

Published: April 30, 2024

Citation: Adedoyin, O., et al., 2024. Analyzing the Reported Prevalence of Heart Disease among United States Adults: Trends from the National Center for Health Statistics Database. Medical Research Archives, [online] 12(4).

<https://doi.org/10.18103/mra.v12i4.5365>

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DOI:

<https://doi.org/10.18103/mra.v12i4.5365>

ISSN: 2375-1924

RESEARCH ARTICLE

Analyzing the Reported Prevalence of Heart Disease among United States Adults: Trends from the National Center for Health Statistics Database

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ABSTRACT

Objective

This study aims to comprehensively analyze and elucidate the reported prevalence of heart disease among United States adults, utilizing data extracted from the National Center for Health Statistics database from 1999 to 2019.

Methods

We conducted a thorough analysis of the National Center for Health Statistics database to examine demographic and socioeconomic variables, such as age, gender, race, education, poverty level, geographic region, and metropolitan status, influencing heart disease prevalence among United States adults. The outcomes were concisely summarized using aggregate data from 1999-2019, delineating prevalence trends across all participants throughout these years. One-way Analysis of Variance was utilized for statistical analyses, assessing variations in heart disease prevalence across diverse demographic and socioeconomic categories.

Results

The study reported notable trends in age-specific prevalence, revealing distinct patterns across different age groups. The age-adjusted average reported heart disease prevalence for individuals aged 18 and over from 1999 to 2019 was 5.9%. Within the 18-44 age group, prevalence started at 1.0% and increased notably across subsequent age brackets: 45-54 (4.3%), 55-64 (9.9%), 65-74 (16.8%), and 75 and older (24.4%). Adult men consistently had a higher prevalence (7.6%) than women (4.5%). Prevalence varied among racial groups, with the highest in American Indian or Alaska Native-only individuals (12.4%). Socioeconomic variables illustrated a robust association between lower educational attainment, poverty, and increased heart disease prevalence. Geographic and metropolitan status analyses unveiled significant regional and residential disparities in reported heart disease prevalence. Education-level analysis revealed a higher prevalence for lower education (9.1%) and a lower prevalence for higher education (6.1%). Significant differences were observed in each category ($p < 0.001$).

Conclusion

This study highlights epidemiological patterns and reports heart disease prevalence, stressing the urgency for targeted interventions and preventative measures. Results underscore the importance of addressing temporal patterns, demographic inequalities, and geographic disparities through strategic public health efforts.

Keywords: Heart Disease, NCHS, Reported prevalence, United States, Adults.

Introduction

Heart disease refers to a broad category of medical conditions affecting the heart's structure and function. It encompasses various disorders, with coronary artery disease being the most common. It is characterized by the narrowing of blood vessels, heart disease impedes blood flow, potentially leading to serious complications such as heart attacks¹⁻². It is a significant public health concern, prevalent among American adults, with specific demographic variations. The economic impact is substantial, surpassing even cancer-related costs³.

Heart disease is prevalent among American adults, affecting 11.2%, with higher rates in those aged 75 and above (37.3%) and males (12.6%). American Indians have the highest prevalence at 14.6%. Coronary artery disease, impacting 6.7% (18.2 million), is a major contributor, causing 1 in 5 deaths below 65 years of age⁴. Every 40 seconds, a heart attack occurs, and 14% of survivors face mortality. Heart failure leads to 1 in 8 deaths⁵. The economic burden is substantial, with cardiovascular disease costing \$378 billion and heart disease \$228.7 billion. Preventive measures are crucial, as 80% of cases are preventable. Projections suggest a concerning rise in both prevalence and economic impact by 2035⁶.

Heart disease is a complex and multifaceted condition with diverse pathophysiological mechanisms. Understanding these mechanisms is essential for developing effective prevention and treatment strategies to reduce the burden of heart disease among United States adults^{1,4,7}. Heart disease pathophysiology involves various mechanisms, typically starting

with atherosclerosis. Accumulation of cholesterol in arterial walls leads to plaques, narrowing vessels and impeding blood flow⁷. This triggers inflammation and platelet aggregation, forming clots that may block vessels, causing myocardial infarctions⁸. Chronic stress on the heart from narrowed arteries can lead to myocardial hypertrophy and heart failure. Additionally, risk factors like hypertension and diabetes exacerbate the process⁹.

Furthermore, lifestyle factors such as physical inactivity, poor diet, obesity, and smoking play significant roles in the development and progression of heart disease. These factors contribute to endothelial dysfunction, inflammation, insulin resistance, and dyslipidemia, all of which are implicated in the pathophysiology of cardiovascular disease^{4,8-9}. Over time, these intricate interactions contribute to the progression of heart disease, impacting cardiac function and increasing the likelihood of adverse events, emphasizing the importance of preventive measures and early intervention.

The National Center for Health Statistics (NCHS) is a valuable database operated by the Centers for Disease Control and Prevention (CDC) in the United States. This comprehensive repository provides a wide range of health-related data, statistics, and information, contributing significantly to public health research and policymaking. The NCHS collects and disseminates data on various health indicators, including mortality, morbidity, and health behaviors, enabling researchers, healthcare professionals, and policymakers to analyze trends, identify health disparities, and formulate evidence-based strategies to improve the health of the population.

This study delves into the reported prevalence of heart disease among United States adults, drawing insights from the NCHS database. This metric is a key indicator in public health and epidemiology, helping to understand the burden of heart disease on a population and assess trends over time. As cardiovascular health remains a paramount public health concern, understanding the trends in heart disease prevalence is crucial for informed policymaking and targeted interventions. The rationale behind this investigation is to identify patterns and shifts in the epidemiology of heart disease over time, considering demographic factors and potential risk modifiers. The objective is to contribute valuable data-driven perspectives that can inform public health strategies, ultimately aiming to curb the burden of heart disease and enhance the well-being of the United States population.

Methodology

DATA SOURCE

The study utilized data from the NCHS Database, encompassing health-related information from the United States population. The dataset spanned an extensive period from 1997 to 2019, providing a comprehensive foundation for analyzing trends in reported heart disease prevalence.

STUDY POPULATION.

The sample population for this study comprised United States adults aged 18 and above, spanning diverse demographics, including varying age groups, genders, races, educational backgrounds, and socioeconomic statuses. The inclusion criteria involved individuals with confirmed diagnoses of heart

disease, ensuring the study's focus on those affected by this condition.

