**DOCTORAL THESIS**

# A Structural Relationship between Socioeconomic Status and Health among the Elderly: A Comparative Study between Japan and China

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# Abstract

Five chapters are organized into this doctoral dissertation.

Chapter 1 provides the trend of population aging in the world due to extended longevity and low fertility. The proportion of elderly individuals in the Japanese population represents the highest in the world at present, with over one fifth individuals aged 65 and above. It took Japan only 24 years to double the percentage of elderly people from 7% to 14%, while it was projected to cost 25 years for China to complete this aging process. Considering the fact that older people currently constitute the majority of those in poor health, the determinants of health in old age have become a growing concern.

On the basis of causal distance to health, all social determinants can be divided into three levels: 1) proximal factors, 2) mid-range factors, and 3) distal factors. Proximal factors, which can be easily changed by individuals, are closest to health and include health-related lifestyles and behaviors. Social relationship and social support are regarded as mid-range factors. Distal factors cover social structure and stratification, over which people have the least control.

The purposes of this dissertation are: 1) to examine the relationship between socioeconomic status (SES) and health status of elderly people in two Asian countries — Japan and China; 2) to inquire the mediating influence of social interaction on the association between SES and health status among elderly people in both Japan and China; 3) to investigate the SES–health mechanism through personal behaviors, such as social interaction and healthy lifestyle, and how this mechanism varies by age and gender among elderly Japanese community-dwellers.

Chapter 2 presents an empirical research on mediating effect of social interaction between SES and health status among Chinese urban community-dwelling elderly. 1,979 elderly individuals aged ≥60 years in 28 communities from 7 sub-districts of Lhasa City and 10 communities from 2 sub-districts of Shigatse City were invited to participate in a questionnaire based survey in 2009. Of them, 1,846 elderly answered, giving a response rate of 93.2%. The elderly people contacted their children (who did not live with them) the most (67.6%), followed by neighbors (51.5%), friends (41.0%), siblings (33.9%) and relatives (25.9%); and most elderly people had between one and three people with whom they were in contact, freely and pleasantly; the majority of elderly people were satisfied with their social interaction. 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 indirect effect, SES exerted a larger direct impact on health status, especially on psychological health. In conclusion, like western countries, people with higher SES were more likely to have better health status in China. In addition, social interaction played a mediating role on the association of SES–health status.

Chapter 3 presents an empirical research on mediating effect of social interaction between SES and health status among elderly suburban community-dwellers in Japan. A self-administered questionnaire was mailed to all of the elderly residents aged ≥65 years in Tama City in Japan in 2001. The results showed that SES had a positive direct impact on social interaction; and social interaction exerted a direct and positive effect on health status; SES not only directly affected health status, but also demonstrated an indirect effect via social interaction, especially on subjective health. All associations were more pronounced among elderly women. Compared with direct impact, SES was more likely

to exert an indirect impact on health status by means of social interaction. In conclusion, social interaction may partly explain SES differences in health status, especially for elderly women.

In Chapter 4, a prospective cohort study was conducted to investigate whether social interaction and healthy lifestyle reduces health disparity by SES among Japanese suburban community-dwelling elderly, and to determine whether patterns of the associations varied by age and gender. Beginning in 2001, 7,904 elderly residents of Tama City were followed for six years through self-administered questionnaires and registries. SES had no direct impact on health status and survival, but had indirect effects through social interaction and healthy lifestyle. Health status exerted the strongest influence on survival days regardless of age and gender. In summary, older individuals are able to reduce the effects of health inequalities by personal behaviors in addition to financial support from the government. The key to prolonging survival in the elderly is to promote health status through social interaction and a healthy lifestyle, especially in elderly men.

Chapter 5 summarized the important findings of this study and compared these associations in Japan and China. In the cross-sectional studies, SES had a direct effect on health status, but also an indirect effect by means of social interaction among both Japanese and Chinese elderly. By comparison, SES exerted a larger direct effect on health status in China; while SES exerted a larger indirect effect in Japan. In the longitudinal study, SES had no direct effect on survival days, but it indirectly affected survival days by social interaction and healthy behaviors among Japanese elderly. Three possible reasons were brought up for that: 1) the gap between the rich and the poor, 2) the development level of society, and 3) different usage of indicators or areas. Moreover,

several implications can be drawn from the conclusions: 1) a preventive method for ill-health was suggested with older individuals being able to diminish health inequalities through their own efforts on the basis of SES, since personal behaviors may in part contribute to the SES gradient among elderly Chinese and Japanese people; 2) interventions to improve health status of elderly people need to be country-specific, taking the development level of each country into consideration in making health policy and providing health education; 3) interventions to improve health outcomes of elderly people also need to be gender-specific and age-specific.

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# Chapter 1 Introduction

## 1.1 Population Aging

### 1.1.1 Global Population Aging

The elderly are currently regarded as the fastest growing age group worldwide. Population aging becomes a global phenomenon. In the last several decades, the number of elderly people has been proportionally and consistently increasing. There were approximately 202 million people age ≥60 years globally in 1950 (Figure 1-1). Thirty years later, the number of elderly population aged ≥60 years had nearly doubled, and fifty years later people aged ≥60 years had tripled across the world, reaching 610 million, constituting 10% of the entire population.

When 10% of the population are aged ≥60 years or 7% are aged ≥65 years, society is regarded as an "aging"; when this increases to 20% for those aged ≥60 years, or 14% for those aged ≥65 years, it is considered to be an "aged society"; and if individuals aged ≥60 years comprise more than 30% of the total population, or individuals aged ≥65 years comprise more than 21%, then a "super aged society" is developing.

Generally speaking, the process of population aging is due to extended longevity and low fertility. Figure 1-2 displays the proportion of the elderly population aged ≥65 years in selected countries. Although the pace of aging is different, the rising tendency is clearly visible. Table 1-1 shows the years needed for selected countries to move the proportion of the elderly aged 65 years and above from 7% to 14%, in an ascending order. Most of today's developed countries have had decades to adjust to the changing age structure, with the earlier that the population aging occurred, the longer the transition from 7% to 14%. For instance, the percentage of elderly people in Sweden and France reached 7% in the nineteenth century. It took these two countries 85 and 115 years to complete the transition from 7% to 14%, respectively; while population aging in Germany, the United Kingdom and the United States happened in the first half of the twentieth century, with 40 to 73 years were required to complete the process. Rapidly aging Japan is unusual among developed countries. The aged population in Japan accounted for only 7.1% of the entire population in 1970 but in 1994, a mere 24 years later, it had doubled in scale to 14.1%, which indicated an unparalleled pace compared with other countries; for China, the same transition is expected to happen in 25 years.

On one hand, this phenomenon reflects the advancement in medical technology and improvement in healthy behaviors; but on the other hand, it also brings many challenges to many aspects of the society, such as economy, policy and culture.

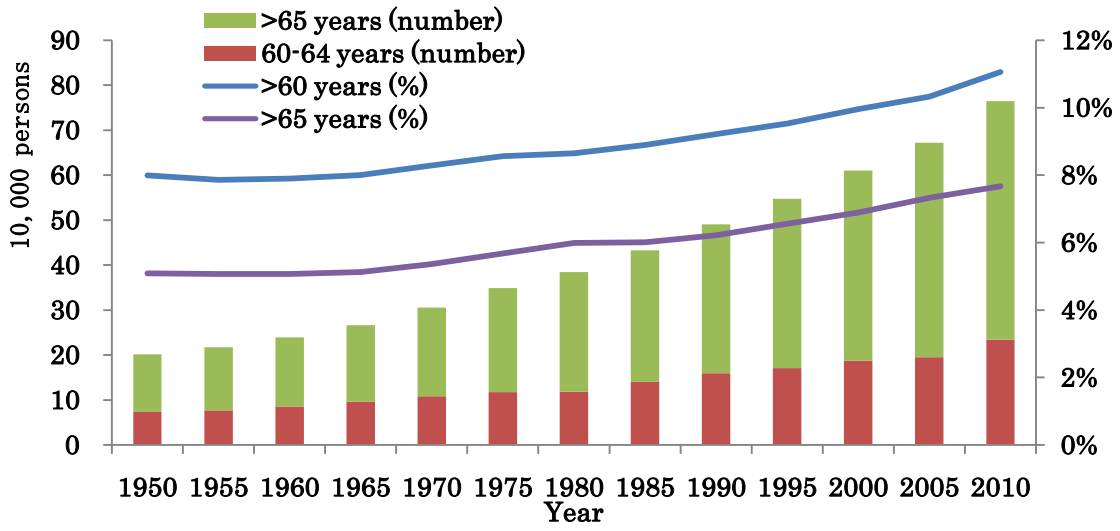


**Figure 1- 1: Population aging in the world from 1950 to 2010**

(Source: United Nations, Department of Economic and Social Affairs, Population Division, 2013) [1]

