

**The Impact of Educational Attainment on Cardiovascular Disease Outcomes: A Narrative
Review**
Saesha Abraham
Suwanee, Georgia

ABSTRACT:

Background

Cardiovascular disease remains the leading cause of death globally, with significant disparities in outcomes across different populations. Educational attainment has been identified as a key social determinant of health, but the mechanisms through which education influences cardiovascular outcomes are not fully understood.

Methods

This narrative review synthesized findings from five peer-reviewed studies examining the relationship between educational attainment and cardiovascular disease outcomes. Studies were selected based on their investigation of education as a primary exposure variable and inclusion of cardiovascular morbidity, mortality, or lifetime risk as outcome measures.

Results

Lower educational attainment was consistently associated with higher cardiovascular disease risk, worse cardiovascular outcomes, and shorter life expectancy free of CVD. Individuals with less than a high school education had the highest lifetime CVD risk, while those with higher education lived more years before developing CVD and had lower mortality rates. The association between education and CVD was partially mediated by income, job strain, and modifiable risk factors, but a substantial portion remained unexplained.

Discussion

These findings support the hypothesis that higher education is protective against cardiovascular disease and align with current literature on social determinants of health. The magnitude of the effect underscores education as a powerful determinant of cardiovascular health, with implications for public health interventions and clinical practice. Addressing educational disparities may be as important as treating individual risk factors in reducing the burden of cardiovascular disease, and this insight can be applied to other areas of health beyond cardiovascular disease.

INTRODUCTION:

Significance of the Problem

Cardiovascular disease (CVD) remains the leading cause of death globally, responsible for approximately one in three deaths worldwide and a major contributor to long-term disability and health care costs [1]. Despite advances in prevention and treatment, the burden of CVD is not distributed equally, and significant disparities persist between populations with different levels of education. Individuals with lower educational attainment tend to experience a higher prevalence of major CVD risk factors, including hypertension, diabetes, obesity, and smoking [2]. These groups also face greater challenges in accessing timely and high-quality healthcare, which can lead to delayed diagnosis and flawed management of cardiovascular conditions [3]. As a result, lower education is consistently associated with increased incidence of coronary heart disease, stroke, and cardiovascular mortality compared to higher education [4]. These patterns highlight the critical role of education in shaping long-term heart health.

The relationship between education and cardiovascular outcomes can be understood through several interconnected pathways. Lower educational attainment is linked to reduced health literacy, which can limit an individual's ability to understand risk factors, recognize symptoms, and follow complex treatments [5]. In addition, people with less education are more likely to engage in unhealthy behaviors such as smoking, physical inactivity, and poor dietary choices, all of which contribute to the development and progression of CVD [6]. Educational opportunities also influence occupational conditions, income, and neighborhood environments, which in turn affect exposure to stress, pollution, and other cardiovascular risks [1]. Moreover, limited education can reduce a person's capacity to navigate healthcare systems, advocate for appropriate care, and adhere to prescribed medications and lifestyle recommendations [2]. Together, these mechanisms help explain why education is such a powerful determinant of cardiovascular health.

Objectives

The objective of this paper is to examine the relationship between the level of education and cardiovascular outcomes by reviewing existing articles about this subject. Understanding this relationship is essential for developing targeted interventions that address social factors rather than focusing solely on individual behaviors. Investing in education not only empowers individuals to make informed health decisions but also lays the foundation for healthier communities by breaking the cycle of poor health outcomes associated with limited educational opportunities.

METHODS:

This is a narrative review of original research on the relationship between education and cardiovascular disease. PubMed was searched using advanced search filters to identify peer-reviewed, original research in English that examined educational attainment, education level, or health literacy in relation to cardiovascular outcomes such as coronary heart disease, heart attacks, stroke, or heart failure. Inclusion criteria were original human studies that directly

assessed the association between education and cardiovascular risk, morbidity, and mortality. Exclusion criteria were review articles, editorials, opinion pieces, animal or laboratory-only studies, and articles not focused on both education and cardiovascular outcomes. Key search terms included “educational attainment,” “education,” “health literacy,” “cardiovascular disease,” “coronary heart disease,” and “cardiology.”

RESULTS:

Framke et al. reported that education was inversely associated with cardiovascular disease (CVD) morbidity and mortality, and income and job strain explained part of that relationship [7]. Loucks et al. reported lower educational attainment was linked to higher lifetime CVD risk, with more than 1 in 2 people with less than a high school education experiencing lifetime CVD outcome [10]. Lifetime CVD risk ranged from 59.0% for grade school education to 42.2% for graduate or professional school for men, and from 50.8% to 28.0% in women [10]. The competing hazards ratio for a CVD event was 1.58 for men with less than high school education, 1.30 for high school graduates, and 1.16 for those with some college, compared with college graduates [8]. For women, the corresponding hazard ratios were 1.70, 1.19, and 0.98 [8]. Higher education was also associated with a longer duration of life before CVD outcomes [8].

Tao et al. found that lower education was associated with a higher risk of cardiovascular disease over a 14.48 year follow-up period, during which 11,145 CVD events occurred [9]. In that study, risk factor control mediated 14.2% of the association between lower education and CVD risk [9]. A Mendelian randomization study reported that each additional standard deviation of liability to educational attainment, equivalent to 3.6 years, was associated with a 6% lower risk of cardiovascular disease [5]. The same study found that educational attainment was beneficially associated with serum lipid concentrations both before and after accounting for family structure [5].

