

**Occupational Exposures and Cardiovascular Disease**  
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**ABSTRACT**

*Background*

This review analyzes the relationship between CVD health disparities and various occupational hazards like job type, psychosocial pressures, and physical requirements. The research investigates how these occupational exposures create biological pathways to produce pathological effects.

*Methods*

A literature review of relevant prospective cohort and cross-sectional studies used PubMed and Google Scholar databases for identification purposes. The research design focused on studies which looked at cardiovascular endpoints in relation to job-demand-control model occupational exposures. The research focused on three main cardiovascular endpoints which were coronary heart disease (CHD) stroke and CVD-related deaths.

*Results*

The analysis of five prospective cohort studies shows that employment status directly correlates with the risk of developing CVD. Women in jobs with high emotional demands and frequent interpersonal confrontation showed a 4-12% higher risk of CVD whereas men in similar positions faced a 2-8% higher risk. Certain job sectors such as construction and service industries demonstrated substantial CVD mortality risks with hazard ratios reaching 3.95 and 2.51 respectively. The mortality risk for cardiovascular disease significantly increased when job strain rose during a nine-year period (HR 2.37) even though solitary cross-sectional measurements failed to reveal this pattern. Physical aspects of employment serve as crucial risk factors for disease. Workers who spend most of their time on their feet face twice the heart disease risk when compared to people who work while seated. Workers who spent extended periods of sitting developed major cardiovascular disease events at elevated rates regardless of their manual or non-manual occupations but non-manual workers who sat for eight hours or longer experienced the greatest risk.

*Conclusion*

Occupational exposures play a substantial role in shaping cardiovascular health. The risk

develops from multiple psychosocial stress factors which trigger harmful physiological effects by activating the hypothalamic-pituitary-adrenal axis and physical job requirements that affect both work-related pressure and health choices.

## **INTRODUCTION**

The primary cause of worldwide deaths is cardiovascular disease (CVD), and its incidence continues to rise despite medical progress [3]. The original focus on individual modifiable clinical risk factors such as hypertension, dyslipidemia, and smoking has proven beneficial but medical professionals now recognize it as an insufficient approach for prevention [1]. Social determinants of health (SDOH) serve as fundamental drivers of health outcomes including cardiovascular morbidity and mortality [8]. These determinants actively create both risk exposure and resource access for individuals from the time they are born until they die. Among these determinants is an individual's occupation [7]. Work represents a fundamental aspect of adult existence because it determines both physical activity patterns and stress experiences as well as behavioral decisions and economic stability [7]. General socioeconomic status (SES) has been proven to correlate with cardiovascular disease (CVD) risks through an established inverse relationship which demonstrates that lower SES generates risks equivalent to primary biological risk factors [8]. To develop effective targeted interventions it is essential to study particular occupational exposures that influence biological pathways which lead to disease development. The job-demand-control (JDC) model evaluates psychosocial work stressors by defining job strain as the combination of high psychological demands and low decision latitude or control [7]. This model proposes that these workplace conditions create enduring physical stress that results in allostasis overload, inflammation, and damage to blood vessels, all of which play a role in atherosclerosis formation [1]. The review combines existing epidemiological evidence to solve the research question about how distinct job-related elements such as psychosocial conditions and work demands affect cardiovascular disease separately and together. This review establishes the scientific basis to develop evidence-based interventions for clinical practice, public health policy, and workplace wellness programs which promote cardiovascular health equity.

## **METHODS**

### *Search Strategy*

The literature search was conducted through PubMed and Google Scholar databases. The search design aimed to detect research studies which studied the relationship between workplace elements and cardiovascular disease. Researchers used the following search terms which combined Medical Subject Headings (MeSH) and text words: ("occupation" OR "occupational class" OR "job strain" OR "work stress" OR "shift work" OR "manual labor") AND ("cardiovascular disease" OR "coronary heart disease" OR "stroke" OR "myocardial infarction") AND ("risk" OR "mortality" OR "incidence").

