

## Original Article

# Lifestyle of Chinese centenarians and their key beneficial factors in Chongqing, China

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**Objective:** This study aims to describe the lifestyle of Chinese centenarians and to identify the beneficial factors that are correlated to their longevity. **Methods:** A census-based survey was conducted among centenarians in Chongqing, Southwest China, to identify the lifestyle factors affecting their health. From screening identification cards, 878 centenarians (age range 100-117, mean 102) were identified and interviewed. **Results:** The survey indicated that 64% centenarians were able to take care of themselves. The majority of centenarians were non-smokers (92%) and non-drinkers (83%). No significant difference was observed between urban and rural distributions ( $\chi^2=0.939$ ,  $p=0.625$ ). Moreover, 43% centenarians maintained a regular diet, and only 33% had a sedentary lifestyle. **Conclusions:** A nutritious diet, adequate physical exercise, and a harmonious family environment may be the key lifestyle factors for their longevity of centenarians in Chongqing. These observations might be helpful in designing health promotion and welfare strategies for the elderly.

**Key Words:** centenarians, lifestyle, census, longevity, Chongqing

## INTRODUCTION

Aging populations (aged 60 years and above) have become a global phenomenon, and centenarians have generated special interest among researchers.<sup>1</sup> The relative absence of diseases and disabilities, as well as their ability to maintain a good physical, cognitive, and psychosocial status, have made centenarians a representation of “successful aging”.<sup>2,3</sup> The aging population is projected to account for 1/4 of the global population by 2050, with 53% of them located in Asia.<sup>4</sup> Population statistics indicate that Chinese aging population has reached 167 million in 2009.<sup>5</sup>

Numerous studies have identified factors that are correlated with longevity and differentiate centenarians from the rest of the population. However, the lifestyle of large groups of centenarians has been rarely investigated.<sup>6</sup> To address this issue, a census-based survey was conducted among centenarians in Chongqing, Southwest China to examine their lifestyle, physical activity and diet, and to determine the key factors that may affect their health. The data are unique and valuable among centenarians from Chongqing. This study aims to describe the lifestyle of Chinese centenarians and to identify the key beneficial factors that are correlated with the longevity of Chinese centenarians.

## MATERIALS AND METHODS

### Participants and setting

Centenarians who live in any of the nine districts of Chongqing City (29.19 million population) and 41 affiliated surrounding counties were visited and interviewed by the researchers between September 1 and December 31, 2010. The sampling was performed by screening and reviewing their identification cards. This study was supported by the Chongqing Health Education Institute, the local Health Education Institute, and the Centre for Disease Control and Prevention. A total of 878 individuals (173 men and 704 women) were identified as aged 100 or above.

### Measures

A structured questionnaire was developed based on previous similar surveys including National surveillance of non-communicable diseases and its risk factors among adults in China 2010 and designed for the target population, and completed after repeated discussions and pilot investigation. It included two sections: 1) demographic

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characteristics including age, gender, educational level, occupation and income source, living in urban or rural, number of children in the family, generations in the family; and 2) lifestyle factors such as smoking, alcohol intake, physical activity, food preference and dietary habits.

Smoking was classified in terms of current smoker or non-smoker, and current smokers were classified into smoking every day or not. Drinking was defined as consumption of at least 30 g of alcohol per week for 1 year or more. Physical activities were defined as athletic, recreational or occupational activities that require physical skills and utilized strength, power, endurance, speed, flexibility, and range of motion or agility. Regular diet was defined as a full, well-balanced diet containing all of the essential nutrients needed for optimal growth, tissue repair, and normal functioning of the organs.

The investigators were experienced in the related research fields and received professional training (including investigation method and quality control measures) for this study. Most interviews were directly conducted between the investigator and the participating centenarians to ensure the quality of the interview. However, some caregivers were interviewed instead of those participants who did not meet the required cognitive status such as AD patient. The final response rate of the survey was 100%.

