

Heart Disease

Author

## **Heart Disease**

### **Problem Statement**

Heart disease refers to a variety of heart conditions, the most common one being coronary artery disease in the United States. In the United States, about 610,000 people die of heart disease every year, which is one of every four deaths (CDC, 2017). Heart disease is the leading cause of death for both women and men. In 2009, more than half of the deaths in men were from heart disease. This paper will focus on the two major types of heart disease: coronary artery disease and heart attack.

### **Coronary Artery Disease (CAD)**

In the United States CAD is the most common type of heart disease. CAD is the first sign of a heart attack for some people. CAD is caused by a buildup of plaque in walls of the coronary arteries (arteries that supply blood to the heart) and other parts of the body. Plaque is composed of cholesterol deposits and other substances in the artery. As plaque builds up in the arteries, with time, it becomes narrow, which can cause total or partial blockage of blood flow, a process called atherosclerosis. Excessive plaque buildup and narrowed artery wall make it difficult for blood to flow in the body. One may experience angina, a discomfort that results from the heart muscles not receiving enough blood. Angina is the most common symptom of CAD. Coronary artery disease can weaken the heart muscle over time and may lead to an irregular heartbeat or arrhythmia, or heart failure, a serious condition where the heart is unable to pump blood how it should. Annually, CAD kills approximately 370,000 people (CDC, 2015).

### **Heart Attack**

A myocardial infarction or heart attack takes place when a part of the heart muscle receives insufficient blood. Greater damage is done to the heart muscle the more time passes

without treatment to restore blood flow. About 790,000 Americans have a heart attack annually, 210,000 happens to people who have already had the first heart attack while 580,000 are a first attack (CDC, 2015). One of five heart attack is silent, the person experiencing it is not aware of it, but the damage is done. The main cause of heart attack is CAD. Another cause, which is less common is a sudden contraction or severe spasm of a coronary artery which cut blood supply to the heart muscle. It is advised that if one knows the signs and symptoms of heart attack and recognize that they or someone near them is having a heart attack, they should immediately seek treatment since more damage occurs to the heart as time passes.

#### **Extent of the Health Condition: Morbidity and Mortality**

Approximately one of every 13 Americans aged 18 years and above has CAD. In the U.S. it is the leading cause of death for people in most ethnic and racial groups (CDC, 2013). CAD is the most prevalent among Hispanic Americans and least common in Asian Americans, Alaska Natives, American Indians, and Pacific Islanders. Since coronary artery disease develops gradually, it is typically a disease of seniors or older people. Age is the strongest risk factor for CAD. While the disease may be clinically apparent by the age of forty, people who are above 65 years account for 85% of death from CAD.

Approximately 935,000 Americans have a heart attack. About 790,000 Americans have a heart attack annually, 210,000 happens to people who have already had the first heart attack while 580,000 are a first attack (CDC, 2015). Heart disease is the leading cause of death in the United States and accounts for one in every four deaths. One person in America gets a heart attack every 34 seconds, and one person dies from heart disease every minute. The frequency of CAD is similar in both white and black populations. However, the rates of death are greater for

blacks than whites. In 2009, African Americans were 30 percent more likely to die from heart disease than non-Hispanic whites.

Although CAD is the leading cause of death in the U.S, there has been a reduction in the mortality rate by 30 percent since the latter part of the 20<sup>th</sup> century. Some factors for reduction include an emphasis on lifestyle modification, thrombotic therapy, and coronary artery bypass. Often the people with no previous symptoms of heart disease succumb to CAD. Over half of the people who have died suddenly from cardiac arrest were previously asymptomatic. Other people may feel dizziness or a rapid heartbeat which alerts them of possible heart disease.

The American Health System gets strained by heart disease. Cardiovascular disease, including stroke and heart disease, costs the U.S \$312 billion annually (WHO, 2017). This figure is also inclusive of the medications, healthcare services, and lost productivity. Heart disease also tops the list for the leading causes of disability, which prevents people from enjoying family activities and from working.

### **Heart Disease Comparison between the U.S and the World**

Every year cardiovascular disease causes 17.9 million deaths, which accounts for 31 percent of all deaths globally. These diseases, which usually manifest through strokes and heart attacks are usually triggered by harmful use of alcohol, unhealthy diet, tobacco use and physical inactivity (Kumar, 2017). The mortality rate for circulatory diseases in the U.S is above the OECD (Organization for Economic Cooperation and Development) comparable country average (Sawyer & McDermott, 2019). The U.S has the second highest mortality rate for ischemic disease (such as heart attacks), which accounts for more than 44 percent of deaths in this category. This represents 113 age-adjusted deaths per 100,000 population versus an average of 77 in comparable OECD countries. For cerebrovascular disease (such as stroke), the U.S has a

comparably low mortality rate. The exact figure is 43 age-adjusted deaths per 100,000 people versus the average 44 in comparable countries.

