

# *Research progress on population aging and chronic diseases*

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**Abstract:** With the further aggravation of population aging, the incidence rate and mortality rate of chronic diseases also increase. At present, population aging is a hot research issue, and the relationship between it and chronic diseases is also one of the major public health problems to be solved urgently, and the prevention and treatment of chronic diseases in the elderly is the most important priority. Based on the literature of population aging and chronic diseases in recent years, this paper clarifies the impact of population aging on chronic diseases, in order to provide a theoretical basis for the prevention and treatment of chronic diseases in the elderly in the context of population aging, reduce the social burden and improve the health level of the elderly.

## 1. Preface

Based on the data of the seventh national population census, the aging degree of China's population is further deepened, which is a major social problem facing us at present. With the aging of the population, the incidence and fatality rate of chronic diseases are also increasing, especially cardiovascular and cerebrovascular diseases, endocrine diseases, chronic respiratory diseases, cancer and other chronic diseases in the elderly. The rapid development of economy, the change of people's lifestyle and the acceleration of population aging process will all affect the mortality rate of chronic non-communicable diseases [1]. The number of deaths from chronic diseases in China now reaches 9.26 million, accounting for 90 percent of all deaths [2]. However, population aging is the biggest risk factor for increased morbidity and mortality in most chronic diseases [3]. Has a significant impact on the cognition of chronic diseases, self-care ability, healthy living habits and so on. This paper studies and analyzes the related literature of population aging and chronic diseases in recent years, clarifies the main risk factors of population aging on chronic diseases and their influence degree, establishes scientific prevention and treatment strategies, reduces the burden of

disease, and improves the health level of the elderly.

## 2. Ageing of population

China has a large population base, according to the 2021 National Development Bulletin on the Aging. The national elderly population aged 60 and above is 267.36 million, accounting for 18.9% of the total population; the national elderly population aged 65 and above is 200.56 million, accounting for 14.2% of the total population, plus the predicted statistics of Chinese Academy Figure 1, the conclusion that the trend of the population aging is becoming more and more obvious. As shown in Figure 2, compared with developed countries, the aging population is ahead of the social and economic development and causes great pressure; the regional distribution of the elderly population is very uneven; the aging dependency ratio is increased first slowly and then fast [4]. Population aging has caused a very important impact on the health and quality of life of the elderly. The accelerated process of population aging leads to the rapid increase in the incidence of chronic diseases and mortality in the Chinese population, which is one of the major public health problems to be solved urgently in China.

