INDIAN SOCIETY OF HYPERTENSION

Hypertension Journal

Published: 28th March 2026

REVIEW ARTICLE

Risk Factors of Cardiovascular Disorders among the Taxi Drivers: A Multivariate Analysis

Lalita K Sharma

Department of Management, Pyramid College, Phagwara, Punjab, India

ABSTRACT

Cardiovascular diseases (CVDs) are a leading cause of morbidity Globally, particularly in occupational groups that experience high levels of stress. Because of the stressful nature of their jobs, taxi drivers are especially susceptible to these health concerns. Examining the effects of several risk variables on cardiovascular illnesses in cab drivers with at least five years of experience was the goal of this study. Data from impacted cab drivers were evaluated using multivariate logistic regression analysis, which divided risk factors into five categories: comorbid diseases, ergonomic issues, psychological problems, work-related factors, and sociodemographic and lifestyle factors. The results showed that a number of stress-related factors play a substantial role in the development of CVD, with the highest correlations seen between psychological and work-related components. These findings highlight how important work-related stressors are to taxi drivers' cardiovascular health. To confirm these results and direct focused interventions, more long-term studies with bigger sample sizes are advised. Policymakers and transportation authorities can use the study's data to help create health policies and preventative measures that work for commercial drivers.

Keywords: Risk factors, multivariate analysis, occupational health, taxi drivers, cardiovascular disorders

doi: 10.61081/htnj/26v12i106

INTRODUCTION

As we gradually enter the twenty-first century, we discover that non-communicable diseases (NCDs) pose a serious threat to individuals all over the world. In developing nations like India, cardiovascular disorders and diseases (CVD) constitute the primary cause of death. Due to the enormous population and high incidence of cardiovascular risk factors, the Indian subcontinent has a significant burden of cardiovascular disease. The most common cardiovascular condition is hypertension (HT), which is also becoming an epidemic in developing nations. Almost 26.40 percent of people globally are impacted. Over the past three decades, the prevalence of hypertension in India has increased by almost 30 times among urban dwellers and by roughly 10 times among rural ones. Taxi drivers are also not exception for these diseases.

Drivers work in a very risky and misery environment such as-shift work, rigid time schedules, increased work traffic and pace, and noise and foul smell in combination with long working hours and prolonged exposure to gasses, toxic fumes and dusts from other motor vehicles (Rosengren *et al.*, 1991; Alfredsson *et al.*, 1993 and Gustavsson *et al.*, 1996). Carbon monoxide, nitrogen oxides, and sulphur dioxide present in motor vehicle fumes and odours, have been confirmed in mounting CHD risk for professional bus and other vehicle drivers (Stern *et al.*, 1988 and Michaels & Zoloth, 1991). However, In French, Limasset *et al.* (1993), discovered that the levels of these chemicals in bus cabins were exactly the same as those in the air of two large French cities and well within occupational exposure guidelines. The height and volume of the vehicle cabin, exposure to cigarette smoke, the type of fuel used, and environmental factors like, whether the setting is urban or rural, along with the current climate, are some of the factors that affect cabin air toxicity, according to Gustavsson *et al.* (1996), Jo and Yu (2001), Kumari and Sidhu (2016), and Elshatarat *et al.* (2023).

LITERATURE REVIEW

Professional drivers, especially those who operate buses and cabs, are at increased risk for health problems, according to a large body of data. According to Hartvig and Midttun (1983), there is a substantial correlation between driving and raised blood pressure, serum triglycerides, and cholesterol, indicating that drivers are at an

Corresponding author

Lalita K Sharma * lalita099@yahoo.com

increased risk of coronary heart disease (CHD). After reviewing 22 epidemiological studies, David *et al.* (1988) determined that bus drivers suffer from three main disease categories: musculoskeletal issues (particularly back and neck pain), gastrointestinal disorders (like ulcers), and cardiovascular diseases (like hypertension). They also came to the conclusion that drivers are more likely than workers in other occupations to suffer from morbidity, mortality, and absenteeism. Time constraints, traffic jams, noise, vibration, pollution, and social isolation are just a few examples of the behavioural and environmental stresses that Bartone (1989) highlighted as major causes of early retirement and cardiovascular risk in drivers. In a similar vein, Annika (1991) independently predicted an increased risk of coronary heart disease (CHD) with an odds ratio of 3.0 using multivariate logistic regression in a comparison analysis of 103 bus/tram drivers and 6596 men from different jobs. According to Tse *et al.* (2006), who compiled more than 50-years of research, job-related stressors like poor cabin ergonomics, shift work, traffic congestion, and passenger violence are largely to blame for the consistently higher susceptibility of urban bus drivers to behavioural (like substance abuse), psychological (like depression and PTSD), and physical (like cardiovascular and musculoskeletal) disorders. These results highlight the critical need for ergonomic changes and health interventions in the public transportation industry. Table 1 provides a chronological overview of major research studies that have examined the cardiovascular health risks faced by taxi drivers across different countries. The table helps to summarize key findings, sample details, and identify gaps in existing research risks.

Research Gaps

Even though occupational health hazards among drivers are becoming more well acknowledged worldwide, there are still a number of important gaps in the literature, especially when it comes to India. Up until now, the majority of research has been descriptive or correlational in character, lacking strong multivariate or causal models that examine the intricate relationships among ergonomic, psychological, occupational, and lifestyle aspects. Particularly in Indian research, ergonomic and psychological factors—like seat design, car vibration, work uncertainty, hostile passengers, and insufficient rest periods—remain little understood. Furthermore, many Indian studies, which are primarily post-2016 and lack continuity with past worldwide research, have small and regionally limited sample sizes that lower their external validity and generalizability. Our knowledge of how cardiovascular outcomes change over time is further limited by the paucity of longitudinal investigations. In terms of methodological rigor and scope, Indian research has not yet caught up to international studies from nations such as the United States, Singapore, Korea, Ghana, and China (e.g., F. Meng, 2015; H. Abban, 2013; Gany *et al.*, 2016; Elshatarat, 2016; Liu, 2016), which consistently report that occupational drivers have a higher prevalence of CVD risk factors compared to private drivers and the general population. According to earlier studies, a number of behavioural risks, including long work hours, erratic eating and sleeping habits, poor diets, substance abuse, and inactivity, are major causes of cardiovascular problems in drivers (Simpson *et al.*, 2004; Gany, 2016; Wang *et al.*, 2019; Shin, 2020; Ahn, 2021). Both operators and drivers are under a great deal of stress due to the often unregulated, competitive, and subpar working conditions in India's unorganized transportation sector. However, trustworthy data on self-employed or informal transport workers—who frequently face terrible living and working conditions—is conspicuously lacking. The majority of current research is descriptive and does not offer useful insights. The current study, "Impact of Various Risk Factors on Cardiovascular Disorders among Taxi Drivers: A Multivariate Analysis," was created in response to these limitations by conducting a thorough literature review and consulting with experts. Its goal is to close the current research gap and offer an evidence-based basis for focused policy and health interventions.

DATABASE AND RESEARCH METHODOLOGY

Objective of the Study

To study the **impact of various risk factors on stress related problems as Cardiovascular Disorders (CVD)**

On the basis of theoretical framework in Table 1 and following null hypotheses are established.

H_{01}: There is an insignificant impact of various Occupational Stress Related Risk Factors on Cardiovascular Disorders (CVD).

Sources of Data

The present study is based on both primary and secondary sources of data. Self-administered Research Schedule was used to collect data from respondents. The source of stress, fatigue, accidents, and its relationship level has also been recorded to get a better understanding of the working life of taxi drivers. The required data on independent and dependent variables were collected and measured with the help of various scales and tools.

