Multi-Layered Catastrophic Health Spending of Inpatient Women by Broad Group of Diseases in India

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Abstract

Healthcare for Indian women needs prioritizing, as they continue to face social and economic discrimination over their healthcare, often with high out-of-pocket payments. The study examines the amount inpatient women have to pay for treatment of major diseases, re-classified into four groups as infectious, reproductive, non-communicable diseases (NCDs), and disabilities & injuries, across the country to comprehend the extent of catastrophic health spending (CHS) they experienced. The study is based on India's 75th round of the National Sample Survey (NSS), i.e., Household Social Consumption: Health (2017-2018), consisting of 26,938 inpatient women aged 12 and above from India's urban and rural areas. We examine the prevalence of the four categories of diseases by individual, household, community, and healthcare characteristics. Expenditure estimates were derived from cross-tabulation, followed by binary logistic regression to assess the association between covariates and inpatient expenditures for the diseases. Indian women are more likely to be hospitalized for infectious diseases (43%), but the burden of CHS (overall) is highest for disabilities and injuries (INR 24,414), followed by NCDs (INR 23,053). Duration of hospitalization and possession of health insurance by women indicate maximum variation with medical spending. Almost 97% of women have incurred out-of-pocket expenditure on hospitalization, from which we identify three layers of CHS. A substantial proportion of women (23 to 50%) experienced CHS, i.e., up to 0-10%, 11-30%, and >30%, which varies distinctively by place of residence and across the six regions. Covariates like age, economic status, and healthcare are highly significant and associated with disease-wise CHS thresholds. Women in India face divergent financial hardships for healthcare. Given the heterogeneity of morbidities and socio-economic characteristics, the need for women-sensitive public health services and interventions are evident.

Keywords

Diseases; healthcare disparity; India; inpatient women; multi-layer CHS

Introduction

Women's health remains a concern worldwide, despite better survival and longevity with a global life expectancy of 74 years for women (World Health Organization, 2019b), increasing health spending reaching USD 8 trillion (Institute for Health Metrics and Evaluation, 2019), and substantial improvement in adequate universal health coverage (UHC) index of 59.8 points (GBD 2019 Universal Health Coverage Collaborators, 2020). According to the Commission on Social Determinants of Health (2008), the health status of a human being depends on the condition the person is born, grown, worked, lived, and aged. Identifying the socio-economic variables helps us understand the health condition, the ability to pay, and the financial situation for measuring the burden of healthcare services both in consumption and production. In the last few years, the Global Burden of Diseases (GBD) for women has shifted from maternal and infectious morbidities to mental disorders, non-communicable and cardiovascular diseases. (Boutayeb & Boutayeb, 2005; Thyloth et al., 2016) The burden of the health expenditure faced by the households and individuals helps add information about the demand for healthcare, affordability, and accessibility. The World Health Organization (2019a) report on global spending on health suggested a way to understand the household's hardship in accessing and availing of health services by measuring catastrophic health expenditure. When health spending exceeds a certain threshold, becoming out-of-pocket (OOP) payment, i.e., a share of total household consumption or income exceeding 10% or 25%, it takes the form of catastrophic health spending.

The National Health Portal of India (NIHFW, 2015) mentioned that women in India face numerous health issues. Both the physical and mental well-being of women contributes to the country's financial burden. Paul and Singh (2017) mentioned that India's infectious diseases, cardiovascular diseases (CVDs), non-communicable diseases (NCDs), and disability increased drastically within two decades (1995-2014), of which CVDs increased the most. Studies have suggested that self-reported morbidity substantially increased in both male and female populations. However, the reported morbidities were higher and worse among females than males (Fernandez et al., 1999; Paul & Singh, 2017; Yadav & Singh, 2020). Healthcare services can become a debt-ridden burden for low-income countries as it requires money and someone to pay for the services. While the limited use of health services relates to many factors, the cost is a substantial barrier (Xu et al., 2003). Adequate health insurance or a tax-funded health system protects the households in developed countries from catastrophic spending on health.

In contrast, in low-income countries, half of the health care funding comes from OOP payments. Out-of-pocket payments often prevent people from seeking health care services, as it may threaten the family's financial ability to keep up its subsistence, leading to impoverishment and economic catastrophe. Lack of proper care arrangement, complicated discharge procedure, limited knowledge on the prevention and treatment, government funding high-cost but low-effect or impact interventions are some disadvantages for under-developed and developing countries (Su et al., 2006; World Health Assembly, 2000; Xu et al., 2007).

Individual and household factors play a vital part in out-of-pocket health expenditure (OOPE). Age, sex, level of education, socio-economic characteristics (wealth status and income), place of residence, type of illness or diseases, type of health care provider (public or private), and health insurance coverage are consistent covariates for OOPE (Kastor &

Mohanty, 2018; Prinja et al., 2019; Wang et al., 2016). Variation in healthcare expenditure by gender is due to differences in demographic, socio-economic, and healthcare factors between males and females and the effect of these characteristics on health care spending. This variation suggests less expenditure on female health care assuming female health is not as important as male's health, i.e., the role of gender in health spending (Jeyashree et al., 2018; Saikia et al., 2016). Studies state that married people are healthier than the non-married, similar among widowed older adults compared with the non-widowed and widowers with worse health status (Ho, 2015; Onah & Govender, 2014). However, many mentioned that income and OOPE have a mixed relationship (Chuma & Maina, 2012; Gustafsson-Wright et al., 2011; Karan et al., 2014). India sees a significant rise in OOP health expenditure by households on inpatient services rather than outpatient services (Ravi et al., 2016). In general, higher OOPE relates to seeking care by providers and hospitalization in the private health sector (Alam & Mahal, 2014; Saksena et al., 2012). In India, the absence of proper targeting and utility from the public sector directs the goodwill towards the already rich. Whereas, instead of benefiting the population under the below-poverty-line (BPL), it brings a high OOP burden, a byproduct of higher exclusion and inclusion errors (Karan et al., 2014). Studies in developing countries, such as Kenya, Namibia, Nigeria, and Albania, found that financially unsound households had low absolute out-of-pocket expenditures on health than wealthier families. While the poorer household bears higher health expenses to total expenses when compared to well-off households (Wang et al., 2016).

In implementing appropriate prevention strategies, countries face the challenge of the growing burden of non-communicable diseases against the existing infectious diseases that remain out of control. The economic essence for treating various health conditions depends on the provider and the illness (Ladusingh et al., 2018). Disease pattern with health services brings a differing impact on health spending. The burden of NCDs is higher in India, contributing to the higher load of CHS among the weaker section of the population (Pandey et al., 2018). Similarly, the burden of medical expenditure for hospitalization of non-communicable diseases, reproductive health, and related diseases and disability is much higher than communicable diseases (Kastor & Mohanty, 2018; Ladusingh et al., 2018).

