

# Impact of Lifestyle and Diets Behaviors on Elderly Health: Questionnaire Based Cross-Sectional Study

Hua Tian<sup>1</sup>, Jie Chen<sup>2</sup>

<sup>1</sup>College of Life Science, Xinyang Normal University, Xinyang, China; <sup>2</sup>School of Marxism, Xinyang Normal University, Xinyang, China

**Abstract.** *Background:* Healthy lifestyle and diet behaviors have a great impact on the life of the elderly. Up to now, few studies had evaluated the relationship between lifestyle and dietary behaviors with elderly health from the three dimensions of self-rated health, objective physical health and mental health. *Objective:* The aim is to understand the elderly health over 65 in CLHLS-2018, the characteristics of participants related to elderly health, and the relationship between elderly health and lifestyle behaviors and dietary behaviors. *Methods:* 8777 elderly aged over 65 years old was drawn from the Chinese Longitudinal Healthy Longevity Survey (CLHLS-2018). SPSS was used for descriptive statistics of the participants. T-test was used to assess the association between participant characteristics (gender, residence, age, nationality, and living status) and three dimensions of elderly health. Logistic regression analysis was used to assess the relationship between elderly health and lifestyle and diet behavior of the elderly (exercise, social activities, dietary supplements, sleep, drinking, smoking, BMI, staple food, fresh fruit, fresh vegetables and taste). *Results:* Among the 8777 participants, the elderly were mainly from female (53.65%), rural (74.30%), 65–79 years old (41.57%), han nationality (95.48%), and living with his/her family or nurses (80.40%). For lifestyle and diet behaviors, the unoptimistic indicators were regular exercise (35.91%), regular social activities (9.71%), regular dietary supplements (12.58%), fresh fruit (23.37%). There were significant differences between the indicators of gender, residence, age and living status. Participants in the healthy group had a healthier lifestyle and diet behaviors than those in the unhealthy group. *Conclusions:* The elderly health in China is not optimistic. Family members, friends and nurses must be encouraged to provide social support for the elderly in order to carry out more healthier lifestyle and diet behaviors together, which provides a new insight into the study of elderly well-being.

**Key words:** lifestyle Behaviors, diets behaviors, elderly health, self-rated health, objective physical health, mental health

## Introduction

The proportion of worldwide elderly is increasing rapidly (1). The risk of various diseases and disabilities increases with age (2), and the growth rate of developing countries is relatively high, which leads to higher medical costs (3). Therefore, improving the elderly health is very important in public health policy. Promoting healthy lifestyle and diet behavior is an effective strategy to improve

the health of the elderly (4). Diet is a major determinant of health and disease (5). Healthy lifestyles prolong the healthy life span, improve the life quality, and reduce the disability rate of the healthy elderly (6). Unhealthy behaviors, especially smoking, drinking, lack of exercise and poor diet, are associated with poor health and a higher risk of death in different environments (7,8).

The aim is to understand the relationship between the elderly health and both six lifestyles and five

dietary behaviors, especially the impact of six tastes (light, salty, sweet, spice, raw and cold, other) on the elderly health. Firstly, people over 65 are the fastest growing age group. Many developed countries set 65 as the cut-off age for the elderly, which is roughly equivalent to the official retirement age in these countries (9). Secondly, the elderly of this age group has the greatest diseases risk related to lifestyle behaviors. Moreover, older people benefit from efforts to reduce their health risk behaviors.

## Methods

### *Participants*

The data was drawn from the Chinese Longitudinal Healthy Longevity Survey in 2018 (CLHLS-2018). The survey was carried out by the Chinese Center for Disease Control and Prevention and the Research Center for healthy aging and development of the National Development Research Institute of Peking University. A total of 15874 were valid samples, which are elderly aged 65 and above from more than 500 sample points in 22 provinces in China, including rural and urban elderly. The purpose of the survey is to evaluate the health status and influencing factors of the elderly in many aspects through the basic health status questionnaire, so as to find potential health problems and better understand the social, behavioral, environmental and biological factors affecting human aging health, in order to provide information for scientific research, aging work and health policy. In this work, 8777 elderly aged 65 and above who completed the self-rated health, objective physical health and mental health questionnaire was drawn from Chinese Longitudinal Healthy Longevity Survey (CLHLS-2018), after deleting those with missing and invalid variable values (Table 1).