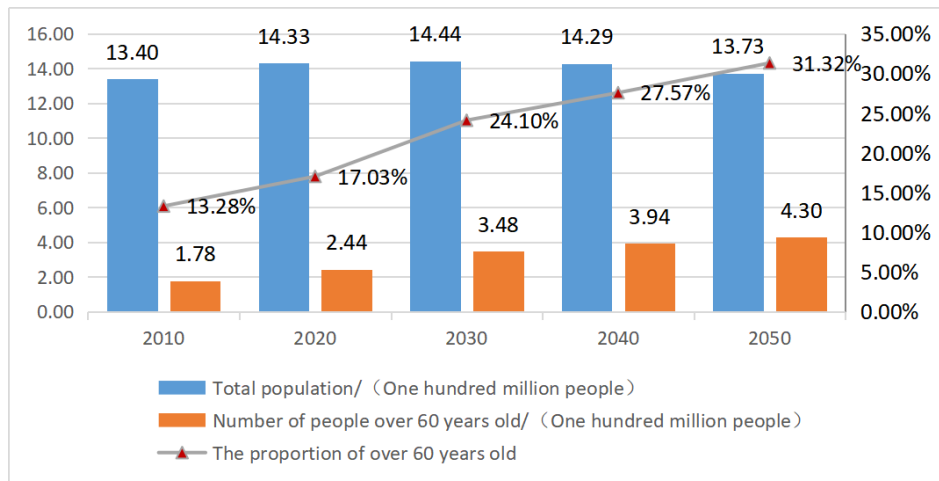


Figure 1: Trend of the aging population

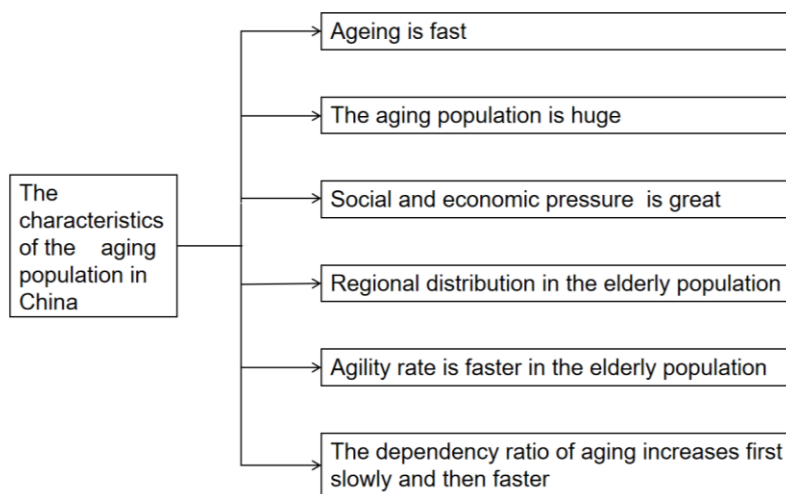


Figure 2: Characteristics of China's aging population

### 3. Population aging and chronic diseases

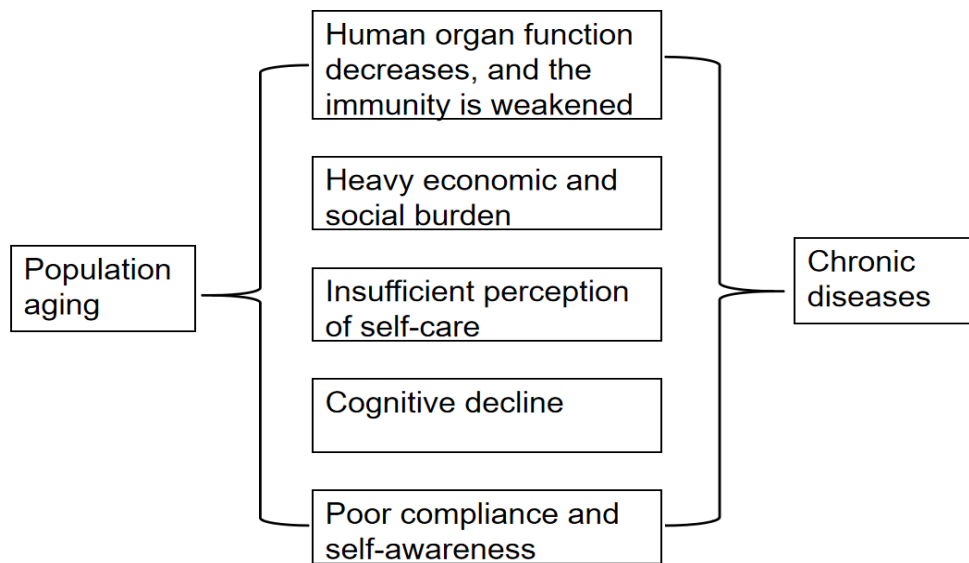


Figure 3: Population aging and chronic diseases

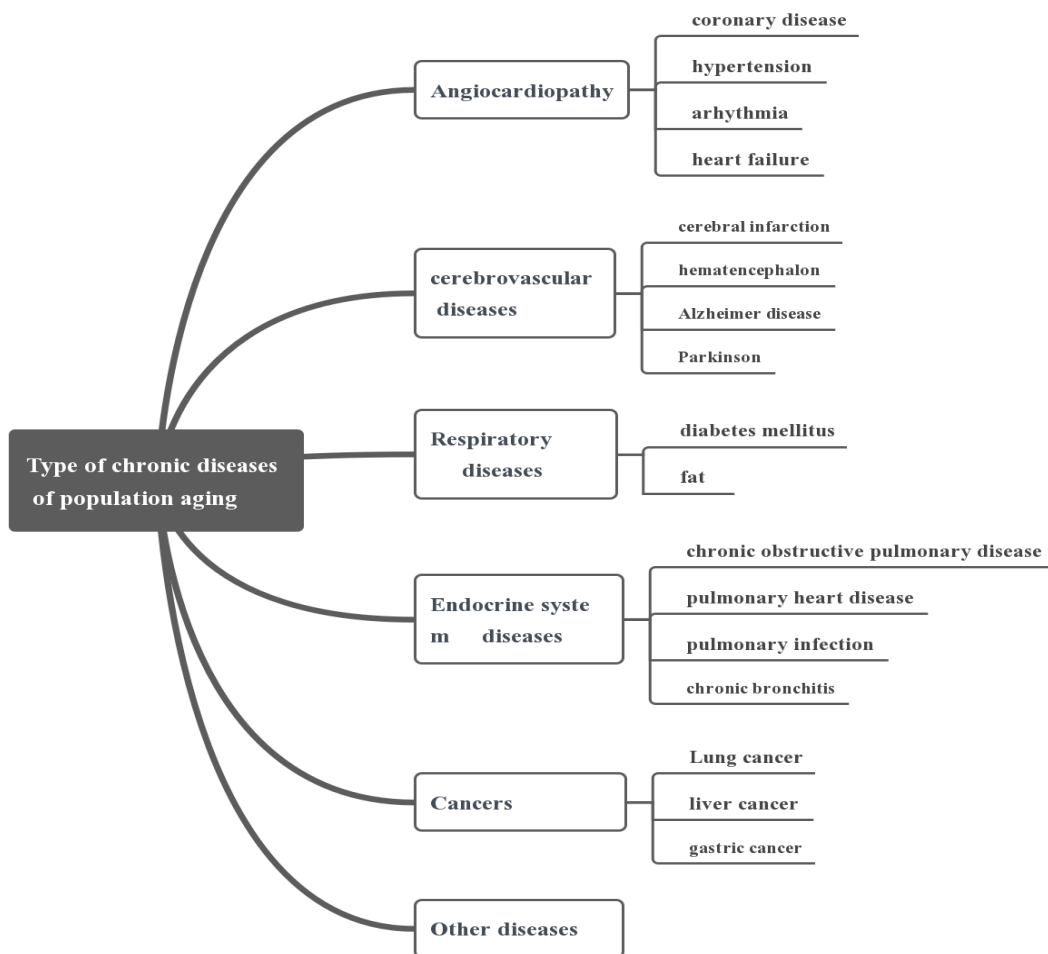


Figure 4: Type of chronic diseases of population aging

The ageing population leads to the increased prevalence and mortality of chronic diseases. Many studies [5] have shown that with the deepening of population aging, the incidence and mortality of chronic diseases such as cardiovascular and cerebrovascular diseases, tumors and diabetes are on the rise. This is mainly because with the growth of age, human organ function decline, weakened immunity, leading to increased susceptibility to chronic diseases. In addition, the aging of the population increases the disease burden of chronic diseases, which often require long-term treatment and management, bringing a heavy economic and social burden to the society and the medical system, and the aging of the population further increases this burden. The elderly have insufficient concept of self-health care or cognitive ability, poor grasp of the basic knowledge of chronic diseases, the importance of drug therapy and medication methods of drugs, and are easy to be misled by wrong information, and poor compliance and self-consciousness will affect the treatment of chronic diseases. Therefore, the relationship between population aging and chronic diseases is shown in Figure 3. Disease spectrum of the elderly will be affected by the population aging phenomenon and corresponding