Original Article

Out-of-pocket payments & catastrophic healthcare expenditure for non-communicable diseases: Results of a State-wide STEPS survey in north India

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Background & objectives: Non-communicable diseases have been designated as 'public health priority' globally, and they are accountable for debility, morbidity, and mortality. Thus, the present study aims to estimate the out-of-pocket payment, catastrophic healthcare expenditures and household wage loss.

Methods: Field research was conducted with an adapted survey questionnaire. Data from 576 individuals from various healthcare facilities in Punjab were collected using a convenience sampling approach. The out-of-pocket and catastrophic healthcare expenditures (CHE) were estimated using descriptive statistics and indices, *viz.*, headcount overshoot and mean positive overshoot. Lastly, logistic regression models were applied to identify determinants of catastrophic health expenditure.

Results: The study findings showed that most respondents incurred a high out-of-pocket payment for inpatient care. Further, at any threshold level, the incidence of catastrophic health was highest among diabetic patients. The intensity of catastrophic healthcare expenditure with diabetes and hypertension exceeded the five per cent threshold bracket. Logistic regression results revealed that the odds of incurring catastrophic healthcare expenditure were highest among respondents diagnosed with diabetes, chronic obstructive pulmonary disease (COPD), and stroke.

Interpretation & conclusions: The study recommends that the government health insurance scheme '*Ayushman Bharat-Mukh Mantri Sehat Bima Yojana* (AB-MMSBY)' must include outpatient and pre- and post-diagnostic costs incurred by respondents diagnosed with cardiovascular disease (CVD), COPD, and diabetes in Punjab. Therefore, respondents with diabetes mellitus (*i.e.*, specifically type-1 patients) must be covered under health insurance benefits.

Key words Catastrophic healthcare expenditure - diabetes mellitus - healthcare utilisation - India - non-communicable diseases - out-of-pocket payments

Globally, non-communicable diseases (NCDs) are considered a 'Public Health Priority', being accountable for huge mortality and morbidity[1,2]. The burden of NCDs is expected to increase globally due to rapid environmental changes, rising global populace, demographic transitions, and lifestyle modifications[3].

People above 60 yr of age are the most affected by NCDs, and the number is projected to double by 2050[4,5]. With the commencement of the millennium, the entire world has been witnessing an increasing trend of NCDs, especially in industrially developed and developing economies[5,6]. Most NCDs are chronic and require expensive treatment regimens and prolonged healthcare utilization[7]. Globally, the economic burden of NCDs is enormous, and diseases like diabetes and cardiovascular conditions have been projected to reduce global GDP by five per cent[8].

India's epidemiological transition is driven by the fact that lives lost due to communicable, maternal, neonatal, and nutritional diseases (CMNNDs) reduced from 53.6 per cent in 1990 to 27.5 per cent. In contrast, NCDs accounted for 61.8 per cent of deaths in 2016[9]. Among NCDs, the leading cause of mortality in India in 2016 was cardiac disease, followed by chronic respiratory diseases and cancer. Developing economies like India are, therefore, witnessing an alarming epidemic of NCDs[10] because of risk factors related to behavioural, biological, environmental, and physical[11] issues. Similarly, the proportion of disability-adjusted life years (DALYs) caused by NCDs has increased remarkably across India, from 30.5 per cent in 1990 to 55.4 per cent in 2016[9]. Examining the transition in DALYs in India, it becomes evident that most NCDs witnessed an upsurge from 1990. According to Verma *et al*[12], 'NCDs in India account for an economic burden in the range of 5 to 10 per cent of the GDP, significantly slowing down the economic growth. Since India is confronted with the 'triple burden' of disease in conjunction with infectious disease and injuries, the burden posed by NCDs remains the Achilles heel for the underfunded health system'. NCDs like diabetes, hypertension, heart disease, chronic obstructive pulmonary disease (COPD), and stroke were among the top five causes of DALYs in 2019[13]. A breadth of literature on NCDs' financial and socioeconomic impact and coping strategies is available at national, state, and district levels[14-17]. Still, literature in the context of Punjab is scant and mainly concentrates on prevalence, risk factors, and prevention strategies[18-23]. Thus, this study aims to estimate out-of-pocket payments, catastrophic healthcare expenditures, and household wage loss.

