



## Review Article

## Risk Factors Associated with Cardiovascular Disorders

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## ABSTRACT

Cardiovascular diseases (CVDs) constitute the primary cause of mortality worldwide. 32% of all fatalities globally in 2019 were attributed to CVDs, with an estimated 17.9 million deaths. Heart attacks and strokes were the significant cause of 85% of these fatalities. More than 75% of fatalities from CVD occur in low- and middle-income nations. In 2019, non-communicable illnesses accounted for 17 million premature fatalities (deaths under 70 years of age) of which 38% were attributable to CVDs. An increased risk of acquiring high blood pressure (hypertension), high cholesterol, and Type 2 diabetes can also be attributed to a family history of these disorders. These conditions can also raise an individual's risk of cardiovascular disease. By addressing behavioral risk factors such as tobacco use, bad food and obesity, physical inactivity, and problematic alcohol consumption, most cardiovascular illnesses may be averted. Early detection of cardiovascular illness is crucial for the commencement of medication and counseling-based therapy.

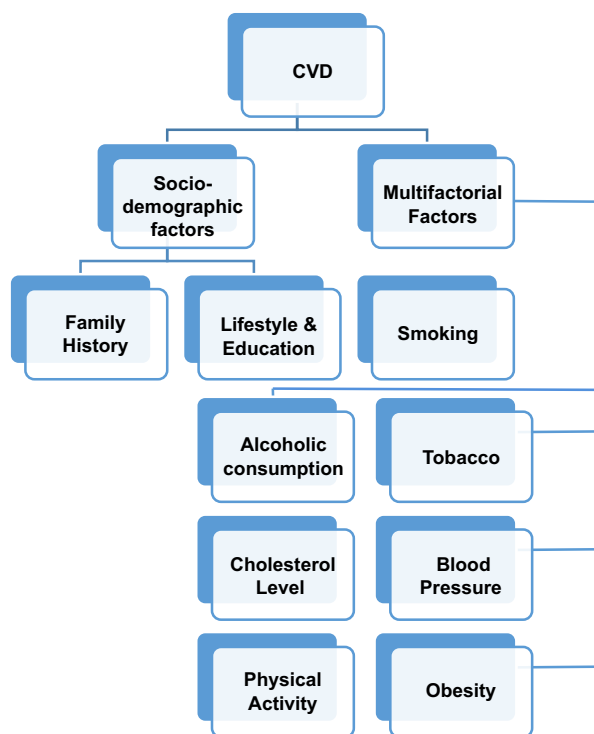
## INTRODUCTION

Cardiovascular disorders (CVD) encompass a spectrum of conditions affecting the heart and blood vessels, posing significant health risks globally [1]. Among these, coronary artery disease (CAD) stands as a prevalent affliction, characterized by the narrowing or blockage of blood vessels supplying the heart muscle, often leading to angina, myocardial infarction, or sudden cardiac death [2]. Hypertension, or high blood pressure, presents as another common cardiovascular disorder, contributing to organ damage and increasing the risk of heart attack, stroke, and kidney disease [3]. Heart failure, a condition where the heart fails to adequately pump blood, results from various underlying factors such as coronary artery disease, hypertension, or valvular heart disease, manifesting in symptoms like shortness of breath and fatigue [4].

Arrhythmias, irregular heart rhythms, can range from benign to life-threatening, potentially causing palpitations, dizziness, or sudden cardiac arrest [5]. Valvular heart disease, peripheral artery disease (PAD), and cardiomyopathy represent additional cardiovascular disorders, each with distinct characteristics and clinical manifestations [6]. These conditions collectively pose significant challenges to public health and are responsible for around 17.9 million deaths worldwide each year [7]. While traditional risk factors like age, gender, and family history play significant roles in CVD development, emerging research sheds light on a myriad of socio-demographic and multifactorial influences that contribute to disease onset and progression [8]. Beyond genetic predisposition and inherent physiological factors, lifestyle

choices and socio-economic determinants exert substantial impacts on cardiovascular health. Behaviors such as smoking, unhealthy diet, physical inactivity, excessive alcohol consumption, and psychosocial stress are well-established risk factors that contribute to the burden of CVD [9]. Furthermore, socio-demographic characteristics including education level, socioeconomic status, and access to healthcare services significantly influence an individual's susceptibility to cardiovascular morbidity and mortality [10].