### Statistical analyses

The survey data were entered using the Epidata 3.0 database software, and the descriptive and statistical analyses of the data were carried out using SAS 8.0. The descriptive analyses were presented as median and interquartile ranges for numeric variables and as percentages for categorical variables. The distribution of the variables was tested through the Kolmogorov-Smirnov test. The differences in the frequencies were tested through the  $\chi^2$  test. All of the statistical tests were two-sided and were conducted at a significance level of 5%.

### Ethical considerations

All of the centenarians were informed of the study's purpose, and their participation in the study was voluntary. The participants gave their oral consent. To ensure their anonymity, the centenarians' names were not asked in the questionnaire. Each centenarian was instead given a unique code, which was written on their questionnaire. The answered questionnaires were stored in a locked cabinet. An ethical clearance was obtained from the local health authorities in Chongqing, and the survey was conducted in compliance with the Ethical Committee of Chongqing Medical University.

## RESULTS

### Basic demographic information

Table 1 shows the basic demographic characteristics of the participating centenarians. A total of 878 centenarians were identified, including 173 men (19.7%), and 704 women (80.3%). Their ages ranged from a minimum of 100 years to a maximum of 117 years, with a mean age of  $102.2 \pm 2.2$  years. A total of 800 centenarians were less than 105 years old, 77 were between 105 and 110 years old, and only one participant was older than 110. A total

of 265 of the centenarians (46.0%) were receiving financial support from their children, 146 (25.4%) were receiving government support, and 82 (14.2%) were not receiving any financial support. The other participants were receiving financial support through different sources, including pension, endowment insurance, social insurance, and other channels. A total of 87 participants (10.4%) only had one child, 308 (37.0%) had two or three children, 277 (33.3%) had four or five children, and 147 (17.6%) had more than five children. More than 70% of the centenarians (571) had three or four family generations, 25.6% (207) had five or six generations, and 4.3% (34) only had one or two generations.

### Self-care situation

Self-care was defined in our research as one's caring for

**Table 1.** Basic personal characteristics of centenarians in Chongqing

Items	Demographic characteristics	Centenarians n (%)
Gender	Male	173 (19.7)
	Female	704 (80.3)
Age (Year)	100~105	800 (91.1)
	106~110	77 (8.8)
	111~115	0 (0.00)
	116~120	1 (0.11)
Incoming source	Nothing	82 (14.2)
	Basic living allowance	146 (25.4)
	From the offspring	265 (46.0)
	Pension	39 (6.8)
	Endowment insurance	27 (4.7)
Regions	Urban	258 (29.5)
	Rural	616 (70.5)
Number of children	1	87 (10.4)
	2~3	308 (37.0)
	4~5	277 (33.3)
	>5	147 (17.6)
Family generations	1~2	35 (4.3)
	3~4	571 (70.2)
	5~6	207 (25.6)

**Table 2.** Self-care situations of the centenarians according to region and age groups

Item	Independent (%)	Dependent (%)
Region*		
Urban	102 (11.8)	154 (17.9)
Rural	210 (24.4)	396 (45.9)
Total	312 (36.2)	550 (63.8)
Age**		
100~105	289 (33.4)	499 (57.6)
106~110	23 (2.7)	54 (6.2)
111~115	0 (0.00)	0 (0.00)
116~120	1 (0.12)	0 (0.00)
Total	313 (36.1)	551 (63.6)

\* The self-care situation of the centenarians in urban areas was statistically significantly different with those in rural areas ( $\chi^2=7.08$ ,  $p$  value=0.029).

\*\* No significant difference was observed in the self-care situation among different age segments ( $\chi^2=3.41$ ,  $p$  value=0.491).

**Table 3.** Distribution of centenarians by factors of smoking, drinking, gender and region in Chongqing

Item	Gender			Region		
	Male n (%)	Female n (%)	Total n (%)	Urban n (%)	Rural n (%)	Total n (%)
Smoker	55 (6.5)	16 (1.9)*	71 (8.4)	14 (1.7)	57 (6.8)***	71 (8.4)
Non-smoker	111 (13.1)	665 (78.5)	776 (91.6)	236 (28.0)	537 (63.6)	773 (91.6)
Alcohol user	55 (6.4)	79 (9.2)**	134 (15.7)	38 (4.5)	96 (11.3)****	134 (15.7)
Non-alcohol user drinker	110 (12.9)	600 (70.1)	710 (82.9)	209 (4.4)	499 (58.5)	707 (82.9)
Occasional alcohol user	1 (0.12)	11 (1.3)	12 (1.4)	5 (0.59)	7 (0.82)	12 (1.4)

\* Significant difference was observed between male and female centenarians on smoking ( $\chi^2=164$ ,  $p$  value<0.0001).

