Does Catastrophic Health Expenditure affect Health Satisfaction status among Road Traffic Injury victims? A Sociological Perspective

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Abstract
Road Traffic Injury (RTI) is one of the major public health concerns worldwide. It often leads to significant out-of-pocket expenses for victims and their families. Such financial constraints are termed as catastrophic health expenditure (CHE), that may have far-reaching sociological implications like reducing health satisfaction is one of them. The objective of this study was to discover and explore the association between CHE and health satisfaction scores (HSS) among RTI victims in District Malakand, Khyber Pakhtunkhwa, Pakistan. The aim was purely studied on a sociological basis to understand the wider circumstances of financial constraints triggered by injury-related healthcare costs. This study was designed based on a cross-sectional survey specifically focusing on RTI survivors. A structured questionnaire was employed to collect data from respondents. For examining associations between CHE indicators and HSS, bivariate analysis (Chi-square tests and Kendall's Tau-b). Likewise, at multivariate level, association between the variables were undertaken by controlling demographic variables (age, gender, education, and income). The results of the study indicate that significant negative associations were found between various indicators of CHE, such as emergency cpayments, rehabilitation costs exceeding income, borrowing for treatment, and lower HSS ($p < 0.001$). The association was found significant among middle-aged (31–60 years) and low-income group of respondents. Gender and education also moderated these associations, with illiterate and male respondents showing higher vulnerability to reduced satisfaction. The study concluded that the CHE has detrimental effect on perceived health satisfaction among the RTI survivors, with vulnerable group bearing the huge burden. To mitigate such effects and promote equity in post-injury care and recovery, strengthening financial protection mechanisms is indispensable, such as health insurance and targeted subsidies etc.

Keywords: *Catastrophic Health Expenditure, Health Satisfaction Status, Road Traffic Injury*

Introduction
Road traffic injuries (RTIs) are a leading cause of morbidity and mortality worldwide, disproportionately affecting low-income countries (LICs) and middle-income countries (MICs). Surprisingly, these countries have only 90% of the world's fatal traffic accidents despite having only 60% of the world's vehicles. Despite surviving the physical trauma of RTIs, the victims and their families suffer from significant economic hardship due to out-of-pocket (OOP) healthcare expenses. The OOP exceeds a household's capacity to pay, leading catastrophic health expenditure

(CHE). Such financial strain can compel the families to reduce daily consumption, sell assets, or incur debt, exacerbating their vulnerability (Alam & Mahal, 2016; Strzyżyńska, 2023, May 29). According to WHO, OOP spending refers to the money paid by the victims or their households directly for healthcare services at the time they receive them, without reimbursement from the insurance or other health coverage systems. In addition, CHE is the OOP health spending exceeding 10% or 25% of total household income or consumption (WHO & World Bank, 2021). In nutshell, OOP payment doesn't include payment received from insurance, government, or employers rather payment for doctor visits, medicines, hospitals bills, diagnostic tests, surgeries etc. More precisely, if a person gets injured in a traffic accident and must pay Rs.100,000 for surgery and medicines from their own savings or borrowed money, that amount would be considered OOP.

OOP is the input as it is the actual amount a household pays directly for health services, with no reimbursement. In contrast, CHE is the outcome because it happens when the OOP spending go beyond a certain threshold of the household's income or capacity to pay, typically 10%, 25%, or 40% of income (WHO, 2010; Xu et al., 2003; WHO & World Bank, 2021 & Azzani et al., 2019). In short, all CHE comes from OOP, but not all OOP leads to CHE. For example, if someone pays a small amount for medicine (OOP), it may not be considered CHE, but if that amount (OOP) increases and pushes a household to cut food, education, or sell assets, then it becomes CHE (WHO & World Bank, 2021).

RTIs seriously affect the households economically that makes them vulnerable to CHE. The long-term acute medical care including emergency services, surgeries, rehabilitation, and medication can result in highest OOP expense. In addition, the victims also face loss of working ability that led to reduced income and economic productivity. The simultaneous impact of high medical expenditures and income loss intensifies the financial burden, resultantly pushes the families into economic distress or extreme poverty (Haagsma et al., 2016; Mock et al., 2019).