The U.S. and other countries have made significant progress in reducing the mortality of cardiovascular diseases. For other countries, the drop has been from 607 deaths to 215 per 100,000 between 1980 and 2015 (Sawyer & McDermott, 2019). The United States has seen a drop in mortality rates from 629 deaths per 100,000 to 257 in the same period. Although there have been significant improvements in the mortality rates that heart diseases cause, other countries have seen improvements which outpace the U.S. The United States rate of decline was 47 percent, Australia, on the other hand, experienced the highest decline of 62 percent, from 486 deaths per 100,000 to 186 between 1990 and 2015 (Sawyer & McDermott, 2019).

### **Disease Description**

In the elderly, the leading cause of hospital admission is heart failure in the United States, a situation which is very expensive for healthcare. African Americans between the age of 45 and 65 have 70 percent higher chances of getting heart failure (Mozaffarian et al., 2016). As shown by the CDC and Census Bureau, the mortality rate for the African-Americans is two and half times that of the Caucasian population. Compared to the non-Hispanic population, the Latino/Hispanic population has a higher incidence of heart failure.

Recent cardiovascular disease investigations in Europe have shown that the epidemiology of the condition has changed. Heart diseases, and particularly stroke and coronary heart disease have been demonstrated to cause more deaths among Europeans than other countries, compared to cancer, they cause twice as many deaths. Another report has shown that some of the Eastern European countries such as Ukraine and Russia have a mortality for coronary heart disease in 55

to 60-year-old individuals greater than that of France in the same bracket (Iqbal, 2008). In the UK, the epidemiology of heart disease was described with regard to treatment costs, prevalence, and mortality. Cardiovascular disease was the most common cause of mortality in the UK for women. The mortality rate was 28 percent for women, for men; however, the common mortality cause was cancer at 32 percent of all male deaths (Shi, Tao, Wei & Zhao, 2016).

There is a significant variation of the mortality from heart disease through the UK. Scotland has the highest age-standardized death rates of 347 for every 100,000 and North of England with 320 for every 100,000 population. Coronary artery disease is also more prevalent in the North of England (4.5 percent) and 4.3 percent in Scotland (Shi, Tao, Wei & Zhao, 2016).

### **Pertinent Studies**

A study by Alderman, Cohen, and Madhavan (1998) sought to determine the determinants of cardiovascular events within 20 years of successful antihypertensive treatment and to stratify them in risk groups based on their pretreatment clinical profiles. The study utilized a prospective study of participants in an antihypertensive treatment program in New York. The variables it measured were the incidence of mortal and morbid cardiovascular events and blood pressure. In the first year, the study achieved the control of blood pressure (to 140 +/-3/87 +/-7mmHg) and maintained it for the remaining 18 years of therapy. In almost 50,000 people in the years of follow up, there were 468 events of cardiovascular disease which included 30 congestive heart failure, 93 strokes, 282 revascularization, and 63 other cardiovascular deaths. Cardiovascular disease events led to 68 percent of all deaths (Bhatnagar, 2017). The most common event being myocardial infarction, after ten years; however, the incidence of myocardial heart failure surpassed stroke.

The study created a risk stratification after the analysis of the independent association of baseline factors and incidence of cardiovascular events. Five pretreatment factors were selected to stratify patterns into four groups: those with a high risk (2237), those with moderate risk (3042), those with no risk factor or low risk (2999), those with very high risk (412). The five factors were diabetes, stroke, pulse pressure  $\geq$  60 mmHg, age  $\geq$  55 and history of heart attack. The unadjusted incident rates of cardiovascular disease per 1000 people differed by factors of 14 and 6 in women and men, respectively.

The results of this study demonstrated that it is possible to achieve the control of blood pressure in the general population. The events of cardiovascular disease still contributed to most mortality and morbidity in the hypertensive patients who recovered. Despite the control of blood pressure, it was possible to stratify patients according to the likelihood of subsequent cardiovascular events.

#### **Data Interpretation issues and Knowledge Gaps**

The study does not consider other factors which promote the development of heart disease risk factors. Since cardiovascular disease is increasing on a global scale, it is important to understand the economic and social forces that affect cardiovascular health events (Kreatsoulas & Anand, 2010). The social determinants of health are the tools which help in understanding the way social problems interact with heart disease on an individual, national and global level. This strategy is important especially in identifying groups that are at a disadvantage. In such cases, interventions can be tailored to those groups at an early age before the conventional risk factors are exhibited by the individuals.

