

Diet, Nutrition and Chronic Disease in Mainland China

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ABSTRACT

In the recent 3 decades, along with the rapid development of national economy, dietary pattern and lifestyle have undergone significant changes in Mainland China. At the same time, the major causes of disease and death in Mainland China have shifted from predominantly infectious disease and diet-related deficiency diseases to overweight/obesity and other non-communicable diseases, including hypertension, stroke, coronary heart disease, diabetes, cancers, *etc.* The characteristics of the dietary change are the decrease of cereal and vegetable consumption and the increase of animal foods and oil/fat consumption; although the average Chinese dietary pattern remains a plant food based diet. These dietary changes, in combination with the decrease of physical activity (sedentary life), continuous increase of tobacco and alcohol consumption have led to the rapid increase of non-communicable diseases (NCDs). The overall contribution of NCDs death to the total death of Chinese people is around 80%.

Current evidences have provided enough scientific basis for placing NCDs prevention and control as the high priority in public health; although further studies on the interactions between human genome and lifestyle factors are important for improving the effectiveness of prevention and control strategies.

Key words: diet, nutrition, lifestyle, chronic diseases, mainland China

INTRODUCTION

Since 1950, the annual Gross National Products (GNP) in Mainland China increased from 12.5 to 4382 USD per capita in 2010, and the average household purchasing power increased more than 4 times⁽¹⁾. China's improved standard of living has brought about significant changes in food consumption, dietary pattern and lifestyle as well as in health and disease pattern, i.e. a reduction in diseases of poverty (infant death, communicable disease, nutrition deficiency), the doubling of life expectancy from 35 years before 1949 to 73 years (male 70, female 74) in 2005⁽²⁾ and the major causes of disease and death in Mainland China have shifted from predominantly infectious disease and diet-related deficiency diseases to obesity and other non-communicable diseases (NCDs), including hypertension, stroke, coronary heart disease, diabetes, cancers, *etc.* Noteworthy is that many of the known risk factors for the chronic diseases have dramatically increased in societal change processes. These behavioral changes include westernization of dietary pattern, reducing level of physical activity, increase tobacco consumption, and alcohol use.

In this paper, the burden of NCDs, the major determinants of NCDs and the current policies, strategies and actions in the control of NCDs in Mainland China will be described.

CHRONIC DISEASES HAVE BECOME THE MAJOR KILLER AND BURDEN

I. Causes of Death

National mortality analysis showed that China has experienced a significant parallel transition in the major causes of death in the past decades. The Third National Retrospective Death Causes Survey conducted in 2004 - 2005, and data collected based on the Diseases Surveillance Points which covered 161 counties/district/cities and 70 million populations. Based on the ICD-10, cerebrovascular disease, cancers, chronic respiratory disease and heart disease accounted for 22.45, 22.32, 15.81 and 14.82% of total of death in China, respectively. These top 4 major NCDs accounted for 75% of the total death in China and the mortality of total NCDs reached to 503/100,000 population⁽³⁾.

The proportion of NCDs in the total death increased from 53 to 85% during the period of 1973 to 2009. After standardized by age and gender, the mortality of stroke in the rural areas was 20% higher than that in the urban areas. The mortality of chronic obstructive pulmonary disease (COPD) in the rural areas was apparently higher than that in the urban areas, and the mortality of cancer was similar in both rural and urban areas^(3,4).

II. Prevalence of Hypertension

Hypertension is one of the most important disease and also the most important risk factors of stroke and other cardiovascular disease in China. According to the 3 National Hypertension Epidemiology Survey conducted in 1959, 1979, 1991, and the 2002 China Nutrition and Health Survey, the crude prevalence of hypertension in

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China among aged 15 years old and above was increased from 5.11% in 1959 to 17.65% in 2002. It is estimated that 200 million Chinese have hypertension at present⁽⁵⁾.

III. Prevalence of Type 2 Diabetes

The prevalence of Type 2 diabetes in 1980s in China was only 0.8%. However, the 2002 National Nutrition and Health Survey showed that national prevalence of Type 2 diabetes has reached 2.6% and was much higher (6.1%) in big cities⁽⁵⁾. According to the 2010 China Chronic Disease Surveillance results, the national prevalence of diabetes among Chinese adults was 9.7%⁽⁶⁾.

IV. Economic Burden of NCDs in China

In 2009, on average, per admission for a common NCDs patient would cost 50% of the disposable annual income of a urban resident (5176.9 RMB or 750 USD per capita per year), and 1.3 times of that of a rural resident (2009 RMB or 291 USD per capita per year). The highest cost was coronary artery bypass operation, which was 1.2 times higher than the annual disposable income of an urban resident or 6.4 times higher than the net annual income of a rural resident.