DATA COLLECTION

Relevant datasets were systematically retrieved from the NCHS Database. The comprehensive nature of the dataset facilitated a nuanced exploration of reported heart disease prevalence over time. Rigorous attention was given to data quality and consistency to ensure the accuracy of findings. The systematic approach to data collection aimed to minimize biases and enhance the reliability of the study outcomes.

VARIABLES

This comprehensive study meticulously examined demographic and socioeconomic variables to reveal intricate heart disease prevalence patterns in the United States. Age groups, like 18-24, 45–54 years, 55–64 years, 65–74 years, and 75 years and over, were stratified for nuanced insights into age-specific trends. Gender analysis uncovered potential disparities, providing insights into gender-related dimensions of cardiovascular health. Stratification by race delved into variations among racial groups, contributing to a more inclusive understanding of cardiovascular impact. Socioeconomic factors like education and the percentage of poverty were analyzed for correlations, shedding light on the social determinants of heart health. Stratifying data by geographic region explored variations, offering a holistic perspective on the interplay of demographic and socioeconomic factors that shaped the United States heart disease landscape.

STATISTICAL ANALYSIS

Descriptive statistics, including means, percentages, and standard deviations, were

employed to summarize demographic and socioeconomic variables. The trends in heart disease prevalence were analyzed over the specified timeframe to identify patterns and fluctuations. The NCHS datasets underwent rigorous cleaning and preprocessing to ensure data integrity. Careful consideration addressed missing values, outliers, and inconsistencies. The dataset was aggregated strategically for structured statistical examination by year, age groups, gender, and relevant categories. Statistical analysis used one-way Analysis of Variance (ANOVA) to examine heart disease rate variations across demographics (age, gender, race/ethnicity) and socioeconomic indicators (percentage of the poverty level). ANOVA assessed mean differences among multiple groups simultaneously. A significance level of 0.05 determined statistical significance. A p-value less than 0.05 indicated significant differences in heart disease prevalence among demographic and socioeconomic categories. Analyses were performed on Microsoft Excel.

of individuals within the NCHS datasets. All data were anonymized to protect personal information, and confidentiality was maintained throughout the study. Transparency in data handling, storage, and sharing was prioritized to uphold trust and accountability. Emphasizing ethical principles was crucial for maintaining research integrity and ensuring the responsible use of health-related data.

Results

The investigation into the reported prevalence of heart disease among adults, reveals noteworthy trends and insights. Throughout the study period, the prevalence of heart disease exhibited dynamic patterns, shedding light on the evolving landscape of cardiovascular health in the United States. Below Table 1-3, the reported prevalence of heart disease among United States adults aged 18 and over is stratified by selected characteristics.

ETHICAL CONSIDERATIONS

This research adhered to strict ethical protocols to safeguard the privacy and rights

Table 1: Respondent-reported prevalence of heart disease among adults by age groups and gender

Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value
Data based on age	Total, 18 years and over, age adjusted	5.6	5.8	6.4	6.2	5.8	6.4	6.4	6.3	6.0	6.2	6.2	6.3	6.2	6.0	5.9	5.4	5.5	5.6	5.4	5.5	5.5	
Data based on age group	18-44 years	0.8	0.7	1.0	0.9	0.7	1.1	1.0	0.9	0.9	1.1	1.1	1.4	0.9	0.9	1.0	1.1	0.8	1.2	0.9	1.0	1.0	< 0.001
	45-54 years	4.0	4.4	5.1	4.6	4.0	4.1	4.6	5.0	4.1	4.1	4.7	4.4	4.6	4.6	4.6	3.3	3.9	4.6	4.4	4.1	3.6	

Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value	
	55-64 years	10.8	10.1	11.6	10.8	10.0	10.9	11.2	10.3	10.1	10.2	10.4	10.8	10.6	10.0	10.0	9.0	8.5	7.5	8.4	7.9	9.0		
	65-74 years	16.4	17.3	17.8	18.7	18.0	18.4	19.0	18.4	18.6	16.9	16.8	16.5	18.3	16.2	16.3	15.4	16.4	13.9	14.0	15.5	14.3		
	75 years and over	20.9	22.6	25.2	24.4	23.9	26.1	25.4	25.7	23.6	26.7	25.4	25.8	24.7	25.8	24.1	21.6	23.3	25.1	23.8	23.9	24.2		
Data based on gender	Male	7.2	7.4	8.1	7.9	7.6	8.2	7.9	7.9	7.9	8.1	8.3	8.1	8.1	7.5	7.5	7.1	7.0	7.2	7.1	7.2	7.0	< 0.001	
	Female	4.2	4.4	5.1	4.9	4.4	4.8	5.2	5.1	4.5	4.7	4.6	4.9	4.6	4.7	4.6	3.9	4.2	4.4	4.0	4.1	4.2		

* - Data not available

The average reported prevalence of heart disease, age-adjusted for individuals aged 18 years and over, was 5.9% from 1999 to 2019. Overall, the analysis indicated a fluctuating trajectory in the reported prevalence of heart disease. From 1999 to 2004, there was a discernible increase, with prevalence rates reaching a peak of 6.4%. The years 2004-2013 witnessed a stabilization of heart disease prevalence, hovering around 6.4%-5.9%. Subsequently, a noteworthy decline was observed in 2014, where the prevalence dropped to 5.4%. However, again, stabilization was seen post-2014, with prevalence rates reaching 5.5% in 2019.

REPORTED PREVALENCE OF HEART DISEASE BASED ON AGE GROUP

The exploration into the reported prevalence unveils intricate patterns across diverse age groups. Categorizing individuals into age brackets of 18-44, 45-54, 55-64, 65-74, and 75 years and older facilitates a nuanced understanding of how heart disease prevalence evolves over the adult lifespan.

Within the 18-44 age group, the lowest heart disease prevalence was observed at 1.0%, marking a notable upward trend across subsequent age brackets: 45-54 years (4.3%), 55-64 years (9.9%), 65-74 years (16.8%), and 75 years and older (24.4%). The observed p-value of less than 0.001 underscores a highly significant difference in heart disease prevalence among the specified age groups.