There is a need to improve the national health surveillance and monitoring systems. Studies using regression analysis technique could be used to determine the social bonds and

latent social conflict which is associated with more physical activity (Kawachi & Subramanian, 2007). Such techniques can help researchers and policymakers to study risk factors such as smoking. To develop prevention strategies, it is important to understand the household and community determinants of the main heart disease risk factors, which may vary by cultural background or geographical region

### **Experimental Design**

Most studies to date have relied on administrative data to define the characteristic of a population, such as a census. Multi-level studies have suggested that living in a deprived neighborhood has increased the risk of adverse health outcome, the mechanisms which underlie the association have not been explored. The proposed experimental design will theoretically develop grounded approaches for measuring the aspects of service and social environments, local physical environments,

The validity and reliability of the proposed study will be ensured by the novel applications of Geographical Information Systems and statistical methods. Identifying the actual neighborhood differences will also require identifying true neighborhoods. The issues of measurement and design exploit the capabilities of the multi-level analytical framework. The research will be cross-sectional and assume a hierarchical structure of individuals in neighborhoods. This approach will assume the possibility that an individual might move severally.

### **Treatment and Preventive Measures**

**Check cholesterol**

At least once in every five years, individuals should have a healthcare provider check their levels of cholesterol. Those who have a family history of the condition or diagnosed with high cholesterol may need frequent checks. People with high cholesterol would require lifestyle changes and medication.

### **Blood Pressure Control**

In most cases, blood pressure has no symptoms. Therefore individuals should have it checked on a regular basis. At least every two years, every person's blood pressure should be taken. Those diagnosed with hypertension will require frequent checks to ensure the condition is kept under control. Some changes in lifestyle may also be recommended for those with high blood pressure, such as lowering the intake of sodium in the diet.

### **Healthy Diet**

Heart disease and its complications can be prevented by choosing meals and snack options that are healthful. A healthy diet has plenty of vegetables and fresh fruits. To prevent high cholesterol, one should eat foods low in saturated fats, cholesterol, and transfat. Lowering the intake of sodium can also lower the blood pressure (Eckel et al., 2006).

### **Physical Activity**

Physical activity helps in maintaining a healthy weight and lowering the blood pressure, sugar levels, and cholesterol. Every week, it is recommended for adults to do two and a half hours of moderate-intensity exercise like bicycling or brisk walking. Adolescents and children should get one hour of physical activity every day (McGill Jr, McMahan, & Gidding, 2008).

## References

- CDC. (2015). About Heart Disease. Retrieved from <https://www.cdc.gov/heartdisease/about.htm>
- CDC. (2017). Heart Disease Facts. Retrieved from <https://www.cdc.gov/heartdisease/facts.htm>
- WHO. (2017). Cardiovascular disease. Retrieved from [https://www.who.int/cardiovascular\\_diseases/world-heart-day/en/](https://www.who.int/cardiovascular_diseases/world-heart-day/en/)
- Sawyer, B., & McDermott, D. (2019). How do Mortality Rates in the U.S. Compare to Other Countries? Retrieved from <https://www.healthsystemtracker.org/chart-collection/mortality-rates-u-s-compare-countries/#item-start>
- Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., ... & Howard, V. J. (2016). Heart disease and stroke statistics-2016 update a report from the American Heart Association. *Circulation*, 133(4), e38-e48.
- Iqbal, R., Anand, S., Ounpuu, S., Islam, S., Zhang, X., Rangarajan, S., ... & INTERHEART Study Investigators. (2008). Dietary patterns and the risk of acute myocardial infarction in 52 countries. *Circulation*, 118(19), 1929-1937.
- Bhatnagar, A. (2017). Environmental determinants of cardiovascular disease. *Circulation research*, 121(2), 162-180.
- Kumar, S. (2017). Cardiovascular Disease and Its Determinants: Public Health Issue. *Journal of Clinical Medicine and Therapeutics*, 2(1).
- Kreatsoulas, C., & Anand, S. S. (2010). The impact of social determinants on cardiovascular disease. *Canadian Journal of Cardiology*, 26, 8C-13C.
- Kawachi, I., & Subramanian, S. V. (2007). Neighborhood influences on health.
- CDC. (2015). Preventing Heart Disease: Healthy Living Habits. Retrieved from [https://www.cdc.gov/heartdisease/healthy\\_living.htm](https://www.cdc.gov/heartdisease/healthy_living.htm)

McGill Jr, H. C., McMahan, C. A., & Gidding, S. S. (2008). Preventing heart disease in the 21st century: implications of the Pathobiological Determinants of Atherosclerosis in Youth (PDAY) study. *Circulation*, 117(9), 1216-1227.

Alderman, M. H., Cohen, H., & Madhavan, S. (1998). Distribution and determinants of cardiovascular events during 20 years of successful antihypertensive treatment. *Journal of hypertension*, 16(6), 761-769.

Eckel, R. H., Kahn, R., Robertson, R. M., & Rizza, R. A. (2006). Preventing cardiovascular disease and diabetes: a call to action from the American Diabetes Association and the American Heart Association. *Circulation*, 113(25), 2943-2946.