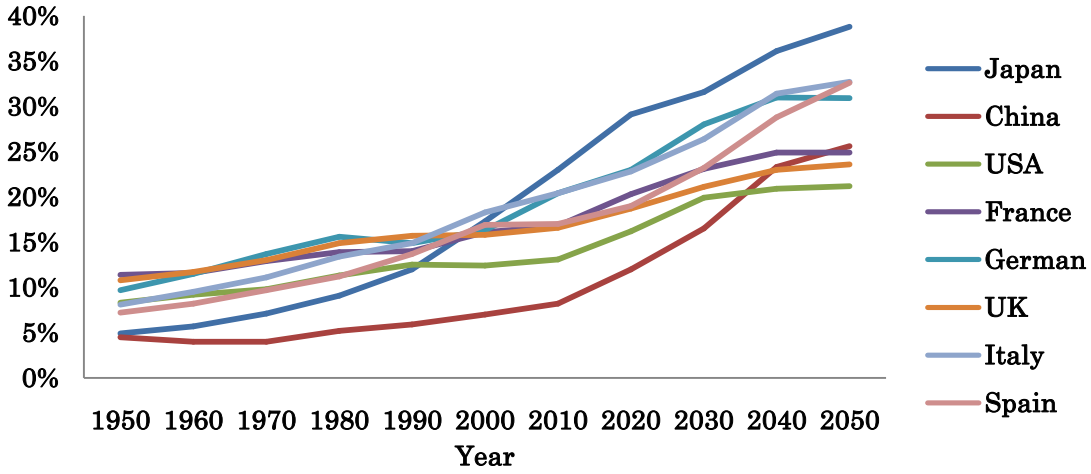


**Figure 1- 2: Proportion of elderly population by country from 1950 to 2050 (age ≥65 years)**

(Source: United Nations, Department of Economic and Social Affairs, Population Division, 2011) [2]

**Table 1- 1. International comparison of the speed of aging in selected countries**

| Country | Percentage of population 65 and older (year attained) | | | Years required for attainment |
|---|---|---|---|---|
| | 7% | 14% | 21% | 7% → 14% |
| Japan | 1970 | 1994 | 2007 | 24 |
| China | 2001 | 2026 | 2038 | 25 |
| Germany | 1932 | 1972 | 2016 | 40 |
| U.K. | 1929 | 1975 | 2029 | 46 |
| U.S.A. | 1942 | 2015 | 2050 | 73 |
| Sweden | 1887 | 1972 | 2020 | 85 |
| France | 1846 | 1979 | 2023 | 115 |

(Source: Japanese Ministry of Health, Labor and Welfare, 2011) [3]

### 1.1.2 Population Aging in Japan

From the 18th century to the first half of the 19th century, the Japanese population remained steady at approximately 30 million. After the Meiji Restoration in 1868, it started expanding in order to build a modern nation-state. The number reached 60 million in 1926, and surpassed 100 million in 1967. During this period, the population increased at a rapid rate. In 1960, the rate of increase suddenly dropped to below 1%. After that, the annual pace of population growth was around 1% from the 1960s to the 1970s. Since the 1980s, it has declined consistently. More recently, the population in Japan has showed negative growth from 2011. Table 1-2, the Japanese total population in 2012 was 127.52 million. This ranked Japan as tenth across the world at 1.8% of the global population. Among the Japanese population, about 30.73 million were aged ≥65 years (14.95 million men and 15.78 million women). People aged ≥65 years accounted for 24.1% of the total population, the highest in the world; that is, a quarter of Japanese are aged 65 and over. Figure 1-3 illustrates the aging trend of population age ≥65 years in Japan from 1900 to 2050. From the 1960s, the proportion of elderly people has been raising consistently and alarmingly. The proportion lines of elderly men and women started to separate since 1940, with more women than men due to women's longer average life expectancy which has had accumulative effects. The differences in the number of men and women have been clearly observed.

**Table 1- 2. Trends in Population of Japan from 1900 to 2050**

| Year | Population (N= million) | | Age composition (%) | | | Average annual rate of increase (%) |
|---|---|---|---|---|---|---|
| | Total | Males | 0-14 years | 15-64 years | ≥65 years | |
| 1900 | 43.85 | 22.05 | 33.9 | 60.7 | 5.4 | 0.83 |
| 1910 | 49.18 | 24.65 | 36.0 | 58.8 | 5.2 | 1.16 |
| 1920 | 55.96 | 28.04 | 36.5 | 58.3 | 5.3 | 1.30 |
| 1930 | 64.45 | 32.39 | 36.6 | 58.7 | 4.8 | 1.42 |
| 1940 | 71.93 | 35.39 | 36.7 | 58.5 | 4.8 | 1.10 |
| 1950 | 84.12 | 41.24 | 35.4 | 59.6 | 4.9 | 1.58 |
| 1960 | 94.30 | 46.30 | 30.2 | 64.1 | 5.7 | 0.92 |
| 1970 | 104.67 | 51.37 | 24.0 | 68.9 | 7.1 | 1.08 |
| 1980 | 117.06 | 57.59 | 23.5 | 67.4 | 9.1 | 0.90 |
| 1990 | 123.61 | 60.70 | 18.2 | 69.7 | 12.1 | 0.42 |
| 2000 | 126.93 | 62.11 | 14.6 | 68.1 | 17.4 | 0.21 |
| 2010 | 128.06 | 62.18 | 13.2 | 63.8 | 23.0 | 0.05 |
| 2011 | 127.80 | 62.18 | 13.1 | 63.6 | 23.3 | -0.22 |
| 2012 | 127.52 | 62.03 | 13.0 | 62.9 | 24.1 | -0.20 |
| 2020 | 124.10 | 60.15 | 11.7 | 59.2 | 29.1 | -0.34 |
| 2030 | 116.62 | 56.25 | 10.3 | 58.1 | 31.6 | -0.62 |
| 2040 | 107.28 | 51.58 | 10.0 | 53.9 | 36.1 | -0.83 |
| 2050 | 97.08 | 46.66 | 9.7 | 51.5 | 38.8 | -0.99 |

(Source: National Institute of Population and Social Security Research, 2012. The numbers and percentages after 2012 were projected in 2012) [4]

The biggest challenge caused by the rapid population aging in Japan is the soaring expenditure in social security benefits (Figure 1-4). It is clear that the social security benefits including pensions, medical services and welfare sharply increased during the past four decades from 3.5 trillion Japanese yen in 1970 to 109.5 trillion in 2012. In the 2012 fiscal year, pensions accounted for half of the total security benefit expenditure (53.8 / 109.5 = 49.1), while medical care accounted for 32.1 percent (35.1 / 109.5), and social welfare and others for 18.8 percent (20.6 / 109.5). The proportion of total benefits to national income has been growing rapidly and consistently: 5.8% in 1970, 12.2% in 1980, 13.6% in 1990, 21.0% in 2000 and 31.3% in 2012, respectively. In addition,

social security benefit expenditure is forecasted to continue to raise, and has been projected to reach 149 trillion Japanese yen in the 2025 fiscal year [6].

