

# Research and solutions to cardiovascular disease in China

**Minghao Wang**

School of Mathematics and Statistics, Xi'an Jiaotong University, Xi'an, Shanxi, China, 710049

907977959@stu.xjtu.edu.cn

**Abstract.** In China, cardiovascular disease (CVD) incidence and mortality rates are rising. CVD is the leading cause of illness mortality in both urban and rural China. Therefore, understanding the social and behavioral aspects of cardiovascular diseases is essential for addressing risk factors such as diet, physical activity, smoking and stress to prevent and manage these diseases. Finally, this article gives some solutions and research conclusions. China should take multi-faceted measures, including education and publicity, medical resource construction, community medical service system construction, scientific research and technological innovation, as well as policy support and financial investment, to comprehensively respond to the challenge of cardiovascular disease.

**Keywords:** Cardiovascular disease, Epidemiology, Health policy, Health influencing factor, Risk factor

## 1. Introduction

Over the past three decades, there has been a significant improvement in both the quality and accessibility of medical care in China. However, the incidence and mortality rate of CVD is still rising, and the turning point of the disease burden decline in China has not yet materialised due to the high prevalence of unhealthy lifestyles among Chinese citizens, a sizable population with CVD risk factors, accelerated population ageing, and other factors. When it comes to the percentage of people who die from the disease, whether in urban or rural areas, CVD remains at the top. Two out of every five deaths in 2020 were attributable to CVD, which accounted for 48.00% and 45.86% of all deaths in rural and urban areas, respectively [1].

It is estimated that the number of current CVD patients in China is around 330 million, including 13 million strokes, 11.39 million cases of coronary heart disease, 8.9 million heart failures, 5 million cases of pulmonary heart disease, 4.87 million cases of atrial fibrillation, 2.5 million cases of rheumatic heart disease, 2 million cases of congenital heart disease, 45.3 million cases of peripheral artery disease, and 245 million hypertension cases [1]. Therefore, CVD is an important public health issue in China.

## 2. Factors that Influence Cardiovascular Health

Tobacco usage is one of the factors affecting cardiovascular health. Data from China's Global Youth Tobacco Survey show that in 2021, 4.7% of secondary school students in the country attempted smoking, and 16.7% of them did so. Students in vocational high schools had the highest percentage of smoking (28.9%), followed by those in senior high school (18.9%) and junior high school (12.9%) [2]. A

prospective cohort study of chronic diseases (CKB) in China included 461,047 persons between the ages of 30 and 79. Compared to those who had never smoked, smokers had a 40% higher risk of dying and a 23% and 14% higher risk of first ischemic heart disease and ischemic stroke, respectively, after a median follow-up of 11.2 years. [3].

Another significant component influencing cardiovascular health is dietary nutrition. China's fat-to-energy supply ratio has risen since 2012 and is now above the recommended range of 20%–30% for dietary requirements. Between 2015 and 2017, the fat-to-energy supply ratio in rural regions reached 33.2%, a 30% increase beyond the recommended maximum limit. This was the first time this had happened. Moreover, the amount of edible oil and cooking salt used far exceeded the necessary amounts [4]. The risk of stroke decreased by 14% when common salt was substituted with a salt substitute, according to the Study of the Relationship between Low Sodium Salt and Stroke. Additionally, the group that substituted salt gained an average of 0.054 additional quality-adjusted life years (QALY) per person, saving about 110 yuan. The salt substitution group outperformed in terms of stroke prevention and QALY, providing superior health outcomes at a cheaper cost [5].

Furthermore, physical activity is another component that influences cardiovascular health. Data from a cross-sectional survey of 298 counties (districts) in 31 provinces, autonomous regions, and municipalities, collected by the China Chronic Disease and Nutrition Surveillance (CCDNS), show that in 2015, 12.5% of Chinese adults aged 18 and older regularly engaged in moderate to vigorous physical activity for at least 30 minutes each time, three times a week. Although this estimate is higher than the one from 2010 (11.9%), Chinese people still don't exercise much [6].

Apart from these, over weight and obesity are also significant factors affecting cardiovascular health. From 2002 to 2017, data from three nationally representative samples revealed that the prevalence of overweight and obesity among Chinese people was on the rise in the country. According to the China Nutrition and Health Surveillance Report from 2015 to 2017, the prevalence of overweight and obesity among Chinese children younger than 6 years was 6.8% and 3.6%, respectively; 11.1% and 7.9% among those aged 6-17 years; and 33.3% and 14.1% among adults aged 18 and older years [7].

Lastly, cardiovascular health is impacted by mental health as well. A meta-analysis of 23 studies found that 51% of Chinese inpatients with CHD had depression, with major depression accounting for 0.50–25.44% of cases [8]. Comorbid depression affects 15%–30% of patients with acute cardiac failure (CHF) and 20% of patients with CHD and chronic heart failure (HF), per the Guidelines for the Diagnosis and Treatment of Depression (2021). Anxiety and depression rates increased with time in a 36-month follow-up study of 190 individuals with newly diagnosed CHD, with anxiety rising from 42.6% at baseline to 51.1% and depression growing from 33.3% to 43.7%. [9].

