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The Factors Influencing Catastrofic Health Spending and Its Prevalence

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ABSTRACT

This study investigates the causes and extent of catastrophic health expenditure in India, addressing a significant gap in understanding the economic burden of healthcare costs. The research analyzes both inpatient and outpatient expenses using data from the National Sample Survey Office (2016) and applies a logit regression model to assess the determinants of catastrophic health spending. Catastrophic health expenditure is defined by three thresholds (5%, 10%, and 15%) of household consumption. Key determinants include household size, socioeconomic status, educational level of the household head, and the type of medical treatment received. The study finds that nearly half of inpatients and 33% of outpatients encounter catastrophic health expenditure, with significant disparities across rural and urban areas. Socioeconomic variables, the nature of ailments, and access to public healthcare play critical roles in mitigating catastrophic expenses. States in northeastern India, and groups like religious minorities and Scheduled Tribes, are disproportionately affected. Despite improvements in health insurance coverage, out-of-pocket expenses remain a significant financial strain, particularly for low-income households and those affected by conditions such as cancer, heart disease, and tuberculosis. The findings underscore the need for targeted policy interventions to reduce catastrophic health costs and improve access to affordable healthcare in India.

Keywords: catastrophic health expenditure, India, healthcare costs, socio-economic disparities, logit regression, National Sample Survey, healthcare policy.

1. INTRODUCTION

Healthcare in developing nations like India is plagued by infrastructural issues, high costs, and limited accessibility, leading to a large segment of the population paying for their own healthcare out of pocket. This puts them at risk of catastrophic health spending, which can exceed a substantial amount of a household's disposable income or consumption. The World Health Organisation (WHO) warns that households facing catastrophic health spending are prone to reduce vital consumption, liquidate assets, or incur debt. India's 2017 National Health Policy and subsequent initiatives aim to provide financial protection for poor populations, but a significant portion of the population still faces healthcare costs. The capacity-to-pay method, proposed by the WHO, determines out-of-pocket healthcare costs by comparing a family's income after basic consumption needs are met. This study aims to analyze catastrophic health expenditure throughout India using information from the 71st round of the National Sample Survey Office to understand the prevalence, causes, and patterns of catastrophic health spending.

2. LITERATURE REVIEWS

Xu et al. (2003) Xu and colleagues expanded on the concept of catastrophic health expenditure by introducing the "capacity to pay" approach, which adjusts household income after basic consumption needs like food are met. This method provided a more realistic assessment of a household's financial capacity to bear healthcare costs. Xu et al. concluded that the capacity to pay should be a crucial factor in determining catastrophic health expenditure. By including consumption of basic goods, they showed that even moderate health expenditures could become catastrophic for poor households, necessitating more nuanced policies aimed at financial protection. **Karan, Selvaraj & Mahal (2014)** This study examined trends in catastrophic health expenditure in India from 1993 to 2004. The authors explored how economic growth, changes in household income, and government health initiatives affected the financial burden of healthcare on Indian households. Karan et al. concluded that despite India's economic growth during the study period, catastrophic health

