Short Communication

A Cross-sectional Study for Examining Catastrophic Healthcare Expenditure Across Socio-demographic Variables among Employees in a Sedentary Occupation

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Abstract

Health expenditure above a certain threshold level can result in a financial catastrophe by reducing the expenses on necessities. Certain socio-demographic variables have been observed to play a role in influencing catastrophic healthcare expenditure, guiding the present study to examine this scenario for employees in sedentary occupations. A cross-sectional study has been conducted among 370 employees recruited through a random sampling technique. Multinomial logistic regression was used to test the main objective of the study. The factors associated with a higher probability of catastrophic healthcare expenditure were males with increasing age. Years of work experience tend to be associated with a lower likelihood of catastrophic healthcare expenditure. No conclusive evidence could be drawn for BMI, income, marital status and education.

Keywords: Catastrophic healthcare expenditure, sedentary occupation, socio-demographic variables

Introduction

"Catastrophic Healthcare Expenditure" (henceforth "CHE") is incurred when the expenses are so high in relation to income that it results in a "financial catastrophe" for the individual or the household reducing resources for the consumption of basic necessities.[1] With an increase in the prevalence of diseases/disorders for an individual, healthcare expenditure also tends to increase. In recent years, an upward trend has been noticed in the prevalence of various diseases/disorders, especially "non-communicable diseases" (NCDs), which are majorly influenced by lifestyle factors. One of the lifestyle factors that has been majorly discussed in the literature for influencing the prevalence of NCDs is the "sedentary lifestyle." Concerning the working sector, "sedentary occupation" because of its sedentary lifestyle of limited physical movement and the majority of time spent in a sitting posture, tends to be at a higher risk of non-communicable disease.[2,3]

Apart from a sedentary lifestyle, certain socio-demographic variables such as age, gender, marital status, BMI, education level, income, or economic status also tend to influence CHE. Various studies have been undertaken about these variables; however, no solid conclusions were drawn for certain variables due to mixed evidence.[4-6] Given this status of uncertainty for these socio-demographic variables, the current study tends to examine the following objectives:

- Assessing catastrophic healthcare expenditure across different threshold levels.
- Examining catastrophic healthcare expenditure across different socio-demographic variables.

Methods

A cross-sectional study was conducted among 370 employees of sedentary occupations starting from November 2021 to

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March 2022 within the region of Delhi-NCR. The sample size was selected based on the results of the sample size calculator confirming, with ±5% margin of error, where the confidence level is 95%, with a population size between 5,000 to more than 1,00,000, a sample size between 357 and 383 can be used.[7] Participants were interviewed in person for the process of data collection. A recall period of 1 month was used to avoid recall bias. Further, respondents were selected randomly to avoid selection bias. Participants were recruited within the age group of 18 to 64 years with at least 1 year of work experience. Further, eligibility criteria required respondents to be employed in a sedentary occupation with a regular salary. Before collecting data, informed consent was taken from all participants and they were made aware of the purpose of the study.

For the purpose of calculating healthcare expenditure, data regarding both direct and indirect costs were collected.[8] Further, to measure CHE out of total healthcare expenditure, headcount, overshoot, and mean positive overshoot measures were calculated at threshold levels of 5%, 10%, 15%, 20%, 30%, and 40%, respectively.[9] Individuals' non-discretionary income (expenditure-food expenses) has been used to measure individuals' resources for measuring catastrophic payments. In addition, the questionnaire also collected information regarding socio-demographic variables such as age, gender, BMI, education, income, years of work experience, and marital status for analysis. The current study uses the following model for the analysis:

$$Y_i = \beta_1 + \beta_2 Gen_i + \beta_3 Age_i + \beta_4 BMI_i + \beta_5 Income_i + \beta_6 Marital\_Sta_i + \beta_7 Edn_i + \beta_8 Work\_exp_i + \varepsilon_i .$$

Where,

Y_i = Catastrophic healthcare expenditure at different thresholds.

= '1' for category less than 5% threshold level.

= '2' for category 5% - 10% threshold level.

= '3' for category 10% - 15% threshold level.

= '4' for category 15% - 20% threshold level.