The total medical cost caused by NCDs in China was 1.48 trillion RMB(210 billion USD) in 2005. The proportion of disease burden of NCDs increased from 54% in 1993 to 63% in 2005⁽⁴⁾. According to the Report on Disease Burden Research published by the World Health Organization in 2009, NCDs accounted for nearly 69% of the total of disease economic burden in China⁽⁷⁾.

The burden of the four leading NCDs –myocardial infarction (MI), stroke, diabetes, and COPD – is expected to increase over 2010 - 2030 by almost 50 percent. More than 50 percent of the disease burden will be caused by CVDs (MI and stroke); stroke has the largest health and well-being impact on an individual in China. The burden due to deaths from these NCDs will increase by more than 80 percent. NCD-related morbidity accounts for more than 90 percent of the total NCD burden. About half of China's disease burden from NCDs occurs in people under 65. The growing NCD burden is ominous for the country as disability will likely be substantial in the years to come, including a significant and growing burden to the health system⁽⁸⁾. If economic losses from absence of work and reduction of productivity were included, the total burden will be much larger.

At the macro-economic level, it was estimated that reducing CVD mortality by 1 percent per year over a 30-year period (2010 - 2040) could generate an economic value equivalent to 68 percent of China's real GDP in 2010⁽⁸⁾.

V. Major Determinants of NCDs in China

(I) Diet and Nutrition Transition in China

The dietary pattern of Chinese people has undergone dramatic changes since 1950s, especially in the last three decades. Based on the national food disappearance data, there was a clear trend of slight decrease in grain consumption and significant increase in animal food and oil consumption in the recent decades⁽⁹⁾.

Four national nutrition surveys (NNS) had been conducted in China since 1950s. The results from the first (1959) NNS showed that national average energy intake was 2,060 kcal and the protein intake was 57g per capita per day; food from plant sources contributed 89% of the total dietary protein intake. The second NNS carried out in 1982 showed that the nutritional status of the Chinese population was greatly improved as compared with the data in the 1950s. The average energy intake was increased to 2,484 kcal and protein intake increased to 67g per capita per day. The third NNS conducted in 1992 showed that the average energy intake slightly decreased to 2,328 kcal and protein intake remained the same (68 g); however, the fat intake was increased to 58.3 g, as compared with the 49.3 g in 1982. The main features of the dietary transition are the decrease of grain and carbohydrate intake and the increase of meat, poultry, fishes and edible oil/fat intake. Using fat intake as the indicator of dietary pattern, the dietary fat intake of urban Chinese was close to 30% of total dietary energy intake, and in the major metropolitan cities, such as Beijing, Shanghai and Tianjin, the average fat intake all exceeded 30% of total dietary energy intake. Therefore, the trend of westernization of diet in Chinese people is quite obvious, although the current average Chinese diet is still based on plant food, i.e. grains, vegetables and fruits are the major foods^(10,11). The fourth NNS was conducted in 2002 and it was the first time to combined nutrition survey with the national hypertension, diabetes and blood lipid survey and the name was changed to 2002 Chinese Nutrition and Health Survey (CNHS). The 2002 survey showed that the average energy intake slightly decreased to 2,250 kcal and protein intake remained the same level (65 g) compared with 1992; however, the fat intake had increased to 76.3 g(85.5 g in urban and 72.7 g in rural) as compared with 58.3 g in 1992. The main features of the dietary transition are the significant changes of dietary pattern. The dietary fat intake of Chinese was close to 30% of total dietary energy intake, the average fat intake of urban Chinese reached to 35.0% of total dietary energy intake and it was 38.4% in the big city, fat contributed 27.5% of total energy intake of rural residents; energy shared from carbohydrate was 47.4% in urban and 60.7% in rural. These data indicated that the diet of urban Chinese is imbalance, and the diet of rural Chinese is getting better comparing with the Chinese dietary guidelines^(5,10,11).

(II) High Salt Consumption

High salt intake is traditional dietary habit in both urban and rural Chinese diets. In China, average daily salt intake for a reference man in 1982, 1992 and 2002 was 12.7, 13.9, 12.0 gram per day respectively. And soy sauce intake was

not included. This is approximately twice the level recommended by Chinese dietary guidelines. In some rural areas, average salt intake was as high as 14.7 grams^(5,10).

(III) *Increasing Intake of Edible Oil Intake*

According to the NNS and 2010 China Chronic Disease Surveillance data, the consumption of edible oil is increasing significantly. The national average consumption of edible in 1982, 1992, 2002 and 2010 was 18.0, 29.5, 41.6 and 49.7 gram per capita per day^(5,6,10).

(IV) *Prevalence of Current Smoking*

Smoking is one of the most important risk factors for NCDs in China. The rate of current smokers in males and females in 2010 was 53.3 and 2.5%, respectively⁽⁶⁾.