changes, according to statistics, 80% of the old people will suffer from one or more chronic diseases, a certain impact on its health, the most common chronic diseases have cardiovascular disease, cerebrovascular disease, endocrine system disease, chronic respiratory diseases, tumors, etc., as shown in Figure 4.

### 3.1. Cardiovascular diseases

With the rapid development of social economy and the continuous improvement of national living standards, the incidence of chronic diseases in the elderly is increasing year by year, and cardiovascular diseases occupy the main body, making the elderly patients lose the labor force, unable to take care of themselves, disabled, and is the main culprit of the death of the elderly. Research finding [6], The mortality caused by cardiovascular disease continues to increase, aging population is the main driving factor for the increase in cardiovascular death; the most common diseases are cardiovascular disease, such as coronary heart disease, hypertension, arrhythmia, elderly template heart disease and heart failure, etc.; China currently cardiovascular disease patients with 330 million people, rural and urban CVD deaths accounted for 46.74% and 44.26% of the total number of deaths, with the aging of the population, cardiovascular incidence is significantly increased, the incidence of people over 80 years old, resulting in sudden death, thrombosis events increased, seriously increase the death and disability rate [7]. The rapid development of cardiovascular diseases and the high incidence of acute and critical diseases, prone to disability and death, will not only affect life and health, but also further increase the social burden.