= '5' for category 20% - 30% threshold level.

= '6' for category 30% - 40% threshold level.

= '7' for category above 40% threshold level.

β_1 *to* β_8 are parameters of estimate.

ε_i = Residual term.

The Shapiro–Wilk test was used to test the data for normality assumption. With test results indicating the non-satisfaction of the assumption of normality, non-parametric tools of analysis were used. Comparisons between different threshold levels of headcount and overshoot measures were made using Cochran and Friedman tests, respectively. Further, multinomial logistic regression was used to examine the CHE across socio-demographic variables. Different levels of thresholds were used as the categories of the dependent variable (headcount) to test across socio-demographic variables.

Results

Most respondents were male (60.3%) with an average age of 35.88 years (σ = 10.308) and an average BMI of 24.97 (σ = 4.065). Further, most people surveyed had completed their under graduation (48.4%) and earned an average monthly income of INR 62,692.43 (σ = 49,162.69) with an average work experience of 11 years.

Table 1 represents CHE measures in the form of headcount, overshoot, and mean positive overshoot at different levels of thresholds. The significance value for headcount and overshoot turned out to be 0.00, showing a statistically significant difference in catastrophic payments across different threshold levels.

Table 2 highlights results from the multinomial regression undertaken to examine socio-demographic variables at different threshold levels of CHE. The *P* value of 0.001 (<0.01) indicates that the full model was better at predicting the CHE than the intercept-only model. Further, significance values for predictor variables indicate age, monthly income, and years of work experience as statistically significant variables ($P < 0.05$).

Discussion

The current study set out with the aim of examining CHE across socio-demographic variables. Results from the Multinomial Logistic Regression Model (MLRM), including parameter estimates and significance values, have been observed to conclude the study.

Based on the statistical significance, factors such as "age," "monthly income," and "years of work experience" strongly determine the CHE. Similar findings were observed in the literature, highlighting the influence of age[4,10] and income[4,11] variables on the same. Among the literature supporting the conclusion that age is a strong determinant of healthcare expenditure,[4] findings that elderly households tend to spend higher than younger households become the key highlight in the present study. When other things remain constant, with every year of increase in age, the log odds of CHE in every category (except above 40%) increase. It is inferred that the CHE incurred will tend to increase with aging, highlighting a strong positive relationship between these two factors.

Further, as highlighted by low-economic-status families tend to experience a higher burden of CHE (proportion to "monthly Income") compared to higher economic-status families.[4] Having limited resources to sustain a livelihood, lower-income families experience a higher risk of CHE when fallen sick. Even though monthly income is significant as a factor, due to the mixed results of the parameters, no conclusive outcome can be drawn from specific income categories. This inconsistency

Table 1: Catastrophic healthcare expenditure measures

Catastrophic Expenditure*	Thresholds						Sig. values#
	5%	10%	15%	20%	30%	40%	
Headcount	75.94%	63.24%	54.86%	44.32%	26.75%	17.29%	0.00
Overshoot	18.85%	15.36%	12.38%	9.89%	6.37%	4.17%	0.00
Mean positive overshoot	24.82%	24.28%	22.56%	22.31%	23.81%	24.11%	

*Catastrophic payments have been measured as a share of the non-discretionary income of the respondents. #Significant at 5% significance level

Table 2: Results from multinomial logistic regression performed for catastrophic payment measure (headcount)