expenditure remained high, particularly in rural areas and among low-income households. They emphasized the need for stronger public health interventions and health insurance schemes to provide financial protection. **Selvaraj & Karan (2012)** Selvaraj and Karan focused on the increasing OOP payments in India and their impact on households, particularly in rural areas. The authors examined how healthcare costs led to impoverishment and the coping mechanisms used by households, such as borrowing and selling assets. The authors concluded that rising OOP payments were a significant driver of poverty in India. They advocated for the expansion of public health insurance schemes and better access to affordable healthcare services to reduce the incidence of catastrophic health expenditure. **Ghosh (2011)** Ghosh analyzed the incidence of catastrophic health expenditure in India, with a focus on rural and urban disparities. The study used data from the National Sample Survey Organization (NSSO) to identify the key determinants of high healthcare costs. Ghosh found that catastrophic health expenditure was more prevalent in rural areas, where access to public healthcare services was limited. The study concluded that improving healthcare infrastructure in rural areas and expanding health insurance coverage were critical for reducing financial hardship due to healthcare expenses. **Mahal et al. (2013) Related Work**: This study focused on the role of health insurance in mitigating catastrophic health expenditure in India. Mahal and colleagues analyzed the effectiveness of government health insurance schemes, such as Rashtriya Swasthya Bima Yojana (RSBY), in providing financial protection to low-income households. The authors concluded that while health insurance schemes like RSBY had a positive impact on reducing catastrophic health expenditure, their coverage and uptake were still limited. They recommended expanding the scope and accessibility of health insurance to better protect vulnerable populations. **Sharma (2018)** Sharma's study examined the role of private and public healthcare providers in India and their contribution to catastrophic health expenditure. The study explored the relationship between the quality of healthcare services and the financial burden on households. Sharma concluded that private healthcare services, though of higher quality, were significantly more expensive and led to higher rates of catastrophic health expenditure. The study suggested that improving the quality and accessibility of public healthcare services could reduce the reliance on costly private healthcare providers. **Garg & Karan (2009)** Garg and Karan examined the socioeconomic determinants of catastrophic health expenditure in India. The study utilized NSSO data to assess how factors such as income, education, and household size influenced the likelihood of experiencing catastrophic health costs. The authors found that households with lower income, larger family size, and lower education levels were more likely to face catastrophic health expenditure. They advocated for targeted financial protection programs for these vulnerable groups to reduce the economic burden of healthcare. **Balarajan, Selvaraj & Subramanian (2011)** This study investigated the equity of healthcare access in India and its impact on catastrophic health expenditure. The authors examined how social and economic inequalities affected access to healthcare services and the resulting financial burden on households. The study concluded that socioeconomic disparities played a significant role in healthcare access and the incidence of catastrophic health expenditure. The authors recommended policies aimed at reducing healthcare inequalities, including subsidies for low-income households and improved healthcare delivery in underserved areas. **Van Minh et al. (2013)** Van Minh and colleagues conducted a multi-country study in Southeast Asia, including India, to explore the relationship between health financing and catastrophic health expenditure. They focused on the effectiveness of health insurance programs in reducing the financial burden of healthcare. The study concluded that health insurance significantly reduced the likelihood of catastrophic health expenditure, particularly in countries with well-established public health insurance schemes. However, in India, the coverage of such schemes was still limited, and more comprehensive health financing reforms were needed. **Gambhir et al. (2019)** This study explored the impact of the Ayushman Bharat program on reducing catastrophic health

expenditure in India. Gambhir and colleagues analyzed early data from the program's implementation to assess its effectiveness in providing financial protection. The study concluded that Ayushman Bharat had the potential to significantly reduce catastrophic health expenditure, particularly for low-income households. However, the program's success depended on improving awareness, accessibility, and the quality of healthcare services in both rural and urban areas. **Azzani, Roslani & Su (2019)** Azzani et al. examined catastrophic health expenditure in the context of cancer treatment across several countries, including India. They focused on the high costs associated with non-communicable diseases (NCDs) and their financial impact on households. The study found that catastrophic health expenditure was particularly prevalent among cancer patients due to the high costs of treatment and the long duration of care required. The authors recommended expanding health insurance coverage to include NCDs and improving access to affordable cancer treatment.

3. METHODOLOGY

A popular method for calculating the disastrous effect of healthcare costs is the "health expenditure approach." This approach classifies healthcare expenditures as catastrophic when they surpass a specific level of family income (Berki, 1986; Wagstaff & van Doorslaer, 2003). But picking this criterion is usually a matter of opinion and could differ from study to study. According to Xu et al. (2003), a family's financial situation should be considered when calculating out-of-pocket (OOP) costs. Their definition of "capacity to pay" is the amount of money a family has left over after paying for necessities like food. Using a cutoff of half of household income after covering basic consumption needs, some studies have embraced this improved measure of catastrophic health cost. Some research have utilised lower thresholds than the 50% suggested by the World Health Organisation (WHO) (Xu et al., 2003). Data on consumption expenditures can also be utilised to examine catastrophic health expenditures in situations where information on household income is inaccessible. According to mathematical definitions, catastrophic expenditure is:

$$OP/HE > Z$$

where

OP = Out-of-pocket health expenditure,
HE = Household income or consumption expenditure,
Z = Threshold level.

Over a set time frame (e.g., a month, a year), both OP and HE are standardised. A patient's out-of-pocket medical expenses only include direct medical costs (after deducting any reimbursements) and do not include indirect or non-medical expenses. All items and services bought and used by a household are considered part of household consumption expenditure, which includes both monetary and in-kind payments (Xu, 2005). Spending on both food and non-food consumption must be included in studies that employ the "capacity to pay" notion. No breakdown of monthly consumption into food and non-food categories was provided by the National Sample Survey (NSS) Office's 71st set of data. Consequently, healthcare costs that surpass a specific level (usually 10% of household consumption) are considered catastrophic in this study.
In order to account for differences across socioeconomic categories, this study used three threshold levels: 5%, 10%, and 15%. Following an examination of the frequency of catastrophic health expenditure among these categories, we delve into the factors that contribute to this type of spending.

