The Impact of Socioeconomic Factors on Heart Disease: Analysis of Trends and Strategies for Improving Population Health

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Abstract. This article analyzes the influence of socioeconomic factors on cardiovascular diseases in order to identify trends and strategies for improving population health. Cardiovascular disease remains a significant public health problem worldwide, and its prevalence varies according to various socioeconomic determinants. Through a comprehensive review of existing literature and statistics, the article examines the relationship between socioeconomic factors such as income, education, employment, and access to health care and the occurrence and consequences of cardiovascular disease. In addition, changing trends in the prevalence of cardiovascular disease among different demographic groups and geographic regions are examined. The findings highlight the important role of socioeconomic factors in shaping inequalities in the burden of cardiovascular disease and highlight the importance of targeted interventions and policies to address these inequalities. By understanding the complex interaction between social status and cardiovascular disease, health systems and policymakers can develop more effective strategies to promote cardiovascular health and reduce the burden of cardiovascular disease in populations around the world.

1 Introduction

The pervasive socioeconomic disparities observed in cardiovascular disease (CVD) pose significant challenges and opportunities for public health interventions. Despite extensive research on the pathways linking socioeconomic disadvantage to cardiovascular risk, effective strategies to address these inequalities remain elusive [1]. Closing the gap in CVD mortality associated with socioeconomic factors could yield substantial public health benefits, potentially saving thousands of lives annually [2]. This review explores the complex relationship between socioeconomic status (SES) and CVD, highlighting key points:

1. Socioeconomic and geographic disparities exist in the incidence, prevalence, and mortality of various cardiovascular health outcomes, with disadvantaged individuals experiencing higher rates of CVD.

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2. Inequalities in CVD risk can emerge early in life, with physiological changes possibly initiating before birth and continuing through adolescence and into adulthood.

3. These inequalities persist over time and across countries, although the magnitude and patterns may vary.

4. Health behaviors partially mediate socioeconomic effects on CVD risk, but addressing behavioral and non-behavioral pathways is essential to eliminating inequalities.

5. Behavioral patterns are shaped by social and physical environments, necessitating a deeper understanding of why these patterns differ among socioeconomic groups and geographic regions [3].

6. Leading hypotheses regarding the mechanisms generating socioeconomic and geographic inequalities in CVD are discussed, along with promising areas for future research and intervention studies.

The review also provides insights into the definition of socioeconomic status (SES) and its multifaceted role in influencing cardiovascular risk, drawing on the Fundamental Cause theory. By elucidating the complex interplay between socioeconomic factors and cardiovascular health, this review aims to inform future public health efforts aimed at reducing health disparities and promoting cardiovascular well-being.

2 Research methodology

Recent studies propose that socioeconomic status (SES) can have varying effects on individuals at different stages of life due to sensitive developmental periods or socially defined vulnerable phases. This underscores the importance of thoroughly assessing SES throughout one's life. Competing theories offer different explanations regarding when and for how long socioeconomic disadvantage influences long-term health outcomes. While the "cumulative" model suggests that risk factors accumulate gradually over time, the "critical period" model argues that certain developmental stages have a more significant impact. Research suggests that both early-life disadvantage and adult SES can affect cardiovascular risk through multiple mechanisms operating at different life stages [4]. Moreover, there is evidence indicating that social mobility, especially downward mobility, may increase the risk of cardiovascular disease. Distinguishing between these models is essential for developing interventions to mitigate socioeconomic health disparities, although empirically testing them presents challenges. Advances in regression models and analytic tools are assisting in this effort, but their application in life-course epidemiology remains somewhat limited.

3 Results and Discussions

Recent research shows a strong link between socioeconomic status (SES), measured by factors like job type, education level, and income, and dietary quality. This connection is particularly significant because socioeconomically disadvantaged groups have a higher incidence of coronary heart disease (CHD) and cardiovascular disease (CVD) mortality. It's plausible that diet contributes to these differences [5].

