原　著

The mediating effect of social interaction on the association between socioeconomic status and health status among Chinese elderly in Tibet

中国チベット高齢者における社会経済的要因と 健康に対する社会関係性の媒介効果

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Abstract

Objectives: This study aimed to determine the structure between socioeconomic status (SES), social interaction and health status among elderly urban community-dwellers in Tibet. **Methods:** A self-administered questionnaire was distributed to 1,979 elderly who were selected by cluster sampling method in 2009, giving a response rate of 93.2%. Structural equation modeling were used to perform the data. **Results:** In the structural model, SES had not only a direct effect, but also an indirect effect on health status by means of social interaction; compared with the indirect effect, SES exerted a larger direct impact on health status, especially on psychological health. **Conclusions:** People with higher SES are more likely to have better health status. In addition, social interaction plays a mediating role on the association between SES and health status. Therefore, improving social interaction of elderly people may decrease socioeconomic differentials in health status among urban community-dwelling elderly in Tibet.

抄　録

目的：本研究は、中国チベット高齢者における社会経済的要因、社会相互作用と健康状況を把握し、それらの相互関連性を構造的に明確にすることを目的とする。**方法**：2009 年にクラスタ・サンプリング法によって選出した 1,979 名の高齢者に自己申告アンケートを配布し、93.2%の回答が与えられた。分析方法は、構造方程式モデリングを用いた。**結果**：健康状態に対する社会経済要因は、直接的影響だけでなく、社会的相互作用を経由する間接的な効果がみられた。社会経済的要因は健康状態、とりわけ精神的要因に対して大きな直接的影響を及ぼしていた。**結論**：社会経済地位が高ければ高いほど、よりよい健康状況を持っている可能性が高いことが示された。また、社会的相互作用が、社会経済地位と健康状態との関連に対して媒介効果がみられた。よって、高齢者の社会的相互作用を向上させることによって、チベット都市在住高齢者の社会経済的格差から健康状態の影響を減少させる可能性が示唆された。

Key words：socioeconomic status; health status; social interaction; mediating effect.
キーワード：社会経済地位；健康状況；社会相互作用；媒介効果

Ⅰ. INTRODUCTION

In China, the average life expectancy continues to improve due to advancements in medical technology and improvements in living standards, but the fertility rate continues to decline, both of which accelerate population aging. According to the sixth national census of China in 2010, the proportion of elderly people aged 60 years and over accounted for 13.26% of the total population, which was an increase of 2.93% compared with the fifth national census in 2000; the number of elderly aged 65 years and over has reached 8.87%, an increase of 1.91% from 2000[1,2].

Similar to other cities in China, the Tibet Autonomous Region (TAR) is experiencing population aging and urbanization, despite it being located in a sparsely-populated plateau area. The percentage of the Tibetan population aged 60 years and above which participated in the census numbered over 220,000, constituting 8% of the entire population in 2007, while the percentage of urban elderly people in Lhasa City and Shigatse City was more than 10%, indicating that the urban area in Tibet has taken the lead into an aging society[3]. On the one hand, this phenomenon reflects the economic and social development of Tibet in recent years; on the other hand, it also brings many challenges to the economy, government policies, and society, particularly with respect to traditional ways of supporting the aged in Tibet. Therefore, how to maintain and improve health status among urban elderly in Tibet is a crucial issue for the government and academia.

Socioeconomic status (SES) is a crucial factor to determine health status[4]. The relationship between SES and health status is well-recognized in western countries, regardless of whether SES is assessed by income, education, or occupation[5-9]. Individuals with more privileged SES have better health status than their unfavorable counterpart. However, few studies have examined the association between SES and health in developing country, particularly at old ages[10]. Existing literature showed that the health status of Chinese elderly was related to SES, but no consistent conclusions were found. Liang et al. pointed out that the higher an individual's educational level, the better his or her physical functioning, but the more his or her diseases, by using data from research on living conditions and health in Wuhan city in 1991[11]. Zimmer and Kwong suggested all education years, average annual household income, pension eligibility, bank deposits, and the number of valuables possessed by household had impacts on self-rated health, functional health and diseases among Chinese elderly in 1992[12]. A longitudinal study on health among Chinese oldest-old elderly, from 1998 to 2000, demonstrated birthplace (urban/rural), ethnic identity, marital status, and occupation before retirement affected mortality to some degree, while the main source of income was not statistically significant[13]. The use of different SES and health indicators may be a reason for inconsistent results across studies[7]. Accordingly, it is very unclear to what extent SES affect health.