There is the critical need to comprehensively explore and elucidate the multifactorial nature of cardiovascular risk factors. By synthesizing existing research and highlighting emerging trends, this article aims to provide a comprehensive overview of the socio-demographic, lifestyle, and behavioral determinants that contribute to the development and progression of CVDs (figure 1).



**Figure 1:** Risk factors associated with Cardiovascular Disorders

## SOCIO-DEMOGRAPHIC FACTORS

### Socio-Class Position and Education

The socioeconomic status (SES) of a person is positively correlated with risky behaviors that lead to an unhealthy lifestyle. Higher rates of alcohol and tobacco use have been connected to low socioeconomic status (SES) and illiteracy. For instance, Teo et al., asserted that 82% of the 1.3 billion smokers worldwide live in low- and middle-income countries (LMICs), which frequently have insufficient resources [11]. People in these countries may

prioritize alcohol and tobacco use over education and healthy diet because of financial constraints, which can be detrimental to the cardiovascular system [12, 13]. Numerous studies conducted in Pakistan have demonstrated a correlation between tobacco use and socioeconomic status. In one such study conducted in Rawalpindi, Pakistan, the percentage of smokers among individuals with "no formal education" was found to be much higher than that of those with a doctorate degree, indicating a significant correlation between literacy and tobacco use [14].

### Dietary Patterns and Challenges

Pakistan's traditional eating customs are greatly influenced by cultural and religious influences, which vary depending on the region and ethnic group. Pakistani diets are often high in carbohydrates, particularly refined carbs, and low in fruits, vegetables, and protein sources including beef, poultry, and fish. This eating pattern has been linked to diabetes, obesity, and cardiovascular disease [15]. Numerous studies have shown that Pakistanis typically consume insufficient amounts of fruits and vegetables—less than one serving per day. A study claims that processed and high-fat foods, such as candies, baked goods, and fried dishes, are popular in Pakistan. The nation's rising rates of overweight and obesity are mostly attributable to this eating practice [16]. CVDs will claim the lives of over 22.2 million people a year by 2030. Low- and middle-income countries (LMICs) account for 75 percent of CVD fatalities, resulting in a 7% decrease in GDP [17]. In Pakistan, poverty, food instability, and malnutrition make it difficult to eat healthily, especially in rural regions. Low-income families find it more difficult to maintain a healthy diet as a result of rising food prices. Why is this taking place? Moreover, it is claimed that even among those who eat healthily, there is a deficiency in information and awareness of nutrition, which contributes to Pakistan's low nutrition [18, 19]. Pakistan uses government initiatives including the Food Promotion and Marketing Act, nutrition education, and awareness campaigns to encourage people to eat healthily. [20].

### Family History

Cardiovascular disease (CVD) can also be predicted by family history; those with higher family record distributions have a higher incidence of CVD than those with the highest concentrations of other risk variables, such as blood pressure and cholesterol [21]. One well-known risk factor for myocardial ischemia is the family tree, which includes social, genetic, and environmental factors along with their interconnections [22]. It is possible to advocate for habits that reduce the risk of cardiovascular disease (CVD) and educate people about their concerns by using past family histories [21, 22]. Heart failure can be prevented by

modifying the following risk factors: smoking, high cholesterol, inactivity, obesity, and hypertension [23-25]. Modifying these contributory factors by dietary modifications, greater activity, stopping smoking, and medication (as needed) can greatly reduce heart disease in many at-risk persons worldwide [26].

### **MULTIFACTORIAL FACTORS**

#### **Smoking**

Cigarette smoking is an established and substantial risk factor for cardiovascular disease morbidity and death [27]. The World Health Organization (WHO) estimated in 2015 that 2.1% of women and 22.2% of men smoke in Pakistan [28]. Public health is seriously threatened by the widespread use of tobacco products. An estimated 100 million people worldwide lost their lives to smoking-related illnesses in the 20th century, and predictions indicate that by 2030, one in six people would die from the dreadful effects of tobacco use. Half of all anticipated deaths will occur in people between the ages of 35 and 69, who are the most vulnerable [29]. There is a clear correlation between smoking and cardiovascular disease (CVD), as evidenced by studies conducted in Pakistan, particularly the INTERHEART experiment. People who smoke 40 cigarettes or more a day have a nine times higher risk of developing heart disease than [30].