Materials & Methods

This cross-sectional study was conducted by the department of Economics, Lovely Professional University, Punjab, India.

Study design: A descriptive, cross-sectional research design was adopted for the present study conducted in the North Indian State of Punjab. Data from 576 individuals were collected using a convenience sampling approach through a survey questionnaire from healthcare facilities like public hospitals, private hospitals, *etc*., from March 6 to September 21, 2023. The out-of-pocket expenses were quantified for both outpatient and inpatient care, as shown in figure. The occurrence of outpatient care was assessed using a two-month recall at the time of the survey. In contrast, the occurrence of inpatient care was evaluated within a one-yr reference period at the time of the survey.

The rationale of the study: According to the Indian Council of Medical Research[9], Punjab's affluence and consuming habits make it the State with the highest rates of obesity and hypertension. The proportion of NCDs to the total disease burden is 52.1 per cent in Punjab. Moreover, Punjab witnessed a drastic shift in Disability-Adjusted life years (DALYs) from 1990 to 2016. NCDs such as ischaemic heart disease, chronic obstructive pulmonary disease (COPD), and diabetes are among the top three leading causes of fatality and debility in Punjab[9], with a mean percentage change of 17.1, 4, and 3.9 per cent, respectively, in 2016.

Study variables: The method adopted by us identified direct and indirect costs and their total expenditure as essential components for assessing the economic burden of NCDs. Direct costs consist of expenses related to resource usage because they originate from diagnosis and treatment followed by healthcare procedures[24]. Direct costs are derived from medical and non-medical costs; their sum calculation produces the total direct cost. Direct medical expenses consist of payment for physician appointments, testing fees, drug prescriptions, and their required supplies. Hospitalisation costs, costs of patient transport to medical facilities, and expenditures on food items and materials make up direct non-medical expenses[16,25].

The loss of worker productivity affects patients with illness and their household members who function as caregivers, resulting in indirect costs. Wage loss data was documented by combining outpatient and inpatient appointment attendance periods through interview responses from patients and their acquaintances[17]. The human capital approach[26,27], served as the methodology followed throughout this investigation. Health expenses become catastrophic whenever individuals spend more on out-of-pocket medical costs than a
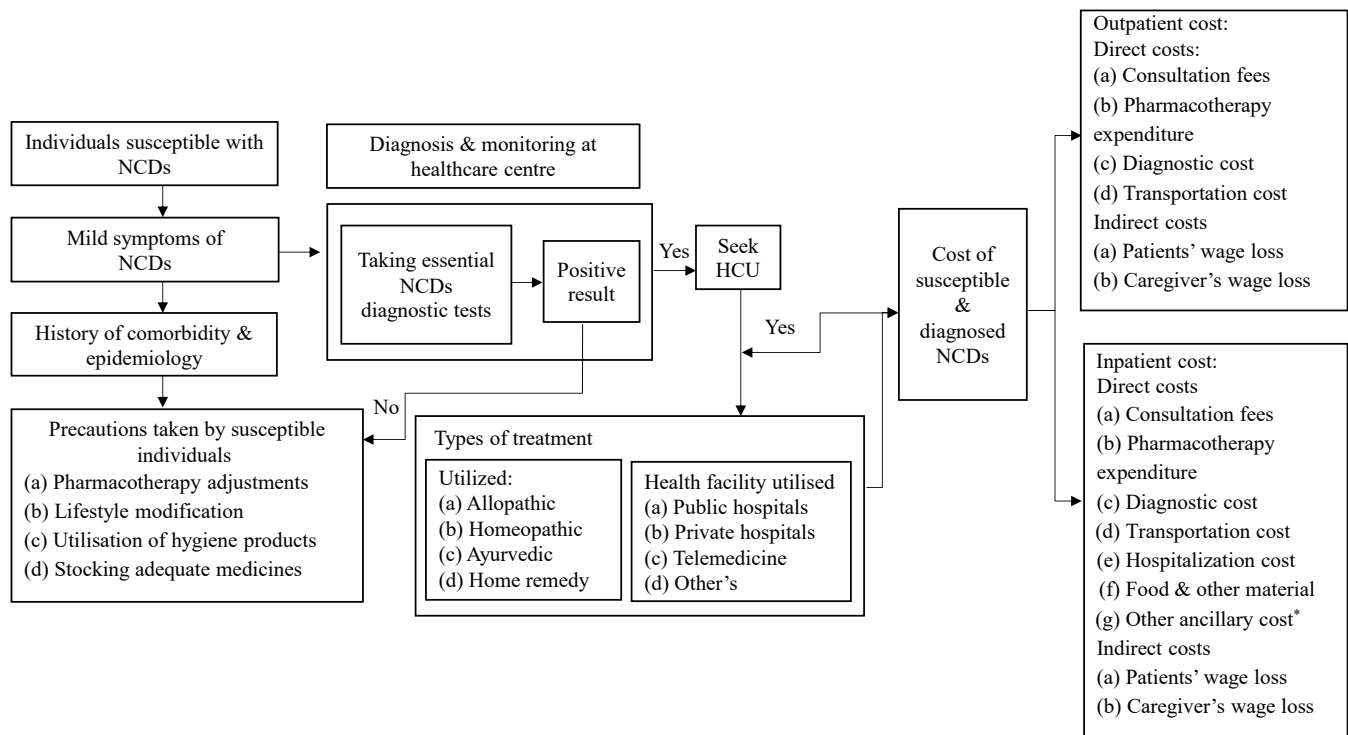
Figure. Framework on the healthcare utilisation and economic enquiry of NCDs. HCU, healthcare utilisation; NCDs, non-communicable diseases. *Multiple responses are possible.