### *Variables and Data*

A person's health has multiple dimensions, so it is difficult to reflect all aspects according to a single index. Based on many factors that may affect the health status of the elderly revealed in the existing studies, this study investigated the elderly health status from

the three dimensions, taking self-rated health and objective physical health as the indicators of physical health, and mental health as the indicators of mental health. Self-rated health was assessed according to "what do you think of your own health?" Objective health status was assessed according to "do you feel energetic?" Mental health was an important part of the elderly health, including loneliness, worry, fear, loss, insomnia, depression and so on. Mental health was assessed according to "are you full of hope for your future life?" For the above three questions, every had six answers of "very good" "good" "general" "bad" "very bad" "I don't know" in the questionnaire. When screening the samples, the elderly who answered "I don't know" was eliminated. Thus, there were only five answers. 1, 2, 3, 4 and 5 points were given respectively for the five answers. Therefore, the health score range was from 3 to 15. The higher the scores, the healthier the elderly are. We took 7 points as the division standard. If the score was greater than 7, it indicated that the elderly were unhealthy, or he or she was healthy. The reason for this division was due to the answer setting of the questionnaire.

**Table 1.** Participant characteristics (N=8777).

Characteristic	Participants, n (%)
Gender	
Male	4068(46.35%)
Female	4709(53.65%)
Residence	
City	2256(25.7%)
Rural	6521(74.30%)
Age	
65-79	3649(41.57%)
80-89	2243(25.56%)
90-99	1804(20.55%)
≥100	1081(12.32%)
Nationality	
Han	8380(95.48%)
Other	397(4.52%)
Living status	
Living with his/her family or nurses	7057(80.40%)
Living alone	1440(16.41%)
Nursing home	280(3.19%)

### Statistical Analysis

Demographic data on participants' characteristics and lifestyles and dietary behaviors were expressed by descriptive statistics. Numbers and frequencies were used to classify variables. The mean and standard deviation were used for continuous variables. Student t-test was used to compare the health scores between healthy and unhealthy groups. In addition, logistic regression analysis was used to access the correlation between health score and lifestyle and dietary behavior. The explanatory variables were the elderly health score group (low/high), and the objective variables were lifestyle behaviors and dietary behaviors. The odds ratio of healthy behavior in high health group was calculated. Low group was as reference. Indicates unadjusted OR and OR adjusted according to participants' characteristics (gender, residence, age, nationality and living status).

## Results

### Participant Characteristics

Of the 8777 Participants (Table 1), 4068 (46.35%) were male, and 4709 (53.65%) were female. 2256 (25.7%) lived in the city. Proportion of the elderly over 80 years old was 58.43% (5128). 95.48% of the elderly were han nationality. 80.40% of the elderly lived with his/her family or nurses.

For lifestyle behaviors (Table 2), proportions of regular exercise and regular social activities were low, especially the latter, only was 9.71%. It showed that most people didn't pay attention to regular exercise and social activities. It was gratifying that more than 80% of the elderly didn't smoke or drink. 52.56% of the elderly slept well. 56.81% of the elderly BMI were normal.

For diet (Table 2), 87.42% of the elderly did not have the habit of regularly dietary supplements. The staple food was mainly rice, flour, or half rice and half flour. Compared with fresh fruits, 67.24% of the elderly had fresh vegetables almost every day. Maybe the elderly had bad teeth and the fruit wasn't easy to chew. The taste of the elderly was mainly light (68.92%), followed by salty (19.89%).

