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Cardiovascular Disease and Risk Factors among Interstate Migrant Workers employed in Construction sector, Chengalpattu District

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ABSTRACT

Background: Cardiovascular diseases (CVDs) remain a primary cause of morbidity and mortality worldwide, with migratory workers at a disproportionate risk due to socioeconomic vulnerability, work related stress, and inadequate healthcare access. However, there is very little evidence of CVD among migrant construction workers in India.

Objectives : The objectives were to (i) estimate the prevalence of cardiovascular illnesses among daily-wage migrant construction workers in Tamil Nadu, and (ii) investigate the socio-demographic, behavioral, and occupational factors of CVD.

Methods: A community-based cross-sectional study of 500 male migrant construction workers was undertaken using simple random sampling. A systematic, pretested questionnaire was used to collect data on socio-demographic traits, lifestyle behaviors, and workplace exposures. Self-reported physician-diagnosed CVD was used as the outcome variable. Descriptive statistics, chi-square tests, and logistic regression were used to find independent predictors of CVD. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were presented.

Results: The prevalence of CVD among older workers increased from 1.16% (18-24 years) to 33.33% (≥50 years). Logistic regression found significant relationships between alcohol use (AOR = 2.42), smokeless tobacco use (AOR = 5.44), longer work experience (AOR = 4.28 for ≥11 years), and high-risk occupations like plumbing/electrical work (AOR = 12.14). Language-based heterogeneity was noteworthy, with Tamil/Telugu-speaking migrants at significantly higher risk (AOR = 13.06). Education, caste, and per capita income were not found to be significant predictors.

Conclusion: The study identifies a significant burden of cardiovascular disease among migrant construction workers, which is driven by behavioral and occupational risk factors. The findings emphasize the importance of targeted workplace health programs, routine cardiovascular screening, tobacco and alcohol cessation initiatives, and enhanced industrial safety measures. Addressing the particular hazards that migrant subgroups face is critical to lowering CVD inequalities and improving long-term health outcomes in this vulnerable workforce.

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INTRODUCTION

Cardiovascular diseases (CVDs) are major cause of deaths worldwide(1).According to World Health Organization(2022) , an estimated 19.8 million individuals died from cardiovascular diseases (CVDs), accounting for nearly 32% of all deaths around the world. Heart attack and stroke caused 85% of these deaths. More than three-quarters of deaths from CVD happen in nations with low or middle incomes(2). India, in particular, is undergoing significant demographic and epidemiological transitions, with noncommunicable diseases (NCDs) such as CVD emerging as important public health issues, especially among the elderly as well as experiencing socioeconomic vulnerabilities (3).

In addition to the general population, migrant workers are a vulnerable and frequently neglected group who bear a disproportionately high burden of cardiovascular disease(4). Evidence suggests that CVDs were responsible for roughly 68% of all illnesses reported by migrant workers in Mumbai between 2011 and 2021. This increased illness burden is related to stressful work settings, long working hours, physically demanding tasks, poor nutritional intake, and limited access to healthcare services(5).

International studies show that migrants in Europe and North America typically face a greater risk of cardiovascular disease compared to host populations, influenced by cardiometabolic, behavioral, and psychological factors. This risk varies among ethnic groups due to disparities in pre- and post-migration conditions, including socioeconomic level, culture, lifestyle, stress, and healthcare access, which may combine with genetic and microbiological variables to affect CVD risk.(6)The construction industry, a key economic driver, relies heavily on migrant labour, which comprises 81% of its workforce(7).As India's second-largest employer, the sector currently engages 71 million workers, with projections reaching 100 million by 2030(8). Existing research on migration and health in India has primarily concentrated on the health of mothers and children, communicable diseases, and patterns of healthcare utilization(9). In India, studies examining cardiovascular diseases specifically among migrant construction workers are extremely limited. In this context, the present study focuses on daily wage migrant construction workers in Tamil Nadu and aims to address the following objectives: (i) to estimate the prevalence of cardiovascular diseases among migrant construction workers, and (ii) to examine the socio-demographic, behavioural, and occupational factors associated with cardiovascular diseases in this population.