Categorization of Variables

Variables age, BMI, education, family size, job experience, monthly income, work duration were categorized into 0,1,2,3. It is coded as 0 if they were up to 30-years of age, coded as 1 if 31-40 years, 2 if 41-50 years and coded as 4 if above 50-years. It is coded as 0 if taxi drivers are under weight, coded as 1 if taxi drivers are normal, coded as 2 if taxi drivers are overweight and coded as 3 if taxi drivers are obese. It is coded as 0 if taxi drivers are below matric, coded as 1 if taxi drivers are matric and coded as 2 if taxi drivers are 10+2 and coded as 3 if taxi drivers are above 10+2 (graduation, technical and diploma/certificate courses). It is coded as 0 if they have up to 2 family members, coded as 1 if they have 3-4 family members, 2 if they have 5-6 family members and coded as 4 if have above 6 members. It is coded as 0 if taxi drivers have 6-10 years' experience, coded as 1 if taxi drivers are 11-15 years driving experience, coded as 2 if taxi drivers have 16-20 years' experience and coded as 3 if taxi drivers have above 20-years experience. It is coded as 0 if taxi drivers are getting monthly income Rs.3000, coded as 1 if taxi drivers are getting monthly income Rs. 3000-5000, coded as 2 if taxi drivers are getting Rs. 5000-8000 and coded as 3 if taxi drivers are getting above Rs.5000. It is coded as 0, if work duration is up to 8 hours, coded as 1, if work duration is up to 12 hours, coded as 2, if work duration is up to 16 hours, and coded as 3, if work duration is above 16 hours. In 2*2 Contingency Tables '1' means presence/occurrence and '0' means absence of diseases, i.e., dependent variable (as Hypertension, Cardiovascular, Gastrointestinal

Table 1: Summary of Previous Studies on Cardiovascular and Musculoskeletal Health Risks among Taxi Drivers.

Author(s)	Year	Location / Sample	Key Findings	Research Gap
Bigert *et al.*	2003	Sweden / 3,000 professional drivers	Higher risk of myocardial infarction due to long sedentary hours and job strain.	Did not explore lifestyle or dietary factors contributing to cardiovascular risks.
Siegrist & Marmot	2004	UK / Review Study	Job stress and effort-reward imbalance are major cardiovascular risk factors.	Review study; lacks empirical validation among driver populations, especially in developing countries.
Van Amelsvoort *et al.*	2006	Netherlands / Cross-sectional study	Shift work among drivers linked to increased cardiovascular disease (CVD) risk.	Lacked analysis of psychosocial stressors and dietary habits.
Shetty *et al.*	2016	India / 300 drivers	Occupational stress and poor lifestyle caused high hypertension and GI issues.	Focused more on GI issues; did not use multivariate analysis to isolate key predictors of hypertension.
Sreedhara *et al.*	2017	Karnataka, India / 210 drivers	High BMI, smoking, alcohol, and inactivity linked with hypertension.	Limited generalizability due to regional samples; no ergonomic or work-pattern analysis.
Ngatcha Tchounga *et al.*	2022	Yaoundé, Cameroon / 151 drivers	MSDs and job dissatisfaction linked to cardiovascular problems.	Combined MSD and cardiovascular issues but lacked specific risk quantification for hypertension.
Patel & Kulkarni	2023	Mahabaleshwar, India / 100 drivers	High BP, stress, and long working hours were major contributors.	Small sample size; no model to assess interaction of variables.
Kumari & Singh	2024	Punjab, India / Survey-based analysis	Age, BMI, sleep deprivation, and long working hours were the strongest predictors.	Did not account for ergonomic or psychosocial stress factors like job insecurity or aggression.
Rana *et al.*	2025	Delhi, India / 500 drivers (Cross-sectional)	BP significantly linked with job strain, poor diet, and lack of breaks.	Strong correlations found, but no longitudinal or causal analysis included.

Source: Peer-reviewed journal articles, public health reports, and occupational health research databases.

and Musculoskeletal Disorders) and in case of independent variable '1' means 'Yes' and '0' means 'No'. The analyses of data are supported by the Statistical package for Social Science (SPSS version 25.0 for windows). The significance of variables tested at the 0.05 alpha level.

STATISTICAL ANALYSIS

On the basis of the primary data collected, the researcher calculated the prevalence of various Health Related Problems and their Class Intervals among taxi drivers. Once the questionnaire was completed, the body mass index (BMI, kg/m2) was calculated. Body mass index (BMI) is calculated by using a metric BMI calculator from the web in which researchers divide the weight in kilograms by the height in meters squared as shown below.

$$BMI = \text{weight (kg)} \div \text{height}^2 (m^2)$$

Table 3 reveals, that diagnostic criterion for Body Mass Index (BMI, Obesity) is used according to WHO classification. Body Mass Index Table was used to access the Body Mass Index of taxi drivers.

The analysis of Personal and Demographic Characteristics of taxi drivers shows that majority (28 percent) of respondents fall in the age group of above 50-years of age. The study further found that this profession is dominated by SC/ST community belonging to Sikh and Hindu caste. The share of General caste was only 18 percent. Another important finding of the study is that the large majority (44 percent) of taxi drivers were educated up to 10th standard only. While, there were only 8 percent above 10+2 (graduates and diploma holders). The finding reveals that the majority (72 per cent and 69.67 percent) of taxi drivers lived in joint families and were married. The study highlights that 30 percent and 28 percent of taxi drivers belonged to families whose size were 5-6 members and more than 6 members respectively, which reveals that drivers come from large size families. The study has further found that a large majority (26 percent) of taxi drivers responded that there are 4 earning members in their family and majority (49.67 percent) of taxi drivers have family monthly income of Rs. 5001-10000. So, the study highlights that the large majority of drivers are living with the meager income in the present days of high cost of living.

The information obtained is presented in terms of 95 percent Confidence Intervals (CI) and Percentages. Chi-Square Test is performed to find the association. Variables which are significantly associated with the Bivariate Analysis are considered in the Multiple Logistic Regression to compare with the prevalence rates. Logistic Regression Model was fitted to obtain the 'Adjusted Odds Ratio (Adj. OR) and 95 per cent Class Interval (CI) by using enter method. Before proceeding with Regression Analysis, Hosmer-Lemeshow Test is used to find whether the data is fit to run the test. The variables having p values greater than 0.05 are considered, which clearly indicates that

Table 2: Assigned Specific Notions.

As the number of variables are very large, therefore, all the variables have been assigned specific notions which are presented below	
Dependent Variables Hypertension (HTN) **Socio-Demographic and Life Style Factors (SDLS)** SDLS 1 : Age SDLS 2 : BMI(kg/m2) SDLS 3 : Education SDLS 4 : Marital status SDLS 5 : Family size SDLS 6 : Sleep SDLS 7 : Refreshment drinking/snacks during the day SDLS 8 : Main meal from dhabas / restaurants SDLS 9 : Dietary habits SDLS 10 : Consumption of oily, fried items and junk food SDLS 11 : Take meal at proper and fixed time SDLS 12 : Time for physical exercise/morning walk/ evening walk SDLS 13 : Alcohol SDLS 14 : Smoking SDLS 15 : Tobacco SDLS 16 : Drugs (sleep inhibitors) **Work Related Factors (WRF)** WRF 1 : Job experience WRF 2 : Monthly income WRF 3 : Work duration WRF 4 : Worked >10 days consecutively without a holiday for a whole day intervening WRF 5 : Drive the taxi >5 hours without taking any rest WRF 6 : Total mileage WRF 7 : Fatigue **Ergonomics Factors (EF)** ER 1 : Handling baggage's and materials ER 2 : Bending and twisting activities while driving	ER 3 : Experience violence (victim of assault) during working hours ER 4 : Too much cold and hot weather ER 5 : Sleep on the taxi seat during rest breaks ER 6 : Narrow cabin space ER 7 : Longer working hours ER 8 : Driving on heavy traffic roads/traffic congestion ER 9 : Frequent driver seat vibration ER 10 : Design and cushions of seat ER 11 : Lack of awareness of good sitting posture ER 12 : Uncomfortable steering wheel ER 13 : Uncomfortable seat ER 14 : Uncomfortable back support ER 15 : Inadequate rest period during the working day ER 16 : Lack of accessibility to the lavatory ER 17 : Seat inclination (Seat Pan) ER18 : Sitting without lumbar support ER 19 : Shocks (due to road surface) **Psychological Risk Factors (PRF)** PRF 1 : Self perceived stress/stress symptoms PRF 2 : Exposure to passenger hostility PRF 3 : Level of social contact with colleagues and lack social support PRF 4 : Lunch break too short **Other Diseases (OD)*** D 1 : Blood pressure (BP) D 2 : Cardiac disease D 3 : Insomnia D 4 : Type of insomnia (Intermittently/Acute and Persistently/ Chronic) D 5 : Diabetes D 6 : Dyslipidemia/Hyperlipidemia (LDL Cholesterol and Triglyceride) **Inside Conditions of Taxi (ISC)**** IC 1 : Draught IC 2 : Distracting noise from the outside IC 3 : Humidity

Source: Literature Review

Table 3: Criterion for Body Mass Index (BMI).