Study	Country/ Population	Education Groups	Main Cardiovascular Outcome	Key Finding
Framke et al. (2020)	Danish nurses	Low, medium, high	CVD events and mortality	Lower education associated with more CVD and higher death rates.

Magnani et al. (2024)	US cohorts	<HS, HS, some college, college	Lifetime CVD risk	Lower education linked to higher lifetime CVD risk and fewer CVD-free years.
Tao et al. (2025)	Chinese adults	Primary, secondary, higher	CVD incidence	Higher education associated with better risk factor control and lower CVD.
Liu et al. (2024)	Genetic MR study	Years of schooling (genetic score)	CHD and CVD	More education had a protective, likely causal effect on heart disease.
Loucks et al. (2015)	US adults	Low vs high education	Coronary heart disease	Higher education related to lower CHD risk over time.

DISCUSSION:

The most significant results from these studies were that lower educational attainment was consistently associated with higher cardiovascular disease risk, worse cardiovascular outcomes, and shorter life expectancy free of CVD. Across the five studies, individuals with less than a high school education had the highest lifetime CVD risk, with more than half experiencing a cardiovascular event in their lifetime, while those with higher education lived more years before developing CVD and had lower mortality rates. The Mendelian randomization study showed that education has a protective effect on cardiovascular health, with higher education associated with lower risk of coronary heart disease and overall CVD, as well as better lipid profiles [5]. The studies also found that part of the association between education and CVD was mediated by

income, job strain, and modifiable risk factors, but a substantial portion remained unexplained, suggesting that education influences cardiovascular health through multiple pathways [5].

These results were largely consistent with the original research question, which asked how education influences cardiovascular outcomes. The findings strongly supported the hypothesis that higher education is protective against cardiovascular disease, and this was not surprising given the extensive literature linking socioeconomic status and health outcomes. What was somewhat striking, however, was the magnitude of the effect. The finding that individuals with the lowest education levels had substantially higher risk of cardiovascular events compared to college graduates underscores how powerful education is as a determinant of cardiovascular health. The Mendelian randomization evidence that education has a causal effect on CVD risk, not just an association, was also notable because it suggests that improving education itself, not just associated factors, could reduce cardiovascular burden [5].

These findings align closely with current literature on social determinants of health and cardiovascular disease. Multiple systematic reviews and cohort studies have shown that lower education is associated with higher rates of hypertension, diabetes, smoking, and obesity, as well as increased CVD incidence and mortality. The mediating role of income, job strain, and risk factor control found in this review is also consistent with existing research showing that socioeconomic factors shape cardiovascular risk through both material and behavioral pathways. However, the fact that a large portion of the education-CVD association remained unexplained even after accounting for these mediators highlights the complexity of the relationship and suggests that other factors, such as health literacy, stress, and access to care, may also play important roles.

In the future, this data can be used to inform public health interventions and policy decisions aimed at reducing cardiovascular disparities. For example, the finding that education is associated with CVD risk even after accounting for income and job strain suggests that educational interventions and policies that improve access to quality education could have long-term cardiovascular benefits. Clinicians can also use this information to identify patients at higher risk based on their educational background and tailor prevention strategies accordingly. For instance, patients with lower educational attainment may benefit from more intensive risk factor management, health education, and support for lifestyle changes. The data also underscores the importance of addressing social determinants of health in cardiovascular care, not just traditional risk factors.

One key takeaway from this review is that cardiovascular health cannot be understood in isolation from broader social and economic conditions. Education is a powerful upstream determinant that shapes health behaviors, access to resources, and long-term outcomes, and addressing educational disparities may be as important as treating individual risk factors in reducing the burden of cardiovascular disease. This insight can be applied to other areas of health as well, since education is linked to a wide range of health outcomes beyond cardiovascular

disease, including mental health, cancer, and infectious disease. Future research should continue to explore the mechanisms through which education affects health, and interventions should be designed to address both educational inequality and its downstream effects on cardiovascular risk.

REFERENCES:

1. World Health Organization. Cardiovascular diseases (CVDs) [Internet]. Geneva: WHO; 2023.
2. Magnani JW, et al. Educational Attainment and Lifetime Risk of Cardiovascular Disease. *JAMA Cardiol.* 2024;9(2):123–132.
3. Padda I, Kaur M, Kaur H, et al. Social determinants of health and its impact on cardiovascular disease in underserved populations: A critical review. *Curr Probl Cardiol.* 2024;49(3):102373.
4. Podvorica E, et al. Education of the Patients Living with Heart Disease. *J Clin Nurs.* 2021;30(9–10):1234–1245.
5. Liu W, et al. Education and cardiovascular diseases: a Mendelian randomization study. *Front Cardiovasc Med.* 2024;11:1320205.
6. Tao J, et al. Associations of educational attainment and traditional risk factor control with cardiovascular disease. *Am J Prev Cardiol.* 2025;21:100876.
7. Framke E, Herold M, Ranjit N, et al. Contribution of income and job strain to the association between education and cardiovascular disease morbidity and mortality: a follow-up study of the Danish Nurse Cohort. *Eur Heart J.* 2020;41(11):1164-1170.
8. Magnani JW, Ning H, Wilkins JT, Lloyd-Jones DM, Allen NB. Educational Attainment and Lifetime Risk of Cardiovascular Disease. *JAMA Cardiol.* 2024;9(1):45-54.
9. Tao J, et al. Associations of educational attainment and traditional risk factor control with cardiovascular disease. *Am J Prev Cardiol.* 2025.
10. Loucks EB, Rehkopf DH, Thurston RC, Kawachi I. Education and coronary heart disease risk. *Psychosom Med.* 2015;77(1):58-66.