Beyond imposing financial hardship on victims and their families, CHE also undermines individuals' health satisfaction status. From sociological perspective, the high OOP payments lead to financial hardships that further exacerbated the psychological stress, accessibility problem to follow-up care, and limit rehabilitation. Such economics difficulties ultimately reduce the victims' perceived well-being and health satisfaction status. Recovery from morbidity is one factor influencing health satisfaction; however, true health satisfaction is more deeply rooted in one's ability to resume social roles, maintain autonomy, and avoid long-term dependency.

In the context of traffic injuries, the victims more often face long-term treatment and income loss, hence exacerbates emotional and social vulnerability. Research studies have shown that high medical costs correlate with poorer self-perceived health, ultimately reduced satisfaction with health (Wagstaff et al., 2003; Flores et al., 2008). Moreover, due to financial crises the victims sometimes skip treatments, delay care, or adopt negative coping strategies, all of which worsen perceived health outcomes (Kieny et al., 2017). Hence, CHE deteriorates not only economic circumstances but also effect overall satisfaction with one's health, specifically among injury survivors facing intricate recovery trajectories.

Justification

Traffic injury is major public health concern, killing 1.19 million people annually worldwide. However, it's not only a public health concern but a significant socioeconomic burden, especially in LICs and MICs where healthcare systems often rely on OOP payments. The physical impact of RTI has been widely studied but studies on broader social and economic consequences particularly the role of CHE in shaping victims' post injury well-being is limited, almost non-existent. This study is a justified effort to explore how financial burden resulting from RTI's affects victims' health satisfaction status, not only as medical outcome but as a reflection of their ability to regain autonomy, fulfill social roles, and avoid long-term dependency. Through a sociological perspective, this research provides a more holistic understanding of post-injury recovery, emphasizing the intersection of economic strain and individuals' perceived health satisfaction status. The findings can help policy makers to improve financial protection mechanisms and post-injury care strategies.

Methodology

Study Design

In this study "Cross-Sectional" design, also termed by some authors as "One Shot" or "Status" studies was used. This research design offers a comprehensive snapshot of prevailing conditions at the time of data collection. Such investigations are termed *cross-sectional* studies, as they concurrently assess temporal dynamics and population characteristics at a singular point in time, without accounting for longitudinal variations (Babie, 2004). The aim of the study was to know whether CHE undermines the health satisfaction status of RIT victims.

Study Universe

The present study was conducted in District Malakand, located in Khyber Pakhtunkhwa (KP), Pakistan. KP is situated in the northwestern region of the country. It ranks as the third largest province in terms of both population and economic contribution, despite being the smallest in land area. Administratively, Khyber Pakhtunkhwa comprises seven divisions and 35 districts, among which District Malakand holds significant importance.

District Malakand is divided into two tehsils, one is Sama Ranizai and the other is Swat Ranizai that encompass 28 Union Councils (UCs), 15 Neighborhood Councils, and 67 Village Councils. The study specifically focused on Tehsil Sama Ranizai which is a hilly region in terms of it geography. There is a wide network of extensive roads. Due to its strategic location, it serves as a major transit route for millions of passengers and tourists, particularly during summer and winter vacation seasons, resulting in high traffic density. The combination of rugged terrain, narrow winding roads, and high vehicle mobility contributes to an elevated incidence of traffic accidents, associated fatalities and injuries.

For the purpose of this research, the target population comprised RTI survivors from 12 randomly selected Union Councils within Tehsil Sama Ranizai, as detailed in Table 2.1.

Sample size and Sampling

Stratified Multistage Random Sampling was used to ensure proportional and representative selection of respondents across District Malakand. The district has 28 Union Councils (UCs), which

were stratified into two strata, Stratum A (Urban UCs) and Stratum B (Rural UCs). Afterwards, 6 UCs were selected from Stratum A and 6 from Stratum B. Traffic injury survivors were identified from available records of 807 eligible cases using proportionate allocation and 274 respondents were randomly selected. This method ensured statistically reliability while maintaining feasibility in terms of fieldwork and resource allocation.