predetermined share of their annual spending. This study investigated threshold levels of 5, 10, 20, and 30 per cent relating to the incidence and intensity of total household expenditures.

Developing research instrument: This study used a self-administered research instrument adapted from the 'WHO STEP wise Surveillance' manual. Before the primary survey, a four-stage procedure was followed to develop and adapt measures regarding scale development[21]; (*i*) designing the instrument, (*ii*) modifications in research items, (*iii*) psychometric trait testing, and (*iv*) reliability test. Demographic characteristics are presented in the first section, followed by section two, which discusses the type of NCD the respondents were diagnosed with. Lastly, section 3 focuses on both inpatient and outpatient costs associated with NCDs.

Statistical analysis: Descriptive analyses were performed in the present study to estimate the socio-demographic characteristics and out-of-pocket payments. Mean, median, and range were calculated for costs by the components of direct and indirect costs. Moreover, catastrophic healthcare expenditure

(CHE) was measured to estimate the incidence and intensity of healthcare expenditures[28]. The headcount and overshoot method was employed to assess the incidence of NCDs[29,30], and mean positive overshoot was used to assess the intensity of healthcare expenditures[29]. The headcount ratio and overshoot technique collectively offer significant insights into the cost of illness (COI) research, facilitating a thorough comprehension of both the prevalence and severity of the economic burden resulting from disease. The headcount ratio offers breadth by indicating who and how many individuals are affected, whereas the overshoot method provides depth by assessing the severity of their impact. Together, these methods create a comprehensive framework for understanding and addressing the economic burdens of illness. The mean positive overshoot technique enhances the study by quantifying the average economic distress of individuals over a cost threshold, thereby guiding targeted interventions, reducing disparities, and offering a more thorough assessment of illness-related financial burdens. Finally, a logistic regression model was used to assess the influence of several independent factors provided concurrently to predict membership in one of the two dependent variable categories[31].