Besides socioeconomic condition, there are several other social factors in determining health. Based on the causal relation with health, social determinants of health fall into three levels: 1) distal factors, such as SES; 2) mid-range factors, including social interaction and relation; and 3) proximal factors, which consist of health-related lifestyle and behaviors[14]. The mediating influence of health behaviors has been increasingly recognized between SES and health[15,16]. In addition, a substantial body of research identified the relationship between social interaction and health[17-19], but no study examined the role which social interaction plays between SES and health among Chinese elderly. Since social structures shape individual values and behaviors, the association between social interaction and health should be taken into individual's structural position.

Therefore, this study aimed to: 1) identify the extent to which SES and health status are related in urban areas of Tibet; 2) determine the structure between SES, social interaction and health status among urban community-dwelling elderly.

Ⅱ. METHODS

1. Sample

The urban elderly in Tibet were considered as

the research population of this study. The definition of "city" employed was that of the administrative divisions of China, rather than the dictionary definition of the word. In the Tibet Autonomous Region, there is one prefecture-level city – the capital city, Lhasa – and six prefectures: Shigatse, Qamdo, Shannan, Ngari, Nagqu and Nyingchi. In addition, Shigatse, as a country-level city, is located in Shigatse Prefecture. As such, there are two cities in Tibet, according to administrative divisions, so all of the elderly in 28 communities from 7 sub-districts of Lhasa City, and 10 communities from 2 sub-districts of Shigatse City, constituted the research objects.

All the communities in Lhasa and Shigatse were arranged by increasing population. Nine communities in Lhasa and four communities in Shigatse were then selected by cluster sampling method, including 1,979 elderly aged 60 years and above, as of August 1, 2009. All of them received our questionnaire, and 1,846 elderly answered, giving a response rate of 93.2%; 732 respondents were men, and the rest (1,114) were women. Approximately 58.5% were aged 60 to 69, 32.2% were between 70 to 79 years old, and those aged 80 and over made up 9.32 % (Table 1).

Table 1. Study subjects by age and gender

	Men		Women		Total	
	N	%	N	%	N	%
60-69 years	447	61.0	633	56.8	1,080	58.5
70-79 years	226	30.9	368	33.0	594	32.2
80 years and over	59	8.1	113	10.1	172	9.3
Total	732	100.0	1,114	100.0	1,846	100.00

The purpose and design of this survey were approved by the government of the Tibet Autonomous Region of China. The retrieved data were confidential and were only utilized for research and analysis. All the participants were also fully informed of the nature of the survey, and provided their consent.

2. Data Collection

The study consisted of three measurement indices: SES, social interaction and health status.

1）SES

SES is the most fundamental cause of health status[20] . Measuring the SES of older adults needs multidimensional indicators, since different SES facets have different meanings and indicate access to different resources[7] . SES has traditionally been defined by education, income, and occupation. Given the majority of elderly people have left their work long time ago, this survey employed education and household income as indicators of SES, since education indicates the ability to get the information on health and health-related behaviors, while income suggests the ability to gain access to health services.

Education is perhaps the most basic SES component, as it can shape occupational opportunities and earning potential, and it plays an important role in predicting SES in developing countries[21] . In the study, educational level was a seven-level ordinal variable: 1 = No education, 2 = One to three years in primary school, 3 = Four to six years in primary school, 4 = Junior high school, 5 = High school, 6 = Junior college, and 7 = University or higher.

Household income was defined as the sum of the monthly income of each individual member of the family and the income received by the household overall. Respondents were asked to choose one of eleven categories that best corresponded to their household annual income in Chinese Yuan (1 USD ≈ 6 Chinese Yuan): 1 = less than 1,000 yuan, 2 = 1,000-1,999 yuan, 3 = 2,000-2,999 yuan, 4 = 3,000-3,999 yuan, 5 = 4,000-4,999 yuan, 6 = 5,000-5,999 yuan, 7 = 6,000-6,999 yuan, 8 = 7,000-7,999 yuan, 9 = 8,000-8,999 yuan, 10 = 9,000-9,999 yuan, and 11 = more than 10,000 yuan.