Sample size

The data for this study were collected from 12 Rural Units (RU). The details of 12 RU are mentioned in table 2.1 of this chapter.

In 2018, a total of 807 fatal road traffic accidents (RTAs) were documented, based on records retrieved from the Emergency Department (ED) registers of the District Headquarter Hospital Batkhela and the Tehsil Headquarter Hospital Dargai. The record for 2018 was found to be complete and systematically maintained, with a dedicated register allocated specifically for Road Traffic Accidents (RTAs) in the ED. In contrast, the records for 2019 were incomplete and did not meet the data requirements for the study. Furthermore, the records for 2017 and earlier were compiled in combined registers, which included various types of emergencies such as RTAs, falls, and burn injuries.

Approximately 25 registers were archived by the ED, but these were not organized by emergency type, making the process of isolating RTA cases both impractical and time-consuming. Given these constraints, the year 2018 was selected as the reference period for the study due to the availability of reliable, complete, and segregated data. The sample size for the study was calculated using the formula recommended by Chaudhry (1996), ensuring a statistically sound and representative sampling approach.

$$\boldsymbol{n} = \frac{N\hat{p}\hat{q}Z^2}{\hat{p}\hat{q}Z^2+Ne^2-e^2} \quad \ldots \text{(Chaudhry, 1996)}$$

Where
N = Total Road Traffic Crashes = 807,
p = Population Portion = 0.50,
q = 0.50,
Z = Confidence Level = 1.96 and
e = Margin of Error = 0.043,

As per the requirement of this study, the number of traffic injuries victims were determined to be 274. These survivors endure significant traffic-related injuries, often manifesting as disabilities, functional impairments, or other limitations in daily activities. To ensure representation of each unit, a proportional allocation method was employed across each urban center, subsequently random selection procedure was carried out through simple random sampling procedure. Table 2.1 provides complete details of proportionally allocated the allocation of the sample size to each selected UC is presented in Table 3.1.

The formula for Proportional Allocation:
The sample size required for each stratum:

$$n_h = (N_h / N)*n$$

Where n_h is the required sample size for stratum h,
N_h is the population size for stratum h,
N is the total population size, and
n is the total sample size

Table 2.1: Allocation of required sample to selected Union Councils
Distribution of Crash Survivors and Sample Size by Union Council

Name of UC	No. of Total Victims	Sample Size
Batkhela (Urban)	139	47
Dargai (Rural)	120	41
Dheri (Rural)	36	12
Gari Usmani (Rural)	37	13
Herosha (Rural)	34	12
Kharkay (Urban)	81	28
Koper (Rural)	35	12
Malakand (Urban)	69	23
Palay (Urban)	73	25
Sakhakot (Urban)	62	21
Thana (Urban)	56	19
Wartir (Rural)	65	22
Total	**807**	**274**

Source: Data extracted from the official records of District Headquarter Hospital Batkhela and Tehsil Headquarter Hospital Dargai, 2018.

Characteristics of respondents

Road Traffic Injury is defined as 'fatal or non-fatal injuries resulting from a road traffic crash' (Peden et al., 2004). In this study, the following criteria were used to include RTI victims:

i. Individuals who sustained injuries in a traffic collision involving at least one mechanical means of transportation. For example, RTA with between vehicles (Cars truck etc.), RTA between vehicles and pedestrians and RTA between vehicles, animals, or buildings.
ii. The victim must be the resident of District Malakand region.
iii. Individuals who suffered moderate to severe injuries from the RTI and were subsequently transported to a hospital for treatment.
iv. RTI victims who continued to experience the effects of their injuries for an extended period, ranging from days to months or even years.