Table 1: Definition of independent variables utilized to model the catastrophic health expenditure on morbidity in last 365 days

	Variable	Definition
	HH size	Family members in the household
	Religious minority	Dummy =1 if household belongs to Muslim, Christian, Sikh, Jain, Buddhist, Zoroastrian religion, =0 otherwise

Household Characteristics	Caste	Dummy =1 if household belongs to Schedule Caste, Schedule Tribe, and Backward Caste, =0 otherwise
	Rural	Dummy =1 if household belongs to rural area, =0 if house- hold belongs to Urban area
	Per capita Exp.	Per person monthly household consumption in Rupees (In thousand)
Head Charac-teristics	Educated head	Dummy =1 if household's head is educated, =0 otherwise
	Head age	Age of the head of household (In years)
	Female Headed	Dummy =1 if household's head is female, =0 otherwise
Person's Charac-teristics	Age 0-5	Dummy =1 if patient's age is between 0 to 5 years, =0 otherwise
	Age 6-14	Dummy =1 if patient's age is between 6 to 14 years, =0 otherwise
	Age 60	Dummy =1 if patient's age is equal to or above 60, =0 otherwise
	Female	Dummy =1 if patient is female, =0 otherwise
	Educated person	Dummy =1 if patient is educated, =0 otherwise
Location	North-Eastern	Dummy=1 If household belongs to north-eastern part of India, =0 if household belongs to Central India
	Southern	Dummy=1 if household belongs to southern part of India, =0 if household belongs to Central India
	Western	Dummy=1 if household belongs to western part of India, =0 if household belongs to Central India
	Eastern	Dummy=1 if household belongs to eastern part of India, =0 if household belongs to Central India
	Northern	Dummy=1 if household belongs to Northern part of India, =0 if household belongs to Central India
Nature of ailments	Childbirth	Dummy =1 if patient is hospitalized due to childbirth, =0 otherwise
	Fever	Dummy = 1if patient is suffering from fever due to diphtheria, whooping cough or other, 0 otherwise
	Injury	Dummy = 1if patient is suffering from accidental injury, road traffic accidents and falls, 0 otherwise
	Gastric	Dummy = 1if patient is suffering from pain in abdomen: gastric and peptic ulcers/ acid reflux/ acute abdomen, 0 other- wise
	Heart disease	Dummy = 1if patient is suffering from heart disease, 0 otherwise
	Pregnancy complication	Dummy = 1if patient is suffering from pregnancy with complications before or during labor, 0 otherwise
	Joints bones	Dummy = 1if patient is suffering from Joint or bone disease/ pain or swelling or pus in any of the joints/bones, 0 other- wise
	Urination	Dummy = 1if patient is suffering from any difficulty or ab- normality in urination, 0 otherwise
	Cataract	Dummy = 1if patient is suffering from cataract, 0 otherwise
	Diarrhoea	Dummy = 1if patient is suffering from diarrhoea/ dysentery/ increased frequency of stools, 0 otherwise

	Duration	Length of stay at hospitals in days
	Duration Sq	Square of length of stay at hospitals in days
Treatment	Asha	Dummy = 1if treatment sought from HSC/ANM/ASHA/AWW,0 otherwise
	PHC	Dummy=1 if treatment sought from PHC/Dispensary/CHC/Mobile medical unit, =0 otherwise
	Public Hospital	Dummy=1 if treatment sought from public hospital=0 otherwise
	Package	Dummy=1 if any package was availed for treatment =0 otherwise.
	Surgery	Dummy = 1if surgery was done on patient from hospital,0 otherwise
	X-ray	Dummy = 1if x-ray, EEG, ECG etc. was done on patient,0 otherwise
	Tests	Dummy = 1if other diagnostic tests was done on patient,0 otherwise
Security Nets	Insurance Govt.	Dummy = 1if patient has government funded insurance scheme (e.g. RSBY, Arogyasri, CGHS, ESIS, etc.) ,0 other- wise
	Insurance employer	Dummy = 1if patient has employer supported health protection (other than govt.) insurance ,0 otherwise
	Insurance own	Dummy = 1if patient has insurance arranged by household with insurance companies,0 otherwise

Note: As notified by Govt. of India in National Classification of Occupation (NCO)-2004.