\*\* Significant difference was observed between male and female centenarians on consuming alcohol ( $\chi^2=48.0$ ,  $p$  value<0.0001).

\*\*\* No significant difference was observed between centenarians in urban and rural distribution on smoking,  $\chi^2=3.65$ ,  $p$  value=0.056

\*\*\*\* No significant difference was observed between centenarians in urban and rural distribution on alcohol consumption,  $\chi^2=0.939$ ,  $p$  value=0.625

**Table 4.** Eating habits and food preference of centenarians in Chongqing (n=875)

Items	Centenarians n (%)
Dietary habits	
Regular diet	545 (62.1%)
No food preference	563 (64.1%)
Strictly no sweet, cholesterol and fatty food	98 (11.2%)
Other	51 (5.8%)
Food preference	
Vegetables	233 (26.6%)
Meats	114 (13.0%)
Salty flavour	35 (4.0%)
Light flavour	156 (17.8%)
Sweet flavour	71 (8.1%)

**Table 5.** Distribution of centenarians physical activity

Physical activity *	Urban n (%)	Rural n (%)	Total n (%)
Reading	12 (1.3)	12 (1.3)	24 (2.5)
Chatting	69 (7.2)	110 (11.4)	179 (18.6)
Walking	69 (7.2)	152 (15.8)	221 (23.0)
Resting	96 (10.0)	214 (22.3)	310 (32.3)
Housekeeping	34 (3.6)	131 (13.6)	165 (17.2)
Other	16 (1.7)	44 (4.6)	60 (6.3)

\* A statistically significant difference was observed between the urban and rural centenarians' preferred physical activities ( $\chi^2=17.7$ ,  $p$  value=0.003).

himself or herself (e.g., eating, bathing, and grooming) without depending on others. Among the 863 centenarians (information on 15 of the study centenarians' self-care situation was missing), most of them (63.8%) could not take care of themselves and required help from others. The self-care situation of the centenarians in urban areas was statistically significantly different with those in rural areas ( $\chi^2=7.08$ ,  $p$  value=0.029). The centenarians in rural areas were more dependent on others. No significant difference was observed in the self-care situation among different age segments ( $\chi^2=3.41$ ,  $p$  value=0.491) (Table 2).

### Smoking and alcohol drinking

Among the 878 participants (information on 14 of the centenarians' smoking and drinking habits was missing), 91.6% were non-smokers and 83.0% were non-drinkers. Table 3 shows the percentage distribution of the centenar-

ians' smoking and drinking habits by region and gender. Significant differences were observed in the smoking and drinking habits of male and female centenarians. About 6.5% of the male centenarians were smokers, whereas only 1.9% of the female centenarians were smokers ( $\chi^2=164$ ,  $p$  value<0.0001). Furthermore, 6.4% of male centenarians and 9.2% of female centenarians were actively consuming alcohol at the time of the survey ( $\chi^2=48.0$ ,  $p$  value<0.0001). No statistical difference was observed in the smoking and drinking habits between urban and rural distribution. For smoking in urban and rural distribution,  $\chi^2=3.65$ ,  $p$  value=0.056; for alcohol consumption in urban and rural distribution,  $\chi^2=0.939$ ,  $p$  value=0.625.

### Eating habits and food preferences

More than half of the centenarians had good eating habits, such as having a regular diet (62.1%) or no food preference (64.1%). Only 11.2% of the participants strictly followed a diet without any sweet-riched food, cholesterol-riched food, and fat-riched food. Approximately 26.5% of the participants preferred vegetables, and 13.0% of them preferred meat. The percentages of the centenarians who preferred salty, light-flavoured and sweet food were 4.0%, 17.8%, and 8.1%, respectively (Table 4).