Conceptual Framework

Table 2.2 Conceptual Framework

Background Variables	Independent Variables	Dependent Variable
Age **Gender** **Educational Status** **Income**	Catastrophic Health Expenditure	Health Satisfaction Status

Data Collection Tools

For accurate collection of relevant data, An interview schedule was prepared to collect primary data that encompass the whole study variables mentioned in the above table 2.2. First of all, all items of the interview schedule are translated into the national language i.e. Urdu. Afterward, all items were pre-tested on 20 victims of RTI (Kothari, 2004). After pre-testing, the inconsistent and ambiguous items were rectified and repeated items were deleted before the commencement of the actual data collection process.

Data collection was conducted directly by the researcher from male respondents. However, cultural limitations prevented access to female participants. Therefore, the data was collected from female respondents with the help of their educated close relative who were trained before collection of required data. The timeframe of the data collection was 4 months from January to April, 2019.

Reliability analysis

Cronbach's Alpha test score for CHE was noted as 0.86. that indicate quite good consistency between the items of the interview schedule. Such result help in the smooth process of indexation practiced by other researchers (Ghazali, 2008).

Data Analysis

The data obtained during the fieldwork underwent a comprehensive process of verification and validation before being systematically entered and coded using SPSS version 20. Subsequently, the dataset was subjected to detailed statistical analysis employing univariate, bivariate, and multivariate techniques to explore patterns, relationships, and potential causal associations within the variables under study.

Bivariate Analysis

In the bivariate analysis, the independent variables were systematically indexed and cross-tabulated against the dependent variable, i.e. health satisfaction status, to evaluate potential associations and identify significant relational patterns between the variables under investigation:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

x^2 = *chi-square*
O_i = *observed values*
E_i = *expected value*

Multivariate Analysis

The independent variable (Catastrophic Health Expenditure) which demonstrated strong internal consistency with a Cronbach's alpha of 0.86, was indexed and cross-tabulated with the dependent variable, health satisfaction status, to examine variations and potential associations. Furthermore, multivariate analyses were performed to explore the relationship between independent and dependent variables while adjusting for key background factors, including age, gender, educational attainment, and household income.

Results and Discussions

Bivariate Analysis

Association between Catastrophic Health Expenditures (CHE) with Health Satisfaction Status (HSS)

Catastrophic Health Expenditure (CHE) was measured using a seven-item scale, as presented in Table 3.1. The result reveals that a majority of respondents with low Health Satisfaction Status (HSS) (70.4%) reported serious impacts on their consumption patterns and daily expenditures, compared to 43.2% who did not report such effects. Similarly, health-related expenditures were perceived as a substantial burden by 72.5% of respondents, whereas 41.7% did not report experiencing such financial strain. A comparable pattern was observed regarding Emergency Services Costs (ESC) incurred immediately after the crash, as shown in Table 3.1. Among individuals with low HSS, 68.7% reported having paid for ESC, while 34.9% did not. These differences were statistically significant ($p = 0.000$). However, the Kendall's Tau-b values (–0.266 and –0.305, respectively) indicated negative associations, suggesting that RTI victims and their families bore considerable health-related financial burdens. This substantial economic pressure appears to adversely affect the overall health satisfaction of the victims.

The results reveal that 72% of respondents with low Health Satisfaction Status (HSS) reported that the Cost of Rehabilitation Services (CRS) exceeded their household income, compared to 39.1% whose income was sufficient to cover such expenses. Additionally, 74.7% of low-HSS respondents reported borrowing money to finance their treatment, while 43.3% of those who did not borrow money were also classified under low HSS. Both associations were statistically significant ($p = 0.000$) and negatively correlated (Kendall's Tau-b = –0.318 and –0.319, respectively), indicating that RTI victims who incurred high CRS and resorted to borrowing were more likely to experience low health satisfaction.

The Cost of Vehicle Damage (CVD) also emerged as a factor contributing to the victims' financial strain. Among respondents, 63% who bore the cost of CVD fell into the low-HSS category, compared to 57.3% who did not incur such costs. However, the association between CVD and HSS was statistically non-significant, though negatively correlated, suggesting that while vehicle damage may impose a financial burden, it does not have a direct or measurable association with health satisfaction levels.