Table 2 shows that there are three threshold levels of catastrophic hospitalisations in the past year. The percentage of rural inpatients confronting catastrophic health cost is 96.51% at the 5% level and 95.74% at the 10% barrier. At 5% and 10% of the criterion, respectively, it is 97.68 and 96.90 percent in metropolitan regions. The percentage of inpatients in rural areas experiencing catastrophic health spending is 95.21% while in urban areas it is 96.16% at the 15% level. Regardless of whether the patient is from a rural or urban location, the proportion of inpatients experiencing catastrophic health spending is very high, as can be seen from the table above. The household's economy may be affected by these expenditures, and these effects may linger for some time.

Table 2: Proportion of hospitalised patients in last 365 days facing catastrophic health expenditure (In percentage)

	Rural	Urban	Total
Catastrophic at 5 Percent threshold	96.51	97.68	96.89
Catastrophic at 10 Percent threshold	95.74	96.90	96.12
Catastrophic at 15 Percent threshold	95.21	96.16	95.52
Number	29,844	25,182	55,026

Source: Unit level data of (National Sample Survey Office, 2016)

Table 3: Determinants of catastrophic health expenditure faced by patients on morbidity in last 365 days: Logit Regression Models

	Variable	5 percent			10 percent			15 percent		
		OR	Std. Err.	P>t	OR	Std. Err.	P>t	OR	Std. Err.	P>t
	HH size	0.978	0.017	0.199	0.963	0.016	0.022	0.960	0.015	0.009

House-hold Charac-teristics	Religious minority	1.176	0.124	0.124	1.145	0.112	0.167	1.208	0.112	0.041
	Caste	0.716	0.082	0.003	0.672	0.070	0.000	0.656	0.064	0.000
	Rural	0.978	0.089	0.807	1.002	0.097	0.983	1.029	0.089	0.740
	Per capita Exp.	1.035	0.046	0.439	0.989	0.036	0.758	0.948	0.028	0.067
Head Charac-teristics	Educated head	0.881	0.091	0.222	0.923	0.098	0.449	0.888	0.089	0.234
	Head age	1.004	0.004	0.258	1.002	0.003	0.647	1.000	0.003	0.914
	Female Headed	0.978	0.164	0.893	1.114	0.169	0.476	1.124	0.157	0.402
Person's Charac-teristics	Age 0-5	1.148	0.227	0.484	1.049	0.182	0.782	0.944	0.150	0.718
	Age 6-14	0.818	0.153	0.285	0.611	0.134	0.025	0.632	0.125	0.021
	Age 60	0.868	0.133	0.358	0.862	0.125	0.306	0.908	0.122	0.471
	Female	0.911	0.096	0.376	0.792	0.089	0.038	0.760	0.079	0.008
	Educated person	1.225	0.130	0.056	1.252	0.129	0.030	1.179	0.115	0.093
Location	North-Eastern	4.070	1.141	0.000	5.265	1.287	0.000	6.349	1.435	0.000
	Southern	0.619	0.079	0.000	0.775	0.102	0.053	0.869	0.104	0.240
	Western	0.304	0.041	0.000	0.439	0.056	0.000	0.531	0.061	0.000
	Eastern	1.682	0.287	0.002	2.337	0.374	0.000	2.816	0.416	0.000
	Northern	0.389	0.050	0.000	0.558	0.067	0.000	0.689	0.077	0.001
	Childbirth	0.703	0.087	0.004	0.739	0.083	0.007	0.727	0.077	0.003
	Fever	1.285	0.197	0.103	0.954	0.160	0.777	0.925	0.139	0.604
	Injury	1.060	0.244	0.801	1.245	0.260	0.295	1.144	0.219	0.484
	Gastric	0.959	0.170	0.814	0.934	0.157	0.684	0.951	0.152	0.752
	Heart disease	1.149	0.276	0.564	0.801	0.293	0.544	0.553	0.175	0.162
	Pregnancy comply	1.143	0.275	0.578	1.333	0.303	0.207	1.410	0.310	0.118
	Joints bones	1.070	0.305	0.812	1.108	0.272	0.676	0.937	0.202	0.763
	Urination	1.393	0.457	0.312	1.831	0.585	0.058	1.135	0.371	0.699
	Cataract	0.416	0.181	0.044	0.419	0.173	0.035	0.353	0.131	0.005
	Diarrhoea	1.122	0.415	0.755	0.857	0.249	0.596	0.848	0.230	0.544
	Duration	0.979	0.008	0.010	0.964	0.008	0.000	0.957	0.007	0.000
	Duration sq	1.000	0.000	0.224	1.000	0.000	0.028	1.000	0.000	0.004
	Asha	0.059	0.019	0.000	0.062	0.020	0.000	0.062	0.020	0.000
	PHC	0.115	0.020	0.000	0.105	0.018	0.000	0.106	0.017	0.000
	Public Hospital	0.089	0.011	0.000	0.083	0.010	0.000	0.077	0.009	0.000
	Package	2.863	0.327	0.000	2.526	0.278	0.000	2.363	0.252	0.000
	Surgery	1.180	0.148	0.185	1.167	0.142	0.203	1.229	0.138	0.067
	X-ray	1.714	0.171	0.000	1.518	0.146	0.000	1.473	0.142	0.000
	Tests	1.004	0.108	0.970	1.028	0.102	0.782	1.016	0.098	0.869
	Insurance Govt	0.486	0.055	0.000	0.558	0.059	0.000	0.565	0.055	0.000
	Insurance employer	0.548	0.214	0.124	0.674	0.230	0.249	0.553	0.156	0.035
	Insurance own	0.617	0.204	0.144	0.761	0.238	0.383	0.808	0.251	0.494

