

Vital Surveillances

Cardiovascular Disease Mortality — China, 2019

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ABSTRACT

Introduction: Cardiovascular disease (CVD) is the leading cause of death and has caused a heavy burden in China. China has about 106 million CVD patients, including 33 million with stroke. This study presents the latest cardiovascular mortality in China in 2019 to provide evidence for disease control and prevention.

Methods: Mortality data from the China Death Surveillance Point System (DSP System) was used for CVD mortality estimation. A descriptive analysis was conducted to demonstrate the results.

Results: A total of 5.09 million CVD deaths were estimated in China in 2019, with a mortality rate and age-standardized mortality rate of 364.5 per 100,000 population and 276.0 per 100,000, respectively. Stroke is the leading cause of death, and the mortality rate and age-standardized mortality rate (ASMR) were 171.6 per 100,000 and 130.0 per 100,000, respectively. The second major cause was ischemic heart diseases, and the mortality rate and ASMR were 147.3 per 100,000 and 142.1 per 100,000, respectively. Stroke and ischemic heart diseases were the two major causes of CVD deaths, which accounted for over 87% of all CVD deaths.

Conclusions: Although age-standardized mortality of CVD continues to decline in China, the number of deaths is still increasing. Therefore, prevention and control efforts for CVD should be maintained. In order to achieve the “Healthy China 2030” goal of reducing the mortality rate of CVD in China, it is necessary to further strengthen the prevention, control, and treatment capacity of stroke. Meanwhile, increases in ischemic heart disease deaths in highly developed areas should be monitored.

INTRODUCTIONS

With socioeconomic development, the lifestyle of the general public in China has shifted significantly. Especially with the acceleration of population aging and urbanization in China, people are increasingly exposed to cardiovascular-related risk factors, and the

incidence and prevalence of cardiovascular disease (CVD) has increased in the past 10 years (*1*). According to the 2018 report on CVDs in China, the report estimated that the number of cardiovascular patients in China was about 290 million, among which approximately 13 million had stroke and approximately 11 million had coronary heart disease. CVD remains the top cause of death and it accounted for over 40% of deaths in China in 2016. Stroke was ranked as the first cause of death among CVDs (*2–3*).

The Chinese government pays a lot of attention to the prevention and control of CVDs. In the past five years, the Chinese government has issued several important policy documents, including “China’s medium-to-long term plan for the prevention and treatment of chronic diseases (2017–2025)” (*4*), “Healthy China 2030” (*5*), and “Healthy China Action (2019–2030)” (*6*), all of which set the reduction of cardiovascular deaths as the priority goal for prevention and control. This report provides a detailed picture about the level and distribution of CVD mortality nationwide in 2019, which will be useful for evaluating CVD prevention and control efforts in the future.

METHODS

The data analyzed in this study came from the National Disease Surveillance Point (DSP) system of China, which covered 24% of the population (over 300 million) and collected all causes of death in 605 surveillance points. Previous work has demonstrated its national and provincial representativeness (*7*). A DSP surveillance point represents a rural county or an urban district, which is an administration unit in China.

In 2019, a total of 1,867,524 deaths were reported to the DSP system. International Classification of Diseases 10th revision (ICD-10) was used to identify CVD deaths (I00–I99). The mortality data was obtained and stratified by causes of CVD, sex, age group, area type (urban/rural), and region (eastern/central/western). National population data was obtained from the National Bureau of Statistics in 2019 with identical stratification as the mortality data.

The crude mortality rate (CMR) of CVD was calculated by using the number of deaths and associated populations. The mortality rate was adjusted through a formula to prevent underreporting of data: adjusted mortality rate (AMR) = crude mortality rate / (1 - underreporting rate). The overall underreporting rate of CVD (12.9%) was based on propensity score weighting established in a previous study (8). By multiplying the mortality rate in specific populations for each stratum and calculating the sum, CVD deaths were estimated by using scaled-up aggregation data in each stratum. The Sixth National Population Census in 2010 was used for age-standardized mortality rate (ASMR) estimation. SAS software (version 9.4, SAS Institute Inc., Cary, USA) was applied for statistical analysis.

RESULTS

The statistics regarding adjusted mortality rates, ASMR, and estimated CVD deaths nationwide in 2019 were shown in Table 1. The mortality rate for all CVD deaths were 364.5 per 100,000 population, 387.6 per 100,000 for males, and 340.9 per 100,000 for females. An estimated of 5.09 million people died because of CVD in 2019, of whom 2.76 million were male and 2.33 million were female. Stroke was the leading cause of death, and the mortality rate and ASMR were 171.6 per 100,000 and 130.0 per 100,000, respectively. The second major cause was ischemic heart diseases, and the mortality rate and ASMR were 147.3 per 100,000 and 142.1 per 100,000, respectively. Stroke and ischemic heart diseases were the two major causes of CVD deaths for both genders. The number of deaths caused by the 2 diseases was estimated to be over 4.45 million and accounted for over 87% deaths of all CVD deaths.

The mortality rate and ASMR of CVD in different areas and regions were demonstrated in Table 2. In 2019, the ASMR of CVD in rural areas was 294.8 per 100,000, which was higher than that in urban areas (241.7/100,000). For different regions, the ASMR was the lowest in the eastern region, followed by the western region, and was the highest in the central region, with 242.6/100,000, 286.0/100,000, and 313.0/100,000, respectively. Stroke was still the most common cause of deaths in different areas and regions, and ASMR was the highest in western rural areas, reaching 154.0/100,000. In eastern urban areas, ischemic heart disease surpassed stroke and became the leading cause of death among CVD, with the ASMR reaching 95.1/100,000.