### 3.2. Cerebrovascular diseases

Cerebrovascular diseases are one of the major chronic diseases in China. According to the report, the mortality rate of cerebrovascular diseases among Chinese residents in 2017 was 147.04/1010 million, accounting for 22.4% of the total number of deaths. The mortality rate of cerebrovascular diseases among urban and rural residents in China was 126.58/1010, 000 and 157.48/10 million, respectively, ranking the third in the urban areas and the first in the rural causes of death respectively [8]. Because of the area of carotid artery stenosis in the elderly increases, and the increase of systolic blood pressure, diastolic blood pressure, glycated hemoglobin and triglyceride levels can cause damage to cerebrovascular function, so the abnormal rate of cerebrovascular function in the elderly is very high, and the common cerebrovascular diseases include cerebral infarction, cerebral hemorrhage, Alzheimer's disease, Parkinson's disease, vertigo and so on [9]. Cerebrovascular diseases are chronic and progressive diseases caused by multifactors, and cerebral hemodynamic detection is the detection parameter reflecting cerebrovascular function [10].

Therefore, the detection of cerebrovascular function is very important to reduce the incidence of cerebrovascular diseases in the high-risk group of the elderly. With the growth of age, blood vessels aging, people's memory decline, behavior slowing down, cognitive decline and so on are the prevention of population aging cerebrovascular diseases should be focused on and need to be solved.

### **3.3. Endocrine system diseases**

Endocrine system diseases are a kind of chronic diseases that affect human health. Especially with the development of the aging population, the incidence of endocrine and metabolic diseases such as diabetes and obesity is getting higher and higher. It has only taken 30 years for the prevalence of diabetes in China to grow rapidly from less than 1% to more than 10%, and it will still show an increasing trend for a period of time. With the improvement of Chinese people's living standards, the improvement of the degree of urbanization and the aging of the population, the prevalence of diabetes will further increase but not decrease [11]. The pathogenesis of diabetes in the elderly is related to mental factors, genetic factors and dietary factors in the elderly, and has a high rate of disability and mortality. The treatment of diabetes is mainly drug treatment and diet control. Due to the poor compliance and self-consciousness of the elderly, there is a poor prognosis and more complications. Endocrine diseases generally have a long course of disease, and suffer from a variety of diseases, lesions can often involve the whole body, will seriously endanger the patient's life and quality of life.

### **3.4. Chronic respiratory diseases**

Respiratory diseases are one of the important factors causing the death of the elderly, and for respiratory diseases in the elderly, the most common COPD, pulmonary heart disease, pulmonary infection, emphysema, chronic bronchitis and tuberculosis. Data show that chronic obstructive pulmonary disease has almost become an epidemic among Chinese adults, with the prevalence rate as high as 8.6%, and the number of people is nearly 100 million. Among them, the prevalence rate of COPD among adults aged 20 and above in China is 8.6%, 13.7% over 40 years old, and the prevalence rate of people over 60 years old has exceeded 27% [12]. Higher age indicates higher COPD prevalence. Chronic bronchitis is a common disease and frequent disease in the elderly characterized by chronic cough and expectoration. It is often attacked repeatedly and acute in the cold season, and will be complicated by a variety of respiratory diseases. The elderly have reduced autoimmune function and often suffer from a variety of basic diseases, which are susceptible to respiratory diseases. The aging process will increase the prevalence and mortality of chronic respiratory diseases.

### **3.5. Malignant tumors**

Malignant tumor is one of the important factors that threaten the health and life of the elderly. Tumor diseases have a high mortality rate. People over 65 years old are the most prone to cancer, and their cancer incidence and mortality rate are the highest. Some studies [13] have said that under the condition of the age incidence and mortality of cancer unchanged, the total incidence of malignancy in the 2020 population model increased by 0.82 times compared with that of the 2000 population model, and the total incidence increased by a factor of 0.98 times, among which the number of deaths older than 60 increased by 1.15 times. Therefore, the rapid aging of the population will directly increase the number of people with high incidence of malignant tumors, so that the number of cases and deaths will rise rapidly. Common ones include lung cancer, esophageal cancer, prostate cancer, stomach cancer, liver cancer, colorectal cancer, pancreatic cancer and

bladder cancer, etc. Some elderly women are also more affected by breast cancer, gallbladder cancer and uterine cancer [14], Its risk factors mainly include the decline of immune function of the elderly, the accumulation of pathogenic factors, and the increased susceptibility of tissues and cells, and very few people are cured, so people will focus on improving their quality of life. Efforts should be made to implement the healthy Chinese cancer prevention and control action, and actively promote the healthy aging of the Chinese population.