Table I. Socio-demographic attributes of study participants	
Characteristics	(N=576), n (%)
Gender	
Male	380 (66)
Female	196 (34)
Residence	
Urban	357 (62)
Rural	218 (38)
Marital status	
Bachelor	75 (13)
Married	301 (87)
Age group (yr)	
Up to 20	17 (03)
21-40	75 (13)
41-60	288 (50)
60 and above	196 (34)
Work status	
Salaried	63 (11)
Business	219 (38)
Student	23 (04)
Homemaker	173 (30)
Retired	52 (09)
Other	46 (08)
Education level	
Illiterate	35 (06)
Primary	173 (28)
Secondary	179 (33)
Graduate	150 (26)
Post-graduate & above	41 (07)
Stated monthly income	
Less than ₹15,000	86 (15)
₹ 15,000 - ₹ 30,000	184 (32)
₹ 30,000 - ₹ 45,000	138 (24)
₹ 45,000 - ₹ 60,000	81 (14)
₹ 60,000 and above	86 (15)
Family type	
Nuclear	271 (47)
Extended	305 (53)
History of NCDs in family	
Yes	351 (61)
No	225 (39)
Type of non-communicable disease	
Hypertension	138 (24)
Diabetes	179 (31)
Cardiovascular disease (CVD)	109 (19)
Chronic obstructive pulmonary disease (COPD)	63 (11)
Stroke	86 (15)
Source: Calculation based on our survey data	

$$\text{Headcount} = \frac{1}{n}\sum_{i=1}^{n}Ei \qquad (1)$$

Where, E = Indicator equal to one, if Oi/Yi>z or else Zero; Pi = Out-of-Pocket expenditure of household; Yi = Household income; Z = Catastrophic threshold level; N = Sample size.

$$\text{Overshoot} = 1/n\sum_{i=1}^{n}Oi \qquad (2)$$

Where,

Oi = Ei ((Pi/Yi)-Z)

$$\text{Mean Positive Overshoot} = \frac{\text{Overshoot}}{\text{Headcount}} \qquad (3)$$

Results

Socio-demographic profile: Table I highlights the socio-demographic profile of the study respondents from Punjab. Of the 576 respondents, a sizable proportion diagnosed with NCDs was male. The majority of the NCDs were identified as lifestyle diseases, and most of the respondents were from urban regions. The analysis revealed that a sizable proportion of respondents diagnosed with any NCD were from the age groups of 41-60 yr and above 60 yr. Moreover, a history of NCDs in the family was reported by 54 per cent of the respondents. Among diverse types of NCDs, a large proportion of respondents were diagnosed with diabetes (31%), followed by hypertension (24%), CVD (19%), stroke (15%), and COPD (11%).

Healthcare utilisation of non-communicable disease in Punjab: Table II elucidates the healthcare utilisation of NCDs in Punjab. It was found that a large proportion of respondents used allopathic treatment (76%), followed by home remedies (18%), ayurveda (5%), and homoeopathy (1%). The study results revealed that 48 per cent of respondents utilised private healthcare facilities, 26 per cent utilised public healthcare facilities, 19 per cent preferred chemists, and seven per cent utilised homoeopathy care. Lastly, of all the 576 respondents, a substantial proportion of 259 individuals own private insurance, followed by 34 per cent with governmental (AB-MMSBY) insurance, and 21 per cent do not know about the health insurance they possess. The mean distance covered to access healthcare facilities was 5.49 km.

Table II. Healthcare utilisation of non-communicable disease in Punjab

Healthcare utilisation	n (%)
Treatment taken	
Allopathic	438 (76)
Ayurveda	103 (18)
Home remedies	29 (05)
Homoeopathy	06 (01)
Type of health facility utilised	
Public hospitals	150 (26)
Private hospitals	276 (48)
Homeopathy clinic	41 (07)
Chemists	109 (19)
Type of insurance owned	
Government (AB-MMSBY)	196 (34)
Private insurance	259 (45)
No insurance	121 (21)
Distance covered to visit health facility	
Mean (±Standard Deviation) distance in km	05.49 (±3.5) km

Source: Calculation based on our survey data

Annual outpatient and inpatient costs of NCDs by component of direct and indirect costs: The results of the annual outpatient and inpatient cost of NCDs by components have been shown in table III. Respondents with cardiovascular disease incurred the highest mean direct outpatient cost of ₹48,000 (3800 - 90,000) and mean indirect cost of ₹6000 (500 - 7500). It was found that respondents with stroke experienced the second-highest mean direct outpatient cost of ₹40,300 (4000 - 85,000). In contrast, respondents with COPD incurred the second-highest mean indirect cost (₹4909). The results revealed that patients with hypertension incurred the least direct and indirect outpatient costs. Expenditure on medicines constituted the most significant cost element among all NCDs, succeeded by expenses related to diagnostics, consultation fees, and transportation costs.