Category	BMI value (kg/mq)
Underweight	≤ 18.5
Normal Weight	18.5 - 24.9
Overweight	25 - 29.9
Obesity Type 1	30 - 34.9
Obesity Type 2	≥ 35

Source: http://www.jcancer.org/v07p2346.htm

data was fit for the Regression Model. Further Cox & Snell R Square (R^2) and Nagelkerke R Square (R^2) (which suggests that model explains the variation in the outcome) have been carried out to test the Goodness of Fit of the model. The values of the Cox & Snell R Square (R^2) and Nagelkerke R Square are found between (0.47-0.78) in case of all the variables which implies that moderate to strong relationship exists between the independent and dependent variables (Cox and Snell, 1989; Nagelkerke, 1991; Maddala, 1983 and Cragg and Uhler, 1970). The analysis was carried out using the statistical package SPSS V.21.

Association Of Various Risk Factors with Cardiovascular Disorders

Cardiovascular Disorders of professional drivers always remain an important issue in occupational health research and clinical practice. Occupational epidemiological studies provide a large body of dependable evidence which indicates that professional drivers are at high risk for Cardiovascular Disorders (CVD). So, in the following discussion, an attempt has been made to identify various risk factors which contribute to Cardiovascular Disorders.

Association of Socio–Demographic & Lifestyle Factors with Cardiovascular Disorders

Table 4 shows association between Socio–demographic & Lifestyle factors and Cardiovascular Disorders. The odds of drivers suffering from Cardiovascular Disorders are found more among above 50 years age group (Adj. OR=8.4; CI= 3.9 to 18.1; P<0.05) and 41-50 years age (Adj. OR=3.5; CI=1.7 to 7.1; P<0.05). Obese (Adj. OR= 3.2; CI =1.8 to 5.7; P<0.05) and overweight (Adj. OR=2.3; CI=1.1 to 4.5; P<0.05) had significant impact on Cardiovascular Disorders. Matric passed (Adj. OR= 11.3; CI= 5.9 to 21.6; P<0.05), drivers show significant extent of Cardiovascular followed by above 10+2 passed (Adj. OR= 1.9; CI= 0.78 to 4.8; P<0.05) and 10+2 passed (Adj. OR= 1.3; CI= 0.7 to 2.6; P<0.05). It implies that drivers having lower education are more prone to suffer from Cardiovascular Disorders. The odds of suffering from Cardiovascular Disorders are higher among drivers having family size of above 6 members (Adj. OR=5.4; CI= 2.6 to11.5; P<0.05) and 5-6 members (Adj. OR=2.5; CI=1.2 to 5.3; P<0.05). Less sleeping duration (less than 6 hours a day) (Adj. OR=6.9; CI= 4.1 to 11.9; P<0.05), less than 2 times refreshment drinking/snacks during the day ≤2 Times (Adj. OR= 5.5; CI= 3.3 to 9.2; P<0.05), consumption of main meal from dhabas / restaurants (Adj. OR=5.5; CI= 3.3 to 9.2; P<0.05), vegan dietary habits (Adj. OR= 4.4; CI= 2.6 to 7.1; P<0.05), consumption of oily, fried items and junk food (Adj. OR= 6.9; CI= 4.2 to 11.6; P<0.05), lack of time for physical exercise/morning walk/ evening walk (Adj. OR= 2.0; CI= 1.2 to 3.3; P<0.05), intake of alcohol (Adj. OR=8.5; CI=4.6 to 15.3; P<0.05), smoking (Adj. OR= 6.9; CI= 4.1 to 11.9; P<0.05), consumption of tobacco (Adj. OR= 3.2; CI= 1.9 to 5.4; P<0.05), drug addiction (sleep inhibitors) (Adj. OR= 4.5; CI= 2.7 to 7.7; P<0.05) are found having impact on Cardiovascular Disorders. However, drivers who took meal at proper and fixed time (Adj. OR= 0.22; CI= 0.14 to 0.37; P<0.05) are less likely to suffer from Cardiovascular Disorders as compared to their reference category. The current analysis also shows that a variety of sociodemographic and lifestyle factors significantly increase the risk of cardiovascular diseases and disorders. These include growing older, being obese, having a larger family, being less educated, sleeping less, not eating many snacks or drinks during the day, relying on roadside eateries (dhabas/restaurants), having poor eating habits (such as mixed diets high in fried, oily, and junk food), not having time for exercise or walking, and abusing drugs, alcohol, tobacco, and sleep-inhibiting substances.

Several studies support these findings. According to Bigert *et al.* (2003), drivers who put in long hours without getting enough exercise were more likely to suffer a myocardial infarction. Key lifestyle-related risk factors, including high body mass index (BMI), poor eating habits (particularly junk and fatty foods), alcohol and tobacco use, and sedentary behavior, were found by Lissah *et al.* (2021). Additionally, Ng and Tan (2017) highlighted the detrimental effects of sleep deprivation and skipping meals or drinks during the workday on the cardiovascular system. These results are in line with earlier studies. According to Chen *et al.* (2005), these variables were significantly linked to cardiovascular outcomes after controlling for sociodemographic factors like education and traditional cardiovascular disease (CVD) risk factors like age, smoking, obesity, alcohol use, irregular exercise, and obesity. In a similar vein, Koppad *et al.* (2012) found that obesity, smoking, alcohol consumption, irregular eating patterns, and advancing age were all significant risk factors for CVD. In addition, Gustavsson (1996) emphasized that obesity, tobacco use, and a lack of physical activity, both at work and in leisure, are risk factors for CVD. According to Robert *et al.* (1981), smoking and a lack of education have a major impact on the course of coronary heart disease (CHD).

Association of Work-Related Factors with Cardiovascular Disorders

Table 5 reveals the association of Work-Related Factors with Cardiovascular Disorders. Drivers having driving experience 16-20 years (Adj. OR= 1.41; CI=0.70 to 2.9; P<0.05), self-earned monthly income Rs. 5000-8000 (Adj. OR= 29.4; CI= 1.8 to 492; P<0.05), worked for more than ten days consecutively, without a holiday for a whole day intervening (Adj. OR= 3.1; CI= 1.8 to 5.2; P<0.05), drove taxi for more than 5 hours without taking any halt (Adj. OR= 4.0; CI= 2.3 to 6.6; P<0.05), drove taxi up to 16 hours per day (Adj. OR= 9.0; CI= 4.3 to 19.0; P<0.05), drove more mileage (Adj. OR=2.4: CI=1.5 to 3.9; P<0.05) and felt fatigue (Adj. OR= 3.6; CI= 2.3 to 6.1; P<0.05) are more likely to suffer from Cardiovascular Deceases. According to the study, a number of work-related factors considerably raise the risk of cardiovascular diseases and disorders (CVDs). These include having a longer work history, earning more money each month, working for more than ten days in a row without taking a complete day off, operating a taxi for more than five hours straight without stopping, working longer hours, putting in more miles, and becoming more exhausted. A higher prevalence of CVDs was found to be closely correlated with occupational factors such excessive work hours, insufficient rest, low pay, and no vacation time. These results are consistent with those of Siegrist and Marmot (2004), who found that an unbalanced effort-reward ratio and job stress were important risk factors for cardiovascular disease. In a similar vein, Sangaleti *et al.* (2014) found that extended work without sufficient rest, such as working for more than ten days in a row and driving for more than five hours straight, has a negative impact on cardiovascular health. Long work hours were also linked to a higher risk of CVD in drivers, according to Van Amelsvoort *et al.* (2000). This was further supported by Chen *et al.* (2005), who found that long hours, vast distances, and long durations of employment all contribute to the development of cardiovascular problems. Professional drivers are commonly exposed to occupational dangers, including as shift work, long hours, loud noise, carbon monoxide exposure, and contact with chemical chemicals, all of which increase the risk of CVD, according to Tse *et al.* (2006). Fumio *et al.* (2002) have pointed out that working at night might cause circadian rhythm abnormalities, which can raise the risk of cardiovascular illnesses, particularly when combined with prolonged job activity.