Moreover, Employer Help (EH) was reported by 67.5% of respondents within the low-HSS group, compared to 52.8% who did not receive employer assistance. This association was statistically significant ($p = 0.013$) and negatively correlated (Kendall's Tau-b = –0.150), indicating that while

employer support exists, its presence is moderately linked to lower health satisfaction levels—possibly due to underlying financial insufficiencies or limited coverage of such aid.

Table 3.1 Association between Catastrophic Health Expenditures (CHE) with HSS

Statement	Attitude	HSS of RTI victim			Chi-square value	Kendall Tau–b value
		High HSS (%)	Low HSS (%)	Total (%)		
Health expenditure seriously affects your consumption pattern and other day to day expenditure	Yes	53 (29.6)	126 (70.4)	179 (100)	x^2 = 19.339 p=0.000	Tau–b = –.266
	No	54 (56.8)	41 (43.2)	95 (100)		
Health expenditure is really a burden to your family	Yes	47 (27.5)	124 (72.5)	103 (100)	x^2 = 25.566 p=0.000	Tau–b = –.305
	No	60 (58.3)	43 (41.7)	103 (100)		
You paid the cost in the emergency department	Yes	66 (31.3)	145 (68.7)	211 (100)	x^2 = 21.888 p=0.000	Tau–b = –.292
	No	41 (65.1)	22 (34.9)	63 (100)		
You paid the cost of vehicle or property damage after the accident	Yes	57 (37)	97 (63)	154 (100)	x^2 =0.614 p=0.433	Tau–b = –.047
	No	50 (41.7)	70 (57.3)	120 (100)		
Cost of rehabilitation services was more than your income status	Yes	51 (28)	131 (72)	182 (100)	x^2 = 27.702 p=0.000	Tau–b = –.318
	No	50 (60.9)	36 (39.1)	92 (100)		
You borrowed money for treatment or other requirements	Yes	39 (25.3)	115 (74.7)	154 (100)	x^2 = 27.836 p=0.000	Tau–b = –.319
	No	68 (56.7)	52 (43.3)	120 (100)		
Your employer does not help you financially	Yes	49 (32.5)	102 (67.5)	151 (100)	x^2 = 6.158 p=0.013	Tau–b = –.150
	No	58 (47.2)	65 (52.8)	123 (100)		

Multivariate

Association between Catastrophic Health Expenditure (CHE) and Health Satisfaction Status (HSS) based on age as a controlled variable

Table 3.2 presents the association between Catastrophic Health Expenditure (CHE) and Health Satisfaction Status (HSS) across different age groups of respondents. The 1st and 3rd age groups yielded comparable results in terms of both statistical significance and the strength of association. Specifically, CHE had a statistically significant influence on HSS in these groups, with p-values of 0.022 and 0.000, respectively. The direction of association, as indicated by Kendall's Tau-b, was moderately negative for both groups ($\tau b = -0.345$ and $\tau b = -0.417$), suggesting that higher CHE was linked to lower HSS.

In contrast, the 2nd and 4th age groups did not exhibit a statistically significant relationship between CHE and HSS, with p-values of 0.067 and 0.365, respectively. Kendall's Tau-b values for these groups were identical (τb = –0.178), reflecting a weak and non-significant negative association. Overall, the table indicates a statistically significant association between CHE and HSS (p = 0.000), with a moderate negative correlation (τb = –0.294). The variation in Kendall's Tau-b values across age groups suggests that age moderates the relationship between CHE and HSS. Notably, the 3rd age group reported the highest incidence of health expenditure and was the most vulnerable to low health satisfaction.

Reducing out-of-pocket (OOP) health expenditures among older adults in Pakistan remains a pressing public health concern. Addressing this issue requires prioritization of both social and medical determinants. Failure to act promptly may lead to increased CHE and exacerbate health care inequities, further deteriorating the economic stability of affected households. Previous research supports these findings: Brinda et al. (2015) found that older adults are at higher risk of incurring CHE, though access to health insurance can mitigate this risk. Similarly, Li et al. (2012) identified the presence of elderly individuals in a household as a significant risk factor for CHE. Moreover, Kang et al. (2018) emphasized that CHE significantly impacts health-related quality of life, particularly among patients with chronic conditions—an observation consistent with the present study.