The analysis revealed that of the total 576 study respondents, only 209 utilised inpatient healthcare. The mean direct inpatient cost incurred by cardiovascular disease respondents was the highest at ₹90,000 (2500 - 1,50,000), followed by COPD, hypertension, stroke, and diabetes, as exhibited in table III. Under indirect inpatient cost, respondents with COPD incurred the highest mean cost of ₹5000 (500 - 10000), followed by cardiovascular disease, diabetes, stroke, and hypertension.

Incidence and intensity of catastrophic healthcare expenditure (CHE) across various NCDs: The incidence and intensity of CHE across various NCDs in Punjab have been presented in table IV. At any threshold level, CHE incidence (headcount) was the highest among diabetic patients. The respondents with COPD experienced a minor incidence of CHE at 20 and 30 per cent threshold levels. The intensity (overshoot) of CHE with diabetes and hypertension was above eight per cent at the threshold level of five per cent, whereas respondents diagnosed with stroke experienced the least intensity (overshoot) of CHE at any given threshold level (*i.e.*, from 5 to 30%). The analysis revealed that respondents diagnosed with hypertension suffered the second highest 'overshoot' and highest 'mean positive overshoot' intensity at five per cent and 10 per cent threshold levels, respectively. Similarly, respondents diagnosed with stroke experience the second-highest intensity (mean positive overshoot) of 11.43 per cent at a threshold level of five per cent.

Determinants of catastrophic healthcare expenditure of NCDs in Punjab: The critical determinants of CHEs of NCDs were identified with logistic regression, as shown in table V. Based on the 'Omnibus Test of Model', the value of 0.000 exhibits the models as statistically significant. Hosmer and Lemeshow's goodness of fit test shows that the model is an excellent fit for the data as the *P* value is more significant than 0.05. At a 30 per cent threshold level, respondents diagnosed with NCDs observed a statistically significant association with CHE and major socio-demographic variables such as gender, age, income, work status, education, and complications. As shown in table V, the probability of CHE was higher among male respondents diagnosed with hypertension, diabetes, and cardiovascular disease.

On the contrary, the odds of incurring CHE were lower among male respondents diagnosed with COPD and stroke. The odds of incurring CHE were two times higher among the respondents diagnosed with hypertension and COPD and having a primary level of education in Punjab. It was found that the odds of incurring CHE were thirteen times higher among diabetic homemakers as compared to other respondents diagnosed with hypertension, stroke, CVD, and COPD. The analysis revealed that respondents with low-income levels were likelier to experience CHE at any given type of NCD than respondents with high income. The logistic regression results revealed that the probability of incurring CHE was higher among

Table III. Annual outpatient and inpatient costs of NCDs by direct and indirect costs in rupees (₹)