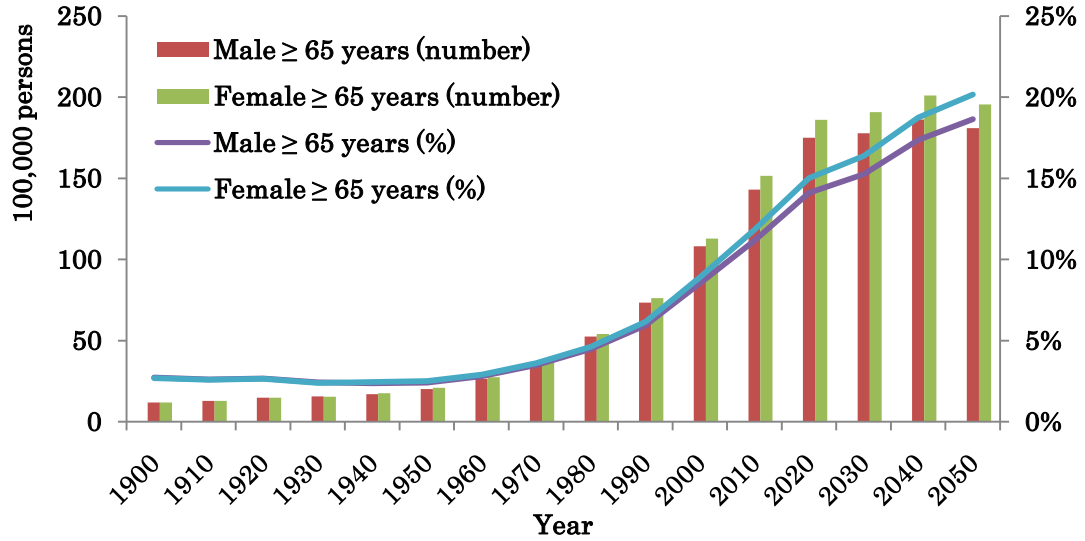


**Figure 1- 3: Population age ≥65 years in Japan from 1900 to 2050**

(Source: National Institute of Population and Social Security Research, 2012; The numbers and percentages after 2012 were projected in 2012) [4]

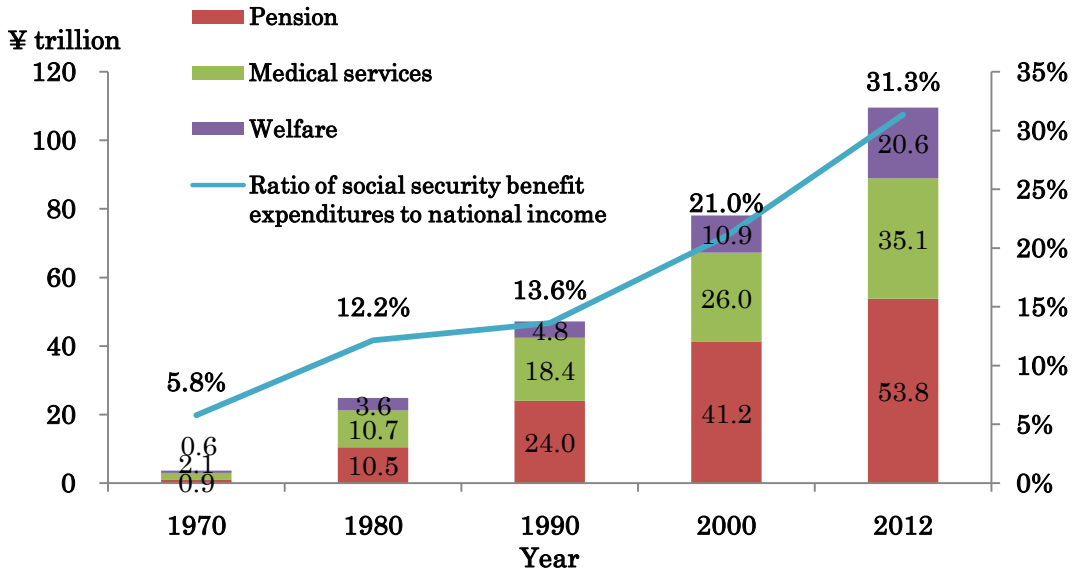


**Figure 1- 4: Trends in social security benefits of Japan from 1970 to 2012**

(Notes: Social security benefit expenditures = Pension + Medical services + Welfare. Source: Ministry of Health, Labor and Welfare, 2012) [5]

### 1.1.3 Population Aging in China

As displayed in Figure 1-5, in 1950 there were 54.4 million people in China, including 4.1 million people aged ≥60 years, accounting for 7.5% of the total population. Thirty five years later in 1985, the number of elderly aged ≥60 years doubled and reached 8.8 million. In 2000, this number reached 12.8 million, suggesting a three-fold increase compared with 1950, comprising 10.0% of the total population. Thus, China has become an aging society.

According to the fifth national population census data in 2000 (Figure 1-6), there were 126.6 million people in main land China, including 65.2 million men (51.5%) and 61.4 million women (48.5%). In this population, the proportion of people aged 0 – 14, 15 – 59 and people ≥60 years was 22.9%, 66.6% and 10.5% respectively. In 2010, when the sixth national population census was undertaken [8], there were 134.0 million people in main land China, including 68.7 million men (51.27%) and 65.3 million women (48.73%). The proportion of people in these age groups changed to 16.6% (0 – 14 years), 70.14% (15 – 59 years) and 13.26% (≥60 years). In comparison with the fifth national census, the total population of main land China increased by approximately 7.3 million annually with an annual average growth rate of 0.57%; the proportion of those aged 0 – 14 decreased by 6.29%, while the proportion of those aged ≥60 years increased by 2.93%.

In the Aging Development Forum of China in 2013 launched by the Ministry of Human Resources and Social Security of the People's Republic of China, the total number of elderly people aged ≥60 years had exceeded 200 million. In recent years, a daily average 25,000 elderly reached the age of 60 years in China. Population aging is therefore considered to be one of the most crucial demographic and social problems facing contemporary China.

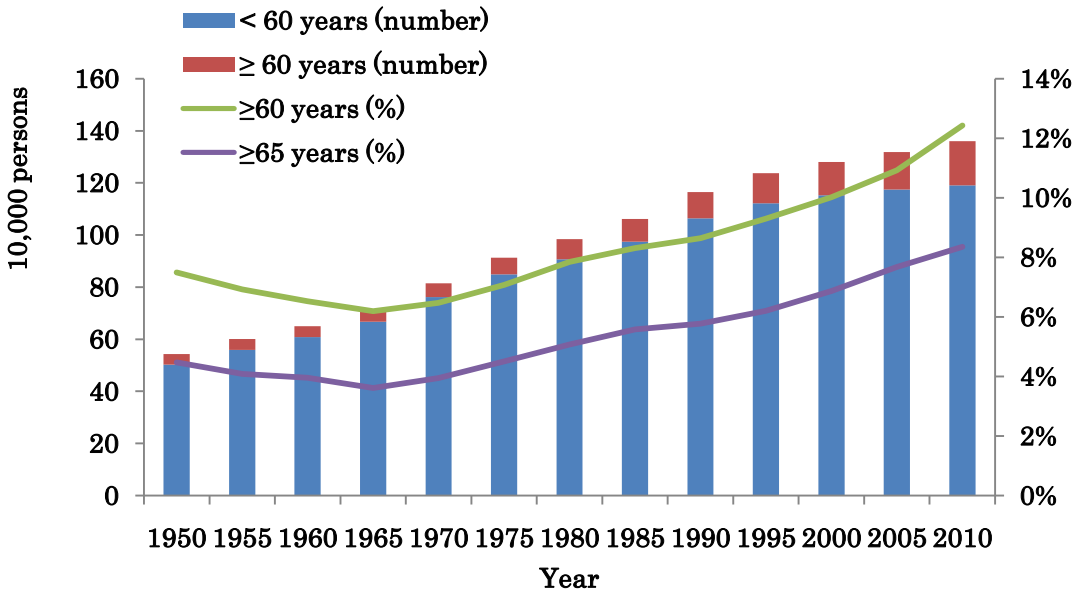


**Figure 1- 5: Population aging trend in China from 1950 to 2010**

(Source: United Nations, Department of Economic and Social Affairs, Population Division, 2013) [1]