Association of Ergonomics Factors with Cardiovascular Disorders

Table 6 shows Chi-Square Test for Ergonomics Factors of taxi drivers and Cardiovascular Disorders (CVD). The results showed that there is a significant association between Ergonomics Factors and Cardiovascular Disorders. Taxi drivers who handle baggages and materials (Adj. OR=3.3; CI=1.9 to 5.8; P<0.05), perform bending and twisting activities while driving (Adj. OR=3.0; CI=1.7 to 5.2; P<0.05), experience violence (victim of assault) during working

Table 4: Association of Socio –Demographic & Lifestyle Factors with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	*p-value*	Df	Adj. OR	CI (95%)
Age	Up to 30-years	72	42	30	55.003 (0.394)	0.000*	1	1	1
	31-40 years	78	50	28				0.784	0.41-1.52
	41-50	66	19	47				3.5	1.70-7.1
	Above 50-Years	84	12	72				8.4	3.9-18.1
BMI (kg/m2)	Underweight	90	49	41	20.988 (0.256)	0.000*	1	1	1
	Normal	42	24	18				0.89	0.42-1.87
	Overweight	54	19	35				2.3	1.1-4.5
	Obesity	114	31	83				3.2	1.8-5.7
Education	Below Matric	96	63	33	70.977 (0.437)	0.000*	5	1	1
	Matric	132	19	113				11.35	5.9-21.6
	10+2	48	29	19				1.3	0.7-2.6
	Above 10+2 (Graduation, Technical and Diploma/Certificate Courses)	24	12	12				1.9	0.78-4.8
Marital Status	Married	209	93	116	3.484 (0.107)	0.000*	1	0.61	0.36-1.1
	Unmarried	91	30	61				1	1
Family Size (Members)	Up to 2	48	13	35	58.419 (0.404)	0.000*	1	1	1
	3-4	78	55	23				0.39	0.20-0.73
	5-6	90	43	47				2.5	1.2-5.3
	Above 6	84	12	72				5.4	2.6-11.5
Sleep	≤6 Hours	138	25	113	55.324 (0.395)	0.000*	1	6.9	4.1-11.9
	>6 Hours	162	98	64				1	1
Refreshment drinking/ snacks during the day	≤2 Times	180	45	135	47.623 (0.370)	0.000*	1	5.5	3.3-9.2
	>2 Times	120	78	42				1	1
Main meal from Dhabas / Restaurants	Regularly	192	51	141	45.956 (0.364)	0.000*	1	5.5	3.3-9.2
	Occasionally	108	72	36				1	1
Dietary Habits	Mixed diet	174	46	128	36.323 (0.329)	0.000*	1	4.4	2.6-7.1
	Vegan	126	77	49				1	1
Consumption of oily, fried items and junk food	On most of the days	174	39	135	59.162 (0.406)	0.000*	1	6.9	4.2-11.6
	Occasionally	126	84	42				1	1
Take meal at proper and fixed time	Yes	114	72	42	37.319 (0.333)	0.000*	1	0.22	0.14-0.37
	No	186	51	135				1	1
Time for physical exercise/morning walk/ evening walk	Never/Sometimes	174	59	115	8.614 (0.167)	0.000*	1	2.0	1.2-3.3
	Often/Very Frequent	126	64	62				1	1
Alcohol	Yes	222	63	159	56.231 (0.397)	0.000*	1	8.5	4.6-15.3
	No	78	60	18				1	1
Smoking	Yes	138	25	113	55.324 (0.395)	0.000*	1	6.9	4.05-11.9
	No	162	98	64				1	1
Tobacco	Yes	222	75	147	18.381 (0.240)	0.000*	1	3.2	1.9-5.4
	No	78	48	30				1	1
Drugs (sleep inhibitors)	Yes	120	25	95	33.625 (0.317)	0.000*	1	4.5	2.7-7.7
	No	180	98	82				1	1

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

Table 5: Association of Work-Related Factors with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	*p-value*	Df	Adj. OR	CI (95%)
Job experience	6-10 Years	102	49	53	53.934 (0.390)	0.000*	3	1	1
	11-15 Years	60	43	17				0.37	0.19-0.73
	16-20 Years	48	19	29				1.41	0.70-2.9
	Above 20- Years	90	12	78				6.0	2.9-12.3
Monthly Income	Below 3000	126	25	101	57.697 (0.402)	0.000*	3	1	1
	3000-5000	150	92	58				0.16	0.09-0.27
	5000-8000	12	0	12				29.4	1.8-492
	Above 8000	12	6	6				0.25	0.08-0.84
Work for more than ten days consecutively without a holiday for a whole day intervening	Yes	210	69	141	19.187 (0.245)	0.000*	1	3.1	1.8-5.2
	No	90	54	36				1	1
Drive taxi more than 5 hours without taking any rest	Yes	204	62	142	29.655 (0.300)	0.000*	1	4.0	2.3-6.6
	No	96	61	35				1	1
Work Duration	Up to 8 hours	72	42	30	58.303 (0.403)	0.000*	3	1	1
	Up to 12 hours	90	56	34				0.85	0.45-1.60
	Up to 16 hours	96	13	83				9.0	4.3-19.0
	Above 16 hours	42	12	30				3.5	1.6-7.9
Total Mileage	Yes	174	56	118	13.311 (0.418)	0.013*	1	2.4	1.49-3.9
	No	126	67	59				1	1
Fatigue	Often/ Very Frequent	132	32	100	27.364 (0.289)	0.000*	1	3.6	2.3-6.1
	Never/ Sometimes	168	91	77					

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

hours (Adj. OR=3.6; CI=2.3 to 5.8; P<0.05), drive in too much cold and hot weather (Adj. OR=5.2; CI=3.1 to 9.0; P<0.05) and sleep on the taxi seat during rest breaks (Adj. OR=4.4; CI=2.6 to 7.1; P<0.05) are more prone to suffer from Cardiovascular Disorders. Data analysis also reveals that narrow cabin space (Adj. OR=2.6; CI=1.5 to 4.7; P<0.05), longer working hours (Adj. OR=4.6; CI=2.8 to 7.6; P<0.05), driving on heavy traffic roads/traffic congestion (Adj. OR=3.6; CI=2.3 to 6.1; P<0.05), frequent driver seat vibration (Adj. OR=3.1; CI=1.7 to 5.4; P<0.05), poor design of seat (Adj. OR=2.4; CI=1.4 to 3.9; P<0.05), lack of awareness of good sitting posture (Adj. OR=4.4; CI=2.7 to 7.2; P<0.05), uncomfortable steering wheel (Adj. OR=3.3; CI=2.0 to 5.4; P<0.05), uncomfortable seat (Adj. OR=2.2; CI=1.4 to 3.8; P<0.05), uncomfortable back support (Adj. OR=4.6; CI=2.8 to 7.6; P<0.05), inadequate rest period during the working day (Adj. OR=2.7; CI=1.7 to 4.3; P<0.05), lack of accessibility to the lavatory (Adj. OR=1.4; CI=0.87 to 2.2; P<0.05), seat inclination (seat pan) (Adj. OR=7.4; CI=4.4 to 12.4; P<0.05), sitting without lumbar support (Adj. OR=5.0; CI=2.9 to 8.7; P<0.05) and shocks (due to poor road surface) (Adj. OR=5.3; CI=3.3 to 8.8; P<0.05) are found significant Ergonomics Factors that increased the odds of Cardiovascular Disorders. According to the analysis, a number of ergonomic factors are linked to a higher risk of cardiovascular diseases and disorders (CVDs). These include handling luggage and materials, bending and twisting a lot while driving, experiencing violence or assault during work hours, sleeping on the taxi seat during rest breaks, having a small cabin, working at a faster pace and with a heavier workload, driving in heavy traffic or crowded conditions, having a poor seat design and cushioning, not being aware of proper sitting posture, having an uncomfortable steering wheel and seat, having a poor back support, not having access to restroom facilities, having a poor seat inclination (seat pan), sitting without lumbar support, and experiencing shocks from uneven roads. Workplaces with high ergonomic demands are a major contributor to elevated cardiovascular risk. Poor seat design, strong seat vibration, a small cabin, and extended sitting without proper lumbar support all increase cardiovascular load and induce physical strain, claim Sangaleti *et al.* (2014). According to Smith *et al.* (2006), musculoskeletal and cardiovascular strain is caused by repetitive tasks including handling