Types of cost component	Type of non-communicable diseases									
	Hypertension		Diabetes		CVD		COPD		Stroke	
Outpatient cost of NCDs (n=576)	Mean	Median (Range)	Mean	Median (Range)	Mean	Median (Range)	Mean	Median (Range)	Mean	Median (Range)
Consultation fee	2400	2304 (3000-10)	3600	3215 (4500-10)	4500	4400 (7200-350)	3600	3450 (6000-150)	3500	3400 (7000-250)
Expenditure on medicines	12000	12128 (17550-1050)	24000	23000 (30000-1800)	36000	33000 (45500-3600)	27797	24000 (60000-2500)	28,000	27500 (80000-4000)
Diagnostic expenditure	3600	3520 (6000-800)	6000	5850 (12500-1400)	9600	9000 (25000-1800)	8003	8015 (18500-2400)	7500	7200 (15500-3600)
Transportation cost	600	500 (1000-200)	1200	800 (2000-200)	1300	1200 (2000-150)	1254	1150 (2000-250)	1300	1100 (2500-500)
Total direct cost	₹15840	14000 (30000-2000)	₹30000	25500 (47550-2500)	₹48000	45000 (90000-3800)	₹35250	33750 (58500-3200)	₹40,300	40000 (85000-4000)
Mean wage loss to the patient	2400	2200 (3500-500)	4200	4000 (7000-500)	4800	4720 (12500-500)	4250	4000 (7800-500)	3750	3500 (10000-500)
Mean wage loss of the caregiver	3000	2750 (4000-500)	4800	4250 (6000-450)	6000	5500 (7500-500)	5110	4560 (9000-1000)	2300	2200 (8000-1000)
Total indirect cost	₹2400	4850 (7200-500)	₹4200	3800 (6000-450)	₹6000	5850 (7500-500)	₹4909	4764 (8500-500)	₹3500	3300 (5500-500)
Inpatient cost of NCDs in the past365 days (n=209)										
Consultation fee	1200	1100 (2500-10)	1751	1700 (3500-10)	2000	1700 (4500-150)	2500	2280 (7000-250)	3000	2500 (6000-400)
Expenditure on medicine	4000	3600 (20000-800)	5516	4408 (25000-800)	6000	5510 (15500-1200)	7200	6500 (14000-1000)	5400	4850 (20000-1000)
Cost of hospitalisation	3500	2800 (7500-250)	5784	5500 (15000-500)	2550	2100 (5500-250)	7850	7000 (20000-800)	3500	3200 (10500-500)
Diagnostic expenditure	4000	3300 (10500-350)	5478	4840 (10500-600)	4500	4550 (10500-700)	7000	6600 (15000-1000)	5200	4945 (17500-800)
Transportation cost	375	250 (1200-100)	684	500 (1800-100)	400	350 (1500-200)	500	400 (1500-100)	550	350 (1500-200)
Food & other material	2000	1800 (5000-250)	2632	2400 (4800-250)	2500	2000 (4500-300)	3000	2500 (5000-500)	2500	2200 (4500-400)
Other ancillary cost[*]	18000	14500 (35000-2000)	27900	25000 (42000-2500)	80000	66000 (150000-2500)	43250	32000 (95000-3000)	20000	15500 (55000-2000)
Total direct cost	₹33075	28500 (38000-2000)	₹35970	34500 (65000-2500)	₹90000	72500 (150000-2500)	₹50000	41000 (105000-3000)	₹25,000	22000 (58500-2000)
Mean wage loss to the patient	1200	1050 (3000-500)	3000	2800 (6500-750)	3172	2845 (12500-500)	4150	3750 (10000-500)	2700	2500 (9500-500)
Mean wage loss of the caregiver	1500	1400 (4000-450)	2500	2200 (4800-450)	3837	3550 (6000-500)	3200	3000 (5000-500)	2100	2050 (6000-500)
Total indirect cost	₹2700	2300 (6000-450)	₹3000	2800 (6000-450)	₹4277	4200 (12500-500)	₹5000	4500 (10000-500)	₹2600	2400 (9500-500)

[*]Expenditure on surgery and miscellaneous charges
Source: Calculation based on our survey data

Types of NCDs	Measures of catastrophic health expenditure	Threshold levels for CHE (%)			
Table IV. Incidence and intensity of CHE across various types of NCDs in Punjab					
		5%	10%	20%	30%
Hypertension	Headcount	65.74	45.24	17.27	11.69
	Overshoot	08.32	06.37	03.55	1.09
	Mean positive overshoot	12.65	14.08	15.59	09.32
Diabetes mellitus	Headcount	85.37	65.71	22.76	12.71
	Overshoot	08.96	05.25	01.8	00.75
	Mean positive overshoot	10.49	08.01	10.4	11.2
Cardiovascular disease	Headcount	80.56	50.97	14.03	5
	Overshoot	07.77	04.32	01.38	00.53
	Mean positive overshoot	09.65	08.48	9.87	10.58
Chronic obstructive pulmonary disease	Headcount	74.17	38.82	9.54	02.63
	Overshoot	5.97	3.04	0.81	00.22
	Mean positive overshoot	8.05	07.83	08.52	08.38
Stroke	Headcount	45.57	37.19	18.1	08.76
	Overshoot	5.21	3.13	1.12	0.12
	Mean positive overshoot	11.43	08.41	6.18	1.36