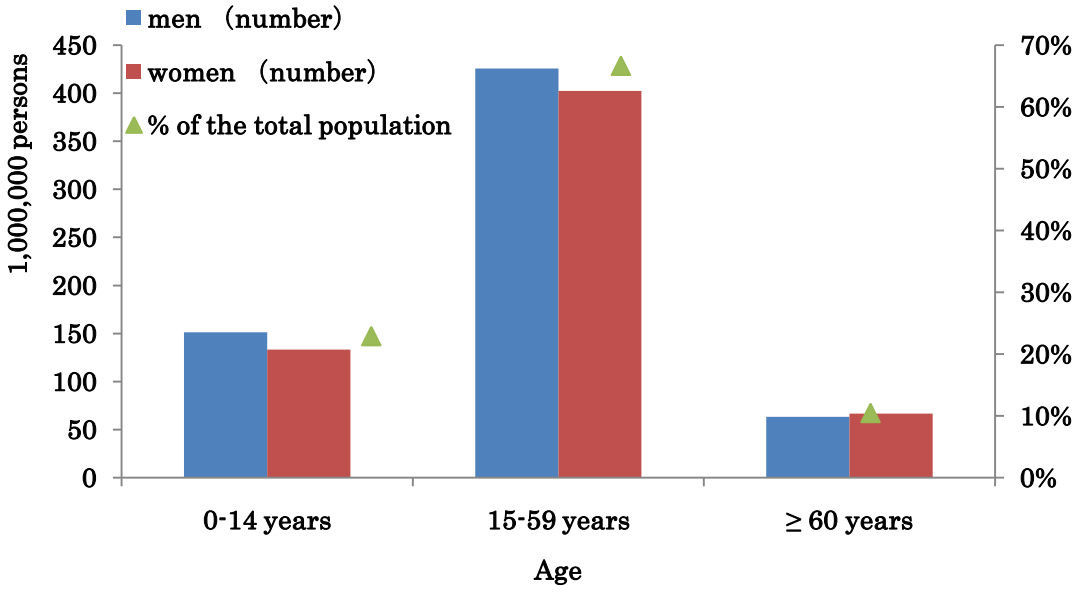


**Figure 1- 6: Age structure of Chinese population in 2000**

(Source: National Bureau of Statistics of the People's Republic of China, 2000) [7]

## 1.2 Literature Review

Considering the fact that older people currently constitute the majority of those in poor health, the determinants of health in old age are a growing concern.

The International Classification of Functioning, Disability and Health, often referred to as ICF, is a classification of health and health-related domains by all 191 WHO Member States in the fifty-four World Health Assembly in 2001 [9]. ICF acknowledges that every human being would experience a decline in health, but the extent to which the health of an individual is impaired could be totally different. A list of environmental factors was also included in the ICF, as well as personal factors, since an individual's health occurs within a context. Thus, changes in the social and ecological environments could alter health conditions (Figure 1-7).

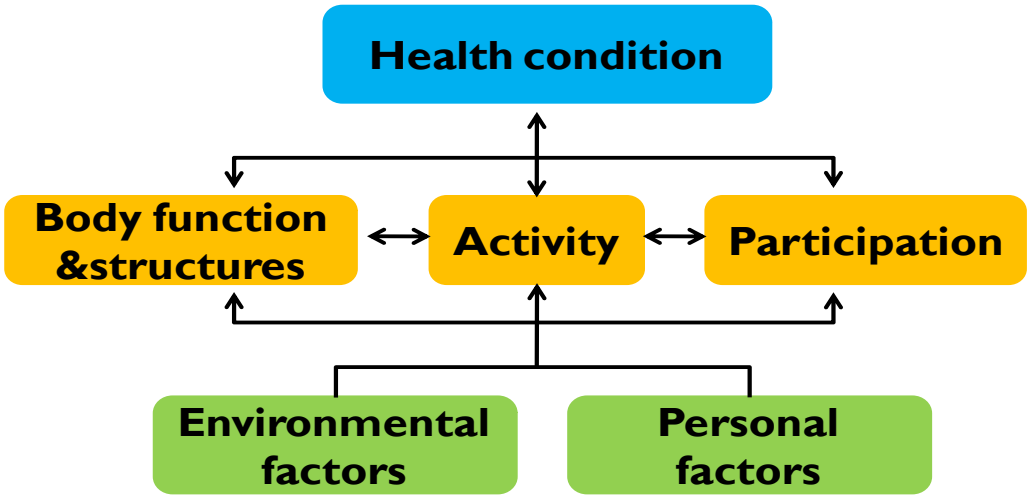


**Figure 1- 7: ICF model.**
(Source: WHO, 2001) [9]

Both in western industrialized countries and developing countries, every improvement in human health of the history is not only ascribed to advances in medical technology, but also to the development in the economy and environment. However, in modern society, the contribution of advancement in medical knowledge and technology to population health is diminishing (accounts for only 10%). Population health was mainly determined by personal health behaviors (50%), social environment (20%) and

heredity (20%) [10]. Therefore, social determinants which were basic and sustainable for national health gradually attracted more attention and were taken into consideration.

Similarly, from the perspective of multiple etiology, in addition to genetic and physical factors, health problems and diseases were also caused by a wide variety of social determinants that were at the root of these inequalities in health [11]. On the basis of causal distance to health, social determinants could be divided into three levels: proximal factors, mid-range factors and distal factors. Proximal factors which could be easily changed by individuals are closest to health, including health-related lifestyles and behaviors; social relationships and social support are regarded as mid-range factors; and distal factors cover social structure and stratification, over which people have the least control.

### 1.2.1 Distal Factor — Socioeconomic Status and Health

An increasing number of literature shows clearly that socioeconomic status (SES) and health are strongly related, in both industrialized and developing countries, in both welfare states and liberal democracies. The issue of whether SES affects health or vice versa has been controversial [12]. Two theories were extracted from these disputes: “social causation” and “health selection” [13]. The social causation theory claims that health is related to socially determined structural factors such as SES [14]. The health selection theory suggests that SES is affected by health, and that the healthy people move up the class hierarchy while the less healthy people move down [15]. Given that the research population is composed of elderly adults, this study uses the social causation theory; that is, SES impacts an individual’s health. A social gradient in health can be identified in both western countries [16-25], and eastern countries [26-30]: people with high SES are more likely to have better health as assessed by self-rated health (SRH) [31-36], functional status [37-39], or mortality [40-47], and regardless of whether SES is measured by levels of income, years of education or occupational class.

In addition, SES has accumulative effects [48], which means that socioeconomic differences in health escalate with an increase in age [49]. However, several studies identified that SES differences in health expand through late middle-age and decline thereafter [50-52]. Declining health inequalities in later life have been attributed to

selective mortality, social sector services targeting older adults, and cohort effects [53]. However, some studies did not draw a consistent conclusion. Lampert suggested that small socioeconomic differences in functional aspects of health up to the age of 90 years, were followed by significant differences in those aged 90 years and over in a research population aged 70 years and over [54]. A Germany study has shown that socioeconomic differences were significant among those aged 70 – 79 and disappeared after 80 years of age [24]. Another Germany study revealed that only a slight age variation existed in the association between SES and health among individuals aged 60 and above [25]. In Japan, there is limited knowledge about how the effects of SES on mortality interact with age and gender. Liang and his colleagues pointed out that there is no significant educational difference of mortality among the 70 – 79 age group [44]. In contrast, a Mexican study analyzed by Smith and Goldman using a nationally representative sample of older adults, indicated no significant age variation in the effects of education and wealth on SRH and physical functioning [39].

Gender differences also emerged in the relationship between SES and health. In Japan a cross-sectional study was carried out among 9,650 participants aged between 47 and 77 to identify gender differences of the impacts of income on health [55]. Males with a low household income were more likely to report poor or fair health but not females. Another Japanese study, conducted by Liang et al. in 2002, found an opposite association to western countries with an educational crossover observed among elderly men [44]. This association may be due to gender and SES differences in the causes of death, morbidity, and health behavior. Fukuda and his colleagues found that the relationship between mortality and SES (including income and education) was stronger in men than in women [41]. In line with this gender difference, Smith and Goldman also claimed an SES-related difference in health was smaller in older women than men [39]. While Bassuk, Berkman and Amick recognized education, household income and occupational prestige were generally associated with lower mortality for men, this was true only for women regarding income among elderly residents in four US communities (East Boston, Massachusetts; New Haven, Connecticut; east-central Iowa; and the Piedmont region of North Carolina) [40]. Prus and Gee believed that the relationship between income and health is only significant in older women aged ≥65 years, based on

data from the 1994 to 1995 National Population Health Survey in Canada [56].

Compared with studies in western countries, the research on the relationship between SES and health is very limited in Asian countries, let alone among elderly people; furthermore, little is known about how the SES–health link differed by age and gender. Therefore, consistent results have not yet to be drawn.

### 1.2.2 The Mechanism of SES–Health by Healthy Lifestyle — Proximal Factor

Sufficient evidence has shown that health-related lifestyles could partly explain health differentials by SES [57,58]. People with high SES are characterized by greater consumption of high-quality and low-fat diets [59,60]. In contrast, disadvantage groups tend to involve cigarette smoking and excessive alcohol consumption [39,61], in order to cope with stress in their lives.