Table 6: Association of Ergonomics Factors with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	*p-value*	Df	Adj. OR	CI (95%)
Handling baggage's and materials	Often/ Very Frequent	220	73	147	20.846 (0.255)	0.000*	1	3.3	1.9-5.8
	Never/ Sometimes	80	50	30				1	1
Bending and twisting activities while driving	Often/ Very Frequent	221	75	146	17.309 (0.234)	0.000*	1	3.0	1.7-5.2
	Never/ Sometimes	79	48	31				1	1
Experience Violence (victim of assault) during working hours	Often/Very Frequent	174	49	125	28.31 (0.293)	0.000*	1	3.6	2.3-5.8
	Never/Sometimes	126	74	52				1	1
Too much cold and hot weather	Often/Very Frequent	204	58	146	41.631 (0.349)	0.000*	1	5.2	3.1-9.0
	Never/ Sometimes	96	65	31				1	1
Sleep on the taxi seat during rest breaks	Never	126	46	128	36.323 (0.329)	0.000*	1	4.4	2.6-7.1
	Sometimes	174	77	49				1	1
Narrow cabin space	Yes	84	21	63	12.347 (0.199)	0.000*	1	2.6	1.5-4.7
	No	216	102	114				1	1
Longer working hours	Yes	144	33	111	37.435 (0.218)	0.000*	1	4.6	2.8-7.6
	No	156	90	66				1	1
Driving on heavy traffic roads/Traffic congestion	Yes	132	32	100	27.364 (0.289)	0.000*	1	3.6	2.3-6.1
	No	168	91	77				1	1
Frequent driver seat vibration	Yes	90	21	69	16.589 (0.229)	0.000*	1	3.1	1.7-5.4
	No	210	102	108				1	1
Poor design of seat	Yes	174	56	118	13.311 (0.206)	0.000*	1	2.4	1.4-3.9
	No	126	67	59				1	1
Lack of awareness of good sitting posture	Yes	138	32	107	36.299 (0.329)	0.000*	1	4.4	2.7-7.2
	No	162	92	70				1	1
Uncomfortable steering wheel	Yes	186	56	130	24.007 (0.272)	0.000*	1	3.3	2.0-5.4
	No	114	67	47				1	1
Uncomfortable seat	Yes	108	31	77	10.548 (0.184)	0.000*	1	2.2	1.4-3.8
	No	192	92	100				1	1
Uncomfortable back support	Yes	174	45	129	39.246 (0.340)	0.000*	1	4.6	2.8-7.6
	No	126	78	48				1	1
Inadequate rest period during the working day	Yes	150	44	106	16.880 (0.373)	0.000*	1	2.7	1.7-4.3
	No	150	79	71				1	1
Lack of accessibility to the lavatory	Yes	180	68	112	1.931 (0.80)	0.000*	1	1.4	0.87-2.2
	No	120	55	65				1	1
Seat inclination (Seat Pan)	Yes	162	33	129	61.959 (0.414)	0.000*	1	7.4	4.4-12.4
	No	138	90	48				1	1
Sitting without lumbar support	Yes	186	56	130	24.007 (0.272)	0.000*	1	5.0	2.9-8.7
	No	114	67	47				1	1
Shocks (due to road surface)	Yes	150	33	117	44.771 (0.360)	0.000*	1	5.3	3.3-8.8
	No	150	90	60				1	1

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

luggage, bending, twisting, and maintaining bad posture throughout lengthy trips, especially in poorly built taxi surroundings. The results of Tse *et al.* (2006), who investigated bus drivers and discovered that exposure to stressors like poor cabin ergonomics, passenger violence, traffic congestion, rigid running schedules, and rotating shifts significantly increased the likelihood of developing CVD, are in close agreement with these findings, despite the fact that they differ from those of Chen *et al.* (2005). Workload and cardiovascular problems have been linked in several studies (Hinkle *et al.*, 1968; Russek *et al.*, 1958; Theorell *et al.*, 1977).

Association of Psychological Factors with Cardiovascular Disorders

Table 7 shows the association between Psychological Factors and Cardiovascular Disorders. Chi-Square values support (P<0.05), that there is a association between Psychological Factors and Cardiovascular Disorders. Taxi drivers who reported self-perceived stress/stress symptoms (Adj. OR=11.5; CI=6.5 to 19.9; P<0.05), exposure to passenger hostility (Adj. OR=2.3; CI=1.5 to 3.6; P<0.05) and too short lunch break (Adj. OR=3.1; CI=1.9 to 5.0; P<0.05) are more likely to suffer from Cardiovascular Disorders. However, lack of social contact with colleagues and lack of Social Support (Adj. OR=0.50; CI=0. 29 to 0.82; P<0.05) are not found to have a significant impact on Cardiovascular Disorders. Inadequate lunch breaks, exposure to passenger animosity, and self-perceived stress and stress symptoms are psychological factors that raise the risk of cardiovascular diseases and disorders (CVDs). One important risk factor for cardiovascular issues is mental stress. According to Ng and Tan (2017), the main causes of CVDs in cab drivers are psychological stress, self-perceived stress symptoms, and passenger hostility.

The relationship between self-perceived work stress and cardiovascular disease, however, is the subject of conflicting research (Belkic *et al.*, 2004; De Lange *et al.*, 2003; Hemingway and Marmot, 1999). According to Belkic *et al.* (1998), high-threat, avoidant vigilant work environments—where employees are required to maintain a heightened state of vigilance for extended periods of time—are likewise linked to cardiovascular disease.

Association of Other Diseases with Cardiovascular Disorders

It can be seen from Table 8 that Adj. OR value (7.8) for Dyslipidemia /Hyperlipidemia (LDL Cholesterol and Triglyceride) is considerably higher (between 4.6 and 13.0) at the 95 per cent confidence intervals generally better defined. Table 6 further reveals that the odds of suffering from Blood Pressure (BP) (Adj. OR=3.8; CI=2.3 to 6.3; P<0.05), Cardiac Disease (Adj. OR=2.1; CI=1.3 to 3.2; P<0.05), Intermittent Insomnia (Adj. OR=1.6; CI=0.70 to 3.4; P<0.05) and Diabetes (Adj. OR=3.9; CI=2.3 to 6.5; P<0.05) are higher for cardiovascular patients. Insomnia (Adj. OR=0.83; CI=0.51 to 1.33; P<0.05) did not make any significant contribution to Cardiovascular Disorders. The results of the study also show that drivers with a higher risk of developing cardiovascular diseases and disorders (CVDs) include those with diabetes, dyslipidemia (high LDL cholesterol and triglycerides), hypertension (high blood pressure), heart disease, and intermittent insomnia. Drivers who have pre-existing medical conditions are more susceptible to cardiovascular difficulties. This is supported by research by Chuang *et al.* (2010) and Lissah *et al.* (2021), which discovered that those with diabetes, hypertension, dyslipidemia, sleeplessness, and other chronic illnesses are much more likely to develop CVDs. The health burden that taxi drivers experience is increased by these comorbidities as well as stressors related to their jobs and lifestyle. In a similar vein, Chen *et al.* (2005) found that diabetes, hypertension, and high cholesterol are important risk factors for cardiovascular diseases. While Gustavsson (1996) also highlighted higher blood lipids and hypertension as significant contributions to cardiovascular risk, Koppad *et al.* (2012) verified hypertension as a substantial CVD risk factor. Furthermore, according to Wang and Lin (2001), Lee *et al.* (2010), and Lee *et al.* (2011), stressors like passenger violence, poor cabin ergonomics, traffic jams, rotating shift patterns, and rigid schedules can exacerbate blood pressure, triglycerides, diabetes, abdominal obesity, and cholesterol levels (total, LDL, and HDL),

Table 7: Association of Psychological Factors with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	p value	Df	Adj. OR	CI (95%)
Self-perceived stress/Stress symptoms	Yes	162	27	135	86.203 (0.472)	0.000*	1	11.5	6.5-19.9
	No	138	96	42				1	1
Exposure to passenger hostility	Yes	150	37	150	33.085 (0.315)	0.000*	1	2.3	1.5-3.6
	No	150	86	150				1	1
Social contact with colleagues and lack of Social Support	Never/ Sometimes	186	50	64	.622 (0.045)	0.000*	1	0.83	0.51-1.33
	Often/ Very Frequent	114	73	113				1	1
Lunch break too short	Yes	120	31	89	19.018 (0.244)	0.000*	1	3.1	1.9-5.0
	No	180	92	88				1	1

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

ultimately raising the risk of CVD in professional drivers. Long-term taxi driving raises blood pressure, which increases cardiovascular risk, according to Fumio *et al.* (2002).

Association of Inside Conditions of Taxi with Cardiovascular Disorders

Table 9 indicates that Inside Conditions had association with Cardiovascular Disorders. Taxi drivers reported that Inside Conditions as draught (Adj. OR=11.5; CI=6.5 to 19.9; P<0.05) and distracting noise from the outside (Adj. OR=9.5; CI=5.6 to 16.1; P<0.05) had significant impact on Cardiovascular Disorders. However, Humidity (Adj. OR=0.37; CI=0.23 to 0.59; P<0.05) was not found having any significant impact on Cardiovascular Disorders. The study also discovered that an elevated prevalence of cardiovascular diseases and disorders (CVDs) is largely caused by the internal circumstances of the taxi, such as drafts and distracting outside noise. The external and internal cab environment both contribute significantly to increased cardiovascular risk. According to Chuang *et al.* (2010), stress levels and the risk of CVD were raised by exposure to traffic noise, vehicle vibration, inadequate air circulation, and thermal discomfort (severe cold or heat) in the taxi cabin. In the same way, Smith *et al.* (2006) found that poor seat inclination, unpleasant seating configurations, and restricted access to basic facilities like restrooms worsen cardiovascular and general physical health issues.