### Physical activity

Most centenarians were not physically active; 23% of the study centenarians considered taking a walk as their favourite daily activity, 33% preferred to rest, and 18.6% preferred to chat. A statistically significant difference was observed between the urban and rural centenarians' preferred physical activities ( $\chi^2=17.7$ ,  $p$  value=0.003), rural centenarians have more physical activities. In terms of social interaction, 403 centenarians (50%) occasionally communicated with fellow elderly, and 299 centenarians (37%) often initiated conversations with other people, including their families, friends, and neighbours. However, 105 centenarians (13%) never communicated with their friends and neighbours (Table 5).

## DISCUSSION

### The general status of centenarians in Chongqing

The number of centenarians in Chongqing City reached to 890 in 2000.<sup>7</sup> We found that the number of centenarians in urban areas is greater than in rural areas. The number

of female centenarians is greater than males, as also observed in other research. Most of these centenarians lived with their offspring (one to five children) in a family with four or five generations. This finding is similar to a published study report that most of 116 centenarians in Shanghai had three to six children and were happily married, which was considered as one of the most important aspects of lifestyle.<sup>8</sup> The present study showed that a harmonious family environment (good family relationship) could contribute to the centenarians' longevity. Most of the centenarians received financial support from their offspring. It is consistent with the study of Egging et al, in which children were the main caretakers of the centenarians.<sup>9</sup> However, 14.2% centenarians in the present study had no source of income, except for the low incomes they received from social securities, government subsidies, or pensions. Failure to provide social obligations with sufficient financial resources for centenarians remains a main social problem in China.

### **Health status of centenarians**

Many people believe that "the older you get, the sicker you become, especially the oldest centenarians." However, 57% of the participating centenarians were still in good health. It is different compared with a population-based study in the Netherlands reported that nearly 100% of the centenarians were afflicted with dementia, which indicated that most centenarians could not take care of themselves.<sup>10</sup> However, our study showed that 63.6% of the centenarians could not take care of themselves, and statistical differences were observed between the centenarians' self-care in urban and in rural areas. However, a significant difference was observed in the urban and rural distribution among the different ages of centenarians. The centenarians were more likely to suffer from serious health conditions than the general aging population because they were more prone to illnesses or they were unable to care for themselves.<sup>11</sup> A research study in 2006, showed that 86.8% of the elderly aged 60 years and above were able to exercise whenever they wanted to. Therefore, the centenarians needed a more comprehensive health care program from their health care systems as well as from their families and communities. Ensuring the availability of professional medical services for centenarians should be pursued to improve the quality of community health services. The government should improve the health insurance for centenarians, promote their knowledge on health care, raise their self-care awareness, and provide them maximum support for their health improvement.

### **Good health habits are the secret to longevity**

The World Health Organization has announced that human longevity has a 60% dependence on the lifestyle and habits of individuals.<sup>12</sup> In the present study, 91.6% of the participating centenarians were non-smokers, and 83.0% were non-drinkers. No statistically significant differences were observed in the smoking and drinking habits between the rural and urban centenarians, which indicated that these centenarians commonly avoided smoking and drinking. This finding effectively refuted the folk saying, "If you smoke and drink, you can live up to 99 years."

The smoking and drinking habits of male and female centenarians were significantly different. The number of smokers among male centenarians was greater than among females. The health of elderly men had to be given attention to ensure their health and to take measures to prevent serious illnesses.<sup>13</sup>

Maintaining a regular diet was believed to improve the health of the centenarians. A survey on the dietary habits of centenarians in Hebei province found that these centenarians followed a regular diet, without preferences for specific foods.<sup>14</sup> Professor Zheng Ji, a famous 108-year-old scientist, emphasized that elderly people should not eat too much.<sup>12</sup> Studies have found that vegetarians were able to live significantly longer than individuals with high-fat dietary habits.<sup>15</sup> Eating more vegetables and eating less meat and oily food could prevent particular diseases, such as hyperlipidemia. A high daily salt intake could increase the risk of high blood pressure. A low-salt diet for the elderly could help them maintain a normal blood pressure. Okinawa, Japan was found to have the most number of centenarians and the longest life expectancy in the world. Most of its residents never developed a preference for salty food.<sup>16</sup> The same bland, plant-based dietary habit could be observed among the Chongqing centenarians, which may have helped them avoid obesity.<sup>12,17</sup>