2）Social interaction

Social interaction was assessed by frequency and scale from objective perspectives, and satisfaction from a subjective perspective. Regarding frequency of social interaction, the elderly were asked, "How often do you contact people with whom you do not live with, such as children, siblings, other relatives, friends and neighbors, respectively?" with 1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, and 5 = Every day. Their scale of social interaction was obtained by asking, "How many people (children, siblings, other relatives, friends and neighbors) do

you have contact with, freely and comfortably?" on a five-point Likert scale, with 1 = None, 2 = One to three people, 3 = Four to six people, 4 = Seven to nine people, and 5 = More than ten people. In addition, the elderly were asked to describe the extent to which they were satisfied with their social interaction. Response options were categorized into five different levels: Very dissatisfied, Dissatisfied, Fair, Satisfied, and Very satisfied. The participants were assigned one to five points, respectively, based on their chosen response.

3) Health status

As with SES, it has long been recognized that health status is a multidimensional construct. In this study, both physical and psychological health were used to indicate a person's health status. All scales of health status were measured using a five-point Likert-type scale (1 = Very bad / Every day; 5 = Very good / Never). Physical health was evaluated by six items: energy, sleep, diet, hearing, seeing, and activity. Psychological health was assessed by asking: "Do you feel lonely?" (loneliness); "Do you think what you have done are not going well?" (dissatisfaction); "Do you feel very sad?" (sadness); "Do you think other people do not like you?" (unpopularity); "Do you think you do not have enough energy to do anything?" (passiveness); "Do you think everyone is not friendly to you?" (unfriendliness); "Do you think your whole life has failed?" (failure); "Have you ever cried?" (crying).

3. Hypothesized model

It was hypothesized that (Figure 1): 1) SES associates with health status positively; 2) SES has a positive impact on social interaction; 3) social interaction exerts a positive impact on health status; 4) social interaction plays a mediating role on SES-health status.
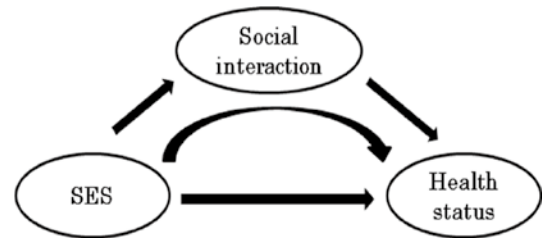

Figure 1. Hypothesized model between SES, social interaction and health status among Tibetan elderly citizens

4. Statistical Analysis

A two-step approach to structural equation modeling (SEM) was carried out to assess the measurement model and structural model between SES, social interaction and health status by using Amos 17.0 for Windows. The maximum likelihood estimation method was applied to estimate the parameters in the model. Significance of the path coefficient was set to a 0.05 level for two-tailed tests. All three kinds of goodness-of-fit indices, consisting of absolute fit, incremental fit, and parsimony fit indices, were utilized to evaluate overall model fit [22]. The chi-squared test was used to assess the hypothesized model and its improvement from the independence model [23]. Normalized Fit Index (NFI), the Incremental Fit Index (IFI), the Root Mean Square Error of Approximation (RMSEA) were also obtained. For a good model, NFI and IFI should be greater than 0.90, and RMSEA was recommended under 0.05 [24].

Ⅲ. RESULTS

1. Measurement Model

Confirmatory factor analysis (CFA) was applied to evaluate measurement reliability and validity in this study. The item reliability, construct reliability (CR) and average variance extracted (AVE) were employed to verify that the estimated constructs are valid, consist and applicable to study the characteristics that they wanted to measure [22]. Table 2 lists the CFA results.

Table 2. Evaluation of measurement model

Primary latent variables	Secondary latent variables	Indicators	Standardized factor loadings	CR	AVE
SES		Education level	0.57	0.67	0.51
		Household income	0.83		
Social interaction	Frequency	Children	0.43		
		Siblings	0.48		
		Relatives	0.62	0.70	0.33
		Friends	0.72		
		Neighbors	0.57		
	Scale	Children	0.40		
		Siblings	0.50		
		Relatives	0.68	0.74	0.38
		Friends	0.76		
		Neighbors	0.66		
Health status	Physical health	Activity	0.78		
		Seeing	0.66		
		Hearing	0.68	0.82	0.44
		Diet	0.71		
		Sleep	0.53		
		Energy	0.57		
	Psychological health	Loneliness	0.75		
		Dissatisfaction	0.69		
		Crying	0.48		
		Sadness	0.71	0.84	0.60
		Passiveness	0.75		
		Unpopularity	0.80		
		Failure	0.73		
		Unfriendliness	0.78		

Note: CR, indicating construct reliability; AVE, indicating average variance extracted.