**Table 2.** Lifestyle and diet behaviors of the participants (N=8777).

Lifestyle and diet behaviors	Participants, n (%)
Six Lifestyle behavior	
Regular exercise	
Yes	3152(35.91%)
No	5625 (64.09%)
Regular social activities	
Yes	852 (9.71%)
No	7925 (90.29%)
Regular smoking	
Yes	1391 (15.85%)
No	7386 (84.15%)
Regular drinking	
Yes	1364 (15.54%)
No	7413 (84.46%)
Good sleep	
Good	4613 (52.56%)
Poor	4164 (47.44%)
BMI	
<18.5	1279(14.57%)
≥18.5 and ≤25	4986(56.81%)
>25	2512(28.62%)
Five Diets Behaviors	
Regular dietary supplements	
Yes	1104 (12.58%)
No	7673 (87.42%)
staple food	
Rice	5196(59.20%)
Cereals	363(4.14%)
flour	1487(16.94%)
half rice and half flour	1671(19.04%)
Other	60(0.68%)
Fresh fruit	
Almost every day	2051(23.37%)
Often	2079(23.69%)
Sometimes	2632(29.99%)
Rarely	2015(22.96%)
Fresh vegetables	
Almost every day	5902(67.24%)
Often	2024(23.06%)
Sometimes	605(6.89%)
Rarely	246(2.80%)
Taste	
Light	6049 (68.92%)
Salty	1746 (19.89%)
Sweet	421 (4.80%)
Spicy	186 (2.12%)
Raw and cold	7 (0.08%)
Other	368 (4.19%)

### Elderly Health

In this work, the health of the elderly was reflected by three questions of self-rated health, objective physical health and mental health in the questionnaire CLHLS-2018 (Table 3). The sum scores of the three questions were used as the standard to evaluate the elderly health status. Therefore, the lower the score, the healthier the elderly. Among 8777 participants, there were 4369 healthy elderly, accounting for 49.78%. Obviously, the health status of the elderly was not optimistic.

### Association between Participant Characteristics and Elderly Health

The elderly health mean score for gender, residence, age, nationality, and living status were all between 7 and 8 (Table 4). There was significant difference between male and female ( $p < .001$ ), city and rural ( $p < .001$ ), age of 65-79 and age above 80 ( $p < .001$ ), and between the elderly Living with others and living alone ( $p < .001$ ) separately. However, there was no difference between han nationality and other ( $p = .027$ )

### Association of elderly Health with Lifestyle and Diet Behaviors

Based on the results of logistic regression, the effects of the variables on health behavior can be summarized as follows. Overall, participants in the healthy group had a healthier lifestyle and diet than those in the low health group. For exercise, in the high health group, 1980/4369 (45.32%) exercised regularly, while in the unhealthy group, 1172/4408 (26.59%) exercised regularly.

**Table 3.** Elderly health of the participants (N=8777).

Elderly Health	Health score, Mean $\pm$ SD	P value (Pairwise comparison)	
Self-rated health	2.54 $\pm$ 0.90	<.001	
Objective physical health	2.54 $\pm$ 0.99		
Mental health	2.46 $\pm$ 1.17		
Sum	7.54 $\pm$ 2.31	8777	
Healthy	$\leq 7$	4369	49.78%
Unhealthy	$> 7$	4408	50.22%

Regular exercise is far less likely to bring unhealthy risks than the elderly who do not exercise [OR=0.44(0.40-0.48)]. The adjusted OR for the high health level group was 0.51(0.47-0.57) ( $P < .001$ , Table 5). For drinking, in the healthy group, 827/4369 (18.93%) didn't drink, while in the unhealthy group, 537/4408 (12.18%) didn't drink. Drinking greatly increased the unhealthy risk of the elderly [OR=1.68(1.50-1.89),  $P < .001$ ]. About sleeping, 2840/4369 (65.00%) and 1773/4408 (40.22%) participants in the healthy and unhealthy groups, respectively, slept well (adjusted OR 0.39(0.36-0.43),  $P < .001$ ). In addition, other lifestyle behaviors and diet was no longer described in detailed one by one.

However, the impact of taste on the health risk of the elderly was very puzzling. 2941/4369 (67.32%) and 3108/4408 (70.51%) participants were in the healthy and unhealthy group respectively. On the contrary, the unhealthy risk caused by taste lightly increased [OR=1.15(1.04-1.27,  $P = .001$ )]. Therefore, it is necessary to conduct in-depth analysis.