Source: Calculation based on our survey data

respondents diagnosed with diabetes, COPD, and stroke as the major NCD complications. Lastly, the odds of incurring CHE were high among diabetic and CVD respondents with a household size of 4-6 members.

Discussion

The prevalence of NCDs stands as the foremost contributor to mortality, disability, and overall health deterioration. Without the implementation of immediate and widespread interventions across the nation, this burden is poised to escalate significantly. NCDs account for 63 per cent of India's total disease burden, leading to a rise in overall mortality[32]. The socio-demographic profile in the study has highlighted that the incidence of NCDs was higher among urban respondents aged 41 to 60 yr. Moreover, the results of the present study are analogous to the evidence from prior literature demonstrating that households with low levels of income experienced a higher intensity of CHE compared to affluent counterparts[33-35]. India's out-of-pocket payments are profusely higher than in other developing economies, owing to the paucity of health insurance coverage and lack of social security schemes[36]. Many out-of-pocket expenditures on NCDs in India are associated with direct costs such as medical expenditures and diagnostic procedures.

The results of the present study elucidate that there exists increasing health and financial insecurity in Punjab because of out-of-pocket healthcare expenditures, like the available literature[12,37]. The logistic regression results are analogous to available literature,[38-41] revealing socioeconomic variables, such as region, gender, age, work status, income, and complications as significantly associated with CHE. Hence, providing financial protection to households with low socioeconomic status in Punjab is imperative. Therefore, the present study highlights the need for robust government policies to create awareness about the social consequences of NCDs in Punjab. This study's strengths include enhancing the sparse literature on CHE, particularly in Punjab, and establishing a basis for focused health interventions. The logistic regression analysis provides a rigorous framework for identifying socioeconomic determinants of CHE, revealing critical patterns across gender, income, and household demographics. However, the study encounters various limitations, such as the cross-sectional approach constraining the establishment of the causation between study variables and limiting the understanding of the temporal evolution of health expenditures. Moreover, the findings of the study lack generalisability to other states and the entire State of Punjab because of distinctive demography and