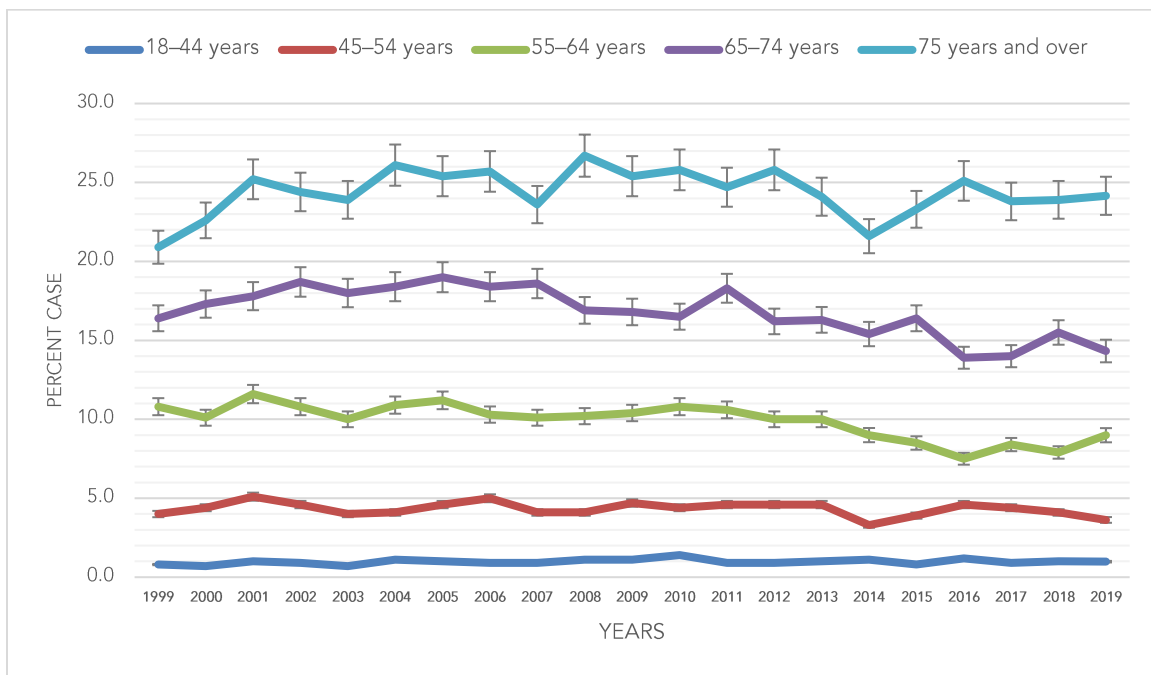
The 45-54 age category displayed a moderate increase, fluctuating between 3.3% in 2014 and 5.1% in 2001. In the 55-64 age group, prevalence remained relatively stable until 2013 (10% to 11.2%), followed by a significant decline to 7.5% in 2016, a rise to 8.4% in 2017, a subsequent decline to 7.9% in 2018, and a final increase to 9% in 2019. The 65-74 age category demonstrated an initial increase to 19% by 2005, followed by a general decline to 14.3% in 2019.

Among those aged 75 and older, substantial heart disease prevalence was observed, starting at 20.9% in 1999, peaking at 26.7% in 2008, and ending at 24.2% in 2019. A major

downturn occurred across all age groups in 2014, except for the 18-44 age group. The most significant decrease was seen in the 75 years and older category, with a 2.5% difference within a single year.

Figure 1 visually illustrates the prevalence of heart disease across age groups during the 1999-2019 study period, providing a comprehensive overview of trends among United States adults.

Figure 1: Reported prevalence of heart disease based on Age Groups



REPORTED PREVALENCE OF HEART DISEASE BASED ON GENDER

The examination of reported heart disease prevalence revealed distinct gender-specific trends. Across the study period, a clear pattern emerged, highlighting disparities in heart disease prevalence based on gender.

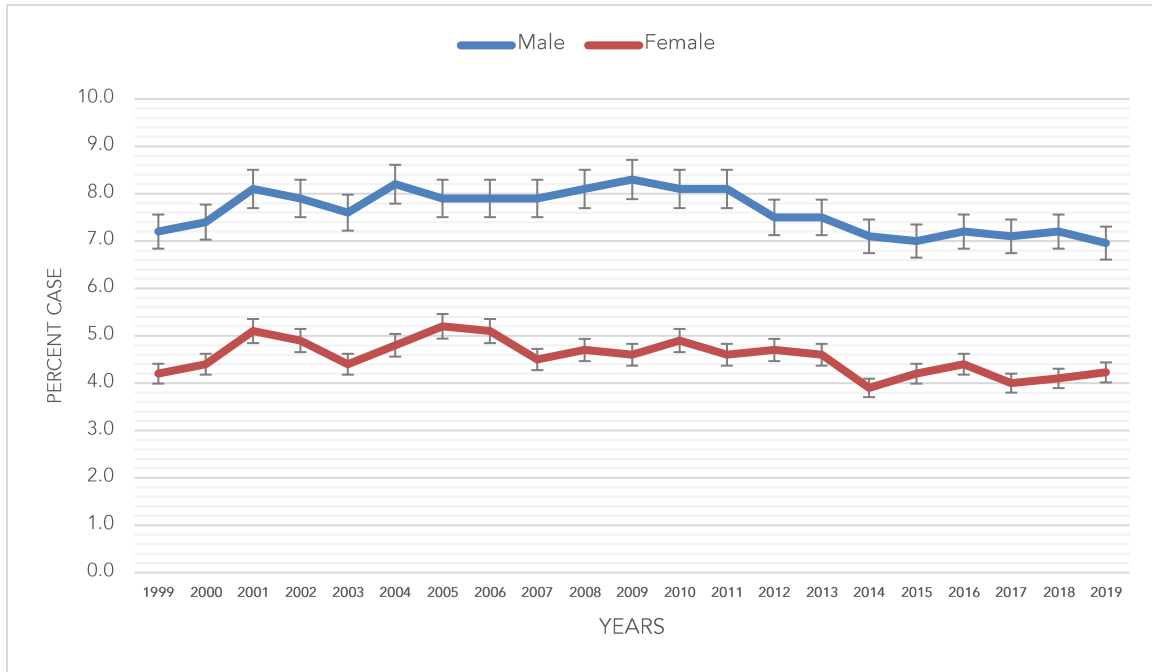
Significantly ($P < 0.001$), adult men consistently exhibited a higher reported prevalence of heart disease compared to adult women. On average, men accounted for a higher percentage of reported heart disease cases, with a prevalence of 7.6%, while women showed a lower prevalence of 4.5%.

Temporal trends further underscored gender-specific nuances in heart disease prevalence. Despite fluctuations in reported cases for both

genders over the years, the prevalence among men consistently peaked at 8.3% in 2009, surpassing the maximum of 5.2% observed among women in 2005. These findings emphasize the ongoing need for surveillance and public health efforts to monitor and address gender-specific factors influencing heart disease prevalence.

Figure 2 visually illustrated the reported prevalence of heart disease among United States adults based on gender, providing a clear depiction of the observed disparities throughout the study period.