METHODOLOGY

Study Design and Population

A community-based cross-sectional study was carried out with 500 migrant construction workers earning a daily salary. Participants were chosen using simple random sampling method from major construction sites. A structured interviewer-administered questionnaire was used to collect data on socio-demographic variables, work-related factors, lifestyle behaviors, and health status. Cardiovascular disease (CVD) was evaluated based on a medical professional's self-reported diagnosis. The characteristics of the participants were summarized using descriptive statistics, and relationships between background variables and CVD were investigated using chi-square tests. Variables with $p < 0.05$ were included in logistic regression to discover independent associations with CVD. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were presented.

Inclusion and Exclusion Criteria

Inclusion criteria : Male migrant construction workers who are 18 years old or older, have moved to Chengalpattu from another state , have lived there for at least a year, and have given a consent.

Exclusion criteria include technical personnel, including managers, contractors, or engineers, who were not actively engaged in manual construction activities.

Sample Size Determination:

The sample size was also estimated using the Leslie Kish formula (Kish, L. Survey Sampling. Wiley; 1965), based on the observed prevalence of musculoskeletal problems (50%) among migrant construction workers reported by Nirmala & Prasad (2019)

n= Z2 x p x q/d2

n= 3.84*0.50*0.50/0.0025

=3.84*0.25/0.0025

=0.96/0.0025

=384 (20% Non-Response Rate)

Thus the total required Sample Size is 463. Considering 20% non-response rate:$384 \times 1.20 = 462.8 \approx 463$

Thus, the final sample size considered for the study was 500 migrant construction workers, ensuring adequate statistical power and representativeness.

Data Collection and Instruments

Data were gathered through a structured, pretested questionnaire that encompassed socio-demographic characteristics, employment history, lifestyle factors (such as tobacco and alcohol consumption) and experiences of food insecurity. The questionnaire was in English, then translated into Tamil and Hindi, and subsequently back-translated to verify accuracy.

Ethical Approval: Institutional Ethics approval was obtained from SRM School of Public Health, SRM Institute of Science and Technology (December 2023). Field investigators skilled in local languages carried out in-person interviews. A preliminary survey was conducted, followed by the comprehensive survey from July to October 2024.

Variables

Outcome Variable: The principal outcome was the occurrence of self-reported cardiovascular disease (CVD), ascertained through participant responses to self-reported diagnosis.

Covariates

The study examined various socio-demographic, behavioral, occupational, and environmental factors as independent variables to assess their association with cardiovascular diseases among daily wage migrant construction laborers. Socio-demographic variables encompassed age groups (18–24, 25–34, 35–49, and 50 years or older), educational attainment (illiterate/primary/middle, high school, and intermediate/diploma), marital status (currently married or never married), religion (Hindu or Muslim/Christian), caste classification (General, OBC/MBC, SC/ST), mother tongue (Tamil/Telugu, Hindi, Bengali, Odiya), and monthly per capita household income (≤50,000 INR or >50,000 INR). Behavioral factors included alcohol consumption (yes/no), tobacco smoking (yes/no), use of smokeless tobacco (yes/no), social activity classified as low or high based on participation in leisure, cultural, religious, and social events, and food insecurity, indicated by either absence or the presence of at least one indicator. Occupational variables encompassed the nature of work (carpentry, cement work, plumbing/electrical, assistants, and others such as painting, scaffolding, chemical handling) and work experience (1–5 years, 6–

10 years, and over 11 years). Environmental and living condition factors encompassed exposure to indoor smoke (yes/no) and access to identification documents and accommodation quality, which were evaluated for contextual analysis.