These associations also vary by age and gender. Øvrum, Gustavsen, and Rickertsen explored how the income and education gradients in physical activity, smoking, consumption of fruit and vegetables and SRH vary with age among Norwegians aged 25 to 79 [62]. The education gradient in smoking and in physical activity, as well as the income gradient in consumption of fruit and vegetables among elderly men, became smaller at older age; while only physical activity among elderly women grew stronger. Smith and Goldman showed reverse income gradients in obesity, smoking and drinking in Mexico, which was contrary to patterns in the industrialized world [39]. A Canadian survey, by Denton and Walters, claimed that smoking and alcohol consumption were more important determinants of health (subjective health and functional health status) for men than women aged 20 and above, while body weight and being physically inactive were more important determinants of health for women than men aged 20 and above [63]. Prus and Gee found having an acceptable body weight was positively linked to health for elderly Canadian women [56]. In China, adults aged 18 to 70 with a high SES were more likely to engage in a healthy lifestyle, being able to afford this, which in turn promoted their SRH [64]. Kim and his colleagues conducted a comparative study between China and the United States to understand health discrepancy issues cross-nationally [65]. As SES (income and education) improved, lifestyle (diet, physical

activity, smoking, and alcohol consumption) became less healthy in China. Conversely in the United States, a higher SES was related to a healthier lifestyle. These findings are important in explaining corresponding age and gender patterns of inequality in health. However, a longitudinal study in America of 3,617 non-institutionalized adults showed that cigarette smoking, alcohol consumption, physical activity, and Body Mass Index (BMI) explained only a modest portion of the socioeconomic differences in health [66]. That is, the higher prevalence of these four health-risk behaviors among lower SES groups was not the dominant mediating mechanism which could contribute to health inequalities by SES.

In fact, multiple liner regression analysis and logistic regression models, which are widely applied in prior studies, are not a good choice for mechanism studies, since these two kinds of analytical methods are not able to reflect indirect impacts, nor are they able to detect the co-variation between independent variables and dependent variables, as well respective analyses would also yield inconsistent results. Most of the mechanism research on SES–health paid attention to the general population, with only a limited number of studies focused on elderly people. Whether healthy lifestyle could explain socioeconomic differences in health among elderly individuals is still unclear.

### 1.2.3 Mid-range Factor — Social Interaction and Health

After reaching old age, individuals have much more leisure time as a result of retirement from activities they used to be responsible for, such as work, household duties and social activities. Social interactions with other people are a crucial part of daily life for elderly people.

Since the mid-1970s, there has been a rapid increase in epidemiological research on the effect of social interaction on health status and longevity. It is well-known that social interaction has a powerful impact on health in old age. Lack of social interaction predicts poor physical health [67-70], low subjective well-being [71,72] and mortality from all causes [73-77]. The reasons are that social interaction may be beneficial to promoting access to information about health and health-related behaviors, rendering emotional support to cope with stress, providing tangible help [78-81], and supplying more opportunities to go outside and do exercise [82].

Social interaction has a greater effect on the life of the elderly than on other age groups in the human population [80]. Unger and his fellow authors indicated that the beneficial effects of social interaction were stronger for male respondents in a sample of initially high-functioning men and women aged 70 to 70 years over a 7-year period from the MacArthur Study of Successful Aging [83]. Avlund et al. used data from 1,396 older non-disabled adults from the Danish Intervention Study on Preventive Home Visits to investigate whether social interaction was related to physical health (disability) and whether these associations vary by age and gender [84]. A large diversity in social interaction and high social participation was important in maintaining functional ability among men and women aged 75 years. Being embedded in a strong network of social relationships provides protection against functional impairment. Mendes de Leon et al. also reported a similar but more specific result that being embedded in a social network of friends and relatives, not of children or a confidant, reduces the risk for functional decline, as well as enhancing recovery from activity of daily living (ADL) disability [85]. In addition, gender differences in the influence of social interaction on the subjective well-being of Japanese older adults were determined among 498 elderly over a three-year survey interval [71]. Interactions with children had benefits on satisfaction only among elderly women. Social interaction quantity and quality were inversely associated with mortality [86], and exerted independent effects on mortality [73,87]. A community sample consisting of 331 individuals 65 years and older in North Carolina, America was assessed by Blazer, who found that the frequency of social interaction significantly predicted thirty-month mortality [74].

A growing body of evidence relating to social interaction and a better state of health status and lower mortality has led to general acceptance of the thought that social interaction influences quality and quantity of health, but there is less consensus on whether social interaction has a mediating role on the associations between SES and health status, as well as mortality. As far as we know, no paper has investigated this explanatory role of social interaction comparing Japan and China.

## 1.3 Study Objectives and Significance

### 1.3.1 A Comprehensive View of Prior Study and Analyses

Findings from previous empirical research gave us a better understanding of the effect of SES on health status and mortality. Many social scientists and public health researchers also provided suggestions on how to promote health status and reduce the risk of premature death. Although results in available literature are not quite consistent, they have still laid the foundation for associations between SES and health. Socioeconomic inequalities in health exist all over the world, but vary by country, age, and gender. Some studies place the emphasis on understanding the mechanisms linking SES to health, including health status and mortality. Critical limitations of prior studies and analyses should be addressed in attempts to elucidate the association of SES–health and the mechanisms which this association acts on.

Firstly, looking at the target research population, the issues of health disparity by SES have been long known in western countries, but less in Asian countries, especially in Asian developing countries. Given that older adults constitute the majority of people who have health problems, special focus should be given to elderly people.

Secondly, looking at the methodological issue, structural equation modeling (SEM) is a statistical method that combines factor analysis and regression analysis. It can be applied to study both direct and indirect effects, and display the co-variation between all independent variables and dependent variables. To this point, it is superior to commonly used logistic regression analysis in previous studies in this field.

Thirdly, the perspective of this mechanism study is that few studies have explored the mechanism of how SES affects health status and survival time in an integrated perspective. A large number of studies have investigated the explanatory impact of healthy lifestyle on the SES–health status and on SES–mortality, however whether it applies to the elderly is still unclear. In addition, whether social interaction can mediate socioeconomic differences in health among elderly people in Asian countries is also far from clear. Furthermore, little studies have taken distal, mid-range and proximal factors of health into account simultaneously.

Lastly, indicators will be used on the basis of inconsistent findings in existing

literature, partly due to multifarious indicators. Different indexes could set limitations on international comparisons.

### 1.3.2 Objectives of Study

This study aims to investigate the structural relationships between SES, social interaction, healthy lifestyle, health status and mortality among community-dwelling elderly in Japan and China, as well as whether these associations differ in subgroups, for example, country, age or gender. More specifically, there are three objectives:

(1) to examine the relation between SES and health of elderly Japanese and Chinese people;

(2) to inquire the mediating role of social interaction on the association between SES and health status among elderly people in both Japan and China;

(3) to investigate the SES–health mechanism through personal behaviors, such as social interaction and healthy lifestyle, and how this mechanism varies by age and gender among elderly Japanese community-dwellers.

### 1.3.3 Significance of Study

This study applies a perspective of multiple etiology in accordance with causal distance to health to analyze the relationship between distal, mid-range, proximal factors and the health of older citizens. There is a knowledge gap in the understanding of SES–health and its mechanism among elderly people in Asian countries. Furthermore, the comparisons between Japan and China can provide a deep insight into differences in developing and developed Asian countries. Thus, the study may bridge the gap by using population-based data.

In addition to academic significance, there is practical significance. From the microscopic view, examining predictors of health status and mortality is helpful to improve quality of life for elderly people and lighten burdens for their caregivers; from the macroscopic view, identifying the mediating effects of personal behaviors on health status and mortality is helpful to establish cost-economical policy to preventive care and promote health.

## 1.4 Study Design

In the light of multiple etiology, and prior studies, a hypothesized model is established to illustrate the structural relationships of SES, social interaction, healthy lifestyle and health status, as well as survival time in Figure 1-8. It depicts the underlying direct and indirect pathways from SES to health. There are four latent variables in the ovals (SES, social interaction, healthy lifestyle and health status) and one observed variables in the rectangle (survival days) in the model. Health status and survival days are employed in the study to indicate health outcomes, which were described as quality and quantity of life, respectively. Among the influence factors, SES is a distal factor which individuals have the least control over; social interaction and healthy lifestyle are behavioral factors which individuals could change relatively easier. Single-headed arrows represent the direction of relationship between two variables. It is hypothesized that:

Hypothesis 1: SES has both positive and direct effects on health status.

Hypothesis 2: SES has both positive and direct effects on survival days.

Hypothesis 3: SES affects health status indirectly by means of social interaction.

