

The **E.C.H.O.** Initiative: Encouraging Cardiovascular **H**ealth Through **O**utreach

Coronary Artery Disease Mitigation within the African American Population

Ria Agarwal, Dipikkasri Dhananjeyan, Akshaya Ganji, Smriti Kumar, Dhruv Malladi, and

Morish Shah

## Abstract

**Background:** Coronary Artery Disease (CAD) is the leading cause of mortality in the US. There is a lack of awareness on how to prevent CAD, as well as risk factors and social determinants of health (SDOH) that increase susceptibility to it, especially for the African Americans population.

**Objective:** The purpose of this review is to analyze and synthesize the various factors that contribute to the susceptibility of CAD within the African American community in Illinois and the U.S.. By recognizing these key components, an effective public health intervention can be designed and implemented into the community to minimize the effects of CAD.

**Methods:** This review was conducted by the use of PubMed, American Heart Association Journals, the Center for Disease Control and Prevention, and other scholarly sources relevant to the keywords. Over 110 pieces of literature were reviewed and synthesized.

**Results:** The African American community is the highest at risk of CAD within Illinois and the United States due to biological, genetic, cultural, behavioral, and socioeconomic reasons. This includes hypertension, smoking, family history, segregation, redlining, and lack of quality healthcare in African American communities.

**Conclusions:** Due to the various SDOH concerning African American communities, African American individuals are unable to receive the equitable quality healthcare needed to care for CAD, especially in Illinois. It is imperative for individuals to proactively initiate healthcare interventions that provide essential resources and education to empower the African American community.

## Keywords

Coronary Artery Disease, African Americans, Social Determinants of Health, Prevalence and Risk Factors of Cardiovascular Diseases, Health Implications, Cardiovascular Health Interventions in Illinois.

## Introduction

CAD is defined by plaque buildup in the coronary arteries, narrowing blood vessels and reducing the flow of blood to the heart and body.<sup>2</sup> Although Cardiovascular Diseases (CVDs) have impacted the U.S. and Illinois greatly, CAD in specific has had the most detrimental impacts both nationwide and locally. African American individuals statistically have the highest mortality rate from CAD in the United States<sup>5</sup>, making it a significant public health issue. It is necessary to ensure that the large African American population in Illinois is protected and

mitigated from the effects of CAD, as African Americans compose 14.7% of the population, a large percentage compared to other states within the US<sup>8</sup>. From our Literature Review and Evidence-Based Research Review, our team was able to understand how and why the African American population was so heavily impacted by CAD: the various SDOH that affect African Americans, such as inadequate environments and a lack of education, and their vulnerability to risk factors influenced by genetics and lifestyle choices. Although there are state-level initiatives within Illinois by the government and organizations, it is imperative that more interventions are created to address the disparities that disproportionately affect the African American community.

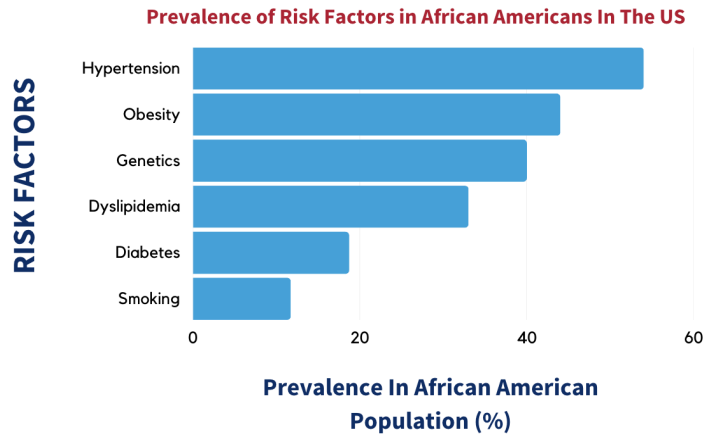
## **Methods**

This review analyzed over 110 existing articles through avenues such as PubMed, ScienceDirect, and Google Scholar to determine potential connections between CAD within the U.S. and Illinois, and the African American population. Our team engaged in discussion with two stakeholders to create a plan of action to combat risk factors and SDOH specific to Illinois.

## **National Literature Review**

Across the United States, the African American community faces the highest rates for CAD. 20 million African American individuals in the U.S. are diagnosed with CVD, and every year, African Americans account for 100,000 CAD death.<sup>3</sup> These numbers demonstrate the urgent need for CAD reform by addressing the various risk factors that contribute to these rates.

Genetic factors play an important role in increasing susceptibility to CAD, due to gene variants that enlarge the likelihood of dyslipidemia and hypertension in African American populations.<sup>9</sup> Cultural elements also factor into higher rates of CAD, such as traditional soul food which has high contents of fats and sugars, as well as attitudes towards exercise.<sup>1</sup>



**Figure 1:** Risk factors for Coronary Artery Disease and their prevalence in African American populations (%).

Fortunately, the impacts can be mitigated. 90% of CVD diagnoses can be prevented through lifestyle changes such as improved nutrition, frequent exercise, and most importantly, awareness of various risk factors and how they can contribute to CAD.<sup>6</sup> A nationwide effort to spread awareness would be a powerful tool in suppressing the rising tide of CAD within the African American community.