Socio-demographic variables	Estimates at different thresholds (odds ratio, *P*#)						Sig. Values
	5%-10%	10%-15%	15%-20%	20%-30%	30%-40%	Above 40%	
Intercept	-1.339	-6.281	-5.093	-4.283	-5.753	-2.863	
	(0.541)	(0.013)	(0.039)	(0.031)	(0.018)	(0.172)	
Male (ref.* female)	0.400	0.963	0.619	0.625	0.522	0.738	0.353
	(1.492;0.324)	(2.621;0.036)	(1.857;0.146)	(1.869;0.090)	(1.685;0.245)	(2.091;0.057)	
Age	0.041	0.145	0.085	0.150	0.121	-0.018	0.018##
	(1.042;0.503)	(1.156;0.038)	(1.089;0.230)	(1.162;0.007)	(1.129;0.069)	(0.982;0.752)	
BMI	-0.024	0.057	0.040	0.015	0.046	0.053	0.740
	(0.977;0.656)	(1.059;0.300)	(1.041;0.447)	(1.015;0.741)	(1.047;0.393)	(1.054;0.248)	
Marital status (ref.* married)	-0.321	0.194	0.214	-0.406	0.370	-1.302	0.117
Unmarried	(0.726;0.550)	(1.214;0.765)	(1.239;0.712)	(0.666;0.419)	(1.448;0.547)	(0.272;0.014)	
Education (ref.* post-graduation)	1.971	3.147	1.114	2.470	1.551	2.436	0.185
High school	(7.181;0.102)	(23.256;0.012)	(3.047;0.457)	(11.827;0.036)	(4.716;0.241)	(11.426;0.033)	
Under-graduation	-0.471	0.063	-0.033	0.150	-0.320	0.416	
	(0.624;0.246)	(1.065;0.897)	(0.968;0.939)	(1.162;0.686)	(0.726;0.479)	(1.516;0.306)	
Years of work experience	-0.030	-0.157	-0.086	-0.159	-0.098	0.022	0.015##
	(0.971;0.626)	(0.855;0.032)	(0.918;0.230)	(0.853;0.005)	(0.906;0.135)	(1.022;0.704)	
Monthly income (ref.* < INR 1,00,000)							0.004##
< INR 25,000	-0.241	-0.934	0.140	-1.126	0.654	2.092	
	(0.786;0.770)	(0.393;0.317)	(1.150;0.893)	(0.324;0.136)	(1.924;0.424)	(8.100;0.022)	
INR 25,000-INR 50,000	0.499	-0.289	1.454	-0.035	0.227	1.705	
	(1.647;0.453)	(0.749;0.697)	(4.281;0.088)	(0.965;0.951)	(1.255;0.758)	(5.503;0.047)	
INR 50,000- INR 75,000	0.349	0.542	1.368	0.140	0.887	0.426	
	(1.418;0.634)	(1.720;0.480)	(3.928;0.131)	(1.150;0.826)	(2.427;0.237)	(1.532;0.663)	
INR 75,000-INR 1,00,000	0.373	-0.603	0.248	-0.388	-0.615	0.407	
	(1.452;0.574)	(0.547;0.445)	(1.281;0.789)	(0.678;0.517)	(0.540;0.449)	(1.503;0.659)	
Chi-square (*P*)				109.486 (0.005)			
Pseudo R^2				0.262			

Less than 5% threshold level is used as the reference category. #*P*=Significance level at 5%. *ref.=Reference category. ##Significant at 5% significance level

in the results may be due to the nature and difference in treatment cost of different types of illness.

Further, in regards to "years of work experience," CHE tends to stay lower for all categories of threshold level as compared to the reference category of less than 5%. This could be attributed to the reasoning that theoretically, it is expected to have a positive relationship between years of work experience and income. The results show that as experience increases, the employee tends to receive relatively higher wages, which will result in lower CHE.

Apart from this, variables such as "gender," "BMI," "marital status," and "education" were found to be statistically insignificant in predicting CHE. Even though "gender" turned out to be insignificant, threshold categories, that is, 10% to 15% and above 40% were statistically significant, inferring that male respondents incur higher CHE than their female counterparts. Further, the same can be verified based on the values of parameter estimates showing a higher CHE for males at every threshold level. Brinda *et al*., (2015) have found similar results highlighting the inverse relationship between "education" and CHE.[5] The results showed a higher level of CHE for individuals lacking formal education as compared to their counterparts. However, it is also highlighted that once pension status as a variable intervenes in the impact of education on CHE analysis, the results became statistically insignificant, and no substantial evidence was presented to validate this claim. In the current study, when education as a variable is studied along the CHE, the results were inconclusive

due to the mixed evidence from categories "high school" and "under-graduation" across different threshold levels. Compared to post-graduation, the CHE for high school is observed to be higher for all threshold categories. Still, the results of the under-graduation level were inconclusive. It could be based on the reason that as the gap in the number of years of formal education increases, the gap in income increases, usually resulting in a lower CHE for people having more years of formal education.