Figure 2: Reported prevalence of heart disease based on Gender



REPORTED PREVALENCE OF HEART DISEASE BASED ON RACE AND ETHNICITY
Within the analyzed racial and ethnic groups, disparate prevalence rates were evident. American Indian or Alaska Native-only individuals exhibited the highest prevalence rate at 12.4%, though the data was discontinuous across years. White-only, non-Hispanic or Latino individuals followed at 6%, Black or African American-only individuals at 5.9%, Hispanic or Latino and Mexican

individuals at 5.3%, and Asian-only individuals at the lowest with 4.2%. The results indicated a statistically significant difference in heart disease prevalence among these groups ($p < 0.001$). These variations underscored the significance of accounting for racial and ethnic factors when assessing heart disease prevalence among United States adults. (Table 2).

Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value
Data based on race and ethnicity	White only	5.6	5.8	6.5	6.3	5.9	6.5	6.5	6.4	6.1	6.4	6.3	6.3	6.1	5.9	6.0	5.5	5.5	5.6	5.4	5.6	5.5	< 0.001
	Black or African American only	5.9	5.6	6.5	5.7	5.4	5.2	6.2	6.2	6.0	5.6	6.7	6.3	6.9	6.4	6.2	5.4	5.3	5.8	5.8	5.3	5.9	
	American Indian or Alaska Native only	12.4	*9.3	*9.7	*	*	*7.2	*	*	*	6.6	*	5.9	7.1	8.3	*	6.0	9.1	12.2	2.6	8.2	*	

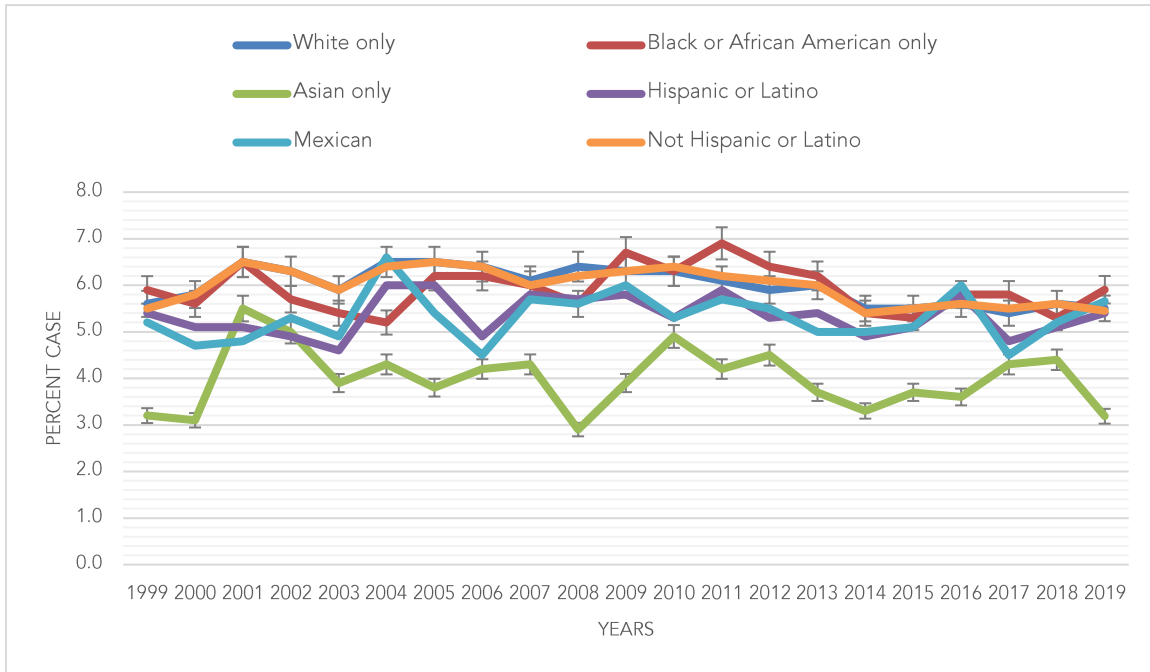
Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value		
	Asian only	3.2	3.1	5.5	5.0	3.9	4.3	3.8	4.2	4.3	2.9	3.9	4.9	4.2	4.5	3.7	3.3	3.7	3.6	4.3	4.4	3.2			
	Hispanic or Latino	5.4	5.1	5.1	4.9	4.6	6.0	6.0	4.9	5.8	5.7	5.8	5.3	5.9	5.3	5.4	4.9	5.1	5.8	4.8	5.1	5.4			
	Mexican	5.2	4.7	4.8	5.3	4.9	6.6	5.4	4.5	5.7	5.6	6.0	5.3	5.7	5.5	5.0	5.0	5.1	6.0	4.5	5.2	5.7			
	Not Hispanic or Latino	5.5	5.8	6.5	6.3	5.9	6.4	6.5	6.4	6.0	6.2	6.3	6.4	6.2	6.1	6.0	5.4	5.5	5.6	5.5	5.6	5.5			
Data based on education	No high school diploma or GED	8.3	8.4	9.3	9.6	8.8	9.4	9.9	10.0	9.6	9.8	9.4	9.6	10.0	9.4	9.5	8.3	8.8	8.9	7.6	8.1	9.4	< 0.001		
	High school diploma or GED	6.3	6.2	7.2	7.0	6.4	7.5	7.3	7.2	6.6	7.5	7.2	7.8	7.4	7.2	7.2	7.2	6.5	6.6	7.2	7.3	6.6			
	Some college or more	5.7	6.1	6.9	6.6	6.1	6.5	6.7	6.2	6.3	6.3	6.4	6.4	6.3	6.2	5.9	5.3	5.8	5.7	5.5	5.5	5.4			

* - Data not available

Temporal trends provided further insights into reported heart disease prevalence within each group. While American Indian or Alaska Native-only individuals displayed discrete and incomplete data with considerable variations, Hispanic or Latino, Mexican, and White-only individuals exhibited stable trends. Black or African American-only individuals experienced fluctuations, Non-Hispanic or Latino individuals showed a consistent upward trend, indicating a concerning pattern of increasing prevalence. Asian individuals, while generally presenting lower prevalence rates, displayed fluctuations warranting closer examination.

These findings illuminated the intricate interplay of factors influencing reported heart disease prevalence across diverse racial and ethnic groups. Figure 3 visually depicted the reported prevalence of heart disease among United States adults by race and ethnicity over the study period.