The analysis of data reveals that null hypotheses have been rejected, and findings of study reveal that the risk factors considered in this study have significant impact on various stress-related health problems of taxi drivers. It implies that sociodemographic/lifestyle factors (age, obesity, poor diet, low education), -work-related exposures (long hours, fatigue, irregular shifts), ergonomic hazards (sedentary posture, vibration, cabin design), psychological stress (passenger aggression, insufficient breaks), pre-existing diseases, and environmental in-cab conditions synergistically elevate CVD risk among taxi drivers—even when assessed independently in controlled studies. Integrating these studies, a comprehensive model of CVD determinants emerges-.

Table 8: Association of Other Diseases with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	*p-value*	Df	Adj. OR	CI (95%)
Blood Pressure (BP)	Yes	150	38	112	30.440 (0.304)	0.000*	1	3.8	2.3-6.3
	No	150	85	65				1	1
Cardiac disease	Yes	168	56	112	9.278 (0.173)	0.000*	1	2.1	1.3-3.2
	No	132	67	65				1	1
Insomnia	Yes	180	92	88	19.018 (0.244)	0.000*	1	0.33	0.21-0.56
	No	120	31	89				1	1
Type of Insomnia	Intermittently	150	74	76	1.138 (0.079)	0.000*	1	1.6	0.70-3.42
	Persistently	30	18	12				1	1
Diabetes	Yes	132	31	101	29.894 (0.301)	0.000*	1	3.9	2.3-6.5
	No	168	92	76				1	1
Dyslipidemia / Hyperlipidemia (LDL Cholesterol and Triglyceride	Yes	159	31	128	64.665 (0.421)	0.000*	1	7.8	4.6-13.0
	No	141	92	49				1	1

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

Table 9: Association of Inside Conditions of Taxi with Cardiovascular Disorders.

Factors		N	Yes (n)	No (n)	X2 (coefficient)	*p - value*	Df	Adj. OR	CI (95%)
Draught	Yes	162	27	135	86.203 (0.472)	0.000*	1	11.5	6.5-19.9
	No	138	96	42				1	1
Distracting noise from the outside	Yes	168	32	136	76.065 (0.450)	0.000*	1	9.5	5.6-16.1
	No	132	91	41				1	1
Humidity	Yes	162	84	78	17.145 (0.233)	0.000*	1	0.37	0.23-0.59
	No	138	39	99				1	1

*Source: Primary Data complied through survey using SPSS;p=0.05; *p* <0.05 (Significant); *p* > 0.050 (Not significant); *Adj. OR=Adjusted Odds Ratio; 1=Reference Category; CI=Class Interval*

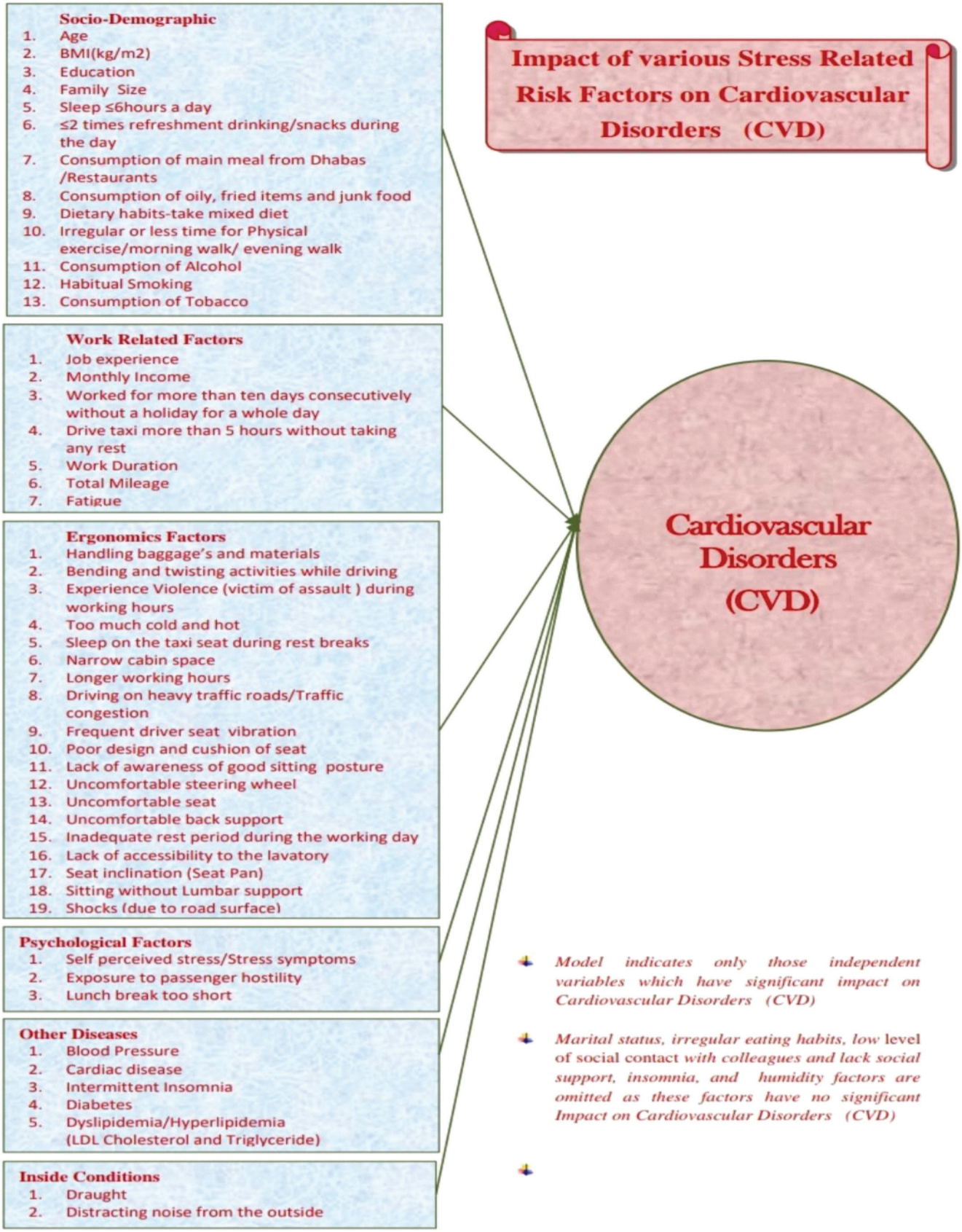

Figure 1: Impact of various Stress Related Risk Factors on Cardiovascular Disorders (CVD).

(CEST, 1993; Mahaja and Gupta, 2003; Miller and Mackie, 1980; Chaudhary *et al*., 2014; Koppad *et al*., 2012; Tse *et al*., 2006 and David *et al*., 1988). Results of Multiple Logistic Regression reveal that there is a significant impact of various stress-related risk factors on cardiovascular disorders. A model (Figure 1) has been developed based on the thorough examination of socio-demographic, lifestyle, occupational, ergonomic, psychological, health-related, and environmental risk factors. This model synthesizes all important determinants to provide a comprehensive understanding of the causes and pathways through which CVDs develop among taxi drivers, and it serves as a basis for future occupational health research and targeted interventions.

CONCLUSION

The study highlights that taxi drivers are more likely to experience a range of cardiovascular than non-professional drivers. Professional taxi drivers have a lifestyle that is not congenial and conducive to good health along with exposure to air and noise pollution. Their job does not provide more opportunities for social contact as many other jobs, and long unsocial working hours and shift work etc. can interrupt both home life and social life. Home life and social contacts with friends and relatives provide a powerful source of psychological support for those experiencing stress and an absence of social support multiples an already complex problem. Taxi drivers are more likely to have a diet that is not favourable to health than those workers who can return home for an evening meal and take regular meal breaks in a staff canteen on a regular basis. A diet high in carbohydrates and fats and low in fresh food, fruit, salads, vegetables, and fibre will contribute to the level of unhygienic and poor health. The incidence of drinking and smoking can also produce health problems, and most empirical studies on drivers provide a strong basis to "control" for this important aspect of lifestyle. Drivers are victims of these diseases because they smoke and drink a lot. Drivers are exposed to many health problems as a direct result of the seat and posture adopted while on wheel. Sitting in the driving position exerts significant force on the spine and can cause a number of problems with the musculoskeletal system, particularly backaches, neck problems, pulled muscles, and general stiffness. The drivers' lifestyle and driving posture also creates many problems for the digestive system.