### **Evidence-Based Research Findings**

Trends nationwide, and the target region for our intervention, the state of Illinois, are similar, as African Americans face a 158.8% higher chance of mortality from CVD than any other race.<sup>7</sup> These are primarily the result of various social determinants of health and risk factors present in Illinois, especially Chicago, that increase the threat of CAD.

Issue	Socioecological Level	Prevalence and Impact
Unsafe Environment	Community, Organizational	<ul style="list-style-type: none"> <li>• 25% of African Americans in Chicago</li> <li>• Limited transportation to access medical services</li> <li>• Increase in psychosocial stress</li> </ul>
Financial Insecurity	Individual	<ul style="list-style-type: none"> <li>• 67% of African Americans in Chicago</li> <li>• Limited access to treatments and diet choices</li> </ul>
Low Quality Education	Organizational, Individual	<ul style="list-style-type: none"> <li>• 30% of African Americans in Chicago</li> <li>• Decreased awareness and health literacy</li> <li>• Worse health conditions due to limited education</li> </ul>
Lifestyle Choices	Individual	<ul style="list-style-type: none"> <li>• Increase in risk factors (hypertension, obesity)</li> <li>• Long term impacts on health</li> </ul>
Support Systems	Interpersonal, Community	<ul style="list-style-type: none"> <li>• Adverse outcomes through lack of emotional or social support</li> <li>• Fewer resources</li> </ul>
Overlooked By Policymakers	Policy, Community	<ul style="list-style-type: none"> <li>• The most impacted face the least benefits</li> <li>• Worsens state by providing for privileged</li> </ul>

**Table 1:** Social Determinants of Health and Risk Factors for African Americans in Chicago.

The risk factors and determinants that lead to CAD in the Illinois population can be curbed through the implementation of varying degrees of interventions. There have been numerous cardiovascular health interventions undertaken in Illinois that apply to the levels of the socioecological model. These include cardiovascular health lifestyle improvement programs, patient-provider communication improvement programs, awareness events, and policies.

However, many interventions, especially lifestyle programs that involve a large time commitment, can be inaccessible to certain populations. There is currently no way to enforce a long-term impact on individuals in these populations. This motivated our team to reach out to stakeholders to further investigate gaps in CAD interventions in Illinois.

### Stakeholder Perspectives

We had the great opportunity of interviewing Kathy Aykroid, the director of the Max Schewitz Heart Smart Foundation, as well as Mya Gamble from the American Heart

Association. Through their experience in cardiovascular interventions, they shared some key considerations for our interventions. First, while most individuals do know what CVD is, they do not believe that it will affect them unless they can form a direct connection with those affected by the disease and see its implications. Moreover, for many populations, various intervention efforts and programs can be inaccessible due to the time commitment, transportation, or cost, so a more readily available method of improving cardiovascular health is key. However, true impacts can only be achieved through monitoring that is not only long term, but consistent throughout time, which many interventions currently lack. We hope to address these concerns with our own intervention plans for improving cardiovascular health.

### **Plan of Action**

Our interventions are strategically designed to be implemented at the different levels of the socioecological model and incorporate stakeholder insights. For our first intervention, we will host workshops in the Chicagoland area to promote health literacy at the organizational level. Our primary goal in the short-term is to target local elementary schools, and plan engaging activities that educate students on CAD from a young age. In the month of August, we will run our first pilot curriculum at Highland Park Montessori.

As we understand the importance of education through our research, we hope to implement these prevention measures in children at a young age. In the month of October, we will continue to revise our curriculum through workshops in local schools, until we are confident it can excel at the community level.

Once done, we will begin hosting workshops in community centers of downtown Chicago in November and December, specifically targeting African American communities based on the research we have done. We will provide stations that teach attendees the importance

of diet, exercise and other factors of their health.

Understanding that many individuals lack a personal connection to CAD, we will have several professionals leading our sessions to build credibility. Through collaboration with our stakeholders like the American Heart Association, we will provide kiosks that offer blood pressure monitoring tools. As most existing CAD interventions are short-term and fail to follow up with communities, we have decided to implement a second intervention to combat this issue.

Our second intervention focuses on digital health, and utilizing technology for long-term prevention. We will be creating an app and website that offer educational content on CAD detection. The app will contain tools that track vital signs, such as blood pressure, heart rate, and cholesterol levels. Additionally, it will offer personalized risk assessments based on user data to encourage individuals to seek medical attention if their risk profile suggests potential issues.

Since we know long-term adherence for individuals will be a challenge, through our app we hope to ensure individuals make long term lifestyle changes. Every attendee will have a full lifestyle plan easily accessible in the app.

### **Strengths & Limitations**

Although there are many strengths that come with our interventions, some limitations proceed to rise. Our team must overcome these issues to successfully implement these initiatives and gain the results we aim for in our communities.