A factor loading could be used as an indicator in interpreting the role each item plays in defining each construct. Factor loadings are in essence the correlation of each item to their underlying factor. Kim and Muller suggested factor loading of 0.30 as a cut-off for significance[25] . The standardized factor loadings ranged from 0.40 to 0.83. And all factor loadings in the model were significant (P < 0.05). The construct reliability (CR) evaluated whether the indicators consistently represent the same latent variable. In this study, the CR estimates ranged from 0.67 to 0.84, exceeding the recommended value of 0.60 by Fornell and Larcker[26] . They also suggested AVE had better exceed 0.50, which determines whether the set of indicators represent the latent variables[26] . With the exception of social interaction and physical health, the average variances extracted (AVE) of SES and psychological health were 0.51 and 0.60.

2. Structural Model

Following the tradition of Amos analysis, observed variables are represented by rectangles, latent variables are represented by circles, and a straight arrow indicates the direction of relationship between

two variables. Path coefficients suggest whether the relationship between two variables is positive or negative and how great the relationship is. Considering that many main variables (frequency of social interaction, scale of social interaction, satisfaction of social interaction, some items of physical health, and some items of psychological health) had no significant differences between elderly men and women, in addition, the structural model by gender displayed something wrong, only the whole population was analyzed in this model. As presented in Figure 2, seven latent variables were included in structural analysis between SES, social interaction and health status among Chinese community-dwelling elderly. Of these variables, 'SES', 'social interaction' and 'health status' were considered as primary latent variables, while 'frequency' and 'scale' were regarded as secondary latent variables of social interaction, and 'physical health' and 'psychological health' were regarded as secondary latent variables of 'health status'. The fit indices for the model were: NFI= 0.921 > 0.900, IFI= 0.935 > 0.900, and RMSEA= 0.049 < 0.05. These results showed that all fit indices met the requirements for a good model.
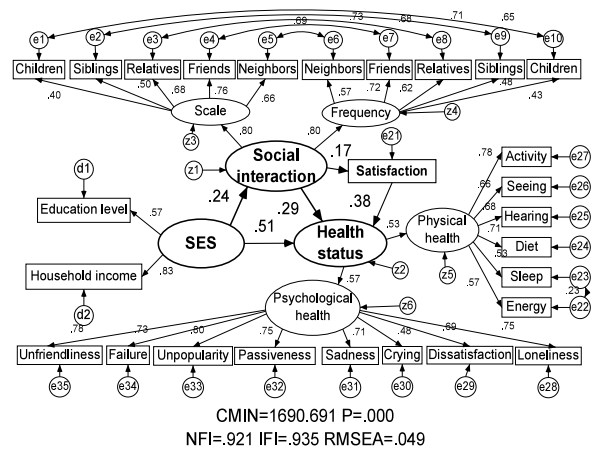

Figure 2. Structural analysis between SES, social interaction and health status among Tibetan elderly citizens

The model depicted the underlying way from SES to health status by means of social interaction and satisfaction of social interaction. Health status was positively and significantly associated with SES and social interaction, since all the path coefficients were

positive. The results indicated that social interaction had both direct (0.29) and indirect (0.07) effects on health status. Analogously, SES not only had direct effects on health status (0.51), but also affected health status indirectly (0.08). By comparison, SES, social interaction and satisfaction exerted slightly greater impact on psychological health (0.57) than physical health (0.53). This meant that individuals with higher education and income could contact their children, siblings, relatives, friends and neighbor more frequently, had more people to communicate with, and would have better satisfaction of social interaction. These elderly people were found to have improved physical and (especially) psychological health.

According to standardized total effects, it is worth pointing out that SES demonstrated much larger impacts on health status (0.59) than social interaction did (0.36) (Table 3). SES was more important for personal health status. Furthermore, household income contributed more in determining health status (0.83) than educational level (0.57). It is also worth noting that social interaction played a mediating role in the relationship between SES and health status: that is, socioeconomic inequalities in health could be explained by social interaction.