Sociodemographic variables	Catastrophic healthcare expenditure at 30 per cent threshold level									
	Hypertension		Diabetes		CVD		COPD		Stroke	
	Odd ratios	*P* value	Odd ratios	*P* value	Odd ratios	*P* value	Odd ratios	*P* value	Odd ratios	*P*-value
Gender (females)										
Male	2.574	0.046*	1.197	0.572	2.551	0.015*	0.333	0.063	0.058	0.055
Age (below 20 yr)										
21-40	3.379	0.120	1.344	0.826	0.489	0.453	0.732	0.693	1.274	0.515
41-60	2.771	0.034*	1.647	0.125	0.716	0.009*	1.292	0.684	1.421	0.539
60 and above	0.989	0.960	1.49	0.036*	0.643	0.114	1.695	0.422	1.467	0.016*
Education (illiterate)										
Primary	2.212	0.875	0.150	0.108	0.614	0.703	2.662	0.510	0.291	0.269
Secondary	0.635	0.690	0.185	0.135	0.657	0.023*	0.579	0.394	0.298	0.274
Graduation	0.981	0.987	0.160	0.103	0.751	0.807	0.598	0.432	0.360	0.359
Post-graduation	0.907	0.031*	0.187	0.135	0.586	0.648	0.375	0.359	0.686	0.773
Others	1.075	0.569	0.227	0.202	0.310	0.384	0.272	0.406	0.434	0.999
Work status (salaried)										
Business	1.759	0.274	1.966	0.107	0.967	0.957	0.903	0.848	0.473	0.001*
Student	1.379	0.409	1.047	0.894	0.857	0.765	1.803	0.366	0.552	0.56
Homemaker	0.714	0.999	13.441	0.022*	15.413	0.002*	0.362	0.108	0.055	0.023*
Retired	0.958	0.943	1.096	0.834	0.47	0.205	0.951	0.944	0.561	0.426
Others	3.561	0.02*	1.699	0.221	0.986	0.983	1.151	0.866	0.277	0.165
Income (less than ₹15,000)										
₹15,000 - ₹30,000	2.448	0.045*	3.939	0*	9.164	0*	1.391	0.027*	1.183	0.041*
₹30,000 - ₹45,000	1.998	0.055	2.463	0.001*	4.824	0.004*	0.335	0.020*	0.618	0.376
₹45,000 - ₹60,000	1.079	0.829	1.876	0.027*	3.513	0.021*	0.192	0.003*	0.614	0.388
₹60,000 & above	0.922	0.827	1.235	0.485	1.458	0.545	0.077	0.000*	0.845	0.776
History of NCDs (No)										
Yes	0.935	0.748	0.874	0.426	0.856	0.536	0.810	0.048*	0.738	0.271
Complications (No)										
Yes	0.461	0.000*	2.417	0.000*	0.495	0.008*	1.518	0.173	2.525	0.001*
Household size (Nuclear)										
4-6 members	0.711	0.44	1.399	0.349	1.82	0.223	0.590	0.209	0.516	0.228
6 members and above	0.999	0.997	0.949	0.815	0.973	0.937	0.808	0.712	0.494	0.276
Model summary										
Omnibus test of model	Sig. = 0.000		Sig. = 0.000		Sig. = 0.000		Sig. = 0.000		Sig. = 0.000	
Hosmer & Lemeshow test	Chi-square = 4.137; Sig.= 0.845		Chi-square = 6.246; Sig.= 0.620		Chi-square = 11.125; Sig.= 0.195		Chi-square = 7.192; Sig.=0.516		Chi-Square = 12.15; Sig.=0.145	
Nagelkerke (R²)	0.162		0.168		0.209		0.216		0.194	

Table V. Determinants of catastrophic healthcare expenditure of NCDs in Punjab

*Significant at 30 per cent threshold level
Source: Calculation based on our survey data

socioeconomic characteristics. Lastly, future studies may mitigate these constraints using longitudinal data and methodologies to achieve a comprehensive view.

Additionally, promoting a healthy diet and physical activity among the youths of Punjab, who are highly disposed to NCDs and are the national front-runners in risk factors like obesity, dyslipidaemia, and hypertension. The study further proposed that the government health insurance scheme '*Ayushman Bharat-Mukh Mantri Sehat Bima Yojana*' must include outpatient and pre-and post-diagnostic charges incurred by respondents diagnosed with CVD, COPD, and diabetes in Punjab. Lastly, the healthcare system in Punjab requires a substantial transition away from its traditional emphasis on infectious diseases and maternity and child health to address primary and secondary prevention, along with diagnosis and treatment and bring affordable medications for diabetes mellitus and other NCDs within reach.

Overall, the study highlights the substantial economic cost that NCDs impose on households in Punjab. Out-of-pocket expenses have resulted in CHE, exhibiting a robust link between socioeconomic characteristics and the occurrence of CHE. Study reveals that households with lower income and specific demographics, such as larger household sizes or persons with lower educational attainment, are especially susceptible. Respondents with CVD incurred the highest direct (₹48,000) and indirect outpatient costs (₹6000). It was found that respondents with stroke experienced the second-highest direct outpatient cost (₹40,300), whereas respondents with COPS incurred the second-highest mean indirect cost (₹4909). The study recommends governmental strategies to bolster financial protection, avert impoverishment from NCD-related healthcare expenses, and promote early identification and treatment coverage to alleviate financial distress.

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