Individuals with lower SES tend to favor foods such as white bread, potatoes, pasta, and refined cereals, whereas those with higher SES prefer whole grain products with lower glycemic index and more fiber [6]. Conversely, higher SES individuals consume more fruits and vegetables compared to middle and lower SES groups. Studies have measured these disparities, highlighting significant differences in fruit and vegetable consumption among various SES groups.

SES also influences dietary choices in other food categories. For example, high SES individuals eat more lean meat and seafood, while lower SES groups consume more fried and canned fish and fatty meats. Similarly, higher SES individuals consume more low-fat cheese and milk, while lower SES groups consume more butter. The consumption of sugary foods varies as well, with socially disadvantaged individuals consuming more sugary sweets, while higher SES individuals opt for pastries and desserts with less sugar. Additionally, lower SES individuals tend to drink more beer and sugary beverages, whereas higher SES individuals are more likely to drink wine, which may have positive effects on CVD health.

These differences in dietary habits based on SES are evident not only in adults but also in children and adolescents [7]. Youth from lower SES families tend to consume more bread and sweets, engage in less physical activity, consume more sugary drinks, and eat fewer fruits and vegetables compared to those from higher SES families.

Overall, these findings emphasize the importance of considering socioeconomic factors in initiatives aimed at promoting healthy eating habits and reducing the risk of CVD among diverse populations, including both adults and children.

In addition to varying impacts over the life course, socioeconomic status (SES) can be defined at different levels: individual (e.g., education), family (e.g., household income), community (e.g., neighborhood poverty), or regional (e.g., state income differences). Often, measurement at one level is used as a proxy for another; for instance, neighborhood SES is often used as a proxy for individual SES due to their strong correlation [4]. However, research suggests that multiple levels may independently predict cardiovascular disease (CVD) risk factors and outcomes [8]. Neighborhood characteristics, such as access to healthy foods and opportunities for physical activity, can influence health behaviors and outcomes regardless of individual SES. While residents of immigrant enclaves may have advantageous dietary habits, low-income communities often lack access to healthy food options. This discrepancy underscores the complexity of measuring SES across different levels and the challenges in accurately capturing its influence on health outcomes. At the individual level, early-life SES is often assessed through parental SES, while education is a stable measure established by early adulthood. Income and occupational class, however, are dynamic and change significantly over time [9]. Neighborhood SES measurement faces challenges due to the heterogeneous nature of neighborhoods and the imperfect alignment of administrative boundaries with individuals' lived experiences. Moreover, other settings such as schools and workplaces may be more relevant for intervention efforts, as they provide structured environments with potential policy interventions to improve health outcomes. In a thorough examination of socioeconomic status (SES) gradients and cardiovascular disease (CVD) risk two decades ago, Kaplan and Keil highlighted the substantial evidence linking socioeconomic disadvantage to increased CVD risk. Recent research has largely confirmed these findings for various CVD outcomes, including myocardial infarction (MI), stroke, and heart failure (HF). Recent systematic reviews and meta-analyses have shed light on the contexts where SES inequalities in CVD are more pronounced or less pronounced.

Behavioral differences are commonly cited to explain SES-related health inequalities, including those in CVD [6]. However, recent studies suggest that while behavioral factors contribute to these inequalities, they do not entirely account for them. Methodological challenges, such as the difficulty in establishing causality due to the non-random assignment of health behaviors in empirical studies, complicate interpretations. Additionally, the structural influence of social settings, such as neighborhoods, workplaces, and schools, shapes health behaviors, making them highly patterned by SES [7].

Psychological experiences influenced by SES, including exposure to adverse social conditions and stressors, play a significant role in CVD risk. Psychosocial stressors can directly impact disease through physiological pathways, such as chronic sympathetic stimulation and hypertension, or indirectly by increasing rates of adverse health behaviors and inducing anxiety or depression [8].