	Constant	124.7	41.1	0.0	147.5	46.8	0.0	175.0	51.0	0.0
	Number	55,026			55,026			55,026		
	Link Test	Coeff	Std. Err.	P>t	Coeff	Std. Err.	P>t	Coeff	Std. Err.	P>t
	Hat	1.005	0.138	0.000	0.957	0.138	0.000	0.848	0.131	0.000
	Hat sq	-0.001	0.022	0.971	0.007	0.023	0.757	0.026	0.022	0.241
	Cons	-0.007	0.209	0.975	0.055	0.195	0.777	0.185	0.183	0.312
	Area Under ROC	0.84			0.83			0.83		

Source: Unit level data of (National Sample Survey Office, 2016)

At all thresholds, catastrophic health expenditure is negatively correlated with household size, meaning larger households are less likely to experience it. Although larger families may have a higher likelihood of illness transmission, they also tend to have more earners and caregivers, reducing financial strain. Religious minorities, however, are more likely to face catastrophic health costs, as are patients from certain socio-economic groups who use cost-saving tactics like cheaper medications. Per capita expenditure has a negative effect on catastrophic health costs, especially at the 15% threshold. For patients aged 6-14, the likelihood of experiencing catastrophic health expenditure decreases, as their healthcare costs are typically lower. Interestingly, female patients face a lower risk of such expenditures, but educated individuals are more likely to incur them due to higher spending on treatment. Regional disparities are significant, with patients in the northeastern and eastern zones more likely to face catastrophic health costs compared to those in the northern and southern zones, where healthcare infrastructure is better. Northern India, despite rapid economic growth, still has a high prevalence of catastrophic expenditure due to poor healthcare access and ongoing regional conflicts. Health initiatives such as the Janani Suraksha Yojana (JSY) and the National Rural Health Mission (NRHM) have contributed to reduced catastrophic health expenditure related to childbirth. Similarly, cataract surgeries have lower associated costs due to philanthropic efforts in eye care. In contrast, conditions requiring hospitalization for urinary issues tend to incur higher catastrophic health costs. The duration of illness also plays a key role: short hospital stays tend to result in more catastrophic expenditures due to the high initial cost of diagnostic tests and procedures, while longer stays increase overall expenses. Public healthcare and government-sponsored insurance programs are shown to reduce catastrophic health spending, though insurance coverage remains limited in India.

Table 4: Nature of ailment and proportion of outpatients facing catastrophic health expenditure (In percentage)

	Reported Diagnosis and/or Main Symptom	Catastrophic at thresholds		
		5%	10%	15%
INFECTION	Fever with loss of consciousness or altered con- sciousness	90.72	86.51	68.19
	Fever with rash/ eruptive lesions	82.32	76.89	73.29
	Fever due to Diphtheria, Whooping Cough	84.30	70.98	60.68
	All other fevers (Includes malaria, typhoid and fevers of unknown origin)	89.18	79.14	70.27
	Tuberculosis	45.36	36.69	32.82
	Filariasis	28.55	27.98	27.98
	Tetanus	14.54	5.76	0.00
	HIV/AIDS	14.10	8.85	8.85