Most studies emphasize the burden of diseases and the differentials in gender and economic status rather than focusing on a group, i.e., women. It is not only men's health but also women's health that brings OOPE and CHS. Studies focusing on OOPE on health by households give us overall knowledge on the spending. In contrast, our study focuses on women to show the share of OOPE on women's health and quantify its extent, which adds information towards understanding the burden of health on women and the household. Women suffer from infectious diseases, NCDs to reproductive health, and disabilities & injuries, yet they face discrimination and ignorance about healthcare access and services. This study analyses (a) percent of inpatient women for four broad diseases, (b) disease-wise average medical spending with various correlates, and (c) the three threshold levels of catastrophic health spending by the plausible factors that affect disease-wise catastrophe health spending, thereby presenting a better and accurate picture of the health burden from hospital care on the household and women.

Data and methods

Study area

According to United Nations estimates, India has a population of approximately 1.38 billion (United Nations, 2019). India is the second-most populous country and the largest democracy globally, currently consisting of twenty-eight states and nine union territories (UTs). Census India (2011a) affirmed India had a sex ratio of 940 females per 1,000 males. India had an overall literacy rate of about 74.0% for all persons, with 82.1% for males and 65.5% for females (Census India, 2011b). According to the Human Development Report of India (UNDP, 2020), the Human Development Index of India has remained constant over the years (0.647 in 2018). It has only marginally improved its global position from 130th to 129th place in the world. The National Health Accounts 2016-2017 (National Health Systems Resource Centre, 2019) stated that India spends only 1.2% of the Gross Domestic Product (GDP) on Government health expenditure, while the OOPE stands at 2.22% of the GDP. Overall, the OOPE is 59.7% of the total health expenditure, despite implementing various policies and programs in the country.

Study design

The study uses the unit-level data related to social consumption (health) of India's 75th round of National Sample Survey (NSS), conducted during 2017-2018 (Ministry of Statistics & Programme Implementation, 2019). The 75th round of NSS was a stratified multi-stage design and covered 555,114 individuals from a random sample of 113,823 households spread across rural and urban areas of every district in India. Out of the total sample, the proportion of total inpatient females in the survey (excluding childbirth) was 22% of total females. However, this study is based on 26,938 women aged 12 and above from India's urban and rural areas. These women were hospitalized for infectious, reproductive diseases, NCDs, and disabilities & injuries in the past 365 days before the survey (i.e., between July 2017 and July 2018). The study considers women aged 12 years and above due to ample evidence of NCDs (UNICEF, 2021) and reproductive health affecting adolescents with the onset of menarche at an early age of 11-12 years (Friedman, 1994). The Health module of NSS also collected information on individual-level morbidities, the profile of ailments, the problems of the aged, information on maternity, childbirth, and types of treatment available, including inpatient and outpatient healthcare services from the public and private health sectors for various morbidities.

Statistical analysis

The study uses the STATA 15 version (Stata Corporation, 2017) to analyze the data and apply bivariate and multivariate methods. We derive the proportions, levels of diseases, and expenditure estimates from cross-tabulation, followed by binary logistic regression to assess the odds of association between covariates and expenditure on illnesses and their treatments. The study considers household monthly per capita consumer expenditure (MPCE) as the proxy for the household's economic status.

The derivation of the estimates or share of OOPE on health from the household monthly consumer expenditure is as follows:

$$Annual\ Per\ Capita\ Consumer\ Expediture\ (APCE) = Monthly\ Per\ Capita\ consumer\ Expenditure * 12$$

$$Out\ Of\ Pocket\ Expenditure = \frac{Medical\ Expenditure}{APCE}$$

According to the World Health Organization (2019a), OOP payments are the sum of all the direct expenditures individuals or households incur on medical care and services. It excludes the prepayment and reimbursements for health services by any form of taxes, insurances, or schemes. Further, by applying the ratio method, catastrophic health expenditure (CHE) is considered as the proportion of total income spent on out-of-pocket health care. An approach adopted to define medical spending as 'catastrophic' if it exceeds some fraction of household income or total expenditure in a given period is usually one year (Berki, 1986; Wyszewianski, 1986; Xu et al., 2003).

A household incurring catastrophic payments is derived from: $\frac{T}{Expenses} > Z$

Whereas 'T' is OOP payments, 'Expenses' are household total (non-food) expenditure, and 'Z' is the threshold. That is, the threshold level at which out-of-pocket expenditure becomes financially catastrophic (usually 10% and more). The World Health Organization suggested a 40% threshold to define catastrophic health expenditures, but studies state varying threshold levels to qualify as catastrophic health expenditures, ranging from 5% to 40% of the household income (Mohanty et al., 2018; Xu et al., 2003).

The proportion of the population experiencing catastrophic health expenditures differs by country and by survey and methods used for calculation (Raban et al., 2013; van Doorslaer et al., 2006; Xu et al., 2003). This study considers OOPE within three thresholds – (a) up to 10%, (b) up to 30%, and (c) above 30% – as catastrophic health spending. To predict the probability of CHS among women, we used a dichotomous logit model, where we assume that the individual, household, community, and health service characteristics influence the CHS on inpatient care for the four disease categories. According to the NSS 75th round, expenses during the hospital stay define medical expenditure. It includes doctor's or surgeon's fee, medicines, diagnostics tests, bed charges, other medical charges (e.g., attendant charge, physiotherapy, personal medical appliances, blood, oxygen), and excludes transport cost of patient and other non-medical expenses.

The study uses the International Classification of Disease (ICD) -10 module (World Health Organization, 2010) to categorize the information of self-reported morbidities. All types of reported diseases/ailments are re-classified into four broad categories of diseases or disabilities: (a) infectious diseases, (b) reproductive illness, (c) NCDs includes CVDs, and (d) disability and injuries (Table 1).

The first category of explanatory variables is the individual characteristics, comprising of age, education, marital status, and whether having any health insurance or not. The second explanatory variable, household characteristics, includes economic condition (monthly per capita consumer expenditure). The MPCE (proxy variable) represents the five income quintiles/categories (poor, poorer, middle, rich, and richest) of household financial/economic status. The assumption is that women in lower-income quintiles will incur higher CHS. We further assumed that: (a) the lowest categories will incur more OOPE and hence more CHS, (b) the community characteristics such as place of residence and in the different regions of

India the rural areas will incur higher CHS, and (c) factors influencing CHS would be the healthcare characteristics (nature of the treatment, type of medical institution, and duration of hospitalization) – all assumed to have a significant part in catastrophic health spending.