### Association of elderly Health with Diet Taste

This work compared and analyzed six different taste of the elderly, such as light, salty, sweet, spicy, raw and cold, other taste (Table 6). With light taste

**Table 4.** Participant characteristics (N=8777).

Characteristic (n)	Health score, Mean $\pm$ SD	P value
Gender		
Male (4068)	7.42 $\pm$ 2.342	<.001
Female (4709)	7.65 $\pm$ 2.280	
Residence		
City (2256)	7.34 $\pm$ 2.492	<.001
Rural (6521)	7.61 $\pm$ 2.242	
Age		
65-79 (3649)	7.26 $\pm$ 2.290	<.001
$\geq 80$ (5128)	7.75 $\pm$ 2.307	
Nationality		
Han (8380)	7.53 $\pm$ 2.318	.027
Other (397)	7.78 $\pm$ 2.163	
Living status		
Living with others (7337)	7.49 $\pm$ 2.311	<.001
Living alone (1440)	7.82 $\pm$ 2.296	

**Table 5.** Lifestyle behaviors and diet of the participants (N=8777).OR values are for the high health level group (n=4369) relative to low health level group (n=4408).

Lifestyle behavior	Unadjusted OR <sup>a</sup> (95%CI)	P value	Adjusted <sup>b</sup> OR (95%CI)	P value	Model P value
Regular exercise	0.44(0.40-0.48)	<.001	0.51(0.47-0.57)	<.001	<.001
Regular social activities	0.63(0.54-0.72)	<.001	0.86(0.73-1.01)	.067	<.001
Regular dietary supplements	0.71(0.62-0.80)	<.001	0.81(0.71-0.93)	.003	<.001
Good sleep	0.36(0.33-0.40)	<.001	0.39(0.36-0.43)	<.001	<.001
Drinking	1.68(1.50-1.89)	<.001	1.52(1.33-1.74)	<.001	<.001
Smoking	1.26(1.12-1.41)	<.001	1.06(0.93-1.21)	.422	<.001
Normal BMI	1.01(0.93-1.11)	.739	0.99(0.90-1.08)	.750	.739
Balanced staple food	0.71(0.64-0.79)	.003	0.83(0.75-0.94)	.003	<.001
Regular fresh fruit	0.58(0.53-0.63)	<.001	0.73(0.66-0.80)	<.001	<.001
Regular fresh vegetables	0.46(0.40-0.53)	<.001	0.62(0.53-0.73)	<.001	<.001
Taste lightly	1.16(1.06-1.27)	.001	1.15(1.04-1.27)	.005	.001
Light	1.00				
Salty	0.79(0.71-0.88)	<.001	1.05((0.95-1.14)	.392	<.001
Sweet	1.04(0.85-1.26)	.728	1.11(1.01-1.23)	.040	.003
Spicy	0.80(0.59-1.07)	.128	1.12(1.01-1.24)	.026	.001
Raw and cold	0.38(0.07-1.95)	.246	1.11(1.01-1.23)	.038	.001
Other	1.13(0.91-1.39)	.269	1.12((1.02-1.24)	.024	.002

<sup>a</sup>OR: odds ratio.

<sup>b</sup>Adjusted: Adjusted for gender, residence, age, nationality, and living status.

**Table 6.** Taste of the participants (N=8777).OR values are for the high health level group (n=4369) relative to low health level group (n=4408).

Taste	Unadjusted OR <sup>a</sup> (95%CI)	P value	Adjusted <sup>b</sup> OR (95%CI)	P value	Model P value
Light	1.00				
Salty	0.79(0.71-0.88)	<.001	1.05(0.95-1.14)	.392	<.001
Sweet	1.04(0.85-1.26)	.728	1.11(1.01-1.23)	.040	.003
Spicy	0.80(0.59-1.07)	.128	1.12(1.01-1.24)	.026	.001
Raw and cold	0.38(0.07-1.95)	.246	1.11(1.01-1.23)	.038	.001
Other	1.13(0.91-1.39)	.269	1.12(1.02-1.24)	.024	.002

<sup>a</sup>OR: odds ratio.