DISCUSSION

This article provided the latest information on CVD deaths in China and displayed regional differences of type-specific CVDs.

China's cardiovascular mortality rate was 364.5 per 100,000 population in 2019 with males higher than females, which was consistent with other previous studies (2–3). Compared with the surveillance results published by China CDC in 2015, the CVD mortality rate increased 7.4% and ASMR decreased 4.7% (9). The results indicated that the increase in the number of deaths from CVD was closely related to population aging. In 2019, CVD accounted for 47% of all deaths in China, suggested that two out of every five deaths were CVD patients.

The mortality rate of CVD was higher in central and western regions than in the eastern region, and higher in rural areas than in urban areas. The results can be explained by the high-salt diet in northern and northeastern areas of China, as well as the high

TABLE 1. Mortality rate, age-standardized mortality rate (ASMR), and estimated deaths of cardiovascular diseases categorized by sex in China, 2019.

ICD-10	Cause	Mortality rate (per 100,000)			ASMR (per 100,000)			Estimated number of deaths		
		Both	Male	Female	Both	Male	Female	Both	Male	Female
I00–I99	Cardiovascular diseases	364.5	387.6	340.9	276.0	325.7	229.0	5,090,379	2,763,498	2,326,881
I01–I09	Rheumatic heart diseases	4.7	4.0	5.4	3.6	3.3	3.7	65,637	28,632	37,005
I10–I13	Hypertensive heart diseases	26.4	25.3	27.6	19.9	21.4	18.1	368,686	180,341	188,345
I20–I25	Ischemic heart diseases	147.3	152.1	142.1	111.4	128.6	94.7	2,057,100	1,085,879	971,221
I60–I69	Stroke	171.6	189.7	153.3	130.0	158.1	103.8	2,396,458	1,351,142	1,045,316
I40–I42, I51.4–I51.6	Cardiomyopathy and myocarditis	1.9	2.1	1.6	1.5	1.9	1.2	26,534	15,343	11,191

Abbreviation: ICD-10=International Classification of Diseases 10th revision.

TABLE 2. Mortality rate (per 100,000) and age-standardized mortality rate (per 100,000) of cardiovascular diseases categorized by area and region in China, 2019.

Item	Total		East			Central			West		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Mortality rate											
Cardiovascular diseases	331.0	382.0	358.7	324.3	378.8	393.1	351.2	410.4	336.1	320.2	345.1
Rheumatic heart diseases	4.1	5.1	3.4	3.2	3.6	4.7	3.2	5.3	6.5	6.2	6.9
Hypertensive heart diseases	21.9	28.8	24.6	19.4	27.6	30.8	24.9	33.3	23.3	22.5	23.8
Ischemic heart diseases	141.0	150.5	149.8	146.0	152.0	164.5	150.6	170.3	120.8	123.0	119.4
Stroke	149.3	183.2	164.9	137.8	180.6	183.0	162.8	191.3	167.4	152.8	175.7
Cardiomyopathy and myocarditis	1.7	2.0	1.1	1.2	1.1	1.2	1.4	1.2	3.8	2.7	4.5
Age-standardized mortality rate											
Cardiovascular diseases	241.7	294.8	242.6	212.7	260.6	313.0	274.9	329.2	286.0	257.6	303.8
Rheumatic heart diseases	3.0	3.9	2.3	2.2	2.4	3.7	2.5	4.2	5.7	5.1	6.1
Hypertensive heart diseases	15.8	22.0	16.3	12.5	18.6	24.5	19.3	26.8	19.9	18.0	20.9
Ischemic heart diseases	102.5	116.1	100.9	95.1	104.5	131.1	118.1	136.7	103.1	99.3	105.4
Stroke	109.1	141.2	111.8	90.7	124.3	145.2	127.1	152.9	141.8	122.3	154.0
Cardiomyopathy and myocarditis	1.3	1.6	0.9	0.9	0.9	1.1	1.2	1.0	3.3	2.2	4.0

prevalence of hypertension, high total cholesterol, blood glucose level, and high smoking rate in the central and western regions (10). It is necessary to strengthen the interventions of these risk factors in the central and western regions.

Stroke is still the most important cause of death of CVD in China. Compared with surveillance results in 2015 (9), ASMR decreased by 8.4%. A nationwide retrospective survey of cerebrovascular disease confirmed the reported trend of declining stroke mortality (11). Reasons for declining stroke mortality mainly include the improvement of access to healthcare, the progress of medical technology, and the improvement of public health conditions (12). Meanwhile, ASMR of ischemic heart disease continued to increase by 3.6% compared with 2015 (9), and in highly developed areas (eastern urban areas), the burden of ischemic heart disease has surpassed that of stroke.

The findings were subject to some limitations. The reporting of underlying cause-of-death has flaws and data underreporting was inevitable. Although we had adjusted the underreporting rate in the study, the underreporting rate is not the latest one corresponding to 2019. Therefore, the reported results may underestimate the current level of CVD and cerebrovascular disease deaths.

Although age-standardized mortality of CVD continues to decline in China, the number of deaths is still increasing. Prevention and control efforts for CVD

should be maintained in the future. To achieve the “Healthy China 2030” goal of reducing the mortality rate of CVD in China, it is necessary to further strengthen the prevention, control, and treatment capacity of stroke, while the increase of ischemic heart disease deaths in developed regions should be closely monitored.

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