Table 1: List of Diseases and their Re-Classification for the Study, according to ICD-10

Infectious diseases	CVDs and NCDs	Reproductive	Disabilities and Injuries
Fever with loss of consciousness or altered consciousness	CANCERS	Any difficulty or abnormality in urination	Mental retardation
Malaria	Jaundice	Pain the pelvic region/RTI	Mental disorders
Fever due to DIPHTHERIA, WHOOPING COUGH	Anemia (any cause)	Change/irregularity in menstrual cycle or excessive bleeding/pain during menstruation and other gynecological & andrological disorders incl. female infertility	Headache
All other fevers (typhoid, rash/eruptive, etc.)	Bleeding disorders	Pregnancy with complications before or during labor	Others include memory loss, confusion
TUBERCULOSIS	DIABETES	Complications in mother after the birth of a child	Decreased vision (chronic) NOT including where decreased vision is corrected with glasses
Filariasis	Under-nutrition		Others (including disorders of eye movements)
Tetanus	Goiter and other diseases of the thyroid		Decreased hearing or loss of hearing
HIV/AIDS	Others (including obesity)		Diseases of mouth/teeth/gums
Other sexually transmitted diseases	Stroke/ hemiplegia/ sudden onset weakness or loss of speech in half of body		Joint or bone disease/ pain or swelling or pus in any of the joints or bones
Diarrheas/ dysentery	Cataract		Back or body aches
Worms infestation	GLAUCOMA		Accidental injury, road traffic accidents, and falls
Discomfort/pain in the eye with redness or swellings/ boils	Earache with discharge/bleeding from ear/ infections		Accidental drowning and submersion
Acute upper respiratory infections	HYPERTENSION		Burns and corrosions
Cough with sputum with or without fever (NOT TB)	Heart disease: Chest pain, breathlessness		Poisoning
Skin infection (boil, abscess, itching) and other skin diseases	Bronchial asthma/ recurrent episode of wheezing and breathlessness with or without cough over long periods)	Intentional self-harm	
Pain in abdomen: Gastric and peptic ulcers/ acid reflux/ acute abdomen			Assault
Lump or fluid in abdomen or scrotum			Contact with venomous/harm-causing animals and plants
Gastrointestinal bleeding			

Note: Reclassifications by authors to analyze health spending.

Results

Women and four broad diseases: Percent inpatient by diseases

Analysis of the 75th round of the National Sample Survey (2017-2018) indicates that in India, women aged 12 and above suffered from infectious diseases (43%), followed by NCDs (includes CVDs) (25%), disabilities & injuries (17%), and reproductive health issues (15%). These diseases have contributed differently to women's suffering and their hospitalization (inpatient). Table 2 presents the distribution of women hospitalized for any of the four broad diseases and the average annual per capita consumer expenditure (APCE) across selected individual, household, community, and healthcare characteristics. The age, marital status, nature of the treatment, and duration of hospitalization show a slight variation among women. By individual characteristics, unmarried/single (63%), middle-aged women aged 30-49 years (49%), and younger women and with higher education (46%) are more likely to suffer and be hospitalized for infectious diseases. Reproductive health-related hospitalization had been more among younger women aged 12-29 (30%) and educated women with graduation or above (21%). In the case of NCDs and disabilities & injuries, the most affected women are older women age 50+ and widowed/separated. Hospitalization across other characteristics does not show many variations.

Further, self-reported morbidity by household economic status (income quintiles) does not vary much except for the NCDs, higher among women in the richer quintiles (43%-45%). However, women suffering from infectious diseases (above 40%) and NCDs (above 20%), regardless of the regions, reveal a high concentration of hospitalization. Inpatient women due to infectious diseases record a higher share in the North-Eastern region (47.5%), followed by the North region (45%). Likewise, reproductive illnesses are found much higher in the Central and Eastern regions. In the case of NCDs, hospitalization is higher in Western (30%) and Southern (26%) regions, which is also the case for disabilities and injuries (18% each). When considering healthcare characteristics, women (43%) utilized more treatments for diseases (e.g., AYUSH and others). More women stayed in the hospital for about a week for infectious diseases (45%), but a month or more for NCDs (35%), and disabilities & injuries (32%).

Household expenditure (Average APCE)

As shown in Table 2, a household's average monthly per capita expenditure is INR 2,525 = USD 35.86, based on the 2019 average exchange rate of 70.4059 INR (UK FX, 2021), and the average annual per capita expenditure (APCE) at INR 30,302. The average APCE reflects the household's economic status and paying capacity for health (proxy). The estimated APCE varies across the different characteristics of women. Women with APCE above the national average (or much higher) are those aged 50 and above, widowed/divorced/separated, whose household possesses health insurance (for at least one member) of government or non-government schemes (INR 30,529 & INR 64,270, respectively), up to secondary and graduate and above education (INR 33,692 & INR 51,263, respectively), the richest category (INR 49,592), and in urban areas (INR 43,471).

Table 2: Percent Distribution of Women Age 12+ Suffering by Broad Diseases according to Selected Characteristics, and Average APCE in India, NSS 2017-2018.

	Covariates	N	Infectious	Reproductive	NCDs	Disabilities & Injuries	Average APCE (Rupees)
Individual Characteristics	**Age**						
	12-29 years	6,965	46.0	29.7	12.7	11.6	26,592
	30-49 years	9,668	48.9	15.5	20.5	15.2	29,743
	50+ years	10,306	35.0	4.7	37.9	22.4	33,334
	Education						
	No education	10,020	40.1	10.1	29.7	20.0	24,191
	Up to primary	6,065	41.2	16.3	25.8	16.8	28,576
	Up to secondary	8,866	46.4	18.4	20.8	14.4	33,692
	Graduate+	1,987	45.3	21.1	19.3	14.4	51,263
	Marital Status						
	Single	2,743	63.1	6.0	14.9	15.9	29,322
	Currently married	18,983	42.0	19.5	22.9	15.6	29,758
	Widowed/divorced/separated	5,212	35.0	3.7	38.6	22.8	32,800
	Health Insurance						
	Government scheme	4,819	41.8	12.6	28.3	17.3	30,529
	Non-government scheme	1,032	44.8	13.0	23.3	18.9	64,270
	No scheme	21,086	42.9	15.7	24.5	16.9	28,586
Household Characteristics	**MPCE**						
	Poorest	4,043	41.7	21.2	21.7	15.4	12,687
	Poor	4,523	40.1	16.0	25.9	18.0	20,035
	Middle	5,040	43.3	14.4	25.8	16.5	24,539
	Rich	5,689	45.3	13.2	24.8	16.7	30,174
	Richest	7,643	42.8	12.9	26.3	18.0	49,592
Community Characteristics	**Place of Residence**						
	Rural	17,561	43.2	16.0	23.2	17.6	23,271
	Urban	9,377	42.0	13.3	28.8	16.0	43,471
	Region						
	North	3,834	44.5	16.3	24.1	15.1	35,332
	Central	5,267	43.0	18.0	21.8	17.2	23,207