<sup>b</sup>Adjusted: Adjusted for gender, residence, age, nationality, and living status.

as reference, the adjusted OR was respectively [OR=1.05(0.95-1.14,  $P=.392$ )], [OR=1.11(1.01-1.23,  $P=.040$ )], [OR=1.12(1.01-1.24,  $P=.026$ )], [OR=1.11(1.01-1.23,  $P=.038$ )], [OR=1.12((1.02-1.24),  $P=.024$ )]. This also showed that in the healthy group, the elderly taste of salty, sweet, spicy, raw and cold, other taste would bring more unhealthy risks than those with above five taste in the unhealthy

group. These findings provided a reference for dietary guidance for the elderly.

## Discussion

This investigation had revealed that only 35.91% of the elderly exercise regularly. Surprisingly, only

9.71% elderly regularly participate in social activities. Increasing physical activity and regular exercise in the elderly will reduce the speed and severity of physiological deterioration and subsequent functional decline caused by aging (10). These include improving blood pressure, coronary artery diseases, diabetes, lipid profiles, osteoarthritis, osteoporosis, mood, neurocognitive function, and overall incidence rate and mortality (11). Keeping regular exercise habits can slow down the occasional memory decline of the elderly, improve cognitive function (12), and reduce the risk of falls and injuries (13). There is a significant correlation between exercise self-efficacy and exercise benefits (14). Regular exercise is an important predictor of depressive symptoms in men and women (15). Regular exercise significantly affects the microbial composition and function of overweight elderly people (16). Participation in social activities has a significant positive impact on the cognitive function of the elderly (17). Among the healthy elderly, participating in social activities helps to improve psychological distress (18). Family members, friends and nurses must be encouraged to provide social support for the elderly in order to carry out sports activities.

It is gratifying that the proportion of smoking and drinking regularly among the elderly is not high, respectively 15.85% and 15.54%. However, the situation of elderly sleep and BMI is not optimistic. Only half of the elderly have good sleep and normal BMI. Among five diets behaviors, 67.24% elderly have fresh vegetables almost every day, and 68.92% taste lightly. Both regular dietary supplements and fresh fruits aren't gratifying, either. For diet taste, salty, sweet, spicy, raw and cold, other taste would bring more unhealthy risks for the elderly. With the increase of age, the taste function of the elderly decreased gradually. Research shows that taste loss does not seem to make the elderly prefer stronger tastes, but the consumption of sweet and salty foods is greater (19). Originally, the taste threshold of the elderly is higher than that of the young (20). High salt and sugar increase the risk of hypertension and cardiovascular disease in the elderly (21). In senior women, there is a significant positive relationship between the intake of copper and forgetfulness (22). Therefore, the elderly should be reminded to pay more attention to dietary taste.

## Conclusions

The elderly health in China is not optimistic. Participants in the healthy group had a healthier lifestyle and diet behaviors than those in the unhealthy group. Family members, friends and nurses must be encouraged to provide social support for the elderly in order to carry out more healthier lifestyle and diet behaviors together, which provides a new insight into the study of elderly well-being.

**Acknowledgements:** This work was supported by Nanhu Scholars Program for Young Scholars of XYNU. The authors would like to appreciate the help received from Xinyang Normal University, China.

**Conflict of Interest:** The authors declare no conflict of interest.

**Author Contributions:** HT performed the statistical analysis and drafted the manuscript. JC revised the manuscript. Both authors read and approved the final manuscript.

**Ethical Approval:** This does not involve human or animal modeling.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author.

