4161 (4508)	5182 (7750)
Diagnostic Tests	488 (1117)	1176 (2203)	2595 (4606)

Bed charges	55 (339)	2051 (3283)	2871 (5397)
Other medical expenses	213 (725)	2188 (2741)	1669 (6236)
<b>Indirect Medical expenditure</b>			
Expenses on Transport of patients	402 (650)	402 (425)	727 (1192)
Other non-medical expenses	696 (990)	1777 (2625)	1493 (3055)
<b>Total Medical expenditure</b>	<b>3571 (6239)</b>	<b>21904 (24139)</b>	<b>27546 (42791)</b>
Amount reimbursed by insurance	80 (730)	577 (2117)	2981 (18831)
<b>Out of pocket expenditure</b>	<b>3491 (6176)</b>	<b>21327 (24520)</b>	<b>24565 (37343)</b>
<b>Loss of household income due to hospitalization</b>	<b>964 (2325)</b>	<b>3119 (4631)</b>	<b>2054 (6095)</b>

Source: NSSO, 2017-18 [13]

Note: The figures are mean expenditure with standard deviation in the parenthesis.

With regards to the distribution of hospitalisation costs related to HTN care, a doctor's fee was negligible in public hospitals but constituted 23% and 19% of total hospitalization costs in charitable and private hospitals respectively. Medicines accounted for the highest 43% (95% CI: 32-52) of hospitalization expenditure in public hospitals. Diagnostic tests were lowest at 7% of health care cost in charitable hospitals. Bed charges were highest in private hospitals. Other medical expenses were highest at 14% in charitable hospitals. Indirect costs on transport of patients and other non-medical expenses were much higher in the public sector (31%) compared with charitable and private hospitals (around 12-13%).

### OUTPATIENT VISITS AND EXPENDITURE

Table 4 shows that around 60% of hypertensive patients reported outpatient visits in the last 15 days to private hospitals or with private doctor or clinic. Out of 6,379 hypertensive patients, 165 people (2.58%) did not specify from where they sought care and 32 persons (0.5%) sought informal care. Total medical expenditure towards HTN care, on an average, was highest in private hospitals (INR 696 or US\$ 9), more than double of that reported in public

facilities (INR 280 or US\$ 4). The amount reimbursed by health insurance is negligible irrespective of the type of medical institutions; hence all of medical expenditure incurred during outpatient visits in the last 15 days was OOP. In terms of distribution of HTN related outpatient visits revealed that medicines accounted for major health component expenses with lowest of 47% in charitable or NGO-run facilities and highest of 87% in informal health care providers. Medicines accounted for 66% (95% CI: 54-64) of costs related to outpatient visits in public facilities.

### FACTORS ASSOCIATED WITH CATASTROPHIC EXPENDITURE DUE TO HTN-RELATED HOSPITALISATION

Table 5 displays three regression models representing different thresholds of catastrophic expenditure (5%, 10% and 15% of total annual household expenditure) towards HTN related hospitalization. These models show that the probability of incurring catastrophic expenditure among hospitalised hypertensive was significantly higher among patients from poorest quintiles as compared to the richest quintile, especially those from rural areas. All models showed significant catastrophic health expenditure among those who were treated for longer duration for more than 7 days, particularly in private hospitals

TABLE 4 AVERAGE EXPENDITURE (RS.) PER OUTPATIENT CASE OF HYPERTENSION AND ITS BREAKUP, INDIA, 2017-18

Components	Not specified (n=165)	Public (n=2201)	Charitable / NGO run (n=73)	Private hospital (n=1946)	Private doctor/cli nic (n=1962)	Informal health care provider (n=32)
<b>Direct Medical expenditure</b>	<b>277</b> <b>(651)</b>	<b>219</b> <b>(468)</b>	<b>428</b> <b>(807)</b>	<b>633</b> <b>(1371)</b>	<b>435</b> <b>(683)</b>	<b>63</b> <b>(78)</b>
• Doctor's/surgeon's Fee	11 (49)	11 (57)	42 (64)	89 (411)	69 (205)	5 (11)
• Medicines: AYUSH	3 (38)	4 (49)	0.5 (7)	12 (95)	11 (80)	0 (0)
• Medicines: Other than AYUSH	241 (488)	186 (379)	231 (374)	450 (810)	325 (359)	57 (76)
• Diagnostic Tests	18 (121)	13 (81)	155 (453)	52 (314)	26 (188)	0 (1)
• Other medical expenses	4 (109)	6 (51)	0.2 (5)	29 (255)	3 (277)	1 (12)
<b>Indirect Medical expenditure</b>						
<b>Expenses on Transport of patients</b>	<b>9</b> <b>(111)</b>	<b>37</b> <b>(93)</b>	<b>45</b> <b>(98)</b>	<b>40</b> <b>(82)</b>	<b>18</b> <b>(47)</b>	<b>1</b> <b>(7)</b>
Other non-medical expenses	6 (29)	24 (108)	13 (90)	23 (87)	8 (40)	1 (9)
<b>Total Medical expenditure</b>	<b>292</b> <b>(710)</b>	<b>280</b> <b>(564)</b>	<b>487</b> <b>(903)</b>	<b>696</b> <b>(1432)</b>	<b>461</b> <b>(723)</b>	<b>66</b> <b>(85)</b>
Amount reimbursed by insurance	0 (0)	2 (88)	5 (67)	1 (90)	4 (332)	0 (0)
<b>Out of pocket expenditure</b>	<b>292</b> <b>(710)</b>	<b>277</b> <b>(571)</b>	<b>482</b> <b>(901)</b>	<b>695</b> <b>(1431)</b>	<b>457</b> <b>(556)</b>	<b>66</b> <b>(85)</b>
<b>Income loss due to illness</b>	<b>35</b> <b>(258)</b>	<b>36</b> <b>(164)</b>	<b>178</b> <b>(609)</b>	<b>63</b> <b>(439)</b>	<b>20</b> <b>(182)</b>	<b>3</b> <b>(38)</b>