### *Study Selection*

Research papers had to include large-scale prospective cohort or cross-sectional studies that showed direct evidence between occupational hazards and cardiovascular disease outcomes. Research investigating potential mechanisms in the findings was also accepted for review. The exclusion criteria included case reports as well as studies below 1,000 participants unless they were mechanistic in nature, studies published in languages other than English, and research focused on specific groups that lacked general applicability. The selection process revealed five high-quality prospective cohort studies which provide evidence for the results section.

## **RESULTS**

Prospective cohort studies show that particular quantifiable occupational factors serve as independent risk factors for cardiovascular disease beyond other known risk elements and socioeconomic status indicators [2]. Research from five essential studies shows that psychosocial stressors together with job classification and physical work demands operate as main risk factors. The findings are presented in Table 1.

**Table 1. Summary of Key Findings**

| <b>Author, Year<br/>(Study ID)</b> | <b>Study Type</b> | <b>Occupational<br/>Variable(s)</b>                                | <b>CVD<br/>Outcome(s)</b> | <b>Main<br/>Findings</b>  |
|------------------------------------|-------------------|--|---------------------------|---|
| Unge et al.,<br>2025               | Cohort            | Person-related<br>work<br>(emotional<br>demands,<br>confrontation) | CVD, CHD,<br>Stroke       | High<br>exposure to<br>emotional<br>demands and<br>confrontation<br>at work<br>increases<br>CVD risk by<br>4-12% in<br>women and<br>2-8% in<br>men. |

|                  |        |   |                             |  |
|------------------|--------|---|-----------------------------|--|
| Li et al., 2025  | Cohort | Occupation categories (e.g., construction, sales) | CVD and all-cause mortality | Workers in construction/clean-up (HR 3.95) and sales/service (HR 2.51) industries have higher CVD mortality. |
| Lee et al., 2021 | Cohort | Job strain (demand-control                        | CVD mortality               | An increase in job strain over a nine-year period  |

|                    |        |   |                        |  |
|--------------------|--------|---|------------------------|--|
|                    |        | model) over time                                  |                        | was associated with a more than twofold increase in CVD mortality risk (HR 2.37).  |
| Smith et al., 2018 | Cohort | Occupational body position (sitting vs. standing) | Incident heart disease | Occupations requiring predominantly standing were associated with a twofold higher risk of heart disease compared to sitting-based jobs. |

|                 |        |   |                                 |  |
|-----------------|--------|---|---------------------------------|--|
| Li et al., 2024 | Cohort | Daily sitting time in manual vs. non-manual workers | Major CVD events, CVD mortality | Longer sitting time increases CVD risk in both manual and non-manual workers, with risk increasing with duration of sitting. |
|-----------------|--------|---|---------------------------------|--|

A 2025 Swedish register-based cohort study of approximately two million workers examined the cardiovascular impact of "person-related work," defined by dimensions of emotional demands and interpersonal confrontation [2]. The analysis revealed statistically significant increased risks of incident CVD among workers exposed to high levels of these psychosocial stressors [2]. The hazard ratios demonstrated that women face a 4% to 12% elevated risk of developing CVD and men experience a 2% to 8% elevated risk [2]. The study demonstrated that worksite social support mitigated these effects because those receiving higher social support did not show increased risks thus indicating an intervention opportunity [2].

The U.S. National Health and Nutrition Examination Survey (2005–2014) conducted a prospective analysis to demonstrate occupational class connections with death rates through 9.9 years of median observation [3]. The analysis indicated that occupation stood as an independent factor that predicted CVD death after controlling for multiple confounders [3]. The construction and clean-up industry demonstrated the highest risk of CVD mortality among reference groups with a hazard ratio of 3.95 (95% CI 1.94–8.04) [3]. The sales and service industry workers demonstrated a significantly higher CVD mortality risk than other workers at HR 2.51 (95% CI 1.15–5.52) [3]. These findings reveal certain industrial sectors where workers experience unusually high fatal cardiovascular event rates that persist beyond other contributing variables [3].

The MIDUS cohort study based in the United States examined job strain effects through longitudinal analysis between two time points that were nine years apart [4]. CVD mortality assessments based on job strain measurements at a single point in time did not reveal any association, but a longitudinal examination showed people whose work stress intensified between assessments developed a significantly higher risk of CVD mortality [4]. The research shows that people with deteriorating work stress experienced a 2.37 (95% CI 0.88–6.42) times higher risk of fatal cardiovascular events [4].