	Other sexually transmitted diseases	12.15	12.15	10.07
	Jaundice	78.97	71.75	63.15
	Diarrhoea/ dysentery/ increased frequency of stools	79.71	63.39	57.44
	Worms infestation	88.90	40.44	37.10
	Cancers and occurrence of any growing painless lump in the body	25.34	17.92	14.42
	Anaemia (any cause)	39.14	32.37	27.96
	Bleeding disorders	45.66	43.78	41.57
	Diabetes	2.99	1.76	1.38
	Under-nutrition	38.18	36.61	36.61
	Goitre and other diseases of the thyroid	8.01	4.14	3.48
	Others (including obesity)	26.71	23.17	23.17
PSYCHIATRIC & NEURO- LOGICAL	Mental retardation	20.82	14.80	11.95
	Mental disorders	16.55	15.54	8.67
	Headache	37.88	23.77	17.35
	Seizures or known epilepsy	14.30	12.05	11.09
	Weakness in limb muscles and difficulty in movements	21.24	17.21	14.13
	Stroke/ hemiplegic/ sudden onset weakness or loss of speech in half of body	14.17	10.15	8.42
	Others including memory loss, confusion	5.77	2.81	1.58
	Discomfort/pain in the eye	59.08	41.91	38.23
	Cataract	8.18	1.93	1.93
	Glaucoma	36.85	34.26	34.26
	Decreased vision (chronic)	9.52	6.57	6.54
	Others (including disorders of eye movements)	21.93	3.49	3.49
	Earache / infections	53.54	48.97	45.13
	Decreased hearing	11.19	5.33	3.95
	Hypertension	6.81	3.93	2.93
	Heart disease	16.90	13.21	12.42
	Acute upper respiratory infections	67.14	51.58	40.89
	Cough with sputum with or without fever and not diagnosed as TB	70.58	49.31	38.78
	Bronchial asthma	11.33	9.56	8.49
	Diseases of mouth/teeth/gums	59.36	54.13	44.94
	Pain in abdomen	50.04	41.63	36.75
	Lump or fluid in abdomen or scrotum	42.01	19.20	17.96
	Gastrointestinal bleeding	48.19	11.39	10.86
	Skin infection	46.28	33.25	27.85
	Joint or bone diseases	20.10	15.73	12.92
	Back or body aches	30.89	22.97	19.66
	Any difficulty or abnormality in urination	32.52	25.76	24.10
	Pain the pelvic region	60.39	52.76	14.27
	Irregularity in menstrual cycle	39.80	35.66	33.38

	Pregnancy with complications before or during labor	70.14	46.55	46.05
	Complications in mother after birth of child	39.77	30.36	28.00
	Illness in the new-born/ sick new-born	59.30	45.94	41.83
	Accidental injury, road traffic accidents and falls	66.34	51.67	46.29
	Accidental drowning and submersion	92.48	77.03	65.74
	Burns and corrosions	80.99	69.50	63.80
	Poisoning	78.38	78.38	78.38
	Intentional self-harm	100.00	41.94	41.94
	Assault	55.32	49.73	49.73
	Contact with venomous animals and plants	84.66	67.92	55.05
	Symptom not fitting into any of above categories	31.43	23.12	14.80
	Could not even state the main symptom	22.47	21.15	21.15
	Childbirth – Caesarean/ normal/ any other	70.59	54.39	42.06

Source: Unit level data of (National Sample Survey Office, 2016)

Table 5: Determinants of catastrophic health expenditure faced by patients on morbidity in last 15 days: Logit Regression Models