Source: NSSO, 2017-18 [13]

Note: The figures are mean expenditure with standard deviation in the parenthesis



**TABLE 5 MULTIVARIATE LOGISTIC REGRESSION TO STUDY THE FACTORS ASSOCIATED WITH CATASTROPHIC EXPENDITURE AS A RESULT OF INPATIENT HOSPITALISATION DUE TO HYPERTENSION IN INDIA, 2017-18**

Characteristics	Model 1		Model 2		Model 3	
	5% threshold		10% threshold		15% threshold	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
<b>Gender</b>						
Male	1		1		1	
Female	0.836 (0.633-1.106)	0.211	0.805 (0.573-1.131)	0.213	0.650 (0.443-0.954)	0.028
<b>Age group</b>						
0-14 years	1		1		1	
15-34 years	0.963 (0.073-12.654)	0.978	0.595 (0.039 -8.942)	0.707	0.435 (0.023-8.012)	0.576
35-59 years	0.834 (0.066-10.505)	0.888	0.469 (0.0328-6.703)	0.577	0.347 (0.020-6.018)	0.468
Above 60 years	0.880 (0.069-11.099)	0.922	0.436 (0.030-6.242)	0.541	0.334 (0.019-5.790)	0.451
<b>Place of residence</b>						
Rural	1		1		1	
Urban	0.623 (0.472-0.823)	0.001	0.613 (0.437-0.860)	0.005	0.464 (0.315-0.684)	<0.001
<b>Type of Health Facility</b>						
Govt/Public	1		1		1	
Charitable Trust/NGO run	1.905 (0.762- 4.763)	0.168	3.127 (1.123-8.705)	0.029	4.495 (1.552-13.021)	0.006
Private	3.986 (2.943- 5.399)	<0.001	5.282 (3.550-7.859)	<0.001	5.629 (3.561 -8.897)	<0.001
<b>Number of days of hospitalisation</b>						
<=7 days	1		1		1	
>7 days	2.083 (1.467 -2.957)	<0.001	3.284 (2.222-4.852)	<0.001	4.098 (2.686- 6.252)	<0.001
<b>Consumption expenditure</b>						
Q5 MPCE quintile (Richest)	1		1		1	
Q4 MPCE quintile	1.337 (0.908- 1.968)	0.141	1.164 (0.711-1.907)	0.544	1.250 (0.703-2.223)	0.447
Q3 MPCE quintile	1.753 (1.181- 2.602)	0.005	1.940 (1.198-3.141)	0.007	2.249 (1.293-3.912)	0.004
Q2 MPCE quintile	1.141 (0.704 – 1.849)	0.591	1.353 (0.754-2.425)	0.310	1.506 (0.770-2.947)	0.231
Q1 MPCE quintile (Poorest)	3.51 (2.28- 5.41)	<0.001	4.579 (2.751- 7.622)	<0.001	6.074 (3.438-10.733)	<0.001
Constant	0.121 (0.009- 1.551)	0.105	0.084 (0.005-1.243)	0.072	0.080 (0.004-1.437)	0.087
Number of Observations	1351		1351		1351	
LR chi2(12)	138.33		147.76		152.87	

Source: Estimated by authors based on NSSO, 2017-18 [13]

## DISCUSSION

The survey highlighted that about 46% of inpatients and 40% of outpatients sought hypertensive care in public facilities in India. While catastrophic expenditure due to HTN care is not common across general population, the survey found that lower middle class and poorest quintile from rural areas face OOPE of 18% and 8% respectively of their household annual per capita consumption expenditure on an average on HTN-related hospitalisations. These proportions were higher at 13% for those seeking care in private facilities as compared to 2% for those seeking HTN care in public facilities. About 25% of the poorest households experienced catastrophic expenditure and resorted to distress financing through sale of assets or borrowing. About 60% of the poorest quintiles utilized public facilities for HTN related hospitalisation. The poorest households incurred OOPE on an average INR 3491 (SD 6176) out of which 43% of the total OOPE was spent on drugs and medicines. The mean private sector OOPE on HTN related hospitalisation expenditure was nearly six times higher than in the public sector. Indirect medical expenses on transport, food and other items constituted about one-third of the total OOPE in public facilities.