Research based on a 12-year study of Canadian workers exceeded 7,300 participants to prove that work demands create risks beyond the traditional sedentary behavior focus [5]. The investigation evaluated occupational work postures and found that workers who spent most of their time standing faced double the risk of developing heart disease when compared to workers who spent most of their time seated [5]. The study established that static postures of any kind cause negative cardiovascular effects through the combination of elevated hydrostatic venous pressure and oxidative stress [5].

Sedentary work does not receive a total clearance from this research [6]. The study examined manual versus non-manual worker groups through prospective data collection from 43,000 Chinese participants to determine the effects of daily sitting time on cardiovascular health [6]. The study showed that extended periods of sitting generated a graded association with major CVD events in both groups [6]. Manual workers who spent between 6 and 8 hours daily sitting faced an increased risk of CVD (HR 1.20; 95% CI 1.05–1.37) while workers who sat for more than 8 hours had a higher risk (HR 1.43; 95% CI 1.12–1.82) [6]. The study found elevated cardiovascular disease risks among workers in the non-manual group when they spent long periods sitting down, and the results showed the highest effect in this population [6]. The study demonstrates that excessive sitting periods function as a strong independent risk factor which affects cardiovascular disease occurrence in all social groups [6].

## **DISCUSSION**

The prospective epidemiological studies demonstrate that occupation functions as a crucial factor that shapes cardiovascular health through separate physical and psychosocial pathways [2]. The research presents evidence beyond socioeconomic associations to pinpoint work-specific risk factors which directly impact cardiovascular disease outcomes and deaths [2].

Studies about job strain and person-related work demonstrate that continuous psychosocial stress leads to CVD pathogenesis [2]. High-strain jobs according to the demand-control model create prolonged stress responses which disrupt HPA axis and sympathetic nervous system functions [1]. Atherosclerosis development and progression occurs through elevated cortisol levels and increased systemic inflammation together with endothelial dysfunction [1]. The analysis revealed that people who experienced increased job strain during follow-up had a substantially higher risk of dying from cardiovascular diseases [4]. The results demonstrate that unrelenting and deteriorating stress poses an extreme risk to cardiovascular health [4]. Social support moderates these adverse physiological effects to become a critical intervention point for organizational programs [2].

The physical requirements at work produce CVD risk by using advanced methods that extend

past the basic distinction between sitting and physical activity [5]. The research demonstrates that prolonged standing increases the risk of disease since it produces negative effects without exercise benefits by raising venous pressure and generating oxidative stress [5]. Prolonged sitting continues to be a major risk factor that affects all occupations because it likely results from unfavorable metabolic changes that replace more intense physical movements [6]. Research has proven that high physical demands at work do not enhance fitness levels in the same way as physical activities during leisure time and simultaneously cause fatigue that makes people avoid exercising outside of work [9]. This creates a negative feedback loop that exacerbates CVD risk [10].

The occupational risk gradient does not exist universally across all populations [11]. This points to the influence of broader sociocultural contexts [11]. Research in Western countries shows entry level occupations have higher CVD risk but Japanese studies found higher rates of CHD among managers and professionals [11]. The observed gradient may be due to cultural differences in work intensity, social pressures, and risk behavior prevalence like smoking across occupational groups [11]. This shows that public health interventions need to be adapted to local conditions rather than using a universal occupational risk model [11].

### *Limitations*

The evaluation depends on multiple constraints from the original research materials. The main problem with this analysis stems from its use of observational cohort studies. The strong temporal links found in these studies do not establish causality since unmeasured confounders or residual confounding factors might exist. It remains difficult to determine how much occupation independently affects the outcome because socioeconomic factors like income and education strongly correlate with it. Several research studies use either self-reported data or job-exposure-matrix-based assessments for occupational characteristics. The measurement approaches used in this study face two major issues because they result in errors during data collection and incorrect classification of data points. Future studies need to use large-scale intervention trials with modified workplace conditions to establish direct causal links between occupational exposures and cardiovascular health results.

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