#### **Other Forms of Tobacco**

In Pakistan, the use of tobacco products such as cigarettes, beedis, chewing tobacco (paan), and hookah (shisha) is on the rise. The nation's culture is deeply embedded in the use of smokeless tobacco, with approximately 33% of men and 4.7% of women admitting to use. Sadly, there is little information available on the health risks associated with waterpipe smoking, and many people choose to ignore them [31-34]. Despite the low level of public awareness of the risks, the tobacco industry contributes a substantial amount of money to the government annually—roughly Rs 27.5 billion [35]. A law prohibiting smoking was passed in 2003, but political obstacles have made it difficult to put it into practice. The government must take action to address this problem by enacting laws that restrict tobacco advertising, outlaw the cultivation of tobacco, and conduct awareness campaigns in an effort to lower tobacco use. [34, 35].

#### **High Blood Pressure**

The primary cause of cardiovascular disease is high blood pressure, or simply "high blood pressure." Both a diastolic blood pressure of 90 mmHg or higher and a systolic blood pressure of 140 mmHg or higher are included in the criteria. The prevalence of high blood pressure has increased in low- and middle-income countries like Pakistan and now affects more than 33% of people worldwide [36]. Fat, thin exercise, smoking, heavy alcohol use, and alcohol

consumption variations are all linked to the development of high blood pressure [37]. High blood pressure has become increasingly common in Pakistan, and many birth plans reflect this in both urban and rural regions. For example, a study in Karachi revealed that 52.5% of hypertension cases in adults over the age of 45 [36]. The incidence, rates, and inadequate management of high blood pressure in Pakistan remain significant despite the condition's importance. According to a Karachi-based study, just 25% of the patients had hypertension. Although most people are aware of their problem, very few actually take medication, and only 6% of people are able to regulate their blood pressure [38].

#### **Obesity**

Cardiovascular disease (CVD) is the major cause of mortality among obese adults [39-41]. Obesity not only indirectly increases the risk of CVD by increasing the prevalence of important risk factors for cardiovascular disease such as sugar and blood pressure, but it also directly increases the risk of CVD (for example, through the adiposopathic actions of epicardial fat) [42]. Furthermore, it has been demonstrated that adiposopathic reactions associated with "sick fat disease" enhance proinflammatory responses and impair both innate and acquired immunity, rendering people more susceptible to infection and resulting in negative results. The COVID-19 pandemic exacerbated the situation, with fat persons developing the disease more frequently and severely. This situation was exacerbated by many patients' reluctance to seek medical assistance, whether for an emergency or a long-term ailment such as obesity, metabolic problems, or cardiovascular disease. Many people suffering from obesity, diabetes, hypertension, and cardiovascular disease (CVD) had worse results as a result of their fear of catching the virus. [43]. The most popular tool for assessing obesity is the Body Mass Index (BMI). It is calculated by multiplying the result by 703 and dividing the weight (in pounds) by the height (in inches) or the weight (in kilograms) by the height (in meters). Despite its limitations, the Body Mass Index (BMI) technique is associated with a higher risk of obesity-related issues and offers a quantitative assessment of body fat [44]. Those who are obese (BMI 20-25 kg m<sup>-2</sup>) have a mortality risk that is 50%-100% higher than that of normal weight individuals. Heart disease is the main cause of this increased risk. Men who are substantially obese may lose two to five years from their life expectancy, while those who are moderately fat may lose roughly thirteen years [45].

#### **LACK OF KNOWLEDGE ABOUT CONTROLLING BLOOD PRESSURE**

According to study conducted by the Pakistan Hypertension League, general practitioners (GPs) in

Pakistan are not accurately identifying hypertension cases following the recommended standards. One key conclusion of the study was that a significant majority of general practitioners (GPs), or 28.5%, do not have a complete grasp of the condition. Moreover, a sizable majority (76.47%) do not follow the suggested standards for appropriately treating individuals with hypertension [46]. 61.5% of general practitioners (GPs) in Australia did not start treating hypertension, according to research. This hesitation was shown to be caused by a number of factors, including a lack of knowledge about pertinent pharmaceutical therapy, unfamiliarity with indicated recommendations, and information gaps [47]. Suboptimal expertise of medical workers, as well as patients' difficulty complying with indicated measures, were recognized as key factors contributing to suboptimal blood pressure control. This issue becomes increasingly more problematic as the population ages, increasing the burden of hypertension-related health problems.

