

The Impact Of Socioeconomic Circumstances On Cardiovascular Health

Vedaant Bhatia

Los Altos, CA

ABSTRACT:

Background

As a growing international issue, cardiovascular disease (CVD) is notorious for its mortality rates and five key risk factors: diabetes, substance abuse, poor dieting, poor exercise, and stress. However, a social determinant of health, socioeconomic status (SES) is also hypothesized to play a significant role in cardiovascular health. This literature review aims to explore the significance of SES in cardiovascular health globally using five research articles.

Methods

The search engines PubMed and Google Scholar were utilized in this literature review, using key search terms, [Cardiology OR Cardiovascular Disease OR CVD] AND [Socioeconomic]. The inclusion criteria were factors related to income, occupation, living standards, or class. The exclusion criteria were factors based on demographics like culture or ethnicity, non-original research, and sample groups under 5,000 participants.

Results

All five studies concluded that there is a proportional correlation to cardiovascular health and SES. Notably, 25% of all US adults with early coronary heart disease (CHD) burden between ages 35 and 64 years of age were found to have low SES.

Discussion

The correlation between SES and CVD is significant and on a global scale, in a variety of ways including worsening risk factors, preventing sustainable access to healthcare resources, and increasing mortality rates.

INTRODUCTION:

Significance of the Problem

Cardiovascular disease (CVD) is the most widespread major disease in the United States, so much so that $\frac{1}{5}$ of all deaths in the United States are due to CVD [1]. The risk factors associated with CVD are comorbidity of diabetes, substance abuse, poor dieting, a lack of exercise, and stress [1]. However, there are also social determinants of health that are known to correlate to these risk factors and the trends of cardiovascular health all over the planet, including education, systemic prejudice, healthcare access, community, and socioeconomic status (SES) [2]. By

investigating the trends of social determinants, we can address modern-day issues when it comes to cardiology and the risk factors associated with it.

Socioeconomic status (SES) for example, may contribute to higher risk for CVD due to poorer health insurance in occupations, less flexible work schedules, and low income that may prevent people who are symptomatic for CVD refrain from getting often expensive and demanding healthcare resources [2]. Someone's SES is tied to risk factors like stress or poor exercise due to a lack of flexibility in work hours, or poor dieting due to less income providing less options on the table. Hence, addressing SES is important to improving the cardiovascular health of individuals all over the globe.

Objectives

This literature review will analyze studies of cardiovascular health among populations of varying demographics to find out whether or not SES is a significant factor in CVD. By highlighting the social links to cardiovascular health, this paper aims to advocate for the further financial aid of lower SES-bound individuals to make a positive impact on cardiovascular health.

METHODS:

Search Strategy

PubMed and Google Scholar were used to conduct this scoping literature review on CVD and how it correlates to SES. The key search terms were [Cardiology OR Cardiovascular disease OR CVD] AND [Socioeconomic].

Inclusion and Exclusion Criteria

The inclusion criteria were factors related to income, living standards, class, or occupation that correlated to cardiovascular health, not exclusive to the United States. In general, I attempted to search for studies based in different regions and levels of development to widen the scope of our results.

The exclusion criteria were factors based on demographics such as ethnicity and culture, or non-original research. Research that surveyed a low population (<5,000) of individuals were also excluded.

RESULTS:

Tabulated Results Summary

Title	Author	Procedure	Conclusion
Relationship between the shift of socioeconomic status and cardiovascular mortality [3].	Jidong Sung, Yun-Mi Song, Kyung Pyo Hong	-172,812 participants -South Korea -Mortality rates based on SES were assessed for all patients to find a link between SES and CVD	Mortality rates were found to be significantly higher for people of low and middle SES
Modifiable risk factors, cardiovascular disease, and mortality in 155 722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study [4].	Salim Yusuf, Philip Joseph, Sumathy Rangarajan, et al.	-155,722 participants -21 countries among varying SES -The goal was to analyze modifiable risk factors for CVD and mortality rates	Out of 14 modifiable risk factors found, a significant amount of mortality rates were based on SES, concluding that SES was a significant factor.
Effects of Socioeconomic Status on Access to Invasive Cardiac Procedures and on Mortality after Acute Myocardial Infarction [5].	David A. Alter, M.D., C. David Naylor, M.D., D.Phil., Peter Austin, Ph.D., and Jack V. Tu, M.D., Ph.D.	-51,951 patients -Canada -Income averages assessed based on access to cardiac procedures a year after myocardial infarction	-Results concluded decreased waiting times for treatments were sharply connected to an increase in median neighborhood salary
Association of Low Socioeconomic Status With Premature Coronary Heart Disease in US Adults [6].	Joanne Penko, Rita Hamad, Dhruv S. Kazi, et al.	-31.2 million participants -United States -The observed risk factors were compared with SES to determine the correlation between SES and cardiovascular health	-This study concluded that SES is a significant factor in the cardiovascular health of American adults
Impact of Socioeconomic Status on Cardiovascular Disease and Mortality in 24,947 Individuals With Type 1 Diabetes [7].	Araz Rawshani, Anne-Marie Svensson, Annika Rosengren, Björn Eliasson, Soffia Gudbjörnsdottir	-24,947 patients -Sweden -The study examined SES to determine if it was a risk factor of CVD in type 1 diabetes patients	-The study concluded that SES was significant in the outcome of CVD in the patients