	East	5,553	40.9	18.0	24.6	16.4	23,980
	North East	573	47.5	15.8	21.5	15.2	26,593
	West	3,945	40.2	11.6	30.1	18.1	34,941
	South	7,767	44.2	11.9	26.1	17.9	35,068
	Nature of Treatment						
	Allopathy	26,744	42.9	15.1	25.2	16.8	30,286
	Others	194	31.6	7.5	18.3	42.6	32,498
	Medical Institution						
Healthcare Characteristics	Government facility	11,671	45.8	15.3	23.3	15.7	25,344
	Non-government facility	15,267	40.5	14.9	26.6	18.1	34,092
	Duration Hospitalized						
	Week	21,656	45.3	15.1	24.0	15.6	30,067
	Month	5,024	33.2	15.2	29.4	22.3	31,352
	> a month	258	23.0	9.5	35.4	32.1	29,545
	Total	**26,938**	**42.8**	**15.0**	**25.1**	**17.0**	**30,302**

Note: 'N' depicts the number of samples with any illness. APCE: Annual per capita consumer expenditure; Average monthly per-capita consumer expenditure (MPCE) per household in India for 2017-18 comes to ***INR 2,525 =*** *USD 35.86, based on the 2019 average exchange rate of 70.4059 INR (UK FX, 2021), as calculated by authors.*

Regions also show wide variation in household expenditure, higher APCE in the South, North, and West (more than INR 34,000). Healthcare characteristics suggest that women who underwent treatment in the non-government facility and stayed for a month had spent an average APCE of INR 34,092 and INR 31,352, respectively. The gap between the poorest (INR 12,687) and the richest households (INR 49,592) in the average APCE is approximately four times.

Average Annual Medical Expenditure (AME) and Catastrophic Health Spending (CHS) by three layers and regression results

Average Annual Medical Expenditure (AME)

A global study has estimated health spending (per capita) for India in 2017 at US$69 and a higher US$265 per capita purchasing power parity, adjusted for 2019 (GBD Universal Health Coverage Collaborators, 2020). Figure 1 and Table 3 exhibit women's average medical expenditure and three threshold levels of CHS for the four diseases, namely, infectious diseases, reproductive, NCDs, and disabilities & injuries. On average, the annual medical expenditure of Indian women is INR 18,119. The estimate for Average Medical Expenditure at 10% of CHS is INR 1,224; 11-30% of CHS amounts to INR 6,112, and for 30+% amounts to INR 34,984 (Figure 1). The visualization reflects that the average medical expenditures increase from infectious diseases to reproductive illnesses, NCDs, and the highest among those with disabilities and injuries.

Figure 1: Disease-Wise Average Medical Expenditure (AME) for Three Threshold Levels of CHS by Broad Diseases, India (2017-2018)

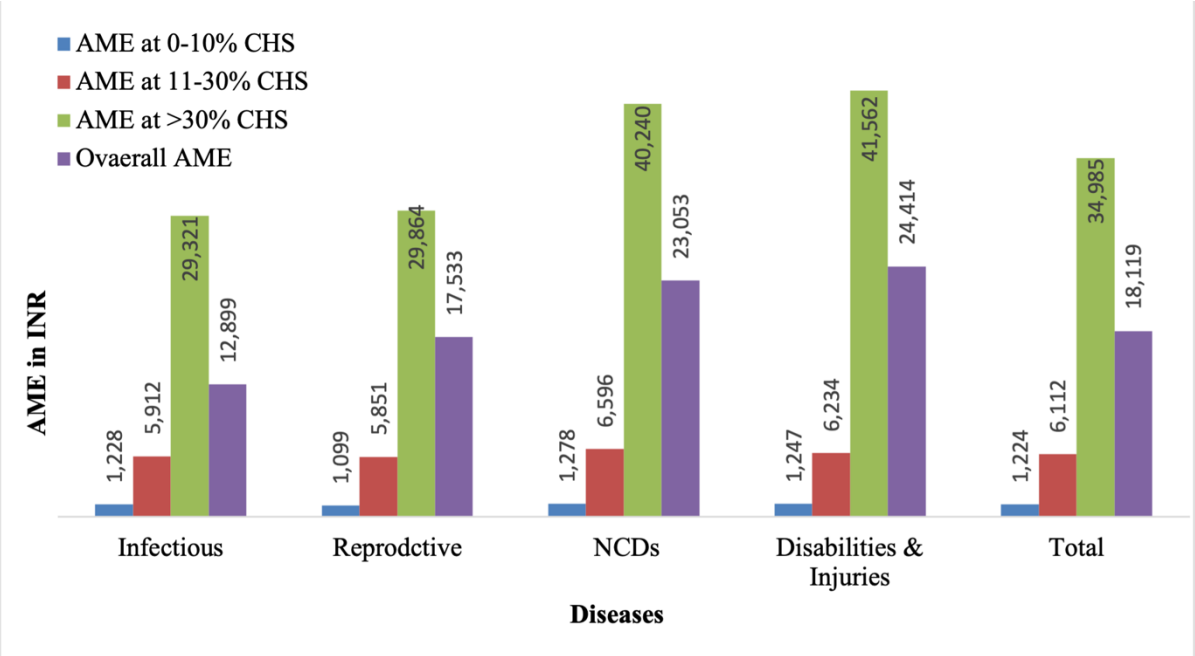


Table 3 presents estimates of more detailed medical expenditures for inpatient women by their characteristics. Women who spent a much higher amount of medical expenses are widowed/separated, living in North, Central, and West regions (INR 20,000 - 21,000), older women age 50+ years (INR 22,312), richest quintile (INR 24,665), graduate and above

education (INR 29,572), and those with non-government insurance scheme (INR 42,001). Similarly, medical expenditure is also much higher for inpatient women for healthcare services. Further, in case of the duration of hospitalization, medical expenditure is INR 68,893 for inpatient women hospitalized for more than a month, followed by INR 39,126 for those who stayed up to a month (Table 3 first column). Medical expenditure also varies among and across the characteristics of women.