## References

1. Wang FH, Wang JD. Investing preventive care and economic development in ageing societies: empirical evidences from OECD countries. *Health Econ Rev* 2021;11(1):18
2. Dean, M, Raats M, Grunert K, Lumbers M. Factors influencing eating a varied diet in old age. *Public Health Nutr* 2009;12(12):2421-2427.
3. Son KY, Park SM, Lee J, Kim CY. Difference in adherence to and influencing factors of as healthy lifestyle between middle-aged and elderly people in Korea: a multilevel analysis. *Geriatr Gerontol Int* 2015;15(6):778-788.
4. Heyn P, Abreu BC, Ottenbacher KJ. The Effects of Exercise Training on Elderly Persons with Cognitive Impairment and Dementia: A Meta-Analysis. *Arch of Phys Med Rehab* 2004; 85(10):1694-1704.
5. Marquesvidal P, Waeber G, Vollenweider P, Bochud M, Stringhini S, Guessous I. Supplementary Material for: Sociodemographic and Behavioural Determinants of a Healthy Diet in Switzerland. *Ann Nutr Metab* 2017;67(2):87-95.

6. Zhang S, Tomata Y, Newson RB, Sugawara Y, Tsuji I. Combined healthy lifestyle behaviours and incident disability in an elderly population: the ohsaki cohort 2006 study. *J Epidemiol Community Health* 2018;67:87-95.
7. Balia S, Jones AM. Mortality, lifestyle and socio-economic status. *J Health Econ* 2008;27(1): 1-26.
8. Holmes WR, Joseph J. Social participation and healthy ageing: a neglected, significant protective factor for chronic non communicable conditions. *Globalization Health* 2011;7:43.
9. Son KY, Park SM, Lee J, Kim CY. Difference in adherence to and influencing factors of healthy lifestyle between middle-aged and elderly people in Korea: A multilevel analysis. *Geriatr Gerontol Int* 2015;15(6):778-788.
10. Savas S. Prescribing Exercise for Geriatric Group. *Turkish Journal of Geriatrics-turk Geriatri Dergisi* 2011;14(3): 281-287.
11. Allen J, Morelli V. Aging and Exercise. *Clin Geriatr Med* 2011;27 (4):661.
12. Jiang S, Liu R, Li J, Hou LJ. Effects of regular exercise on episodic memory of the elderly over 60 years old. *Int J Psychophysiol* 2021;168: S136-S136
13. Kerschman-Schindl K, Ebenbichler GR. Save motion in the elderly: Optimisation of sensorimotor skills to prevent falls. *Phys Med Rehab Kuror* 2009;19(2): 107-115.
14. Hwang EH, Chung, YS. Effects of the exercise self-efficacy and exercise benefits/barriers on doing regular exercise of the elderly. *J Korean Acad Nurs* 2008; 38(3):428- 436.
15. Chang SH, Chien NH, Chen MC. Regular Exercise and Depressive Symptoms in Community-Dwelling Elders in Northern Taiwan. *J Nurs Res* 2016;24(4):329-335.
16. Zhu QW, Jiang SF, Du GK. Effects of exercise frequency on the gut microbiota in elderly individuals. *MicrobiologyOpen* 2020;9(8):e1053.
17. Cai S. Does social participation improve cognitive abilities of the elderly? *J Popul Econ* 2022;35(2):591-619.
18. Owari Y, Miyatake N, Kataoka H. Relationship between social participation, physical activity and psychological distress in apparently healthy elderly people: a pilot study. *Acta Med Okayama* 2018; 72(1): 31-37.
19. Sergi G, Bano G, Pizzato S, Veronese N, Manzato E. Taste loss in the elderly: possible implications for dietary habits. *Crit Rev Food Sci* 2017; 57(17): 3684-3689.
20. Kim WY, Hur M, Cho MS, Lee HS. Effect of olfactory function on nutritional status of Korean elderly women. *Nutr Res* 2003;23(6):723-734.
21. Hirose K, Tran TP, Yamamoto S. Decreasing Salt in Hospital Meals Reduced Energy Intake in Elderly Japanese Inpatients. *J Nutr Sci Vitaminol* 2021;67(2):105-110.
22. Odai T, Terauchi M, Suzuki R, Kato K, Hirose A, Miyasaka N. Severity of subjective forgetfulness is associated with high dietary intake of copper in Japanese senior women: A cross-sectional study. *Food Sci Nutr* 2020;8(8):4422-4431.

---

**Correspondence:**

Hua Tian,  
College of Life Science, Xinyang Normal University  
Nanhu Road 237, China  
E-mail: tianhua@xynu.edu.cn