	Variable	5 percent			10 percent			15 percent		
		OR	Std. Err.	P>t	OR	Std. Err.	P>t	OR	Std. Err.	P>t
House-hold Charac-teristics	HH size	0.841	0.015	0.000	0.845	0.015	0.000	0.820	0.015	0.000
	Religious minority	0.917	0.104	0.443	0.946	0.094	0.576	0.944	0.089	0.543
	Lower caste	1.094	0.113	0.385	0.995	0.090	0.959	0.984	0.088	0.855
	Rural	0.919	0.091	0.395	0.985	0.085	0.864	1.017	0.083	0.836
	Per capita Exp.	0.763	0.030	0.000	0.752	0.031	0.000	0.697	0.032	0.000
Head Charac-teristics	Educated head	0.641	0.094	0.002	0.821	0.117	0.166	0.837	0.118	0.205
	Head age	0.997	0.003	0.184	0.994	0.003	0.033	0.997	0.003	0.228
	Female Headed	1.086	0.207	0.665	1.032	0.185	0.862	0.941	0.167	0.732
Person's Charac-teristics	Age 0-5	1.696	0.256	0.000	1.487	0.205	0.004	1.293	0.168	0.048
	Age 6-14	0.773	0.118	0.093	0.797	0.104	0.080	0.796	0.097	0.061
	Age 60	1.231	0.168	0.130	1.313	0.181	0.048	1.324	0.188	0.048
	Female	0.744	0.075	0.003	0.788	0.069	0.007	0.862	0.072	0.076
	Educated person	1.130	0.149	0.357	0.946	0.114	0.647	0.976	0.112	0.832
Location	North-Eastern	1.806	0.886	0.229	1.973	0.743	0.071	1.561	0.459	0.130
	Southern	0.677	0.089	0.003	0.843	0.102	0.158	0.792	0.091	0.042
	Western	0.919	0.141	0.583	1.041	0.142	0.770	1.048	0.140	0.725
	Eastern	1.086	0.175	0.609	0.881	0.117	0.337	0.863	0.107	0.237
	Northern	1.131	0.173	0.424	0.984	0.136	0.906	0.953	0.127	0.718
	Fever other	1.818	0.239	0.000	1.714	0.186	0.000	1.697	0.171	0.000

Nature of ailments	Hypertension	0.645	0.153	0.065	0.548	0.148	0.026	0.501	0.143	0.015
	Diabetes	0.453	0.100	0.000	0.495	0.155	0.025	0.499	0.181	0.055
	AURI	0.512	0.074	0.000	0.531	0.068	0.000	0.539	0.068	0.000
	Joint and Bones	0.713	0.147	0.102	0.916	0.171	0.639	0.855	0.182	0.460
	Pain Abdomen	1.296	0.263	0.202	1.348	0.258	0.119	1.394	0.254	0.069
	Heart Diseases	1.150	0.224	0.473	1.300	0.319	0.285	1.683	0.391	0.025
	Asthma	1.094	0.398	0.805	1.811	0.761	0.157	2.013	0.935	0.132
	Aches	0.368	0.093	0.000	0.455	0.110	0.001	0.537	0.133	0.012
	Cough	0.857	0.211	0.530	0.555	0.130	0.012	0.532	0.121	0.006
	Cancers	3.092	1.099	0.001	3.617	1.890	0.014	3.219	1.851	0.042
	TB	2.376	0.816	0.012	1.526	0.792	0.415	1.491	0.672	0.376
	Pregnancy	0.979	0.606	0.972	0.621	0.339	0.383	0.913	0.497	0.867
	Duration Q2	0.494	0.050	0.000	0.435	0.038	0.000	0.489	0.041	0.000
	Duration Q3	0.008	0.002	0.000	0.005	0.001	0.000	0.005	0.002	0.000
	Duration Q4	0.00003	0.00002	0.00000	0.00002	0.00002	0.00000	0.00003	0.00003	0.00000
	Hospitalised15	1.020	0.139	0.885	0.989	0.127	0.934	1.011	0.124	0.931
Treat-ment	Asha	0.461	0.199	0.073	0.802	0.324	0.585	0.927	0.339	0.835
	PHC	0.406	0.084	0.000	0.611	0.111	0.007	0.703	0.120	0.040
	Public Hospital	0.299	0.049	0.000	0.369	0.053	0.000	0.418	0.055	0.000

Source: Unit level data of (National Sample Survey Office, 2016)

The study investigates the likelihood of experiencing catastrophic health spending in India, focusing on factors such as household size, education level, age, gender, southern zone, fever, hypertension, diabetes, acute upper respiratory infections, abdominal pain, heart diseases, aches and pains, cough, cancer, tuberculosis, duration of illness, treatment from HSC/ANM/ASHA/AWW, PHC/Dispensary/CHC/Mobile medical unit, public hospital, insurance coverage from the government or own policy, and the likelihood of facing catastrophic health expenditure on morbidity in the last fifteen days from the date of the survey. The results show that the likelihood of encountering catastrophic health expenditure decreases as the number of household members grows. Low-income households are more likely to experience this type of expense. The study also finds that the likelihood of catastrophic health expenditure decreases as patients' per capita monthly consumption expenditure increases. The study also finds that the nature of the illness usually has a major bearing on catastrophic health expenditure. The study also finds that the fraction of catastrophic health cost is uniquely related to the duration of certain ailments. The percentage of people confronting catastrophic health spending declines sharply with the length of their illness. Public health facilities should be used more efficiently and effectively, and the likelihood of encountering catastrophic health expenditure is reduced with insurance from both patient-owned plans and government-funded schemes. To lessen the likelihood of experiencing catastrophic health spending, India should raise the coverage of health insurance. The area under the ROC and link test coefficients are not statistically significant, but the hat coefficients are.