Table 3: Estimates of AME, Disease-Wise Average Medical Expenditure (in Rupees) Under Three Threshold Levels of CHS for Inpatient Women by Selected Characteristics, India, NSS 2017-2018

Covariates		AME (INR)	Infectious			Reproductive			NCDs			Disabilities & Injuries		
			0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%
Individual Characteristics	**Age**													
	12-29 years	11,759	1,137	5,987	20,866	985	5,050	22,144	1,291	5,307	31,979	1,010	5,141	33,654
	30-49 years	18,218	1,156	5,863	30,375	1,326	6,644	33,213	1,359	6,710	35,839	1,512	6,490	38,600
	50+ years	22,312	1,397	5,911	34,719	1,302	7,904	40,116	1,237	6,874	44,260	1,154	6,378	45,861
	Education													
	no education	15,513	903	4,357	27,361	655	4,827	25,872	1,010	4,887	32,440	843	4,714	29,789
	Up to primary	16,597	1,166	5,495	23,999	845	4,461	26,695	1,326	6,855	39,363	1,189	5,920	47,337
	Up to secondary	19,387	1,342	6,529	32,774	1,373	5,732	28,218	1,616	7,673	46,313	1,606	8,124	49,243
	Graduate+	29,572	2,453	9,821	35,529	2,012	11,141	49,165	1,480	12,082	69,458	3,133	11,630	62,107
	Marital Status													
	Single	12,462	1,284	6,403	20,310	2,024	5,555	27,280	1,435	5,624	40,420	900	4,357	33,378
	Currently Married	18,334	1,215	5,819	29,761	1,016	5,738	29,630	1,209	6,984	39,576	1,432	6,142	40,397
	Widowed/Divorced/ Separated	20,377	1,223	5,865	35,839	1,585	7,922	35,805	1,368	6,056	41,835	996	7,032	47,612
	Health Insurance													
	Government Schemes	17,114	1,073	5,940	30,319	896	6,917	30,213	1,177	5,892	40,546	1,170	6,181	36,458
	Non-Govt. Schemes	42,001	2,866	10,206	44,478	3,682	12,781	58,768	3,435	13,385	77,923	3,257	19,911	1,05,776
	No Schemes	17,125	1,202	5,589	28,270	1,087	5,221	28,450	1,249	6,426	38,158	1,214	5,703	37,665
Household Characteristics	**MPEC**													
	Poorest	11,898	557	2,455	18,382	519	2,138	19,314	558	2,720	20,148	554	2,415	29,512
	Poor	13,393	787	3,905	23,674	575	3,635	20,569	879	4,151	24,929	881	3,671	29,194
	Middle	17,420	933	4,707	37,551	1,045	4,350	28,009	944	4,634	35,686	873	4,844	31,213
	Rich	18,103	1,186	5,551	26,457	1,346	5,692	38,664	1,407	5,893	41,389	1,113	5,496	53,823
	Richest	24,665	1,943	9,102	36,965	2,056	10,633	40,343	1,842	10,249	63,995	2,163	10,832	52,997
Community Characteristics	**Place of Residence**													
	Rural	14,820	978	4,457	24,664	899	4,514	27,065	976	4,891	31,999	909	4,359	31,193
	Urban	24,286	1,723	8,393	38,754	1,489	8,741	36,624	1,696	9,238	53,715	1,936	9,549	63,523
	Region													
	North	20,060	1,243	6,625	29,904	1,210	7,248	30,391	1,530	8,340	50,659	1,636	6,734	44,673
	Central	21,418	1,012	4,598	34,839	775	4,505	31,897	996	5,775	33,473	670	4,325	38,200
	East	11,949	875	3,764	21,661	1,170	3,758	23,051	1,118	4,733	36,942	1,112	3,499	31,796
	North East	10,228	1,387	3,900	18,961	1,763	4,648	24,976	1,740	5,123	39,656	1,351	4,553	36,874
	West	21,605	1,390	7,409	31,472	1,340	6,914	28,659	1,444	6,861	35,876	1,152	9,617	53,722

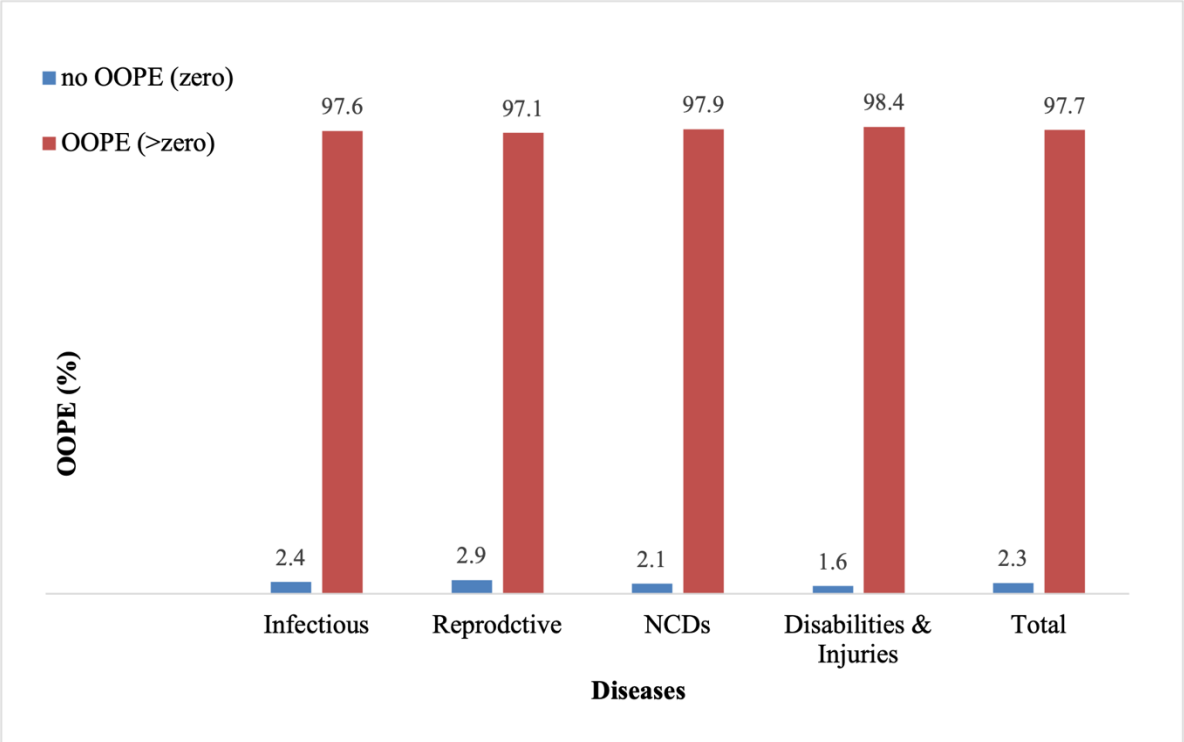
Covariates		AME (INR)	Infectious			Reproductive			NCDs			Disabilities & Injuries		
			0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%
	South	18,286	1,587	6,766	26,568	1,155	8,340	35,226	1,347	7,576	46,475	1,559	7,947	41,151
	Nature of Treatment													
	Allopathy	18,161	1,229	5,908	29,353	1,103	5,853	29,919	1,285	6,598	40,281	1,248	6,224	41,797
	Others	12,734	1,046	6,656	23,506	286	4,635	16,774	621	6,295	29,951	1,210	7,224	27,518
	Medical Institution													
Healthcare	Government facility	5,059	870	3,586	21,537	844	3,689	15,726	1,030	4,343	27,452	952	3,689	21,749
Characteristics	Non-govt. facility	26,775	2,885	7,066	30,421	2,477	8,491	32,686	2,240	8,224	42,326	3,101	8,405	44,686
	Duration Hospitalized													
	Week	12,609	1,228	5,893	21,688	1,086	5,694	24,185	1,261	6,430	28,742	1,254	6,128	33,744
	Month	39,126	1,238	6,415	47,245	1,260	7,352	37,088	1,386	7,886	63,943	1,338	6,913	53,809
	> a month	68,893	1,105	2,531	90,651	863	3,936	5,02,872	1,341	8,118	86,651	612	6,436	78,449
	Total	**18,119**	**1,228**	**5,912**	**29,321**	**1,099**	**5,851**	**29,864**	**1,278**	**6,596**	**40,240**	**1,247**	**6,234**	**41,562**