Hypothesis 4: SES affects survival days indirectly by means of social interaction.

Hypothesis 5: SES affects health status indirectly by means of healthy lifestyle.

Hypothesis 6: SES affects survival days indirectly by means of healthy lifestyle.

Hypothesis 7: Survival days was positively associated with SES, social interaction, healthy lifestyle and health status.

Hypothesis 8: The structural relationships between SES, social interaction, healthy lifestyle, health status and survival days vary by age and gender.

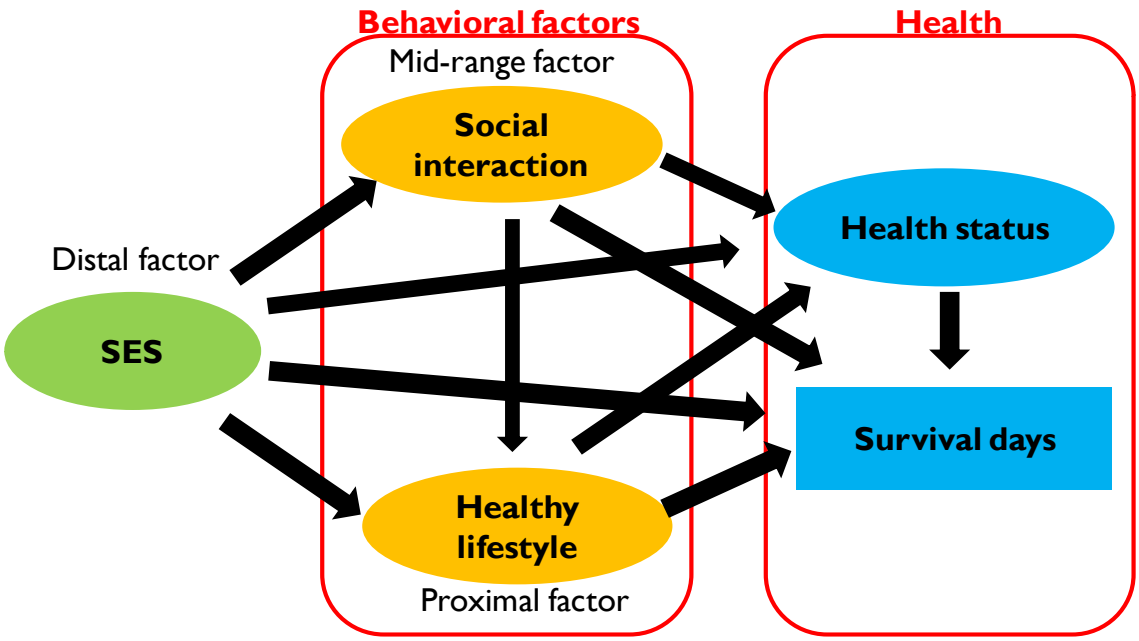


**Figure 1- 8: Hypothetical model of dissertation (Wang, 2011)**

(Notes: Latent variable is included in the oval shape and observed variable is included in the rectangle shape. Single-headed arrow indicates the direction of relationship between two variables.)

## 1.5 Data and Location

The data of the study were collected from Tibet Autonomous Region (TAR) of China in 2009, and Tama City of Japan in 2001, 2004 and 2007.

### 1.5.1 Profile of Tibet Autonomous Region

Tibet Autonomous Region was established in September 1, 1965. It is located in the southwest border of China (Figure 1-9). Tibet faces Sichuan province, Yunnan province, Qinghai province and Xinjiang province on the east and north. It is bounded on the west by India and Nepal, and on the south by Bhutan and Myanmar. Tibet is the highest plateau on earth, with an average elevation of 4,900 meters. Thus, it is often referred to as the "Roof of the World". Tibet covers over 1,220,000 square kilometers, accounting for 12.8% of China, embracing over 2.84 million people in 2007. The natural growth of population was 11.3‰, with a birth rate of 16.4‰ and a mortality rate of 5.1‰. Tibet is home to the Tibetan, Han and Hui people, as well as other ethnic groups. [89]

Tibet Autonomous Region contains a prefecture-level city (Lhasa City), a country-level city (Shigatse City) and six prefectures (Shigatse, Chamdo, Shannan, Ngari, Nakchu and Nyingchi) (Figure 1-10). According to administrative divisions, there are only two cities in Tibet — Lhasa City and Shigatse City.

Lhasa, which literally means "Land of the Gods", is the capital of the Tibet Autonomous Region of China. It has always been the political, economic, and cultural center over its 1,300-year history. Lhasa is one of the highest cities in the world with an altitude of 3,600 meters, and sits in a valley next to the Lhasa River. The valley location protects the city from intense cold or heat and heavy winds. Lhasa City administers one district (Chengguan District) and seven counties (Lhünzhub County, Damxung County, Nyêmo County, Qüxü County, Doilungdêqên County, Dagzê County and Maizhokunggar County) (Figure 1-11). Lhasa City had 223,001 people in the Chengguan District in 2000 (117,004 men and 105,997 women), and nearly half of Lhasa city's population lives here [91]. There are 7 sub-districts and 28 communities in Chengguan District. The seven sub-districts are Gamagongsang, Jibenggang, Gongdelin,

Bakuo, Zhaxi, Jiri, and Chongsaikang.

Shigatse City, which means “the fertile land”, is the administrative center of Shigatse Prefecture as a county-level city, and the second largest city in the TAR of China (Figure 1-12). Shigatse City had a population of 99,863 (51,915 men and 47,948 women) in 2000 [91] and sits in southwest of Lhasa City about 250 kilometers. It is located in flat terrain surrounded by mountains at an elevation of 3,840 meters. Shigatse governs two sub-districts (Chengbei and Chengnan) and ten townships: Lian, Nianmu, Jiangdang, Bianxiong, Dongga, Nierixiong, Jiacuoxiong, Qubuxiong, Qumei, Na’er. There are five communities in the Chengnan Sub-district and five communities in the Chengbei Sub-district.


**Figure 1- 9: Location of Tibet**
(Retrieved from
http://img.shanghaifocus.com/image/tibet/Map-of-Tibet-Location-in-China.jpg) [88]


**Figure 1- 10: Map of Tibet**


**Figure 1- 11: Administrative divisions of Lhasa City**

(Notes: 1, Chengguan District; 2, Lhünzhub County; 3, Damxung County; 4, Nyêmo County; 5, Qüxü County; 6, Doilungdêqên County; 7, Dagzê County; and 8, Maizhokunggar County. Retrieved from http://en.wikipedia.org/wiki/Lhasa) [90]

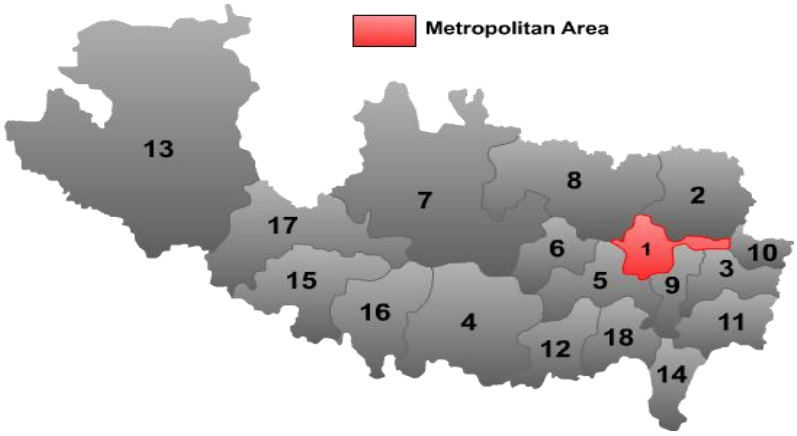


**Figure 1- 12: Administrative divisions of Shigate City**

(Notes: 1, Shigatse City; 2, Namling County; 3, Gyantse County; 4, Tingri County; 5, Sa'gya County; 6, Lhatse County; 7, Ngamring County; 8, Xaitongmoin County; 9, Bainang County; 10, Rinbung County; 11, Kangmar County; 12, Dinggyê County; 13, Zhongba County; 14, Yadong County; 15, Gyirong County; 16, Nyalam County; 17, Saga County; 18 Gamba County. Retrieved from http://en.wikipedia.org/wiki/Shigatse_Prefecture) [92]

### 1.5.2 Profile of Tama City

Tokyo is one of the 47 prefectures and capital of Japan. Tama City is located in the western suburbs of Metropolitan Tokyo (Figure 1-13), covering an area of 19.92 $km^2$ in 2012 [94]. Construction of Tama New Town started in 1966 in order to create integrated living-working commuting communities as Japan's largest residential development. The first round of occupants began moving in 1971, when Tama was classified as a city.
As of 1971, there were 25,105 citizens living in Tama City, and only 5.2% of them were aged ≥65 years (Figure 1-14). Along with young citizens moving, two years later, the proportion of the elderly was 3.7%. The number of inhabitants steadily grew until 1995, with the population of 145,677 at peak, dropping to 141,039 in 2003. The population of Tama City has remained at around 140,000 over the past two decades. However, the young population has decreased since 1988, and the reproductive age population has reduced since 1996. Forty years later, as young adults gradually increased in age, the proportion of the elderly increased remarkably. In 1995, the proportion of elderly aged ≥65 years was 6.8%, reaching 14.2% in 2005. It took just 20 years to double the proportion of the elderly. Tama City has entered hyper-aged society since 2012, since 21% of total population were elderly people.