Figure 3: Reported prevalence of heart disease based on Race and Ethnicity



REPORTED PREVALENCE OF HEART DISEASE BASED ON EDUCATION LEVEL

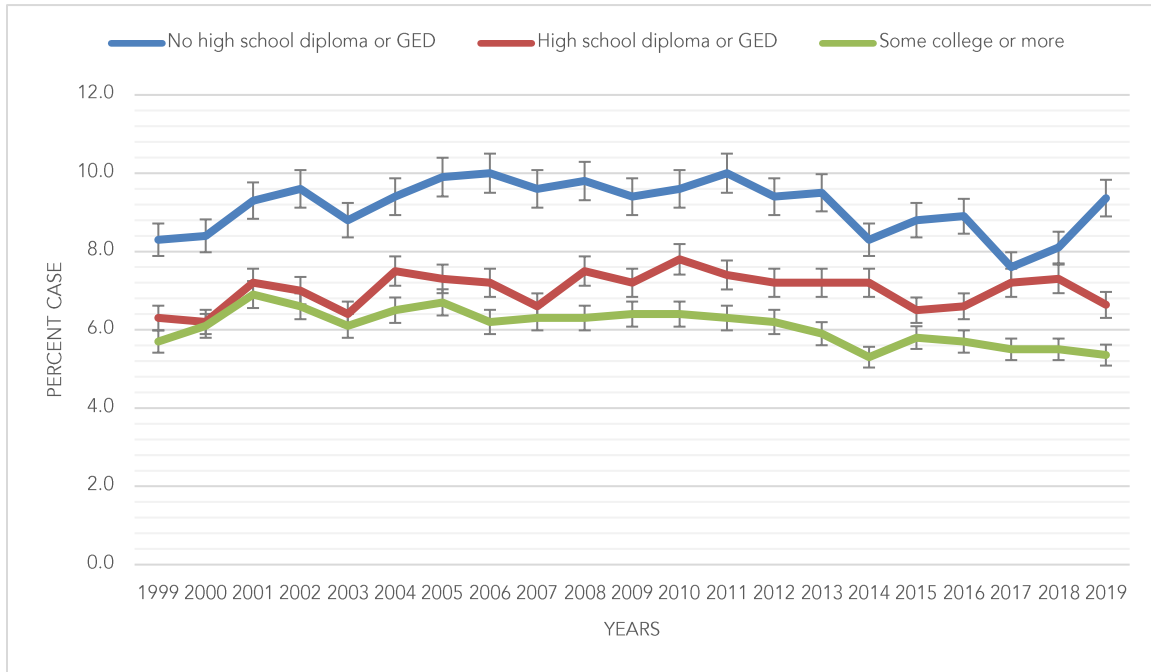
The exploration of reported heart disease prevalence revealed significant trends linked to educational attainment. The analysis exposed distinct patterns in reported heart disease prevalence associated with different education levels, emphasizing the influence of education on cardiovascular health.

Throughout the study period, a consistent inverse relationship emerged between educational attainment and reported heart disease prevalence. Individuals with lower levels of education consistently exhibited higher reported prevalence rates, while those with higher educational attainment demonstrated lower rates. Specifically, those without a high school diploma or General Equivalency Diploma (GED) education displayed the highest reported prevalence at 9.1%, followed by those with a high school diploma or GED at 7%. Notably, adults with some college education or more showcased

the lowest reported prevalence of heart disease at 6.1%. The observed p-value of less than 0.001 emphasized the highly significant association between educational attainment and reported heart disease prevalence.

Figure 4 visually depicted the reported prevalence of heart disease among United States adults based on education level throughout the study period.

Figure 4: Reported prevalence of heart disease based on education level



REPORTED PREVALENCE OF HEART DISEASE BASED ON GEOGRAPHIC REGION

The analysis of reported heart disease prevalence unveiled distinct patterns based on geographic regions. Focusing on the Northeast, Midwest, South, and West, our study aimed to discern regional variations in heart disease prevalence.

Throughout the study period, noticeable regional disparities in reported heart disease prevalence emerged. The South consistently exhibited the highest prevalence at 6.5%, followed by the Midwest at 6.1%, the

Northeast at 5.5%, and the West with the lowest prevalence at 5%. The results indicated a statistically significant difference in heart disease prevalence across different regions ($p < 0.001$). The Midwest and South regions displayed peak prevalence rates of 7.3% and 7.2% in 2006 and 2005 (and 2008), respectively. In comparison, the Northeast and West regions demonstrated peak prevalence rates of 6.3% (2004) and 6.1% (2001), respectively. (Table 3)

Table 3: Respondent-reported prevalence of heart disease among adults by poverty and region

Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value
Data based on percentage of poverty level	Below 100%	7.4	7.8	9.0	8.7	8.3	9.2	8.9	9.7	8.2	8.6	8.4	9.1	8.3	9.3	9.4	8.0	8.3	8.7	7.3	7.4	8.7	< 0.001
	100%–199%	6.5	7.0	7.5	7.0	7.1	7.5	7.8	7.3	7.1	8.2	7.7	7.8	7.2	7.3	7.1	6.8	6.5	7.1	7.0	7.1	7.2	

Characteristic	Variables (% of adults)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	P value	
	200%-399%	5.5	5.7	6.3	6.6	5.7	6.2	6.2	6.2	6.4	6.2	6.1	6.4	6.4	5.8	5.9	5.4	5.7	5.8	5.9	5.7	5.2		
	400% or more	4.9	4.7	5.7	5.4	4.8	5.7	5.6	5.2	5.0	4.9	5.2	4.9	4.9	4.6	4.4	4.0	4.1	4.3	4.3	4.4	4.1		
Data based on Geographic region	Northeast	5.4	4.9	6.1	5.7	5.5	6.3	6.0	6.2	5.3	5.7	5.7	5.9	6.0	5.2	5.4	5.0	4.9	5.3	5.0	5.3	5.6	< 0.001	
	Midwest	5.2	5.6	6.5	6.2	5.5	6.3	6.6	7.3	6.6	6.4	6.6	6.6	6.1	6.4	6.6	5.6	6.6	6.3	5.8	5.5	5.3		
	South	6.0	6.5	6.8	6.8	6.7	6.7	7.2	6.6	6.4	7.2	7.0	7.0	6.9	6.8	6.5	6.1	5.7	6.2	5.9	6.2	6.0		
	West	5.5	5.3	6.1	5.9	5.0	6.0	5.2	4.8	5.4	4.8	4.9	5.4	5.2	5.0	4.7	4.4	4.5	4.5	4.8	4.6	4.7		
Data based on location of residence	Within MSA	5.3	5.6	6.3	6.0	5.7	6.1	6.1	6.1	5.7	5.9	6.1	6.1	5.9	5.8	5.7	5.2	5.2	5.5	5.3	5.4	5.2	< 0.001	
	Outside MSA	6.4	6.5	6.8	7.0	6.1	7.2	7.6	7.4	7.6	7.7	6.6	7.5	7.5	7.1	7.1	6.6	7.2	6.6	6.5	6.3	6.7		