Study Procedures

Sung et al. selected 178,812 deceased participants who were 20+ years of age, had available medical records, and varying SES in a study to determine the correlation between socioeconomic status (SES) and cardiovascular disease (CVD) [3]. Similarly, The Prospective Urban Rural Epidemiology (PURE) study conducted by Yusuf et al. had 155,722 people, although they acquired data from 21 countries among varying economic statuses in order to obtain a wider scope. Yusuf et al. aimed to provide a thorough analysis of modifiable risk factors for CVD all over the globe using mortality rates among different ethnic and socioeconomic groups [4]. In contrast, a vital study composed by Alter et al. solely in the Canadian province of Ontario examined the performance of the Canadian healthcare system by assessing the impact of neighborhood incomes on access to cardiac procedures and mortality a year following myocardial infarction. Alter et al. assessed 51,591 patients and former patients who experienced acute myocardial infarction and used the median income of their respective neighborhoods to assess their SES [5]. Being a notable maverick, Penko et al. conducted a computer simulation study using the Cardiovascular Disease Policy Model and trends of coronary heart disease (CHD) in the United States. Penko et al. conducted a computer simulation and utilized mortality rates and the trends of risk factors to be compared with SES among all American adults between 35 and 64 years old to detect whether or not an underlying correlation exists between SES and risk factors for CHD in the United States [6]. Finally, Rawshani et al. performed a study in Sweden to investigate the linkage between SES and CVD in adults with type-1 diabetes [7]. Rawshani et al. studied 24,947 Swedish adults with type-1 diabetes and measured socioeconomic factors including income, occupational benefits, living standards, and marital status [7].

Study Outcomes

Sung et al. determined that cardiovascular mortality rates were significantly higher for people of low and even middle SES compared to higher SES [3]. The used regression model used a hazard ratio of 0.46, 95% confidence interval 0.4-0.52 which demonstrated that an upward shift of SES was associated with a lower risk of cardiovascular mortality [3]. Additionally, Yusuf et al. observed that a concerning amount of mortality rates were based on poverty, a lack of exercise, and other factors related to lower-income circumstances affecting people's cardiovascular health [4]. The population-attributable fractions or PAF were composed of many unfortunate shortcomings when it came to the wealth gaps in different countries, causing a concerning amount of substance abuse that made up 26.3% of PAF [4]. Moreover, Alter et al. noted that the waiting times for treatments for patients in the study decreased by 45% and that fatality was reduced by 10% for every \$10,000 increase in neighborhood median income [5]. Likewise, Penko et al. recorded that 25% of all adults aged between 35 and 64 years old in the United States who demonstrated early CHD burden were of significantly low SES based on projections through the simulation [6]. Furthermore, using the Cox Regression Model with a socioeconomic

variable, Rawshani et al. produced results indicating that factors associated with SES including marital status and higher income demonstrated a 50% lower risk of CVD in all potential-risk patients. It was noted that lower SES was observed to have increased the fatality rate of CVD by 2-3 times in type 1 diabetes patients [7].

DISCUSSION:

Key Findings

Based on the findings of these five studies, it's abundantly clear that SES has an impact on CVD of an individual of almost any age globally, whether it comes to causing early burden for CHD, increasing mortality rates, or worsening due to associated risk factors [2-7]. To reiterate, in the United States alone, CVD is an overwhelming fifth of deaths and the fact that a fourth of early burden of cardiovascular issues are correlated to a low SES demonstrates the large role SES plays in cardiovascular health nationwide [1, 6]. It's also transparent that this is an international issue, as shown by increased mortality rates based on SES in 21+ countries all over the globe, and that mainstream risk factors including diabetes and stress plays a role in CVD in accordance with SES [2, 4, 7].

Addressing Drawbacks

Although the evidence gathered from analyzing the five studies does heavily align with the idea that cardiovascular health correlates to SES, there are potential drawbacks to the analysis that should be addressed before proceeding [2-7]. While these studies did take large numbers of people into account, they may not represent entire populations. It's also worth noting four of the studies are entirely focused on a developed yet diverse set of nations including the United States, Republic of Korea, Sweden, and Canada which may not be representative of cardiovascular health on an international scale, particularly in low-income countries [3-7]. While most of the studies were based in developed countries, Yusuf et al. took into account 21 diverse nations of varying development and standards of living which strengthens our ability to generalize the findings globally [4].

Moving Forward

The purpose of this literature review was to bring light to the global issue of SES upon cardiovascular health in order to promote further research and application of strategies to combat economic disparity and classism as modifiable risk factors of CVD.

REFERENCES:

1. Heart Disease and Stroke Prevention. New York State Department of Health. 2023.
2. Escarce J. Health Inequity in the United States. Penn LDI. 2019.

3. Sung J., Sung Y., Pyo Hong K. Relationship between the shift of socioeconomic status and cardiovascular mortality. *European Journal of Preventive Cardiology*. 2020; 27:749-757.
4. Yusuf S., Joseph P., Rangarajan S., et al. Modifiable risk factors, cardiovascular disease, and mortality in 155 722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *The Lancet*. 2020; 395:795-808.
5. Alter D., Naylor D., Phil D., Austin P., Tu J. Effects of Socioeconomic Status on Access to Invasive Cardiac Procedures and on Mortality after Acute Myocardial Infarction. *The New England Journal of Medicine*. 1999; 341:1359-1367.
6. Penko J., Hamad R., Kazi D., et al. Association of Low Socioeconomic Status With Premature Coronary Heart Disease in US Adults. *JAMA Cardiology*. 2020; 5(8):899-908.
7. Rawshani A., Svensson A., Rosengren A., Eliasson B., Gubjornsdottir S. . Impact of Socioeconomic Status on Cardiovascular Disease and Mortality in 24,947 Individuals With Type 1 Diabetes. *Diabetes Care*. 2015; 38(8):1518-1527.