Note: NSS 2018-2019. AME includes package components, non-package components (doctor's fee, medicines, diagnostic tests, bed charges & other medical expenses); calculated by authors.

Catastrophic Health Spending (CHS): The three layers

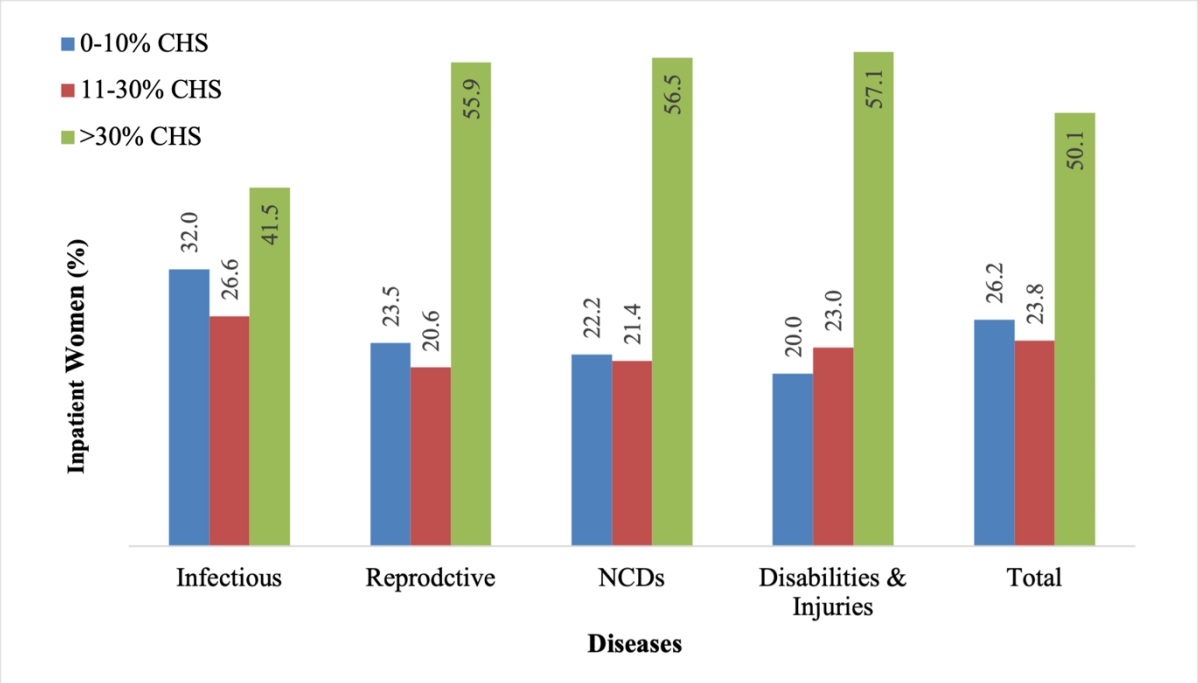
Figure 2 illustrates how contrasting the medical spending on inpatient care is for women. In India, medical spending on inpatient care for women indicates that almost all women (97.7%) incurred OOP payments, i.e., medical spending more than their total household spending. In contrast, only a small proportion of women (2-3%) who received inpatient care had reported zero OOP payments for the most recent visit, which is highest for reproductive diseases (2.9%), followed by infectious (2.4%), NCDs (2.1%), and disabilities and injuries (1.6%).

Figure 2: Percentage of Inpatient Women Who Incurred OOPE (>zero) and No OOPE (zero) on Health by Broad Diseases, India (2017-18)



The three threshold levels of the CHS in this study are: (a) up to 10%, (b) up to 30% (11-30%), and (c) 30%+ (above 30%). This layering of health spending helps to understand and gauge the quantum of women's financial burden (distress) for healthcare utilization. The study estimates the CHS by characteristics of inpatient women and the four broad diseases: infectious, reproductive health issues, NCDs, and disabilities & injuries. Figure 3 and Table 3 summarize the estimated CHS by the three layers and broad diseases. While average annual medical expenditure amounts to just over INR 18,000, half of the inpatient women (50.1%) spent a very high level of CHS, i.e., above the 30% threshold. A little over a quarter of women (26.2%) incurred up to 10% of CHS, and nearly a quarter (24%) borne up to 30% of CHS. Women's medical expenditure of inpatient (hospitalization) reveals a wide variation and contrast. Compared to women with lesser CHS levels (32% in >10%, and 27% in 11-30%), the proportion of women who incurred higher CHS (30+%) has been the least for infectious diseases (42%) than others. Despite a lesser proportion of hospitalized women, more inpatient women (56-57%) had to pay CHS of over 30% for reproductive, NCDs, and disability & injury.

Figure 3: Percentage of Inpatient Women who Incurred CHS by Three Threshold Levels According to Broad Diseases, India (2017-18)



The average medical expenditure increases with the levels of catastrophic health spending for all four broad morbidities. The disease-wise average medical expenditure by the three levels of CHS (Table 3) differs across individual, household, community, and healthcare characteristics. It ranges from INR 1,099 for reproductive health matters to INR 1,278 for NCDs. CHS up to 10% does not vary much across the four broad diseases. However, for infectious diseases in 10% CHS, it is as high as INR 2,866 for those having health insurance from non-government schemes and INR 2,453 for women with graduate and above education, and as low as INR 557 for women in the poorest economic quintile. Likewise, women's inpatient spending for other diseases shows a similar pattern, with more than INR 3,000.

Women in different sub-groups incur higher medical spending of 30% above the CHS threshold (INR 30,000-40,000), which is highest among those who spent more than a month hospitalized for reproductive health issues (INR 502,872). Similarly, women spent INR 105,776 for treatment of disability & injury by those women who have health insurance from non-government schemes, followed by INR 90,650 for hospitalization for more than a month due to infectious diseases, INR 86,651 for treatment of NCDs, and INR 78,449 for disability and injury.