## I. App & Website:

Strengths	Limitations
The app will foster a sense of community when raising awareness and prevention for CAD, by making individuals feel connected, while also advocating for health literacy synchronously.	The creation stage of the app will be difficult, as our team members are not professional website or app developers, but the assistance of developmental services for apps and websites can be used.
The app will support treatment adherence by assisting our users make necessary changes in their daily lives to see prominent results.	The publishing portion of the app will be very costly, so our team will need to organize many fundraisers to gather the necessary funds.
The app will facilitate early detection by helping users become more aware of the signs and symptoms of CAD and help others through gaining this knowledge, and through a prediction tool.	During the promotion stage, it will be difficult to acquire long-term users for our app and website, so to keep users attracted and engaged, we will combine incentivization and advertisement.
This app will work alongside our website to enhance our overall impact and reach a larger audience through seamless user experience.	This intervention could limit access for individuals who do not have access to technology, so our team can encourage individuals to utilize libraries as a resource.

## II. Workshops:

Strengths	Limitations
Hosting workshops help directly raise awareness in our communities and give our team members first-hand experience on how individuals are affected by CAD.	This intervention will be difficult to organize, so an advanced level of coordination and communication will be necessary.
The workshops will assist our team in educating individuals with a one-on-one conversation, which can help clear up any questions or misconceptions.	Assembling one workshop may not be effective, so multiple workshops must be arranged to reach our target.

## Discussion

Due to the several SDOH, African Americans are predisposed to CAD. This inequity poses significant repercussions as this group lacks access to proper treatment and education on CAD. With mortality rates from CVD being disproportionately high in African Americans compared to any other demographic, Illinois has significant inequities because of SDOH.

This inequity poses dangerous implications for both the state of Illinois and specifically one of the nation's most marginalized groups. With a history of discrimination and racism, it is essential to provide adequate care to help promote health equity today. Our intervention



strategically takes into account the SDOH at play in Illinois, and current gaps in care. As we have learned from our stakeholders, existing interventions lack longevity, which is why we have implemented an app and website to work in conjunction with our workshops. This way, attendees can follow up and track their progress easily.

Possible limitations from our research include accessibility to a greater variety of journals/articles. While we compiled adequate resources, we were limited to databases which don't require fees. Another challenge in our research was finding specific data for the prevalence of CAD in African Americans in Chicago. There is currently a lack of literature on this issue.

## **Conclusion**

CAD is a critical public health issue with prominent consequences on various levels, causing it to be the leading cause of death worldwide. Heart disease accounts for one of the top causes of death in Illinois, impacting more than half its population.<sup>4</sup>

The significance of combining interventions such as an app in conjunction with a website, workshops, and active education towards the younger population, all allows for prominent community connection, the ability to facilitate early detection and monitoring, lifestyle modification, and treatment adherence. After securing a solid foundation in Illinois, we plan on implementing said interventions in underserved communities nationally, to bring true revolutionary change in regards to CVD.

Furthermore, in-depth research is necessary to advance our knowledge on CAD allows for better understanding of what patients currently face. This could include analyzing the effects of genetic factors through novel genetic markers and risk profiling, by leveraging AI. The effect of environmental pollutants and gut microbiomes on CAD could also be studied, as well as psychosocial factors, social support, and telemedicine.

Implementation of such recommendations will bring in innovative initiatives that can provide new insights into CAD management, prevention, and patient outcomes, ultimately contributing to improved public health and reduced burden from CAD.

## References

1. Carnethon, M. R. *et al.* Cardiovascular Health in African Americans: A Scientific Statement From the American Heart Association. *Circulation* **136**, e393–e423 (2017)
2. CDC. Coronary artery disease. *Centers for Disease Control and Prevention*  
[https://www.cdc.gov/heartdisease/coronary\\_ad.htm](https://www.cdc.gov/heartdisease/coronary_ad.htm) (2022)
3. CDC. Heart disease facts. *Centers for Disease Control and Prevention*  
<https://www.cdc.gov/heartdisease/facts.htm> (2023)
4. Chronic diseases.  
<https://dph.illinois.gov/topics-services/diseases-and-conditions/chronic-diseases.html>
5. Clark, L. T. *et al.* Coronary heart disease in African Americans. *Heart Dis.* **3**, 97–108 (2001)
6. Heart disease risk: How race and ethnicity play a role. *Cleveland Clinic*  
<https://my.clevelandclinic.org/health/articles/23051-ethnicity-and-heart-disease>
7. Illinois heart disease and stroke prevention program.  
[http://www.idph.state.il.us/heartstroke/cvd\\_aa\\_fs.htm](http://www.idph.state.il.us/heartstroke/cvd_aa_fs.htm)
8. United States Census Bureau > Communications Directorate - Center for New Media.  
QuickFacts: Chicago city, Illinois.
9. Zilbermint, M., Hannah-Shmouni, F. & Stratakis, C. A. Genetics of Hypertension in African Americans and Others of African Descent. *Int. J. Mol. Sci.* **20**, (2019)