The NSSO 2017-18 findings in this study are compared and contrasted to those reported in 2011-12 India Human Development Survey (IHDS) study (11). The previous study made no distinction between inpatient services and outpatient visits and reported 73.1% of the hypertensive population have been found to prefer private institutions for treatment. Our study distinguished between treatment as inpatient services and outpatient visits and found that 54% of respondents preferred private institutions for HTN-related hospitalization and 61% of respondents preferred private facilities for outpatient visits. One plausible reason could be the expansion of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) program since 2010 at different levels of public health systems with greater thrust on NCD care delivery could be the reason for the decline in patients seeking care from the private sector. [17]

The average OOPE HTN related hospitalization among poorest quintile reported in the IHDS study was Rs. 5,834 while the richest quintile spent Rs. 7,619 on HTN related treatment in 2011-12. This study finds similar average hospitalisation expenditure in nominal terms towards HTN

care in poorest quintile to be Rs 5000 (2000-12000) while richest quintile to be Rs 7550 (2510- 26200) in 2017-18. These similar expenditures over a period of time cannot be attributed to deflationary conditions and consequent decline in hospitalization expenditure in real terms, since the overall consumer price index in India has increased from 100 in 2012-13 to 146.3 in 2019-20. [18] Further, with regards to components of medical expenditure related to HTN, OOPE on medicines constituted on an average 43% and 66% of public sector hospitalisation and outpatient care respectively. This finding is much less than previous household survey findings that report 70% of OOP expenditures on medicines in India. [19] Although the availability of generic medicines in public facilities has improved in recent years, there is a need to examine thoroughly episodes of drug stock outs as well as prescription patterns for HTN drugs in public facilities.

One of the unique observations from the study is that OOP expenditure on diagnostics especially in charitable facilities was found to be substantially higher as compared to public and private facilities. One probable reason could be the transformation of the charitable and not-for-profit medical institutions, amidst the slowdown in the flow of funds from the churches in Europe, rising commercialisation of medical care and willingness to pay among middle class population for "quality" care. [20]

### STRENGTHS AND LIMITATIONS OF THE STUDY

The strength of the study is that it measures the magnitude of OOPE associated with HTN care in India based on a large, nationally representative household survey. The study provides population level information about the magnitude and extent of catastrophic health expenditure due to both HTN related inpatient care and outpatient care in the Indian context. The study provides estimates on average hospitalization expenditure from societal perspective since indirect costs due to loss of wages. The results of this study pinpoint the need for strengthening public health efforts to strengthen HTN control and management programs in India to improve access to HTN-related drugs and medicines to the most deprived and vulnerable sections of the society.

The value of the study lies in its contribution towards providing cost estimates for HTN related care that can serve as inputs for economic evaluation. The cost estimates from NSSO survey on disease specific OOPE enables to be able to account for cost of management of disease condition from societal perspective. The household -based

survey provides estimates on direct and indirect medical expenditure such as transportation and food costs along with loss of income due to illness. Such estimates also can help in informing the potential cost saving in economic evaluation studies that compare HTN control and management interventions through averting CVD-related hospitalizations from patient and their carer's perspective. Limitations of the study are directly related to the features of NSSO household survey that collected data on OOP based on broad classification of self-reported ailments. Firstly, the survey does not provide any information about clinical presentation of HTN and its related complications. Secondly, the survey does not provide treatment cost based on standard diagnostic and treatment strategies, rather medical and non-medical expenditure on hospitalization and outpatient visits are self-reported based on recall within the reference period of 365 days and 15 days respectively. Hence, the study does suffer from recall bias inherent in the survey data. Three, the WHO recommends a 40% threshold level for non-food expenditure to define catastrophic expenditure. But this study considers OOP expenditure as a proportion of the annual household consumption expenditure since the survey does not differentiate between food and non-food consumption expenditure.

### SCOPE FOR FURTHER RESEARCH

The scope of the study can be extended to conduct the OOP related to HTN care at the sub-national and regional levels. Such an analysis would inform geographical variations and programmatic efforts by the state health administrators to address concerns over catastrophic health expenditures and its correlates and tackle the inequity gap for utilizing health facilities for NCD-related ailments.

### CONCLUSION

With the increasing incidence of HTN and its related consequences and growing commercialisation of health care sector in India, high and persistent OOP expenditure remains a major public health concern. Our study finds that catastrophic expenditure due to HTN care is not common in general population, though about four out of ten households among the poorest quintile are likely to incur catastrophic health expenditure. Also, more than 50% of hypertensive population seeks care from the private sector. Those seeking HTN care in public health care facilities spend around 43% of total medical expenditure was on medicines, followed by 14% on diagnostic tests. Improving

the availability of drugs and diagnostic tests within public facilities under the NPCDCS program can reduce HTN related catastrophic expenditure among the poorest quintiles.

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