Results of Logit model

The multivariate analysis (Logit Model) is applied to examine all the four broad diseases taking the three threshold levels across selected covariates. Table 4 presents the odds ratios obtained from the logit models, reflecting proportional odds ratios for a one-unit increase in background characteristic on the disease-wise CHS levels, taking the other variables in the model as constant. Many variables from the four categories (individual, household, community, and healthcare characteristics) show statistical significance for two levels or thresholds. The variables such as age, the monthly per-capita consumer expenditure (MPCE), place of residence, regions, medical institution of treatment, and duration of stay in the

hospital were significant for the inpatient women with Infectious, Reproductive, NCDs, and Disabilities & Injuries. However, marital status does not indicate an influence on CHS, contrary to our expectations. Education, health scheme, and the nature of treatment were partially significant in some of the cases.

Among the individual characteristics of women, the results show significant odds with CHS for all four diseases. In all the broad disease categories, the older women (aged 30-49 and 50+ years) are more likely to experience higher CHS (30% or above) than the younger women aged 12-29 (p<0.001 & p<0.05, respectively). Likewise, among the household characteristics, MPCE indicates lower odds of high CHS for all the diseases for richer women than the poorer women (p<0.001). The urban women also show significant odds by 37%-52% of 30+% CHS (p<0.001) more than their rural counterparts. The levels of CHS also illustrate a wide regional variation. The odds of experiencing CHS are much higher in Central and South (24-30%, p<0.01) than in the North, but lower odds in East and North East (25%-36%, p<0.001) for infectious diseases. In contrast, for reproductive health problems, Central, East and West show higher odds for 10% CHS (p<0.001 & p<0.05), and East 30% lesser odds to up to 30% CHS. Non-communicable diseases show 1.5 times higher odds for 10% of CHS in the Central region (p<0.001), but Central, West, South show lesser odds (19-39%), and 1.4 times higher odds in North East for 30% CHS (p<0.001). In case of Disabilities and Injuries, the Central and Eastern regions are 38% more likely to incur 10% of CHS (p<0.05), and in the West is 24% less likely, whereas the South is 27% more likely to incur 30%+ of CHS (p<0.05).

In the case of healthcare characteristics, women admitted in the non-government facility are 4.4 times more likely to incur higher catastrophic health spending (>30%) for infectious diseases, but 10 times higher for reproductive health-related issues, 5.8 times for NCDs, and 7.7 times for disabilities & injures (p<0.001). Duration of hospitalization is another significant predictor of CHS for all the diseases, with both a month and more than a month showing a higher likelihood for >30% of CHS (p<0.001) compared to a week duration. With hospitalization of more than 30 days, the odds of CHS is higher by 7.5 times, 3.48 times, 6.01 times, and 5.23 times for infectious diseases, reproductive illnesses, NCDs, and disabilities and injuries, respectively, when compared with those inpatient women who stayed at hospitals for less than a week (Table 4).

Table 4: Odds Ratios of the Logit Model Showing Disease-Wise Catastrophic Spending by Women at Three Threshold/Cut-Off Levels, India, NSS 2017-2018

Covariates		Infectious Disease			Reproductive Health			NCDs			Disabilities & Injuries		
		0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%
Individual Characteristics	**Age**												
	12-29 years ®												
	30-49 years	0.82**	0.99	1.23**	0.65***	0.90	1.55***	0.82	0.87	1.31*	0.76	0.99	1.25
	50+ years	0.83*	0.91	1.32***	0.55***	0.76	2.03***	0.74*	0.86	1.43**	0.66*	1.012	1.35*
	Education												
	No education ®												
	Up to primary	1.13	1.00	0.91	0.82	1.13	1.07	0.83*	1.00	1.13	1.14	0.91	0.99
	Up to secondary	1.05	1.02	0.95	0.74*	1.25	1.07	0.92	0.92	1.16	1.13	0.80*	1.13
	Graduate+	0.97	1.03	1.07	0.65*	1.55**	1.03	0.73	1.08	1.17	0.90	0.92	1.19
	Marital Status												
	Single ®												
	Currently Married	0.90	0.95	1.16	0.93	1.07	0.97	1.09	0.95	0.99	1.07	0.86	1.11
	Widowed/Divorced/ Separated	1.15	1.02	0.88	0.80	1.50	0.79	1.28	1.00	0.86	1.29	0.98	0.87
	Health Insurance												
	Government Scheme ®												
	Non-Govt. Scheme	0.66**	1.38**	1.11	1.10	1.09	0.95	0.67*	0.89	1.48**	0.69	0.74	1.81**
	No Scheme	0.85*	1.19**	0.99	0.87	1.01	1.09	0.82*	1.10	1.06	0.89	1.07	1.03
Household Characteristics	**MPEC**												
	Poorest ®												
	Poor	1.51***	0.83*	0.83*	1.48*	1.01	0.73*	1.91***	0.94	0.68***	1.29	1.05	0.79
	Middle	2.00***	0.84*	0.65***	1.67***	1.12	0.59***	2.00***	1.16	0.55***	1.65**	1.17	0.60***
	Rich	2.47***	0.90	0.51***	2.64***	1.38*	0.35***	2.66***	1.24*	0.43***	2.46***	1.34*	0.41***
	Richest	4.05***	0.93	0.33***	4.22***	1.23	0.28***	3.66***	1.34**	0.32***	3.31***	1.39**	0.32***
Community Characteristics	**Place of Residence**												
	Rural ®												
	Urban	1.86***	0.98	0.62***	2.07***	1.04	0.57***	1.60***	1.20**	0.63***	2.11***	1.30***	0.48***
	Region												
	North ®												
	Central	1.27**	0.59***	1.24**	2.02***	0.69*	0.84	1.54***	0.61***	1.13	1.38*	0.73*	1.05
	East	1.22**	1.10	0.75***	1.39*	1.12	0.70**	1.27*	1.00	0.85	1.25	1.14	0.76*
	North East	0.83*	1.78***	0.64***	0.86	1.31	0.87	0.83	1.44***	0.85	0.82	1.28	0.93
	West	1.12	1.01	0.92	1.52*	0.65**	1.13	1.27	0.81*	1.04	1.38*	0.809	1.039