In additional to low fertility, the life expectancy at birth of Tama City was high for both men and women compared with overall Tokyo, and women generally lived longer than men (Figure 1-15). The life expectancy at birth was 77.9 years for men and 84.1 years for women in Tama City in 1995; in Tokyo the corresponding figures were 76.7 for men and 83.1 for women. In 2010, the life expectancy at birth in men was 79.9 in Tokyo, and 81.5 in Tama City; in women these were 86.4 and 87.2, respectively. The trends were clearly observed for males and females, as well as for Tokyo and Tama City. In addition, Tama City has the lowest long-term care needs for both men and women in Tokyo [97].

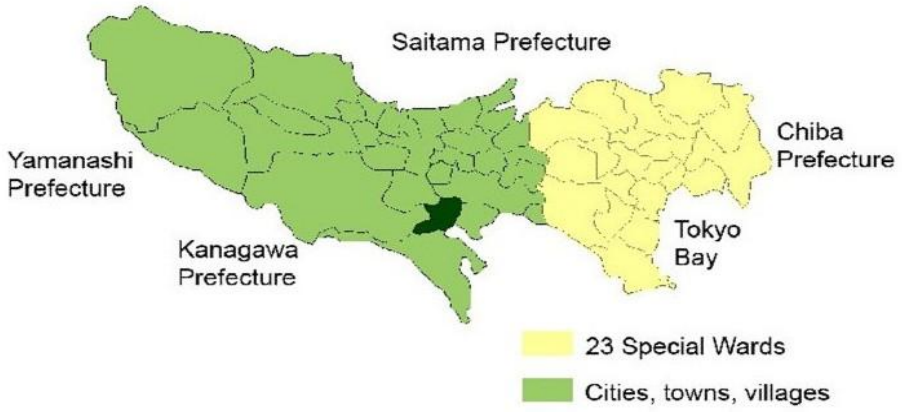


**Figure 1- 13: Location of Tama City in Japan**

(Retrieved from http://mapsof.net/map/map-tama-en#.UuNBDFSCjcs ) [93]

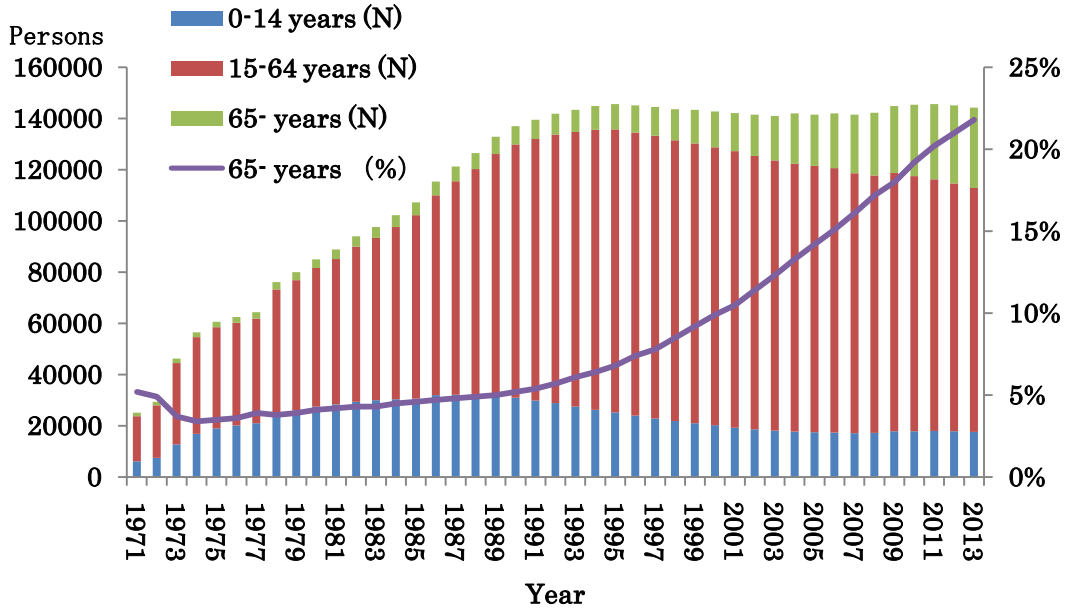


**Figure 1- 14: The population trend of Tama City from 1971 to 2013**

(Source: Tama City census, 2012) [95]

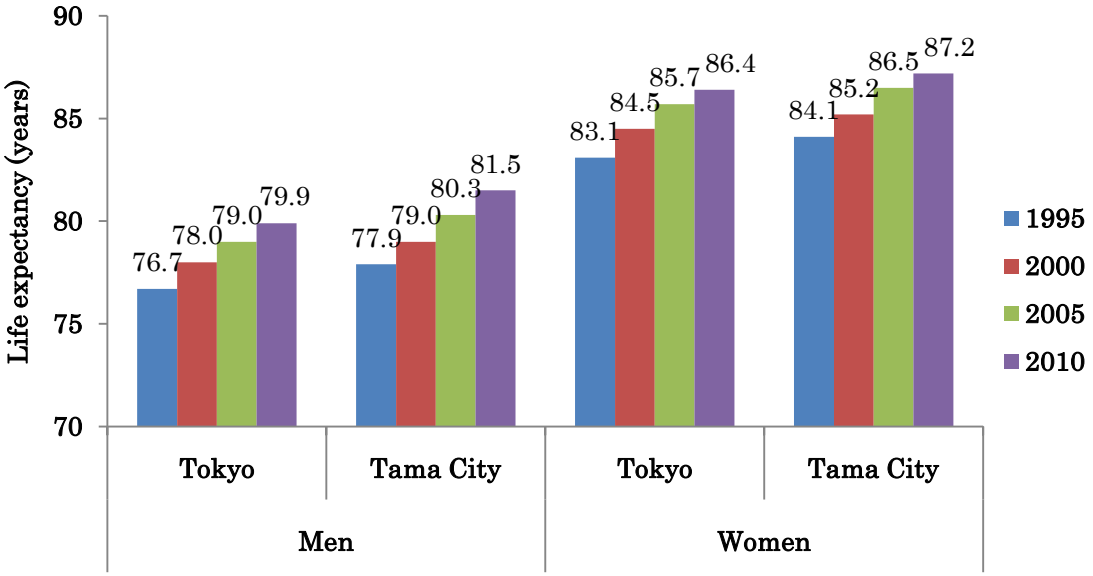


**Figure 1- 15: Life expectancy at birth in Tokyo and Tama City by gender**

(Source: Tama City census, 2012 [95]; Ministry of Health, Labor and Welfare, 2012 [96])

### 1.6 Statistical Methods

Four statistical methods were applied in the study analysis, including frequency distribution analysis, bivariate correlation analysis, factor analysis and structural equation modeling by SPSS 19.0 for Windows and Amos 17.0 for Windows.

Frequency distribution was used to display the basic information in different main variables. Bivariate correlation analysis was used to explore the relationship between two variables. Age-gender related differences among main variables and bivariate correlations were examined by Chi-square tests. Factor analysis was then conducted to identify several underlying factors from an initial set of observed variables. Structural equation modeling was used to understand the associations between health and its predictors, as well to understand the pathway by which SES demonstrated effects on health status and mortality. Furthermore, multi-group analysis was employed to determine whether the hypothesized relationship in the model would vary by age and gender.