### **3. The PRECEDE–PROCEED Model: A Behavioral Approach Used to Study CVD**

The PRECEDE–PROCEED model is a cost-effectiveness assessment framework that can help health program planners, policymakers, and other evaluators analyze situations and effectively design health programs. It offers a complete framework for analyzing health and quality of life needs, as well as creating, implementing, and evaluating health promotion and other public health programs to address those needs [10]. One purpose and guiding principle of the PRECEDE–PROCEED model is to direct initial attention to outcomes, rather than inputs. It walks planners through a process that begins with desired outcomes and then works backwards in the causal chain to discover a combination of techniques for reaching those goals [10].

Health behavior is viewed as being influenced by both individual and environmental influences in this theory, and so comprises two separate aspects. First is an "educational diagnosis" – PRECEDE, an acronym for Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation. Second is an "ecological diagnosis" – PROCEED, for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development [11].

The PRECEDE-PROCEED model is a comprehensive planning framework that can be applied to address the issue of cardiovascular disease (CVD) in China. Here is how the model can be applied in the context of CVD [12]:

#### Phase 1: PRECEDE Phase

**Social Assessment:** Conduct a social assessment to understand the social and cultural factors that contribute to CVD in the target population, such as lifestyle choices, dietary habits, and physical activity levels.

**Epidemiological Assessment:** Conduct an epidemiological assessment to identify the prevalence and risk factors of CVD in the target population, such as smoking, high blood pressure, high cholesterol, and obesity [13].

**Behavioral and Environmental Assessment:** Identify the modifiable behaviors and environmental factors that contribute to CVD, such as tobacco use, unhealthy eating habits, sedentary lifestyle, and limited access to healthy foods or exercise facilities.

**Educational and Ecological Assessment:** Based on the above assessments, identify the knowledge, attitudes, and beliefs related to CVD and the ecological factors that influence these attitudes and behaviors.

#### Phase 2: PROCEED Phase

**Intervention Design:** Develop an intervention plan that encompasses strategies to address the identified issues and leverage the factors influencing the target population's CVD risk. This could include developing educational materials and programs, creating policies to enforce healthy environments, providing access to healthcare services, or implementing community-wide interventions [14].

**Implementation:** Implement the intervention plan, ensuring the effective delivery of educational programs, access to healthcare services, or the enforcement of policies. Collaboration with various stakeholders, such as healthcare professionals, community leaders, and policymakers, is important for successful implementation.

**Evaluation:** Assess the effectiveness and impact of the intervention through evaluation methods, such as surveys, interviews, data collection, and analysis. Evaluate if the intervention has led to changes in knowledge, behaviors, or environmental factors related to CVD. This evaluation helps in identifying areas of success and areas that need improvement.

**Administrative and Policy Evaluation:** Evaluate the administrative and policy aspects of the intervention to determine if the program is being implemented as planned and if the policies are being enforced effectively.

The PRECEDE-PROCEED model can provide a systematic and evidence-based approach to plan and implement interventions for preventing and controlling CVD in China. It helps identify the underlying causes and determinants of CVD and guides the development of tailored interventions to address those factors effectively [15].

## 4. Possible Solutions

China should take comprehensive measures to address the challenge of cardiovascular disease from multiple angles.

First, strengthening public education and health promotion could improve people's awareness of cardiovascular disease and risk factors and help them change their behaviors to

enhance their health. Disseminating knowledge about healthy lifestyles through the media, community publicity, and health education courses, and guiding people to develop good health habits could also prevent CVD in China.

Secondly, steps should be taken to strengthen the development of medical resources and improve the level of cardiovascular disease prevention and treatment. Increasing the construction of cardiovascular disease specialized hospitals and cardiovascular disease diagnosis and treatment centers, increasing the supply of professional doctors, technical equipment and drugs, and improving diagnosis and treatment levels are all steps that could prevent CVD.

At the same time, it is recommended that China strengthen the construction of community medical service systems and provide health management and disease screening services for grassroots residents. Other suggestions include establishing a family doctor contract service system, promoting health

management plans and chronic disease management models, providing regular health examinations and life intervention, and timely detection and intervention in risk factors for cardiovascular diseases.

In addition, scientific research and technological innovation should be strengthened. Supporting basic and clinical research on cardiovascular diseases, promoting the application of new technologies, and improving the early diagnosis and treatment of cardiovascular diseases are all steps that should be taken.

Finally, the government should increase policy support and financial investment in the prevention and treatment of cardiovascular diseases. Strengthen legislation and supervision, promote nutritional improvements in important foods, strengthen supervision of harmful substances such as tobacco and alcohol, and reduce risk factors for cardiovascular disease.

## 5. Conclusion

To sum up, China should take multi-faceted measures, including education and publicity, medical resource construction, community medical service system construction, scientific research and technological innovation, as well as policy support and financial investment, to comprehensively respond to the challenge of cardiovascular disease.

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