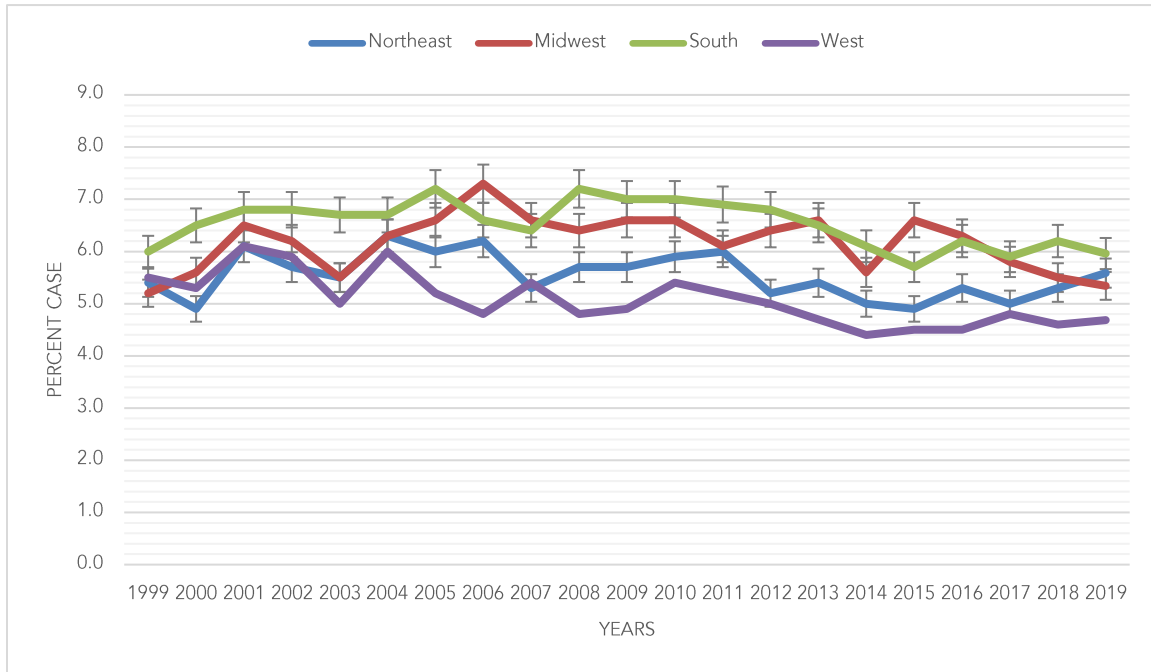
* - Data not available

Temporal trends further illuminated the evolving landscape of heart disease prevalence across geographic regions. The South showed a gradual increase from 1999 to 2008, followed by a decline, ending at 6% in 2019. The Midwest exhibited an upward trend followed by a downward trend towards the end of the study period. The Northeast maintained a stable curve throughout, while the West displayed more unstable patterns, with fluctuations and consistent upward or downward trends.

geographic regions, offering a clear depiction of the regional disparities observed during the study period.

Figure 5 visually represented the reported prevalence of heart disease based on

Figure 5: Reported prevalence of heart disease based on geographic region



REPORTED PREVALENCE OF HEART DISEASE BASED ON LOCATION OF RESIDENCE

The analysis of reported heart disease prevalence revealed notable trends influenced by the location of residence, distinguishing between Metropolitan Statistical Areas (MSA) and non-MSA settings. Our examination brought to light distinct patterns in reported heart disease prevalence across these residential categories.

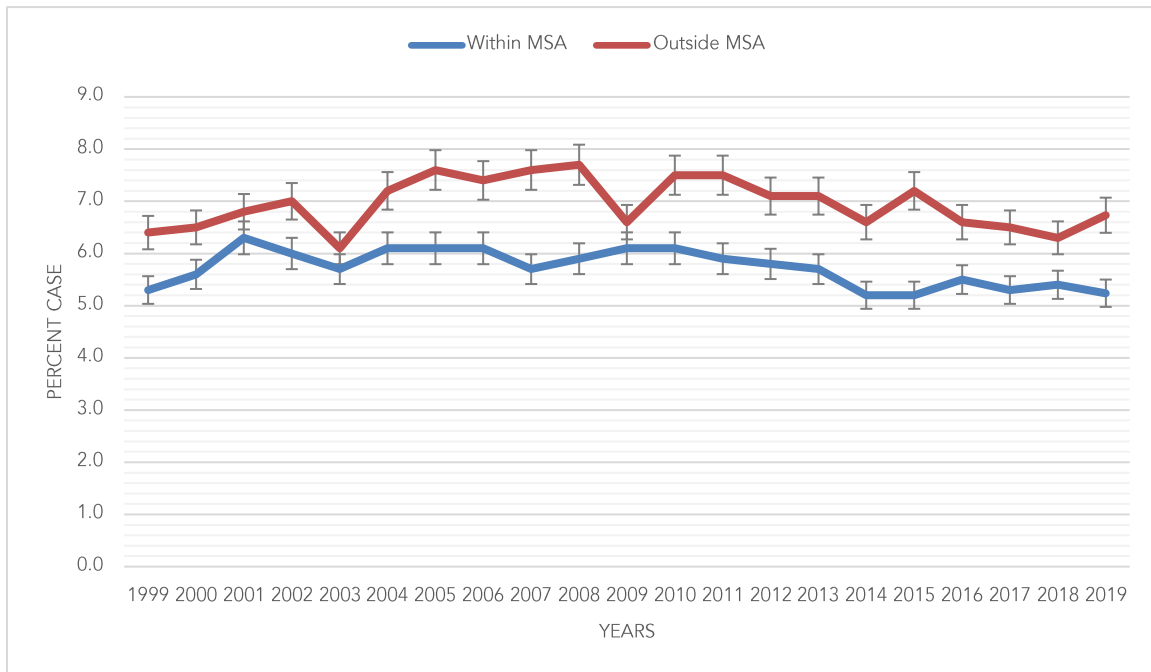
Throughout the study period, adults residing outside MSAs consistently exhibited a higher reported prevalence of heart disease at 7%, compared to those within MSAs at 5.7%. The prevalence outside MSAs displayed a consistent upward trend, increasing from 6.4% in 1999 to 6.7% in 2019. In contrast, adults within MSAs demonstrated a more modest increase, from 5.3% in 1999 to 5.2% in 2019. The observed p-value of less than 0.001 underscored the highly significant difference in reported heart disease

prevalence between adults residing inside and outside MSAs throughout the study period.