Statistical Analysis

Descriptive analysis assessed the prevalence of cardiovascular diseases among migrant construction workers across socio-economic and demographic groups. Chi-square tests examined variable associations. Logistic regression results were performed. Analyses were conducted using Stata software 15.0 version.

RESULTS

Table 1: Association of Socio demographic characteristics among Daily Wage Migrant construction workers

Background Characteristics	Sub-groups	Cardio vascular diseases
Age	18-24	1.16
	25-34	6.53
	35-49	24.73
	50-max	33.33
Education	Illiterate/Primary/Middle	9.72
	High School	5.57
	Intermediate/Diploma	17.69
Religion	Hindu	10.82
	Muslim/Christian	3.96
Marital Status	Currently married	13.83
	Never married	1.69
Caste	General	6.52
	OBC/MBC	13.13
	SC/ST	8.38
Mother tongue	Hindi	7.56
	Bengali	6.71
	Odiya	6.67
	Tamil/Telugu	66.67
Alcohol Consumption	No	7.06
	Yes	15.56
Smoking Tobacco	No	4.48
	Yes	12.85
Smokeless Tobacco	No	6.18
	Yes	11.25
Food Insecurity	No	8.52
	Yes	62.5
Social Activity	Low Social Activity	9.03
	High Social Activity	16.67
Percapita Income	5000&below	9.07
	more than 5000	12.5
Type of Work	Carpentry	11.29
	Cement work	7.32
	Others	9.91
	Helper	6.51
	Plumbing/Electrical	33.33
Work Experience	1-5yrs	3.66
	6-10 yrs	12.78
	More than 11 yrs	22.89
Indoor Smoke	No	8.91

	Yes	17.24

Source: Authors Calculation from Primary Survey Data

Table 1 shows the relationship between several sociodemographic, behavioral, and occupational factors and the prevalence of cardiovascular disease (CVD) among daily wage migrant construction workers. The findings reveal that the prevalence of CVD rises dramatically with age, from 1.16% in the youngest age group (18-24 years) to 33.33% in those 50 and older. Workers with an intermediate or diploma-level education had a higher frequency (17.69%) than those with lower educational attainment. Currently married people, OBC/MBC caste members, and those whose mother tongue is Tamil or Telugu had significantly higher rates of CVD, with the latter group having an especially high prevalence of 66.67%. Behavioral risk factors were also evident, with alcohol consumers (15.56%), smokers (12.85%), and smokeless tobacco users (11.25%) having higher CVD rates. Food insecurity was highly related with CVD, with a staggering 62.5% prevalence among individuals who were food insecure. Plumbing and electrical workers (33.33%) and those with more than 11 years of work experience (22.89%) were particularly affected. Additionally, workers exposed to indoor smoke (17.24%) and those with higher social activity (16.67%) had a higher CVD prevalence.

Table 2 : Logistic Regression results of Factors associated with cardiovascular diseases among Daily wage migrant Construction Workers (n=500)

Category	**Sub-Groups**	**Adjusted Odds Ratio [95% CI]**
Age Group	18–24 (R)	(R)
	25–34	0.83 [0.10, 6.81]
	35–49	4.66 [0.53, 40.72]
	50 & above	6.82 [0.61, 76.62]
Marital Status	Currently married (R)	(R)
	Never married	0.45 [0.08, 2.67]
Education	Illiterate (R)	(R)
	High school	0.38 [0.10, 1.43]
	Intermediate/Diploma	1.02 [0.25, 4.19]
Religion	Hindu (R)	(R)
	Muslim/Christian	0.56 [0.09, 3.49]
Caste	General (R)	(R)
	OBC/MBC	0.42 [0.13, 1.39]
	SC/ST	0.31 [0.09, 1.08]
Per Capita Income	≤5000 (R)	(R)
	>5000	1.20 [0.28, 5.20]
Alcohol Consumption	No (R)	(R)
	Yes	2.42 [0.95, 6.14] *
Smoking	No (R)	(R)
	Yes	1.50 [0.48, 4.72]
Smokeless Tobacco	No (R)	(R)
	Yes	5.44 [1.12, 26.48] **
Work Experience	Low (R)	(R)
	Moderate	2.83 [0.85, 9.43] *
	High	4.28 [1.28, 14.28] **
Type of Work	Carpentry (R)	(R)
	Cement work	1.77 [0.42, 7.48]
	Others	1.59 [0.42, 6.01]
	Helper	1.08 [0.28, 4.14]
	Plumbing/Electrical	12.14 [2.35, 62.83] **
Food insecurity	No (R)	(R)
	Yes	3.45 [0.23, 51.44]
Mother Tongue	Others (R)	(R)
	Bengali	1.32 [0.43, 4.03]