Table 3.2 Association between CHE and HSS on the basis of age as controlled variable

AGE GROUP	STATISTICS (Chi–square-x^2, P-value, Kendall-T^b)	
1st Age Group (below 20 years)	$x^2 = 5.231$ p=0. 022 $T^b = –.345$	$x^2 = 23.756$ p=0.000 $T^b = –.294$
2nd Age Group (21 – 30 years)	$x^2 = 3.344$ p=0.067 $T^b = –.178$	
3rd Age Group (31 – 60 years)	$x^2 = 17.029$ p=0.000 $T^b = –.417$	
4th Age Group (above 60 years)	$x^2 = 0.821$ p=0.365 $T^b = –.178$	

Association between independent variable (CHE) with dependent variable (HSS) controlling gender

The association between Catastrophic Health Expenditure (CHE) and Health Satisfaction Status (HSS) was analyzed in relation to the gender of the respondents. Among male respondents, the association was statistically highly significant ($p = 0.000$) and moderately negative (Kendall's Tau-b = –0.297), indicating that higher levels of CHE were linked with lower levels of HSS. Conversely,

among female respondents, the association was negative but statistically non-significant ($p = 0.334$; Tau-b = –0.258). Overall, the relationship between CHE and HSS, when assessed without controlling for gender, was also found to be highly significant and negative ($p = 0.000$; Tau-b = –0.294).

However, the chi-square values revealed a spurious association when gender was not considered, suggesting variations in how CHE impacts HSS based on gender. Thus, gender serves as an important control variable in explaining this relationship. The findings clearly indicate that male RTI victims who reported high CHE were more likely to experience low health satisfaction. This trend diverges from the findings of several previous studies, which reported that females were more likely to face CHE than males (Li et al., 2013; Krůtilová & Yaya, 2012).

The heightened impact on males in this study can be attributed to the prevailing patriarchal social structure, where men are traditionally responsible for earning a livelihood and financially supporting their families, whereas women typically manage household affairs. As a result, male respondents may perceive and experience financial burden from health expenditures more acutely than female respondents.

Table 3.3 Association between independent variable (CHE) with dependent variable (HSS) controlling gender

Gender of the Respondents	STATISTICS (Chi–square-x^2, P-value, Kendall-T^b)	
Male	$x^2 = 22.956$ p=0.000 $T^b = –.297$	$x^2 = 23.756$ p=0.000 $T^b = –.294$
Female	$x^2 = 0.933$ p=0.334 $T^b = –.258$	

Association between CHE and HSS in the context of education as controlled

Table 3.4 demonstrates the association of Catastrophic Health Expenditure (CHE) and Health Satisfaction Status (HSS) controlling education. The table consists of chi-square values along with probability values Kendall's tau-b values. CHE's influence on the satisfaction level of those who have no qualification at all shows statistically significant, indicating p values are equal to 0.037. The direction of association based on Kendall's tau-b value was moderate negative ($T^b = –.311$). Identical results were recorded in respect of respondents having secondary education where the p-value was equal to 0.001, statistically significant, and moderate negative ($T^b = –.251$). Moreover, the influence of the aforesaid variables in terms of respondents having higher education was statistically non-significant, where p value was equal to 0.112; however, the direction of association was moderate negative ($T^b = –0.214$). The entire table shows a highly significant and negative association between the variables while controlling education. The variation amongst the chi-

square and Kendall's tau-b values shows that education explains the relationship between the CHE and HSS. It can be concluded that illiterate respondents were observed more likely to incur CHE after traffic injury. This finding seems to be consistent with Khaing et al., (2015) medium educational level was related to increase the probability of experiencing CHE.
Education is one of the essential tools to shape the overall fabric of society. Therefore, educated members contributed productively to the community as compared to uneducated. Similarly, educated members more meticulously perform to the development of society. In close proximity, the educated people are less likely to be involved in traffic crashes while the uneducated more likely (Walton et al., 2013; Kim, 2011).