#### **CURRENT CHALLENGES OF DIABETES**

Compared to non-diabetics, those with diabetes have a threefold increased risk of cardiovascular disease, or CVD [39,40]. Cardiovascular disease (CVD) becomes increasingly prevalent as people age and varies by nation; lower- and middle-income countries have greater rates of CVD than high-income ones [48]. Tobacco usage, sedentary lifestyles, bad eating habits, and population aging are all contributing to the rise in diabetes mellitus in Pakistan. Recent survey data confirms this trend, showing that 5.1% of Pakistanis have recently been diagnosed with diabetes, with somewhat higher rates among urban women than rural ones [49]. From 5.2 million in 2000 to an anticipated 13.9 million in 2020, the number of diabetics in the country is predicted to reach 14.5 million by 2025 [49]. CVD is the primary cause of death and disability in diabetics. Up to five young people with type 1 diabetes, ages 8 to 43, pass away from cardiovascular disease (CVD) each year [50-52]. Diabetes and cardiovascular disease, despite their widespread stigma, are prevalent in low- and middle-income countries. A global assessment of 23 low- and middle-income nations found that between 2005 and 2015, diabetes and CVD caused USD 84 billion in economic losses. Russia, China, and India together contributed for half of the total GDP decline [53].

#### **ALCOHOLIC CONSUMPTION**

With 4% of all disease-related deaths and disabilities, alcohol is the fifth most common cause of death and disability [54]. Overindulgence in alcohol consumption increases the chance of high blood pressure, a crucial sign of cardiovascular disease (CVD). [55]. Observational evidence supports the hypothesis that infrequent drinkers are less likely to develop heart disease than habitual users.

The risk of cardiovascular events such as hemorrhagic stroke, generalized hypertension, cardiomyopathy, supraventricular cardiac arrhythmia, and cardiac failure unrelated to coronary artery disease (CAD) is increased by frequent alcohol usage [56].

#### **LACK OF EXERCISE**

Chronic illness is increasingly a leading cause of mortality. Inadequate physical exercise is one of the primary causes of these diseases [57].

#### **HIGH LEVEL OF CHOLESTEROL**

A vital biological component, cholesterol helps animals produce hormones and vitamins as well as help build and function plasma membranes. Certain genetic disorders can affect metabolism, which can result in illnesses that manifest early in life. However, its primary significance is from its role in atherosclerosis, a degenerative condition affecting the medium and large arteries that is responsible for the majority of cardiovascular illnesses (CVD), which is the world's leading cause of death, as reported by World Health Statistics [1]. In adults, hypercholesterolemia is a significant cardiovascular risk factor that increases the chance of atherosclerotic illnesses; however, the association between hypercholesterolemia and atherosclerotic diseases is less clear in the elderly. Statins' effectiveness in lowering the incidence of myocardial infarctions or deaths in patients with a history of cardiovascular problems or high risk, regardless of age, is well documented [59]. Apart from elevated blood cholesterol levels, other risk factors like diabetes, hypertension, and smoking can also hasten the progression of atherosclerosis. These compounds play a role by making endothelial cells more permeable and by causing oxidation, coagulation, and inflammation within blood vessel [59].

#### **CONCLUSIONS**

Cardiovascular disease is a major global health issue that has an impact on people of all ages and in different ways. Comprehensive strategies for early detection, effective treatment, and prevention are necessary given its prevalence and effects on morbidity and death. Cardiovascular diseases are complex conditions influenced by many different risk factors and lifestyle decisions, therefore a multimodal approach including public health initiatives, advancements in medicine, and education is required. Even though we have made strides in our knowledge and treatment of many illnesses, further research and international collaboration are needed to build on these advancements and enhance treatment choices and preventive measures.

## Authors Contribution

Conceptualization: MMH, UR, AI

Methodology: MMH, UR, AI

Formal analysis: MMH, UR, AI

Writing–review and editing: MMH, UR, AI, MUR, SKA

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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