Temporal trends further emphasized the reported heart disease prevalence disparities based on residence. Outside MSAs, there was a notable increase from 6.4% to 7.7% during 1999-2008, followed by a relatively stable period until 2015, and subsequently, a decline to 6.7% by 2019. Conversely, inside MSAs, the prevalence exhibited a gradual rise from 5.3% to 6.1% during 1999-2010, followed by a more modest decrease to 5.2% by 2019.

Figure 6 visually illustrated the trends in reported heart disease prevalence based on the location of residence (within MSA and outside MSA) during the study period.

Figure 6: Reported prevalence of heart disease based on location of residence



REPORTED PREVALENCE OF HEART DISEASE BASED ON PERCENTAGE OF POVERTY LEVEL

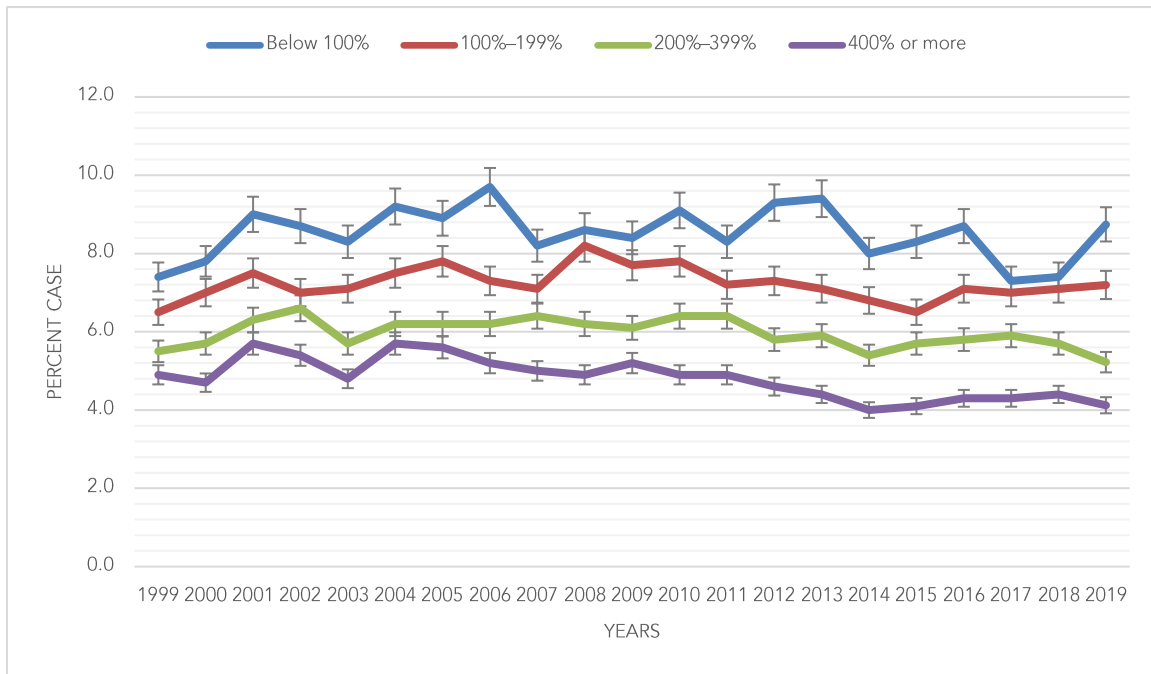
The examination of reported heart disease prevalence revealed crucial insights into the relationship between socioeconomic status and heart disease prevalence. Notably, individuals below 100% of the poverty level consistently exhibited a higher reported prevalence of heart disease, constituting a notable proportion of cases at 8.5%. This emphasized the vulnerability of those in lower socioeconomic strata to heart disease. The results revealed a statistically significant difference in heart disease prevalence across different socioeconomic status categories ($p < 0.001$).

Temporal trends highlighted the dynamics of reported heart disease prevalence across different poverty levels. The below 100% poverty level category displayed a consistent upward trend, indicating enduring health disparities linked to economic disadvantage,

starting at 7.4% in 1999 and reaching 8.7% in 2019. In contrast, other poverty level categories exhibited varied patterns, such as the 400% and more category showing a decline followed by an upward rise, reaching 5.2% in 2009 and then declining to 4.1% by 2019. The 200-399% category followed a similar pattern, reaching a peak at 6.4% in 2011, then decreasing to 5.2% by 2019. The trend in the 100-199% category showed fluctuations, starting at 6.5% in 1999, experiencing troughs and peaks, and ending at 7.2% in 2019.

Figure 7 visually depicted the distribution of reported heart disease cases based on the percentage of poverty level, providing a clear illustration of disparities among different socioeconomic strata over the study period.

Figure 7: Reported prevalence of heart disease based on percentage of poverty level



Discussion

This analysis explores heart disease prevalence across demographic and socioeconomic dimensions to inform targeted public health strategies. The findings presented in this study reveal a dynamic pattern in the reported prevalence of heart disease over the two-decade period from 1999 to 2019. The average age-adjusted prevalence of heart disease, considering individuals aged 18 years and over, was 5.9%, indicating a substantial public health burden. Notably, our analysis demonstrated a fluctuating trajectory in the prevalence rates during this period¹⁰⁻¹¹.

Distinct age-specific patterns unveiled a higher reported prevalence of heart diseases, with rates of 25.8% among adults aged 75 years and over and 16.2% among those aged 65 to 74 years, highlighting the unique challenges associated with this older population. With the number of adults aged 65 years and older projected to increase an

additional 44% from 2017 to 2030, innovative and effective approaches to prevent and treat heart disease, particularly the substantially increasing rates of heart failure, are needed¹². Our age-specific findings are in line with prior studies consistently indicating elevated heart disease prevalence rates among adults aged 65 years or older^{10,12-13}. This suggests that the challenges inherent to older adulthood may intensify heart disease symptoms and contribute to the observed higher prevalence during this life stage.