Table 6: Proportion of catastrophic health expenditure and duration of ailments

Duration quartile	Catastrophic at thresholds		
	5%	10%	15%
Duration Q1: duration of illness 0 to 6 days	88.00	77.31	67.40
Duration Q2: duration of illness between 7 to92 days	72.43	55.29	46.33
Duration Q3: duration of illness between 93 to 1015 days	2.97	0.95	0.58
Duration Q4: duration of illness above 1015 days	0.02	0.01	0.00

Source: Unit level data of (National Sample Survey Office, 2016)

The percentage of catastrophic health cost is affected by the duration of diseases, as shown in Table 12. The percentage of catastrophic health spending is highest in Q1 and Q2 when illness length is short, and it declines as illness duration grows in Q3 and Q4.

4. CONCLUSION

Households with higher disposable incomes tend to allocate more resources to medical care, whereas low-income families, despite spending less in absolute terms, often face a significant burden relative to their total income or consumption. This leads to the opportunity cost of healthcare expenditures either being within reasonable limits or exceeding them. Berki (1986) introduced the concept of catastrophic health expenditure, which refers to healthcare costs that exceed a certain percentage of household income or consumption, making such expenses financially devastating. In India, where out-of-pocket payments dominate the healthcare landscape, understanding catastrophic health expenditure is crucial. Despite its importance, there has been limited academic research on the topic in India. This chapter aims to bridge this gap by investigating the causes, frequency, and severity of catastrophic health expenditure in the country. Catastrophic health spending is typically defined as exceeding 10% of monthly consumption; however, this study also considers thresholds of 5%, 10%, and 15% to reflect the diversity of financial burden across different regions and socio-economic groups. The Logit model is employed to estimate the factors contributing to catastrophic health costs, analyzing both the past year and the most recent 15 days of illness. Key findings of the analysis indicate that hospitalizations for major health events over the past year often lead to catastrophic health costs, irrespective of whether the patient resides in rural or urban areas. Several factors influence the likelihood of encountering such expenditures, including household characteristics, the head of the family's profile, the nature of the illness, the type of treatment sought, and the availability of financial protection mechanisms like insurance. Certain factors help mitigate catastrophic costs, such as larger household size, higher per capita expenditure, younger patient age (6-14 years), residence in southern, western, or northern regions of India, and the use of public health services or insurance coverage, either through government or employer schemes. Interestingly, religious minorities and patients with a higher level of education tend to face higher odds of catastrophic health spending. The study also finds significant regional disparities in the incidence of catastrophic health expenditure. In the northeastern and eastern zones of India, patients are more likely to face devastating health costs, whereas southern zones show the lowest proportion of such expenses. Furthermore, a disproportionate number of rural patients face higher medical costs than their urban counterparts. In states like Nagaland, Manipur, and Tripura, over half of the patients encounter catastrophic health expenditures, while states like Kerala, Sikkim, and Andhra Pradesh see lower proportions of such cases. The economic burden is particularly high among the poorest households, though it diminishes with rising monthly expenditure. Religious affiliation plays a role in health spending, with Christians and Jains having lower incidences of catastrophic expenditures, while Zoroastrians experience the highest. Socially disadvantaged groups, such as Scheduled Tribes and Scheduled Castes, also face a significant burden, with 43-59% of patients from these groups experiencing catastrophic healthcare costs. Employment status also influences the likelihood of facing financial devastation from

health expenditures, with casual laborers in rural and urban areas being disproportionately affected. The nature of illness also plays a critical role, with conditions such as dental issues, pregnancy complications, injuries, assault, and infectious diseases like diphtheria, jaundice, and diarrhoea leading to high catastrophic expenditures. Conversely, diseases like diabetes, cataracts, and hypertension, while still serious, do not lead to such high financial burdens. Allopathy was found to be the most expensive form of treatment, with over half of the patients facing catastrophic costs. Treatments under the Indian system of medicine, yoga, and homeopathy tend to be less financially burdensome, but still disastrous for many at lower thresholds.

5. REFERENCES

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14. These additional references provide further context for public health and healthcare infrastructure issues in India related to catastrophic health expenditures.