Implications of the Study

The study's conclusions have important ramifications for HR managers, government officials, and legislators, especially the Ministry of Labour and Welfare, as well as anybody else who cares about the well-being, safety, and standard of living of professional drivers. As a useful beginning point for activities aimed at optimizing occupational safety and fostering improved health outcomes, the findings offer insightful information to healthcare practitioners, transportation regulators, taxi owners, and the drivers themselves. adoption of advantageous employment-related regulations that protect drivers' welfare in the transportation industry.

The findings have significant ramifications for professional drivers as well. One noteworthy result is that some drivers utilize Central Nervous System Agents (CNAs), frequently as a coping mechanism for long and demanding workdays. This study can educate drivers on the negative impacts of CNAs and highlight the advantages of leading a better lifestyle, which includes eating cleanly, getting enough sleep, exercising frequently, and being physically fit overall. The study will also assist drivers, especially those who travel long distances, in recognizing and comprehending the root reasons of their health issues. Because of this increased awareness, they might be more likely to take corrective and preventative action. Furthermore, the survey found that many taxi drivers continue to work under difficult conditions imposed by taxi owners because they are mostly ignorant of their legal rights and safeguards under the Motor Transport Workers Act, 1961. These findings may inspire drivers to learn about the Act and support its implementation to improve their working conditions and job security.

Recommendations of the Study

For professional drivers as well as policymakers, this study has important ramifications. The findings offer crucial evidence for policymakers, particularly those in the Ministry of Labour and Welfare, HR managers, and transportation authorities to create and execute driver-friendly and health-focused policies. The information highlights the critical need for health and safety initiatives and advances our understanding of common morbidities among drivers. However, the study provides useful information for professional drivers, especially those who travel great distances. It increases knowledge of the negative effects of central nervous system agents (CNAs) as well as the advantages of embracing good habits including regular sleep, clean diet, and physical exercise. It also emphasizes how many drivers continue to work in exploitative conditions because they are ignorant of their rights under the Motor Transport Workers Act of 1961. Drivers may promote better working circumstances, which will enhance their health and job satisfaction, by gaining knowledge and empowerment.

Scope for Further Research

Numerous problems related to the current study's limitations present worthwhile opportunities for further investigation. Future research might involve drawing blood samples in simple tubes to check thyroid status, complete blood profiles, hemoglobin levels, and blood sugar levels for more thorough health evaluations. Additionally, by integrating behavioural risk assessments using structured questionnaires with anthropometric data, the World Health Organization's Stepwise methodology may offer a more methodical assessment of cardiovascular risk factors. Standardized methods and calibrated tools for anthropometric data collection—such as calibrated scales for weight, standard tapes for height measurement, and well-maintained mercury sphygmomanometers for blood pressure readings—should be used in future research to improve accuracy. Furthermore, measurements of belly circumference, which have been shown to link more strongly with hypertension than body mass index (BMI), may be used in future studies as a more accurate indication of cardiovascular risk.

ACKNOWLEDGEMENTS

The author would like to thank UGC-NEW DELHI for its financial support. She also wishes to thank all taxi drivers who participated in this study and thank Dr. Amarjit Singh Sidhu (Professor) for helping the author complete this project.

AUTHORS DECLARATION STATEMENT

The author declares that she has no conflicts of interest or competing interests.

Funding

The authors received financial support for the research, authorship, and/or publication of this article from UGC. The grant number is 993 (NET-DEC-2010).

REFERENCES

1. Ahn, Y. H. S. Lee, S. R. Kim, J. Lim, S. J. Park, S. Kwon, et al. (2021). Factors associated with different levels of daytime sleepiness among Korean construction drivers: a crosssectional study. *BMC public health*, vol. 21, pp. 1-12.
2. Annika, R., Karen, A., and Andlars, W. (1991). Risk of Coronary Heart Disease in Middle-Aged Male Bus and Tram Drivers Compared to Men in other Occupations: A Prospective Study. *International Journal Epidemiology*, 20(1), 82-87.
3. Bartone, P. T. (1989). Predictors of Stress-Related Illness in City Bus Drivers. *Journal of Occupational Medicine*, 31, 657–663.
4. Bigert, C., Gustavsson, P., Hallqvist, J., Hogstedt, C., & Lewné, M. (2003). Myocardial infarction among professional drivers. *Epidemiology*, 14(3), 333–339.
5. Bigert, C., Gustavsson, P., Hallqvist, J., Hogstedt, C., Lewné, M., Plato, N., ... & Theorell, T. (2003). Myocardial infarction among professional drivers. *Epidemiology*, 14(3), 333–339.
6. Chaudhary, S., Nagargoje, S.S., Gupta, K., and Misra, S.K. (2014). Prevalence of Some Cardio-Vascular Disease (CVD) Risk Factors among Auto-Rickshaw Drivers Working in Nagpur City of Maharashtra. *Indian Journal of Community Health,* 22(2), 32-34.
7. Chuang, K. J., Yan, Y. H., Cheng, T. J., & Chuang, H. C. (2010). Effects of traffic-related air pollution on cardiovascular and respiratory health of individuals living near a major highway in Taipei, Taiwan. *Environmental Research*, 110(2), 158–164.
8. Cragg, J.G., and R.S. Uhler .(1970). The Demand for Automobiles. *The Canadian Journal of Economics,* 3, 386-406.
9. David, E., and Joseph, S. (1988). The Effects of Quality of Working Life (QWL) on Employee Behavioral Responses. *Social Indicator Research*, 31-47.
10. Elshatarat, R. A. and B. J. Burgel. (2016). Cardiovascular risk factors of taxi drivers. *Journal of Urban Health*, vol. 93, pp. 589-606.
11. F. Gany, S. Bari, P. Gill, J. Ramirez, C. Ayash, R. Loeb, et al. (2016). Step on it! Workplace cardiovascular risk assessment of New York City yellow taxi drivers," Journal of immigrant and minority health, vol. 18, pp. 118-134,.
12. F. Meng, S. Li, L. Cao, M. Li, Q. Peng, C. Wang, et al.(2015). Driving fatigue in professional drivers: a survey of truck and taxi drivers. *Traffic injury prevention*, vol. 16, pp. 474-48.
13. Fumio, K., Takemasa, W., Misuzu, W., Yasuhiro, A., and Teruyuki T. (2002). Blood Pressure and Heart Rate Variability in Taxi Drivers on Long Duty Schedules. *Journal of Occupational Health*, 44(4), 214-220.
14. Gany, F. S. Bari, P. Gill, J. Ramirez, C. Ayash, R. Loeb, et al. (2016). Step on it! Workplace cardiovascular risk assessment of New York City yellow taxi drivers. *Journal of immigrant and minority health*, vol. 18, pp. 118-134.
15. Gustavsson, P., Alfredsson, L., Brunnberg, H., Hammar, N., Jakobsson, R., and Reuterwall, C. (1996). Myocardial Infarction among Male Bus, Taxi, and Lorry Drivers in Middle Sweden. *Occupational and Environmental Medicine*, 53, 235–240.
16. H. Abban. (2013). Cardiovascular diseases risk factors among commercial long distance bus drivers in Cape Coast. *University of Ghana*.
17. Hartvig, P., and Midttun O. (1983). Coronary Heart Disease Risk Factors in Bus and Truck Drivers. *International Occupational Environmental Health*, 52, 353-360.
18. Jo, W.K., and Yu, C.H. (2001). Public Bus and Taxicab Drivers Exposure to Aromatic Work-Time Volatile Organic Compounds. *Environmental Research,* 86, 66–72.
19. Koppad, R., Kumar, S., Kotur., N., and Umakanth, A.G. (2012). Cross Sectional Study on Magnitude of Risk Factors of Cardio-Vascular Diseases among Auto Rickshaw Drivers of Davangere City of Karnataka, India. *International Journal of Current Research and Review,* 22 (4), 66-73.
20. Kumari, L., & Sidhu, A. S. (2016). Factors Affecting Quality of Work Life of Private Taxi Drivers. Management and Labour Studies, 41(4), 331-354. https://doi.org/10.1177/0258042X16676669
21. Kumari, L., & Singh, R. (2024). Multivariate determinants of hypertension among taxi drivers in Punjab. *Journal of Health Management*, 26(1), 23–31.
22. Limasset, J.C., Diebold, F., and Hubert, G. (1993). Assessment of Bus Drivers' Exposure to the Pollutants of Urban Traffic. *Total Environment*, 134, 39-49.
23. Lissah, R., Akparibo, R., & Ayanore, M. A. (2021). Risk factors of cardiovascular disease among commercial vehicle drivers: A scoping review. *BMC Public Health*, 21(1), 1563. https://doi.org/10.1186/s12889-021-11558-2
24. Nagelkerke, N.J.D. (1991). A Note on a General Definition of the Coefficient of Determination. *Biometrika,* 78, 691-692.
25. Ng, M. K., & Tan, S. Y. (2017). Occupational stress and cardiovascular disease risk among taxi drivers in urban areas: A review. *International Journal of Occupational Safety and Ergonomics*, 23(2), 242–250.
26. Ngatcha Tchounga, C. F., et al. (2022). Musculoskeletal disorders and job dissatisfaction among taxi drivers in Cameroon. *African Health Sciences*, 22(2), 115–122.
27. Patel, H., & Kulkarni, S. (2023). Occupational hazards and hypertension among professional drivers. *Indian Journal of Public Health Research & Development*, 14(1), 135–139.
28. R. A. Elshatarat and B. J. Burgel. (2016). Cardiovascular risk factors of taxi drivers," Journal of Urban Health, vol. 93, pp. 589-606.
29. Rami Azmi Elshatarat, Barbara J. Burgel, Ahmad Mahmoud Saleh (2023). Driving Behaviors, Cardiovascular Disease Risk Factors, Road Traffic Crashes, and Their Association with Fatigue in Urban Taxi Drivers. Universal Journal of Public Health, 11(5), 770 - 781. DOI: 10.13189/ujph.2023.110527.
30. Rana, A., Mehra, S., & Bhatia, M. (2025). Occupational correlates of blood pressure among taxi drivers: A cross-sectional analysis. *Indian Journal of Occupational and Environmental Medicine*, 29(2), 45–53.
31. Ronna, B. B, Thiese, M. S. U. Ott, A. Effiong, M. Murtaugh, J. Kapellusch, et al. (2016). The association between cardiovascular disease risk factors and motor vehicle crashes among professional truck drivers. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine*, vol. 58, p. 828. Wang, Y. Zhang, Y. L. Li, and G. Liang. (2019). Self-reports of workloads and aberrant driving behaviors as predictors of crash rate among taxi drivers: A cross-sectional study in China. *Traffic injury prevention*, vol. 20, pp. 738-743.
32. Rosengren, A., Anderson, K., and Wilhelmsen, L. (1991). Risk of Coronary Heart Disease in Middle-Aged Male Bus and Tram Drivers Compared to Men in Other Occupations: A Prospective Study. *International Journal of Epidemiology*, 20, 82–87.