In terms of physical activity, most of Chongqing's centenarians preferred to rest peacefully, take a walk, and socialize, which reflected the combination of dynamic and static approaches. A study of centenarians in Japan showed that 43% of the centenarians exercised every day, and their major activity was walking.<sup>18</sup> Regular daily exercise was conducive to both the mental and physical health of the centenarians, and light exercises, such as walking, have become a major activity among the centenarians.<sup>18</sup> Researchers found that the elderly in the Bama at Guangxi province in southwest China often engaged in exercises and long-term physical activities, which promoted their longevity.<sup>19</sup> The elderly received other benefits from exercising, such as establishing social circles and maintaining good interpersonal relationships. The primary difference between urban and rural centenarians was that more elderly in rural areas engage in housework as their daily activity. Moreover, the elderly often took care of their grandchildren at home. In terms of interpersonal communication, 50% of the centenarians occasionally communicated, and 13% never initiated conversations with other people.

Many factors, such as forms of entertainment, assistance in communication, and good interaction with family members, might improve the social support of the centenarians. Most of the elderly had no particular preferred sources of entertainment. Antonini et al observed that the passion in the elderly was an important factor.<sup>20</sup> The elderly were more conservative; thus, special attention must be given to rural centenarians to ensure that they were provided with a wide range of choices for cultural and sports activities. We should also focus on the psychosocial influences of the elderly. Several research studies have suggested that the psychosocial features of the elderly might influence their longevity in four areas, namely, (1) demographics, life events, and personal history, (2)

personality, (3) cognition, and (4) socioeconomic resources and support system.<sup>21</sup>

We should not only focus on this particular group of centenarians but also promote the benefits of a healthy lifestyle and habits, as well as raise public awareness on the effects of our daily activities on our health and longevity. We should also maintain a good and optimistic lifestyle and actively create a good, health-conscious atmosphere in our community.

### Limitations

The diet questionnaire used has not been validated before, and as a result the quantity of the food and nutrients could not be analyzed. Further research is warranted to collect more detailed information on Chongqing's centenarians, using a standard diet questionnaire. In addition, we did not involve a control group for comparison, such as other aging people, which limits a deeper understanding of the lifestyle benefits for these centenarians.

### Conclusions

Some lifestyle variations were observed in gender, age and rural/urban difference among Chinese centenarians identified from the 2010 census in Chongqing, China. A nutritious diet, adequate physical exercise, and a harmonious family environment may be the key lifestyle factors for their longevity of centenarians in Chongqing. These observations might be helpful in designing health promotion and welfare strategies for the elderly.

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### AUTHOR DISCLOSURES

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## Original Article

# Lifestyle of Chinese centenarians and their key beneficial factors in Chongqing, China

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## 中国重庆百岁老人生活方式和关键有利因素调查

目的：本研究旨在描述中国百岁老人的生活方式和识别出长寿的有利因素。方法：采用普查的方式调查可能影响重庆(中国西南地区)百岁老人健康的生活方式。通过身份证筛选出 878 位百岁老人(年龄范围为 100-117 岁，平均为 102 岁)，并进行问卷调查。结果：调查结果表明，64%的调查者能够生活自理，大多数不吸烟(92%)、不喝酒(83%)，且城乡间无显著性差异 ( $\chi^2=0.939$ ,  $p=0.939$ )。此外，43%的调查者保持规律饮食，只有 33%的人有久坐的生活习惯。结论：合理饮食、适当体育锻炼和家庭和睦等可能是百岁老人长寿的重要因素。本研究结果可能有助于老年人健康促进和福利策略的制订。

关键词：百岁老人、生活方式、普查、长寿、重庆