Covariates		Infectious Disease			Reproductive Health			NCDs			Disabilities & Injuries		
		0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%	0-10%	11-30%	>30%
	South	0.77***	0.93	1.30***	1.21	0.95	0.94	1.23	0.77**	1.10	0.98	0.79*	1.27*
Healthcare Characteristics	**Nature of Treatment**												
	Allopathy ®												
	Others	1.15	1.00	0.88	2.16	0.66	0.83	1.56	1.18	0.64	2.69***	0.91	0.52*
	Medical Institution												
	Government facility ®												
	Non-government facility	0.081***	2.07***	4.41***	0.060***	0.58***	10.11***	0.079***	0.93	5.83***	0.06***	0.83*	7.72***
	Duration Hospitalized												
	Week ®												
	Month	0.25***	0.53***	4.18***	0.43***	0.55***	2.83***	0.31***	0.51***	3.52***	0.27***	0.46***	4.15***
	> a month	0.19***	0.33*	7.48***	0.62	0.32	3.48**	0.28***	0.27***	6.01***	0.32***	0.30***	5.23***

*Note: ® = Reference group. Exponentiated coefficients; * p<0.05, ** p<0.01, *** p<0.001.*

Discussion and conclusions

The study reveals that Indian women aged 12 and above battle various diseases such as infectious diseases, reproductive illnesses, NCDs, and disabilities & injuries, which subject them to catastrophic expenditure for treatments. Among the broad diseases, women with infectious diseases have a higher share of hospitalization than those with any other category of diseases, which varies depending on the background characteristics. A high proportion of women suffering from diseases indicates frequent hospitalization for a week (45.3%) or a month (33%) to treat infectious diseases. The difference in the percentage of inpatient women by the duration of hospitalization among the four broad diseases portrays the severity and expensiveness of medical services and care. Over 97% of women experienced payment of more than zero percent of OOPE, which indicates a vast difference between women who received inpatient care but spent zero/naught from OOP and those who have to spend from OOP payment. With the average annual consumer expenditure among the inpatient women varying between INR 12,687 to INR 64,270, their socio-economic characteristics have huge implications on medical spending. Moreover, it also points to skewness towards 30% and above CHS level with health insurance scheme and duration of hospitalization showing high variation and odds among the four broad groups of diseases.

Among the many plausible causes of CHS, the magnitude of catastrophic health spending is associated with the age of women in all four disease categories. The cost of healthcare tends to escalate with the increasing age, and with it comes the burden of high catastrophic health spending (Wang et al., 2016). The marital status does not seem to influence CHS on any morbidities but possessing an insurance plan/scheme (government or private) indicates a mixed association with CHS. However, the economic/financial status of women (i.e., the monthly per capita consumption expenditure) shows an inverse relationship with the burden of catastrophic health spending, primarily for all the broad diseases (Su et al., 2006; Xu et al., 2006). Region and the place of residence also influence CHS on hospitalization of women in India for all the four morbidities (also observed by Dash & Mohanty, 2019; Pandey et al., 2018; Wang et al., 2016), with noticeably less catastrophic spending (10%) in the urban areas, differentiating it from the rural areas (Chowdhury et al., 2018; Gotsadze et al., 2009). Other studies also indicated that the impact of OOPE on health in poorer and richer states was mainly attributed to the place of residence, i.e., rural areas. Whereas in both urban areas and the wealthier states, where more women and households have higher annual expenditure as a result of better economic status, the same level of OOPE does not result in the same level of catastrophic health spending for reproductive illnesses and NCDs (Garg & Karan, 2009; Mondal et al., 2014).

This study also reinforces the criticality of healthcare characteristics on overall CHS at the individual, household, and community levels. Studies pointed out that Indian women hospitalized in a government facility have faced less CHS than non-government facilities for all four broad morbidities (Ladusingh et al., 2018). Despite higher average medical spending on disabilities & injuries, reproductive illnesses treated in private facilities and an extended stay in hospital incur a higher burden, followed by disabilities & injuries than NCDs and infectious diseases. In India, people tend to avoid or not consider government hospitals as the first choice to treat ailments due to their perceptions of inferior quality of care being provided (Misra et al., 2015). This explains women's vulnerability and dilemma on treatment-seeking, resulting in higher hospitalization in private or non-government healthcare facilities for any reproductive health diseases and emerging as the highest CHS burden. The non-government

or private health care facilities bring a higher economic burden in the form of high CHS, which emerges as distress financing (Kastor & Mohanty, 2018). Besides, the nature of the treatment also plays a role in case of disabilities & injuries. For instance, women seeking treatment other than for allopathy tend to incur mostly 10% of CHS. Hospitalization in a private healthcare facility is more likely to compel the household towards incurring a higher catastrophe spending. The solution lies in promoting awareness about various free programs and their benefits when accessing government health care facilities.

While designing health policies and programs, one must consider the heterogeneity in the morbidities and treatment-seeking behavior, as each region has its diversified characteristics. In India, the burden of unfinished infectious diseases and NCDs still prevails, which increases the load of hospitalization, signaling a serious concern for proper healthcare planning and its implementation in urban and rural areas. The inclination of women towards private healthcare services and willingness to pay with higher expenditure also stems from the shortfall of resources, including human resources, in public healthcare facilities. The preference for medical institution and duration of stay, as this study reveals, points towards the urgent need to improve the standard of the public hospitals with the proper amenities and human resources (as outlined under Indian Public Health Standards), with prioritizing spending on the health sector.

Our study shows why and how more women are paying OOP payments to treat diseases and reconsider the existing policies and programs by paying more attention to women and their healthcare needs. The government has recently launched schemes like the Ayushman Bharat: Pradhan Mantri Jan Arogya Yojana in 2018 (a flagship scheme of the Government of India, launched as recommended by the National Health Policy 2017, to achieve the vision of Universal Health Coverage [UHC]) that focus on OOPE on healthcare services, including services and procedures specific to women. Similar schemes were also promoted by some state governments such as the Bhamashah Sawasthya Bima Yojana in 2015 (a cashless health insurance scheme in the state of Rajasthan where the beneficiaries are provided treatment benefits of up to INR 30,000 for illnesses and INR 300,000 for critical illnesses) to cover the medical expenses for the rural population for inpatient and outpatient services. The administration is taking these actions to reach out to the country's poor and disadvantaged citizens. Reproductive health issues are still sensitive topics in India. The deep-rooted patriarchal structure, social norms, and fear of huge expenditure followed by poverty undermine women's health. Providing hygienic and free sanitary materials through government schemes/programs like Sanitease in 2017, launched by the Union Ministry of Youth Affairs and Sports under its social development activity, provides correct information on reproductive health matters at the local level, and minimum expenses on healthcare services can help manage and prevent long-term distresses both physically and financially (Express News Service, 2017). It can also create a positive ambiance for treatment-seeking behavior in government facilities without neglecting treatment and care for disabilities & injuries, which incurs higher CHS. There is still a need to adequately monitor women's health programs. However, as the Indian government has launched many laudable programs in recent years, women in India are ensured better lives and be rescued from CHS or distress financing.

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