Intrauterine conditions also contribute to adult CVD risk, with low birth weight being a strong predictor [9]. The "fetal origin" theory suggests that intrauterine factors modify fetal growth and susceptibility to environmental risk factors across the lifespan. Research on famine exposure during fetal development further highlights the importance of timing and duration of exposures in shaping long-term CVD risk.

Moving forward, translating evidence into effective interventions to reduce CVD requires distinguishing between causal and non-causal correlates of CVD, which is challenging due to the clustering of social disadvantage. Establishing causal inference may involve innovative research methodologies, such as migration studies and quasi-experimental designs [10]. Understanding the primary mechanisms linking social factors and CVD can guide intervention design, potentially interrupting pathways leading to elevated risk. Utilizing social information for predictive modeling and prioritizing high-risk individuals for preventive interventions may offer practical strategies to address socioeconomic inequalities in CVD. Collaboration between public health and clinical sectors may also be essential in addressing disparities in healthcare delivery and outcomes.

4 Conclusions

The overarching aim of epidemiology is to advance public health and alleviate suffering and illness by scrutinizing disease patterns to reveal root causes. When discrepancies in disease prevalence linked to social factors emerge, they serve as indicators of areas where interventions could mitigate disease burden. Although social disparities in cardiovascular disease (CVD) present sobering challenges, they also present avenues for intervention and prevention.

Translating scholarly research findings on social disparities in CVD into practical public health measures necessitates a synergistic collaboration between observational and interventional research efforts. Current evidence underscores the importance of intervention strategies that concentrate on early developmental stages and address both individual and contextual factors shaping conventional cardiovascular risk factors. This holistic approach recognizes the intricate interplay between socioeconomic status and health outcomes, underscoring the need to tackle social determinants of health alongside individual-focused interventions.

References

1. A.V. Sokolov, A.A. Chulok, Long-term forecast of scientific and technological development of Russia for the period until 2030: key features and first results. Forsyth, **6(1)**, 12-25 (2012)
2. Kh.M. Musaeva, Analysis of key success factors of Russian biotech firms, **76**, 08003 (2023)
3. Y.A. Ivanchenko, T.V. Vorotilina, S.S. Teygisova, I.S. Shul'zhenko, K.A. Selivanova, Fenômeno da competição no ambiente educacional. Revista on line de Política e Gestão Educacional (2022)
4. I. Podkolzina, A. Tenishchev, Z. Gornostaeva, H. Tekeeva, O. Tandelova, Assessment of Threats to Environmental Security and Climate Change. BIO Web of Conferences, **63**, 04002 (2023)

5. I. Podkolzina, A. Tenishchev, Z. Gornostaeva, H. Tekeeva, O. Tandelova, Ecological and Food Security in the Conditions of the Geopolitical Situation in the Worldglobal Digital Transformation Trends in Real Sectors of the Economy. SHS Web of Conferences, **172**, 02041 (2023)
6. L. Agarkova, T. Gurnovich, S. Shmatko, I. Podkolzina, V. Filonich, Priority directions of development of the cluster of innovative education in the regional agro-industrial complex. International Journal of Monetary Economics and Finance, **6(2)**, 718 (2016)
7. A.S. Salamova, O. Dzhioeva, Green transformation of the global economy in the context of sustainable development, 152-159 (2023)
8. R.A. Gakaev, The world's forests are a stabilizing element of the climate system, **76**, 06003 (2023)
9. D.T. Dzhatdoeva, Study of the composition of medicinal plants in the prevention of infectious diseases based on biochemical mechanisms. Bulletin of the Kursk State Agricultural Academy, **9**, 88-93 (2022)
10. S.G. Shmatko, L.V. Agarkova, T.G. Gurnovich, I.M. Podkolzina, Problems of increasing the quality of raw material for wine in the stavropol region, **7(2)**, 725-730 (2016)