(V) *Physical Activity*

Increasing urbanization and industrialization is associated with a dramatic decrease in physical activity level and lifestyles of Chinese in general have become more sedentary, as indicated by the low percentage of Chinese people taking regular exercise. According to the findings in Survey on Physical Exercise among Rural and Urban Chinese in 2007, less than 12% of Chinese aged 16 and above undertook regular exercise for three times and 30 minute on weekly basis⁽⁴⁾. The number of private cars has been increased by more than 40 times since 1990s.

(VI) *Overweight and Obesity*

The prevalence of overweight and obesity has significantly increased over the past decade. In 2002, China had nearly 300 million people as either overweight or obese; among them, 22.8% of adults are overweight and 7.1% are obese. During the decade between 1992 and 2002, the overweight rate in adults increased by 40.7% and obesity rate increased by 97.2%⁽⁵⁾. According to the China Chronic Disease Surveillance data, the prevalence of overweight among aged 18 - 60 was 23.1% in 2004, 27.3% in 2007 and 28.6% in 2010, and obesity rate was 7.2% in 2004, 8.0% in 2007 and 10.0% in 2010^(5,12). At the same time, the prevalence of overweight and obesity among Chinese children and adolescent is also increasing rapidly, especially in big cities⁽⁵⁾.

At least 580 million Chinese were estimated to have at least one modifiable NCD-related risk factor in 2010. About 70 - 85 percent of these people were under age 65. By 2030, those risk factors – behavioral and nutritional – could contribute to a 50 percent increase in China's NCD burden if not controlled⁽⁸⁾.

(VII) *Social Determinants: Industrialization, Urbanization and Aging*

The low fertility rate in the past several decades, the social economic development and health care

improvement are the demographic drivers shaping China's population profile. The 2010 National Census data showed that aged population (60 years old and above) accounted for 13.26% of the total population and there was a 2.93% increase since 2000, and 65 years old and above accounted for 8.87% of total population in 2010 and 1.91% increase since 2000⁽¹³⁾.

The increase of numbers of adults and elderly inevitably leads to a shift in the burden of NCDs from younger to older age groups. China's rapid population aging is estimated to increase the NCD burden by at least 40 percent by 2030⁽⁸⁾.

In China, rural populations are aging more rapidly than urban populations, largely due to rural-to-urban migration. In 2010, 49.68% of Chinese population lived in urban and 50.32% in rural. Compared with 2000, urban population increased by 13.46%⁽¹³⁾.

VI. *Policies, Strategies and Actions in the Control of NCDs in China*

To meet the challenges of NCDs, the Chinese government have made commitment to NCD control. Increase life expectancy by 1 year was set as one of the major goals of the 12th Five Year (2011 - 2015) Plan for National Economic and Social Development. Taking effectiveness measures to prevent NCDs needs actions from the government.

The "Compendium for Food and Nutrition Development in China (2001 - 2010)" issued by the General Office of the State Council as No. 86 Document in 2001 was the first time that the Compendium integrated food, nutrition and health into one national document. Three priorities have been defined: soybean production, milk and food industry. Rural areas, poor areas and western regions were the three key areas⁽¹⁴⁾.

In 2007, The National Action on Healthy Lifestyle for All was jointly initiated by the Ministry of Health, National Patriotic Health Campaign Committee and Chinese Center for Disease Control and Prevention. The objectives of this campaign is to work together to help individuals, communities and workplace to realize informed healthy lifestyle. The first phase of the campaign was focused on balanced diet and physical activity. All the information provided are science-based, practicable, measurable and effective and socialized. By 2010, the campaign has expanded to the whole 31 provinces in Mainland China and was set as an important platform for health promotion.

The Project on Path to Health to establish exercise facilities in communities across the country was initiated by the General Administration of Sports, China in 2000. Sustainable funding of 40 million USD annually was provided by the Chinese Sports Lottery Fund.

Technical guidelines including Chinese Guidelines on Adult Obesity Control and Prevention, Chinese Guidelines on Childhood Obesity Control and Prevention, Chinese Dietary Guidelines and Chinese Food Pagoda, Chinese

Guidelines for Hypertension Control and Prevention, Chinese Guidelines for Diabetes Control and Prevention, Chinese Guidelines on Adult Physical Activity, *etc*, have been developed by related scientific societies and mostly issued by Ministry of Health.

In 2007, Sunny Sports Program Supporting Millions of Students across China having one hour exercise every day was launched under the leadership of Ministry of Education, General Administration of Sports and Central Committee of the Communist Youth League. The document was issued jointly by the Central Committee of the Communist Party of China and State Council of China, which showed the importance of the document.

CONCLUSIONS

China's NCD epidemic will continue to explode over the next 20 years if not addressed effectively. Much of China's NCD burden can be avoided and controlled by the adoption and adaptation to local conditions of good practices that have been proven effective internationally.

With reduced unhealthy behaviors such as imbalanced diet, physical inactivity, and improved socioeconomic environments conducive to health, and expanded access to quality health services, not only do people live longer, but their quality of life is also improved by the reduction of sickness and disability at the end of life.

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