Table 3. Standardized direct, indirect and total effects

Standardized direct effects	SES→ Social interactions	0.24
	Social interactions→ Health status	0.29
	SES→ Health status	0.51
Standardized indirect effects	SES→ Health status	0.08
	Social interaction→ Health status	0.07
Standardized total effects	Social interactions→ Health status	0.36
	SES→ Health status	0.59
Coefficient of determination (R^2)		0.61

Social interaction had weak correlation with satisfaction of social interaction (0.17), while satisfaction had moderate relationship with health status (0.38). In other words, not everyone with higher frequency and larger scale social interaction could be satisfied with their social interaction, but satisfaction did enhance the influence of social interaction on health status.

IV. DISCUSSION

This population-based cross-sectional study investigated the structure between SES, social interaction and health status among urban community-dwelling elderly in Tibet. In general, it was found that people with higher levels of education and income would like to communicate with their children, siblings, relatives, friends, and neighbors; to some extent, people who connected with others frequently and had many people to contact were more likely satisfied with their social interaction. All these factors may then allow the elderly to improve their health status, especially their psychological status.

Like studies in western countries, SES was found to have significant influence on health status, be it physical or psychological. The higher an individual's SES, the better his or her health status. The results showed that household income exerted greater effects on health status than education, indicating the importance of income. Liang and colleagues pointed out that education was the best indicator to reflect SES of elderly people[11]. This is because education can increase employment opportunities, which can lead to higher-paying jobs[27, 28]. In addition, the principal advantage of utilizing education level as an indicator of SES is that educational attainment is generally stable across an individual's lifespan and is easily recorded[10, 29]. In contrast, however, Braveman and his fellows insisted that educational level could not represent the key aspects of economic status[30]. Zimmer and House also found income predicated functional health better[31]. With the increase in age, the elderly need more and more medical resources and care, which are largely dependent on financial capacity. Considering that China is a developing country, the government can only afford a small amount of medical expenses for the general population: most of the costs are supported by companies and/or individuals. This is why household income plays such a pivotal role in determining health status of Chinese elderly.

Another main finding of this study was that social interaction had a mediating role on association

between SES and health status. Higher levels of social interaction provide elderly people with more opportunities to go outside. For example, they may use the chance to get some exercise, even just walking; or, they may use the chance to socially interact with others, helping mediate a bad mood or loneliness. Decline in physical health with age is an irreversible process. However, the elderly can still get along very well with others, given the chance, and feel that life is worth living. We feel that this is why SES and social interaction demonstrated more influence on psychological health than physical health. Moreover, satisfaction of social interaction could enhance the effects of social interaction on health status. The existing literature has not identified the consistent mediating effect of social interaction on the relationship between SES and health status. In line with the findings of a study among older Malaysians, having daily contact with adult children moderates the effect of low SES on self-rated health status[32]. Two German studies also observed the mediating effect of social interaction[4, 33]. However, Klein et al. did not specifically focus on elderly people, who consist of the majority with health problems. They realized that self-rated health, which was the only indicator they used for the measurement of health status, may generate bias; thus, physical health and psychological health were applied to evaluate health status in our study. Another German study suggested the mediating effect of social interaction on SES-health status was very weak possibly due to the small size of the research population (682 older people)[34]. A Danish study has denied the explanatory role of social interaction as well[35]. The statistical analysis method of logistic regression may turn the results into a limitation. In fact, this method is not suitable to carry out a mechanism study, because it can reflect neither covariant relations nor indirect impacts between variables, both of which are crucial for a mechanism study. What is more, the respective analyses would yield inconsistent results.

Several limitations of this study need to be considered. First, this was a cross-sectional study,

and it was subject to the problem that both dependent and independent variables were based on self-rated data. The cross-sectional nature of the data set limits the interpretation of the results, rather than their causal relationship. In general, longitudinal studies are preferable for investigating the causal relationship between SES, social interaction and health status. Second, only registered citizens in Lhasa City and Shigatse City were selected as research population, excluding those who lived in communities without a census register.

Despite these limitations, our analysis provided additional evidence on the role of social interaction in SES-health status in a developing country. In addition, we paid special attention to elderly people, who accounted for the majority of people with health status, as the proportion of elderly people is growing rapidly.

V. CONCLUSIONS

In conclusion, the study revealed that SES had positive and significant impacts on health status among elderly urban people in Tibet. People with higher SES are more likely to have better health status. In addition, social interaction plays a mediating role on the association between SES and health status. Satisfaction of social interaction can enhance the effects of SES on health status. This study lead us to conclude has some implications that improving social interaction of elderly people may decrease socioeconomic differentials in health status.

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