	Odiya	0.48 [0.11, 2.09]
	Tamil/Telugu	13.06 [2.44, 69.94] **
Indoors Smoke	No (R)	(R)
	Yes	0.79 [0.13, 4.66]
Social Activity	Low (R)	(R)
	High	1.15 [0.13, 10.21]

Source: Authors Calculation from Primary Survey Data

Note: (R): Reference Category, *** P < 0.01, ** P < 0.05, * P < 0.10

Table 2 highlights the findings of logistic regression analysis investigating the factors linked to cardiovascular diseases (CVDs) among daily wage migrant construction laborers (n = 500). Age demonstrated an increasing association with risk, with workers aged 35–49 years exhibiting an adjusted odds ratio (AOR) of 4.66 (95% confidence interval [CI]: 0.53–40.72) and those aged 50 years and above showing an AOR of 6.82 (95% CI: 0.61–76.62), in comparison to the reference group of 18–24 years. Marital status was not significantly associated, with never-married workers exhibiting lower odds (AOR = 0.45, 95% CI: 0.08–2.67) compared to those who are presently married. Education level was not significantly correlated with CVDs; workers with a high school education exhibited lower odds (AOR = 0.38, 95% CI: 0.10–1.43), while those with intermediate/diploma qualifications had comparable odds (AOR = 1.02, 95% CI: 0.25–4.19) relative to illiterate workers. Religion and caste likewise did not exhibit significant effects. Higher per capita income (>5000) was linked to an increase in likelihood (AOR = 1.20, 95% CI: 0.28–5.20). Lifestyle factors indicated that alcohol consumption (AOR = 2.42, 95% CI: 0.95–6.14, *p < 0.05) and smokeless tobacco use (AOR = 5.44, 95% CI: 1.12–26.48, **p < 0.01) were positively correlated with cardiovascular diseases, whereas smoking did not demonstrate a significant association. Work-related factors were significant; moderate work experience (AOR = 2.83, 95% CI: 0.85–9.43, *p < 0.05) and high work experience (AOR = 4.28, 95% CI: 1.28–14.28, **p < 0.01) were associated with an increased risk of CVD. Additionally, the type of occupation emerged as a strong determinant, with plumbing and electrical workers exhibiting substantially higher odds (AOR = 12.14, 95% CI: 2.35–62.83, **p < 0.01). Mother tongue was also correlated, with Tamil/Telugu speakers exhibiting higher odds (AOR = 13.06, 95% CI: 2.44–69.94, **p < 0.01). Other variables, such as food insecurity, indoor air pollution, and social engagement, did not exhibit statistically significant correlations.