Gender disparities were apparent, with males consistently reporting higher prevalence rates of heart disease compared to females, aligning with established research trends. This persistent gender gap has been consistently observed in prior research, emphasizing the imperative for a thorough investigation into the factors contributing to this disparity¹⁴⁻¹⁵. According to research, this is mostly due to the protective effect of estrogen on the cardiovascular system. During the fertile

years, women are protected from atherosclerosis. Other causes include hypertension, total cholesterol, and low-density lipoprotein (LDL) cholesterol¹⁶⁻²⁴.

In this study, notable disparities by race/ethnicity were observed, with higher reported prevalence rates observed among adults identifying as American Indian or Alaska Native only individuals. Previous research has consistently delved into racial disparities, highlighting variations in reported heart disease prevalence among diverse racial and ethnic groups¹⁶⁻¹⁷. Specifically, non-Hispanic or Latino, White only, and Black or African American-only individuals exhibited higher prevalence compared to Asian-only, Hispanic or Latino, or Mexican individuals.

The observed variations in heart disease prevalence among different racial and ethnic groups emphasize the importance of recognizing and addressing the complex interplay of socio-cultural, environmental, and genetic factors that contribute to health disparities. Factors such as socioeconomic status, access to healthcare, health behaviors, and genetic predispositions may all contribute to the differential burden of heart disease among diverse demographic groups.²⁵⁻²⁷ These findings underscore the imperative of acknowledging the substantial influence of cultural and racial factors on the reported prevalence of heart diseases, emphasizing the nuanced dynamics that contribute to disparities within these demographic groups¹⁶⁻¹⁸.

Interestingly, our study highlights a trend where individuals with higher educational attainment exhibit a lower reported prevalence of heart disease. This aligns with

previous research, suggesting a potential protective effect associated with higher educational levels. Educational inequality is one of the most important socioeconomic factors contributing to CVD. Higher education attainment tends to be associated with healthier behaviors, healthier working conditions, and better access to health care. Efforts to promote educational equity and access to quality education can serve as upstream determinants of cardiovascular health by empowering individuals with the knowledge, skills, and resources necessary to adopt healthy lifestyles and navigate the healthcare system effectively. By addressing educational disparities, we can strive towards achieving greater health equity and reducing the burden of CVD on populations worldwide²⁸⁻³⁰.

According to research, individuals with more than a high school diploma had a decreased lifetime risk of CVD than individuals with less educational attainment, regardless of their income or occupation. The mechanisms underlying this association warrant further exploration, possibly involving lifestyle choices, access to healthcare, health literacy, cognitive skills, problem-solving skills, and personal control^{17,19-20}. These findings highlight the demand for further efforts to reduce CVD inequalities related to educational attainment.

The geographic analysis of reported heart disease prevalence among United States adults reveals a noteworthy trend, with the Southern region's highest prevalence, succeeded by the Midwest, Northeast, and West regions. According to research, there are several limitations in healthcare accessibility in the Southern and Midwestern

regions, such as clinicians per capita and insufficient public transportation in rural settings. The findings prompt further exploration into improving healthcare accessibility, health infrastructure, and outreach campaigns. This regional disparity underscores the need for targeted interventions addressing specific regional health challenges. The findings prompt further exploration into the socio-demographic, lifestyle, and environmental factors contributing to this variation. Tailoring public health strategies based on geographic nuances is crucial to effectively mitigate the burden of heart disease across diverse regions in the United States²⁰⁻²¹.

Our analysis indicates that individuals residing within MSAs exhibit a distinct prevalence pattern compared to those outside MSA regions^{17,22}. This disparity prompts further exploration into the potential urban-rural health divide influencing heart disease prevalence. Understanding the nuanced dynamics associated with location-specific factors can inform targeted interventions and public health strategies to address cardiovascular health disparities among diverse populations.

Within the purview of this study, socioeconomic factors emerge as pivotal determinants, notably influencing the prevalence of reported heart disease among United States adults. A discernible trend indicates that individuals from families below the poverty line exhibit heightened rates of reported heart disease prevalence. Recognizing the association between poverty and heightened rates of heart disease prevalence underscores the urgency of addressing health inequities at both individual

and societal levels. Efforts to alleviate poverty, improve access to education, ensure equitable access to healthcare services, and create supportive environments are essential for reducing the disproportionate burden of cardiovascular disease among disadvantaged populations.³¹⁻³³ This finding holds significant ramifications, particularly in recognizing the impact of socioeconomic status on cardiovascular health outcomes. Adults with an economic disadvantage consistently manifest a higher likelihood of being reported with heart disease. Such an association underscores the profound influence of social determinants of health on cardiovascular well-being and underscores the imperative for fostering equitable access to healthcare, educational resources, and timely interventions^{17-18,22}.

It is crucial to acknowledge the inherent limitations of our study, which analyzes the reported prevalence of heart disease among United States adults using data from the NCHS Database spanning the years 1999-2019. While the dataset offers valuable insights, potential biases may arise from the reliance on self-reported data, which could lead to variations in reporting accuracy. Additionally, the retrospective nature of the study limits our ability to establish causation, emphasizing the need for a cautious interpretation of observed trends. The demographic variables explored, including race, age group, gender, percentage of poverty level, education level, geographic region, and location of residence (within MSA, outside MSA), present a comprehensive yet generalized overview, and more granular sub-analyses could provide deeper insights into specific subpopulations. Furthermore,

external factors influencing heart disease prevalence, such as lifestyle choices and genetic predispositions, were not extensively addressed in this analysis. Despite these limitations, our study serves as a foundational exploration of nationwide trends, laying the groundwork for future research endeavors that can delve into more nuanced aspects of heart disease prevalence among diverse demographic groups. It is crucial to acknowledge the inherent limitations within our study in analyzing the reported prevalence.

Conclusion

Our extensive analysis reported heart disease prevalence spanning two decades from the NCHS Database reveals critical insights. Notable trends emerged in age-specific prevalence, with distinct patterns observed across different age groups. Gender-based disparities revealed consistently higher reported prevalence among adult men. Racial and ethnic analyses showcased disparate prevalence rates, emphasizing the importance of considering these factors in public health interventions. Socioeconomic variables illustrated a robust association between lower

educational attainment, poverty, and increased heart disease prevalence. Geographic and metropolitan status analyses unveiled significant regional and residential disparities in reported heart disease prevalence. This study consolidates knowledge and provides contemporary insights for future research and tailored interventions against heart disease in diverse United States demographic groups.

Conflict of Interest:

None.

Funding:

No conflict of interest to disclose.

Acknowledgements:

None.

Authorship

Everyone who is listed as an author made substantial and direct contribution to the article, such as contributing to the conception, design, analysis, or interpretation of data.

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