33. Sangaleti, C. T., Trindade, L. L., Zarate, M. A. O., Jardim, V. M. R., & Robazzi, M. L. C. C. (2014). Burnout syndrome and minor mental disorders in public health workers. *Revista Latino-Americana de Enfermagem*, 22(6), 1044–1051.

34. Shetty, P., Rao, K., & Kumari, V. (2016). Occupational stress and lifestyle diseases among urban transport drivers in India. *Indian Journal of Occupational Health*, 59(2), 91–96.

35. Shin, D. S. Jeong, B. Y. and M. H. Park. (2020). Comparison of work-related traffic crashes between male taxi drivers aged≥ 65 years and< 65 years in South Korea. *Work*, vol. 67, pp. 369-380.

36. Siegrist, J., & Marmot, M. (2004). Health inequalities and the psychosocial environment—two scientific challenges. *Social Science & Medicine*, 58(8), 1463–1473.

37. Siegrist, J., & Marmot, M. (2004). Health inequalities and the psychosocial environment—Two scientific challenges. *Social Science & Medicine*, 58(8), 1463–1473.

38. Simpson, C. P. Dorian, A. Gupta, R. Hamilton, S. Hart, B. Hoffmaster, et al. (2004). Canadian Cardiovascular Society Consensus Conference. Assessment of the cardiac patient for fitness to drive: drive subgroup executive summary. *Can J Cardiol*, vol. 20, pp. 1314-20.

39. Smith, P. M., Saunders, R., Lifshen, M., Black, O., Lay, M., Breslin, C., ... & Kosny, A. (2006). The development of a conceptual model and self-reported measure of occupational health and safety vulnerability. *Accident Analysis & Prevention*, 38(6), 1127–1137.

40. Sreedhara, D., Prabhu, G. R., & Kamath, R. (2017). Prevalence and determinants of hypertension among urban taxi drivers in Karnataka. *Journal of Clinical and Diagnostic Research*, 11(3), LC06–LC09.

41. Stern, F. B., Halperin, W. E., Hornung, R. W., Ringenburg, V. L., and McCammon, C. S. (1988). Heart Disease Mortality among Bridge and Tunnel Officers Exposed to Carbon Monoxide. *American Journal of Epidemiology*, 128, 1276–1288.

42. Tse, L.M., Rhona, F., and Kathryn, M. (2006). Bus Driver Well-Being Review: 50 Years of Research. *Transportation Research Part* F, 9, 89-114.

43. Van Amelsvoort, L. G. P. M., Schouten, E. G., & Kant, I. J. (2006). Risk of cardiovascular disease among shift workers: A review. *Scandinavian Journal of Work, Environment & Health*, 32(3), 163–172.

44. Van Amelsvoort, L. G., Schouten, E. G., & Kok, F. J. (2000). Impact of one year of shift work on cardiovascular disease risk factors. *Journal of Occupational and Environmental Medicine*, 42(7), 687–693.

45. Vingard, E., Alfredsson, L., Hagberg, M., Kilbom, A., Theorell, T., Waldenström M., Hjelm, EW., Wiktorin, C., and Hogstedt, C. (1976). To What Extent Do Current and Past Physical and Psychosocial Occupational Factors Explain Care-Seeking for Low Back Pain in A Working Population? Results from the Musculoskeletal Intervention Center-Norrtalje Study. *Spine,* 25(4), 493-500.

46. Wang, P.C., and Delp, L. (2013). Health Status, Job Stress and Work-Related Injury among Los Angeles Taxi Drivers. *Work*, 4.

47. Y. Liu, A. G. Wheaton, D. P. Chapman, T. J. Cunningham, H. Lu, and J. B. Croft. (2016). Prevalence of healthy sleep duration among adults—United States, 2014," Morbidity and Mortality Weekly Report, vol. 65, pp. 137-141.

BOOKS

48. Cox, D.R., and. Snell, E.J. (1989). *Analysis of Binary Data*. Second Edition. Chapman and Hall.

49. David, L., Brazil, K., Krueger, P., Lohfeld, L., and Tjam, E. (2001). *Extrinsic and Intrinsic Determinants of Quality of Work life, Leadership in Health Sciences*. MCB University Press, 14(2).

50. Maddala, G.S. (1983). *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge University Press, England.

51. Mahajan, B.K., and Gupta, M.C. (2013). *Text Book of Preventive and Social Medicine*. Edition 4th. JayPee Brothers Medical Publishers, India.

REPORTS

52. CEST. (1993). *The Future Road Transport Noise Agenda in the UK. The UK Environmental Foresight Project*. Volume 3. HMSO, London.

53. Goran, K., Torbjorn, A., Michael, I., and Marie S. (1999). *Train Drivers' Working Conditions and Their Impact on Safety, Stress and Sleepiness: A Literature Review, Analyses of Accidents and Schedules. National Institute for Psychosocial Factors and Health, Department of Public Health Sciences, Division for Psychosocial Factors and Health*. Karolinska Institutet, Stockholm, Sweden.

54. Mackie, R., and Miller, C. (1978). *Effects of Hours of Service, Regularity of Schedules and Cargo Loading on Truck and Bus Driving Fatigue*. Coleta, C, Technical Report No. 1765-F.

55. Organisation of Economic Cooperation and Development. (1996). *Technology, Productivity and Job Creation*. 1 and 2, OECD, Paris.

How to cite this article: Sharma LK. Risk Factors of Cardiovascular Disorders among the Taxi Drivers: A Multivariate Analysis. Hypertens J. 2026;12(1): 25-38

Source of support: Nil, **Conflicts of interest:** None