Analysis for the variable "marital status" has shown inconclusive results when tested along CHE. CHE with some low and high values were observed for the category of "unmarried" compared to the category of married at different threshold levels leading to mixed evidence. Similar results were observed from a previous study showing the insignificant effect of marital status on CHE.[5]

Further, the study could not draw conclusive evidence based on the parameter estimates and significance values for BMI in examining CHE. Theoretically, there seems to be a positive relationship between BMI with CHE, as can be observed from most threshold categories (except the category of 5% to 10% threshold level). This could be attributed to the reason that with an increasing BMI, the exposure to certain non-communicable diseases increases leading to a higher CHE. These results for the variable "BMI" and the variable "education" are supported by the findings from another study showing inconclusive evidence for both variables when tested for CHE with respect to diabetes, cardiovascular diseases, and cancer.[6]

Taken together, these findings suggest that being males working in sedentary occupations, the CHE tends to increase with every year increase in age and decrease with every increase in the number of years of work experience. Even though theoretically, with every unit decrease in formal education and a unit increase in BMI, there ought to be an increase in CHE. However, due to inconclusive findings from the current study, no specific implication can be provided. Also, no conclusive evidence can be drawn for income and marital status. Further research focusing more on the variable education, BMI, marital status, and income is therefore suggested.

Limitations of the study

- Certain variables such as age, BMI, and monthly income could have been studied as categorical variables rather than continuous variables giving a detailed explanation of CHE across their categories.
- The current study was limited by the lack of information regarding diseases/disorders causing healthcare expenditure.

Strength of the study

Along with clearly stated objectives and inclusion criteria, the present study utilizes a validated tool to conduct the study.

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Conflicts of interest

There are no conflicts of interest.

References

1. Xu K, Evans DB, Carrin G, Aguilar-Rivera AM. Designing health financing systems to reduce catastrophic health expenditure. World Health Organization; 2005. Report No.: WHO/EIP/HSF/PB/05.02. Available from: https://repository.uantwerpen.be/record/irua/opacirua/c:irua:55823. [Last accessed on 2021 Jul 15].
2. Pronk NP, Katz AS, Lowry M, Payfer JR. Reducing occupational sitting time and improving worker health: The take-a-stand project, 2011. Prev Chronic Dis 2012;9:E154. doi: 10.5888/pcd9.110323.
3. Daneshmandi H, Choobineh A, Ghaem H, Karimi M. Adverse effects of prolonged sitting behavior on the general health of office workers. J Lifestyle Med 2017;7:69-75.
4. Choi JW, Choi JW, Kim JH, Yoo KB, Park EC. Association between chronic disease and catastrophic health expenditure in Korea. BMC Health Serv Res 2015;15:1-8. doi: 10.1186/s12913-014-0675-1.
5. Brinda EM, Kowal P, Attermann J, Enemark U. Health service use, out-of-pocket payments and catastrophic health expenditure among older people in India: The WHO study on global ageing and adult health (SAGE). J Epidemiol Community Health 2015;69:489-94.
6. Jelena A, Pavlova M, Rechel B, Groot W. Catastrophic health care expenditure among older people with chronic diseases in 15 European countries. PLoS One 2016;11:e0157765. doi: 10.1371/journal.pone.0157765.
7. Creative research systems: Your complete survey software solutions since 1982 [Internet]. Creative Research Systems. Available from: https://www.surveysystem.com/sscalc.htm. [Last accessed on 2021 Aug 05].
8. Jo C. Cost-of-illness studies: Concepts, scopes, and methods. Clin Mol Hepatol 2014;20:327-37.
9. O'Donnell O, Doorslaer EV, Wagstaff A, Lindelow M. Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation. Washington, D.C.: The World Bank; 2008.
10. Xu K, Evans DB, Carrin G, Anguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. Health Affairs 2007;26:972-83.
11. Bhojani U, Thriveni BS, Devadasan R, Munegowda CM, Devadasan N, Kolsteren P, *et al*. Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. BMC Public Health 2012;12:1-14.