Table 3.4 Association between independent variable (CHE) with dependent variable (HSS) when education is controlled

EDUCATION	STATISTICS (Chi–square-x^2, P-value, Kendall-T^b)	
Illiterate	$x^2 = 4.344$ p=0.037 $T^b = –.311$	$x^2 = 23.756$ p=0.000 $T^b = –.294$
Secondary Education (SSC/HSSC)	$x^2 = 10.985$ p=0.001 $T^b = –.251$	
Higher Education (Graduation above)	$x^2 = 2.520$ p=0.112 $T^b = –.214$	

Association between Catastrophic Health Expenditure and Health Satisfaction Status (HSS) based on family income as a control variable
Table 3.5 presents the association between Catastrophic Health Expenditure (CHE) and Health Satisfaction Status (HSS) based on family monthly income. Among the low-income group (LIG), the influence of CHE on HSS was found to be highly significant and moderately negative ($p = 0.000$, $\tau b = –0.327$). In contrast, for the high-income group (HIG), the association was statistically non-significant ($p = 0.088$), though still negative ($\tau b = –0.201$). Overall, the table indicates a highly significant and negative association between CHE and HSS across all income groups ($p = 0.000$, $\tau b = –0.201$). The observed variation in chi-square values suggests a spurious relationship, emphasizing that income level plays a moderating role in the association between CHE and HSS.

The findings clearly demonstrate that the low-income group is the most vulnerable to experiencing catastrophic health consequences. These results align with previous research by Kavosi et al. (2012). Individuals in lower income brackets often struggle to afford essential health care services. Consequently, they may resort to borrowing money, mortgaging or selling assets, disposing of livestock, or even withdrawing their children from school to meet healthcare expenses. In some cases, they may forgo seeking care altogether, which can lead to worsened health outcomes, decreased productivity, and diminished income (Onoka et al., 2011). Additionally, CHE has a direct impact on the treatment choices of victims, those who can afford better care opt for higher-quality,

costlier services, while those facing financial hardship are often constrained to substandard treatment options, ultimately reducing their health satisfaction.

Table 3.5 Association between CHE and HSS based on family income as a control variable

FAMILY MONTHLY INCOME	STATISTICS (Chi–square-x^2, P-value, Kendall-T^b)	
Less than PKR16500 Low-Income Group (LIG)	$x^2 = 21.627$ p=0.000 $T^b = –.327$	$x^2 = 23.756$ p=0.000 $T^b = –.294$
Equal or more than PKR16500 High-Income Group (HIG)	$x^2 = 2.908$ p=0.088 $T^b = –.201$	

Conclusion

The findings of this study highlight a significant inverse relationship between Catastrophic Health Expenditure (CHE) and Health Satisfaction Scores (HSS) among victims of road traffic injuries. Statistical evidence from bivariate and multivariate analyses consistently demonstrated that higher financial burden—such as paying for emergency care, rehabilitation costs exceeding income, and borrowing money for treatment—was strongly associated with lower satisfaction levels regarding health. Particularly, the association was more pronounced among individuals from low-income households, less educated groups, and those within the middle-aged bracket (31–60 years). These insights emphasize that the financial aftermath of injury is not only a medical or economic concern but a deeply sociological one, impacting individual perceptions of health and well-being.

From a sociological perspective, the inability to manage health expenses without sacrificing daily consumption or seeking loans erodes an individual's sense of control, security, and dignity—factors central to social well-being. This erosion is amplified among vulnerable demographics, where institutional support is minimal or absent. The study underlines the need for targeted policy interventions to reduce out-of-pocket health expenses and strengthen social protection mechanisms. Doing so will not only ease the economic burden but also enhance the overall satisfaction and recovery experience of road traffic injury victims, contributing to more equitable and humane healthcare systems.

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