DISCUSSION

The present study investigated the socio-demographic, lifestyle, and occupational factors influencing cardiovascular diseases (CVDs) among daily-wage migrant construction workers. Age was identified as a significant predictor of cardiovascular disease, with individuals aged 35–49 years and those aged 50 years and above exhibiting markedly higher odds of developing CVD compared to those aged 18–24 years. This pattern corresponds with findings from both national surveys (e.g., LASI) and international research, which consistently demonstrate an age-related rise in CVD burden among migratory populations attributable to cumulative exposure to stress, hazardous working conditions, and delayed healthcare utilization(10,11) . Alcohol consumption has been consistently associated with increased cardiovascular risk, with research such as the UK Biobank indicating that even low to moderate intake elevates the risk of hypertension and coronary artery disease. Consistent with this evidence, our study also determined that alcohol consumption markedly elevates the risk of cardiovascular disease among migrant labourers(12).According to our research, migrant construction workers who used smokeless tobacco had a considerably higher risk of cardiovascular disease (AOR = 5.44, 95% CI: 1.12–26.48, p < 0.01). This is in contrast to certain research conducted on younger immigrant groups, which found that smokeless tobacco was only associated with alcohol consumption rather than traditional CVD risk factors(11).Similarly to the LASI findings, which found that longer duration of stay and early-life migration were associated with higher CVD risk among older male migrants, our study discovered that longer work experience among migrant construction labourers was significantly associated with increased odds of cardiovascular disease (AOR = 4.28, 95% CI: 1.28-14.28). This implies that prolonged exposure—whether through longer migration or extended engagement in physically demanding work—contributes to increased cardiovascular risk, emphasizing the role of both occupational and migration-related factors in influencing CVD outcomes(5).In line with the results of the Belgian occupational health study, which identified workers in the construction and transportation sectors as having the highest prevalence of elevated cardiovascular risk, our study similarly observed that plumbing and electrical workers demonstrated significantly increased odds of cardiovascular disease (AOR = 12.14, 95% CI: 2.35–62.83). These findings underscore that certain physically demanding occupations, whether in India or Europe, are linked to increased cardiovascular risk, highlighting the importance of implementing targeted workplace interventions and health promotion initiatives for high-risk occupational groups(13).Global research indicates that cardiovascular risk varies significantly among migrant subgroups, with South Asian and Middle Eastern migrants in Europe having higher CVD rates, whereas North African migrants frequently have reduced risk .Similar heterogeneity was shown in the RODAM trial, in which sub-Saharan African migrants in Europe had a higher CVD risk than those living in rural home settings. In keeping with these findings, our study found significant intra-group disparities, with Tamil/Telugu-speaking migrant workers having much greater odds of CVD than other language groups. This confirms the assumption that migrant communities are not homogenous; rather, CVD risk varies between sub-groups based on cultural, occupational, and socioeconomic exposures(14).

LIMITATIONS OF THE STUDY

Although it provides valuable insights, this study possesses several limitations. Initially, reliance on self-reported data may lead to recall or reporting bias. Second, the cross-sectional study design limits the capacity to establish causal relationships between occupational exposures and cardiovascular disease. Furthermore, the study was confined to migrant construction workers within

a specific district, potentially restricting the applicability of the findings to other regions or migrant populations. Future longitudinal, multi-site studies that include clinical assessments are advisable to enhance understanding of the long-term health effects of migration, working conditions, and socio-environmental exposures.

CONCLUSION

This study indicates a significant burden of cardiovascular diseases among daily-wage migrant construction laborers, influenced by a combination of socio-demographic, behavioral, and occupational factors. Increased age, alcohol intake, use of smokeless tobacco, extended work experience, and involvement in high-risk occupations such as plumbing and electrical work were identified as factors that substantially elevate the likelihood of developing cardiovascular disease. The observation that Tamil/Telugu-speaking migrants demonstrated a disproportionately elevated risk further emphasizes the heterogeneity present within migrant subgroups and the importance of implementing culturally and contextually targeted interventions. Targeted preventive strategies including workplace health promotion, routine cardiovascular screening, tobacco and alcohol cessation initiatives, and enhancements in living and working conditions are vital for mitigating the burden of cardiovascular disease within this underserved workforce. Enhancing occupational health policies and incorporating migrant workers into formal healthcare systems will be essential measures to improve their long-term cardiovascular health and overall well-being.

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