### **3.6. Other diseases**

In addition to the above several major diseases, chronic non-fatal diseases such as obesity, constipation, arthritis, cataract and osteoporosis in the elderly also seriously affect the health and quality of life of the elderly. There are many causes of obesity in the elderly: dietary factors, too little activity, physical factors, disease effects, drug effects, environmental effects and so on. The elderly constipation is more, often cause a certain pain and mental burden to the elderly, but also affect the health. Constipation refers to the number of defecation less than 2 times a week or dry stool, difficult defecation. It is mainly because of the elderly gland aging, saliva, gastric fluid, intestinal fluid secretion reduction, and intestinal tension, peristalsis slow, resulting in feces in the intestinal tract for a long time, too much water is absorbed, stool dry not easy to discharge. The aging of the population has brought about changes in the disease spectrum, especially the increasing burden of chronic diseases. Chronic diseases in the elderly have multiple characteristics of large number of patients, high prevalence rate, high fatality rate and high disability rate. Therefore, the relationship between the two should be effectively solved.

## **4. Prevention and treatment of chronic diseases with an aging population**

With the aging population, the prevention and treatment of chronic diseases is becoming increasingly important. Studies have shown that a healthy lifestyle can reduce the risk of chronic diseases. Therefore, health promotion and disease prevention is one of the important measures to tackle the aging population and chronic diseases. Nutrition and diet are one of the important factors in the prevention and management of chronic diseases.

The health management of the elderly is becoming more and more important, the first should strengthen health education, mobilization of elderly health promotion action, vigorously promote health aging concept and elderly health policy, for the elderly and their caregivers in health education activities, promote the elderly to form a healthy lifestyle, improve health literacy, build care support elderly health social atmosphere. Newspapers, radio, television stations and new media platforms give full play to their respective advantages and actively participate in health education for the elderly. Activity centers for the elderly and nursing homes hold regular health lectures. Establish and improve the health science expert database and health science resource database to provide support for health education for the elderly. Encourage sports associations for the elderly and other related professional social organizations to carry out sports and sports activities for the elderly to promote the health of the elderly. Secondly, prevention and health care should be strengthened, and establish and improve the tertiary prevention system of health risk factor intervention for the elderly, early detection, early diagnosis and early treatment, and disability prevention. We will strengthen health management for the elderly, provide lifestyle and health status assessment, physical examination, auxiliary examination and health guidance services, and establish continuous, comprehensive and dynamic health management files for the elderly. The health management of the elderly is regarded as an important part of the annual performance evaluation of basic public health service projects; improve the working mechanism of family doctor contract service, and establish the full-cycle health management of chronic diseases, grassroots

primary diagnosis and hierarchical diagnosis and treatment mode in the county medical community. Early screening and health guidance for neurodegenerative diseases such as senile dementia and Parkinson's disease. We will implement smart health management for the elderly, and dynamically monitor the basic health status of key groups such as the elderly, living alone, disabled and semi-disabled. Pay attention to the mental health of the elderly, rely on the routine mental health assessment and follow-up management, and play the leading role of TCM in the treatment of diseases and the unique role in the prevention and treatment of geriatric diseases, strengthen the health care of TCM, and promote the traditional TCM sports programs. Finally, we should strengthen the diagnosis and treatment of diseases, give priority to supporting the allocation of bed resources such as geriatric medical treatment, rehabilitation and nursing, and establish and improve the geriatric medical service network. On the basis of the existing key departments of geriatric medicine and competent geriatric hospitals, we will promote the construction of flag, county and city geriatric medical centers. We will strengthen drug use guarantee for the elderly, strengthen drug guidance for the elderly, and improve the long-term prescription system for chronic diseases in the elderly. We will fully implement preferential policies for medical services for the elderly and optimize the medical treatment process for the elderly. To alleviate the problems of the elderly and disabled elderly and the elderly left in areas with inconvenient transportation and scarce medical and health resources, medical and health institutions are encouraged to provide on-site services such as home beds and home visits for disabled elderly people at home. We will improve the cooperation mechanism between medical institutions and elderly care institutions, and promote the establishment of two-way referral channels between medical institutions [15].

## 5. Summary

With the aging of the population, there are great challenges and pressures on the country, society, families and individuals. To sum up, population aging has become an important factor affecting and exacerbating chronic diseases, and improving the prevention and treatment of elderly chronic diseases under the population aging will help to improve the quality of life and health level of the elderly, and relieve the pressure brought by population aging. At the same time, strengthening the research on this is crucial to establish scientific prevention and control strategies, reduce the burden of disease and improve the health level of the elderly. It is an important project to further promote the combination of medical care and nursing care and establish a healthy aging society. For medical workers, we should actively carry out epidemiological research to deeply understand the current situation and trend of population aging in China, so as to provide theoretical basis for the establishment of a harmonious and sustainable aging society.

## References

- [1] Haggarty S J, Karmacharya R, Perlis R H. *Advances toward precision medicine for bipolar disorder: mechanisms & molecules* [J]. *Molecular Psychiatry*, 2020((Suppl 4)):1-18.
- [2] Krams IA, Rantala MJ, Borrás-león J, et al. *Corrigendum to "bipolar Disorder: an Evolutionary Psychoneuroimmunological Approach"* [J]. *Neuroscience & Biobehavioral Reviews*, 2021.
- [3] Abia R. *Prologue: Nutritional Genomics for Understanding the Interaction of Dietary Lipids and Chronic Diseases* [J]. *Grasas Y Aceites*, 2009, 60(1): 7-7.
- [4] Wang Sen. *Analysis of characteristics, prospects and countermeasures of population aging in China* [J]. *Journal of Shijiazhuang University of Economics*, 2006, 29(2): 4.
- [5] Aldrich N, Benson WF. *Disaster Preparedness and the Chronic Disease Needs of Vulnerable Older Adults*[J]. *Preventing Chronic Disease*, 2008, 5(1): A27.
- [6] Li N, Wu P, Shen Y, et al. *Predictions of mortality related to four major cancers in China, 2020 to 2030* [J]. *Cancer Communications*, 2021(9983).
- [7] Ma Liyuan, Wang Zengwu, Fan Jing, et al. *China Cardiovascular Health and Disease Report 2021 on the*

- prevalence and prevention of hypertension in China*[J]. *Chinese Journal of General Practice*, 2022, 25(30): 6.
- [8] Malhi GS, Tim O, Grace M, et al. *Royal Australian and New Zealand College of Psychiatrists Clinical Practice Guidelines for Mood Disorders: Bipolar Disorder Summary* [J]. *Medical Journal of Australia*, 2018, 208(5): 219.
- [9] Wang Yan. *Influencing factors of cerebrovascular dysfunction in the elderly* [J]. *Contemporary Nurses: Late Edition*, 2022, 29(8): 3.
- [10] Wang Yushan, Wang Shuxia, Wang Wenhui, et al. *Correlation analysis between pulse pressure index, body mass index and cerebral hemodynamics in 12 375 physical examination population in Urumqi*[J]. *Chinese Journal of Health Management*, 2020, 14(1): 6.
- [11] Ning Guang. *Current status and prospect of diabetes prevention and treatment in China* [J]. *Science China Life Sciences*, 2018, 48(8): 810-811.
- [12] Wang Yue, Mao Kaiyun, Wang Hengzhe, et al. *Promoting the development of China's health industry in the face of aging and chronic diseases*[J]. *Chinese Journal of Life Sciences*, 2018, 30(8): 7.
- [13] Chang Qingyun, Du Jun, Yu Da. *Research progress on aging of Chinese population and cancer prevention and control* [J]. *Chinese Journal of Cancer Prevention and Treatment*, 2022, 29(16): 6.
- [14] Chen Wanqing, Zheng Rongshou, Zhang Siwei, et al. *Analysis of incidence and mortality of malignant tumors in China in 2012*[J]. *Chinese Oncology*, 2016, 25(1): 8.
- [15] Zhou Tao. *Further promote the integration of medical and elderly care to actively cope with the aging population* [J]. *Population and Health*, 2022(12):2.