## 1.7 Framework of Dissertation

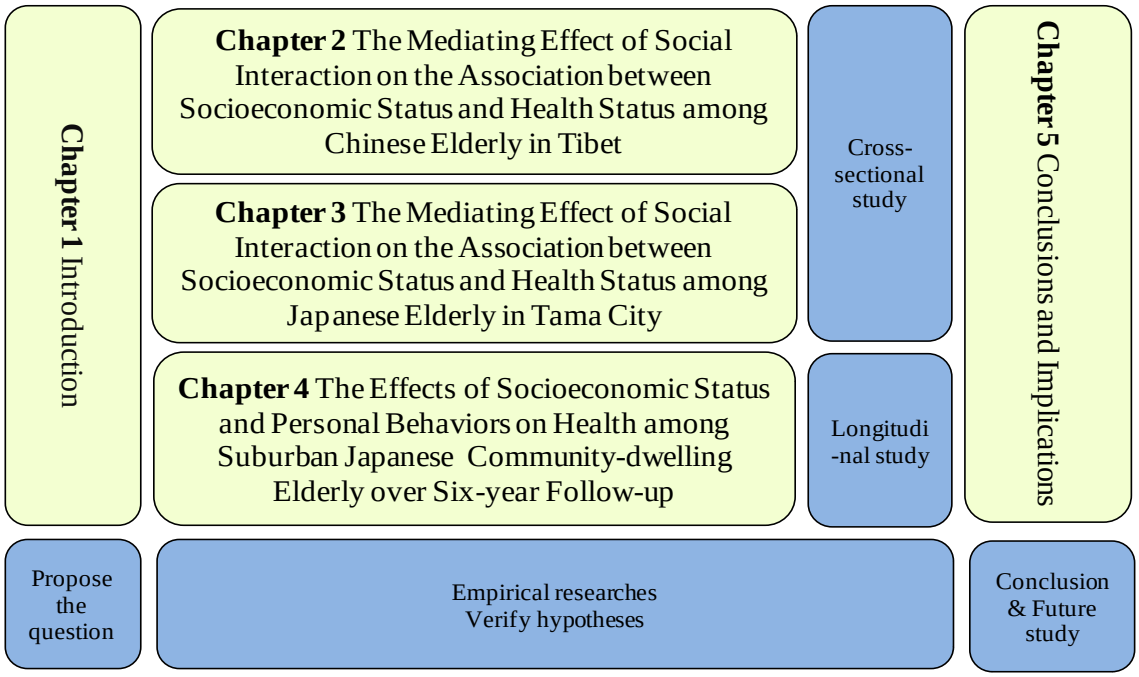


**Figure 1- 16: Framework of the dissertation**

The doctoral dissertation is organized into five chapters (Figure 1-16).

Chapter 1 is an introduction to provide the trend of population aging in the world, especially in Japan and China, and to provide a full view of existing literature on the association between SES and health, as well as the mechanism by which SES affects health status and mortality. These findings laid a good foundation of a health issue among older adults, but fell short of a comprehensive analysis on the SES–health mechanism. Subsequently, the purposes, significance, hypothetical model and statistical methods of this study were addressed.

Chapter 2 presents an empirical research on mediating effect of social interaction between SES and health status among Chinese urban community-dwelling elderly (Figure 1-17); a cross-sectional study conducted in 2009 with 1,979 elderly aged ≥60 years constituting the research population, drawn from 38 communities by cluster sampling methods in the two cities of Tibet — Lhasa City and Shigatse City.

Chapter 3 explores the mediating role of social interaction on the association between SES and health status among elderly suburban community-dwellers in Japan (Figure 1-17). It was also a cross-sectional study and was conducted in 2001, with 7,904

participants aged 65 to 84 selected to verify the hypothesis.

Chapter 4 investigates the structure between SES, social interaction, healthy lifestyle, health status and survival days among elderly citizens of Tama City according to causal distance to health (Figure 1-18). It was a longitudinal study with 7,904 individuals aged 65 – 84 years followed six years from 2001 to 2007.

Chapter 5 summarizes the important findings of this study and compares these associations in Japan and China.

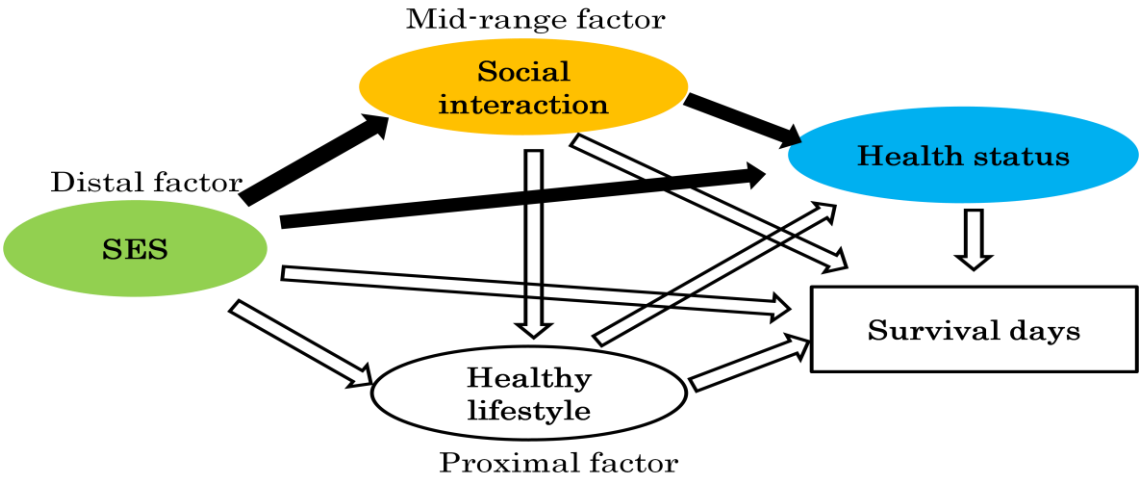


**Figure 1- 17: Hypothetical model of the mediating role of social interaction on SES–health status**

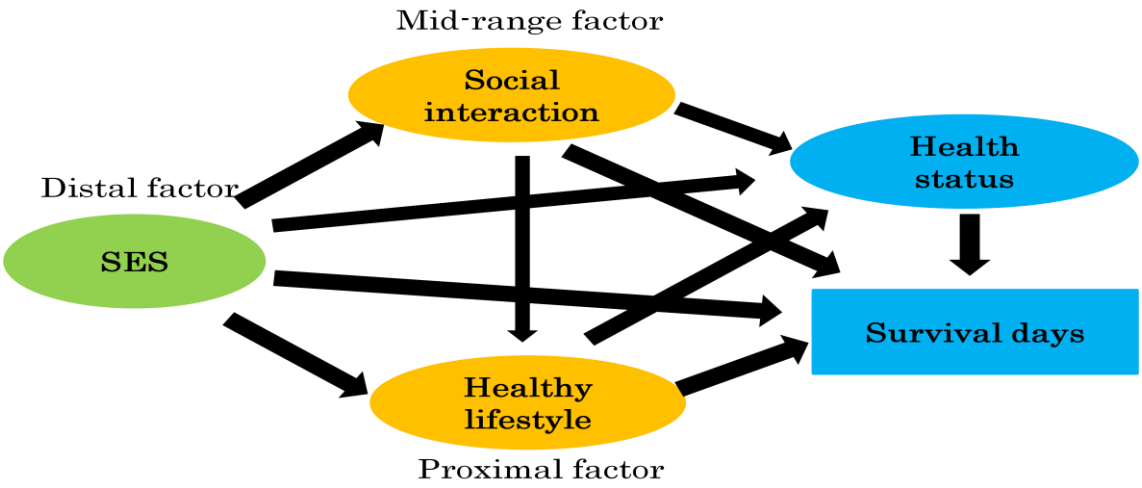


**Figure 1- 18: Hypothetical model of the SES–health mechanism by means of personal behaviors**

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# Chapter 2 The Mediating Effect of Social Interaction on the Association between Socioeconomic Status and Health Status among Chinese Elderly in Tibet

## 2.1 Background and Issue

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 ≥60 years 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 age ≥65 years 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 ≥60 years 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.

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 [5-11]. 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 [12]. 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 [13]. 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 SRH, functional health and diseases among Chinese elderly in 1992 [14]. 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 [15]. The use of different SES and health indicators may be a reason for inconsistent results across studies [9]. Accordingly, it is very unclear to what extent SES affect health, let alone international comparison.

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 relationship; and 3) proximal factors, which consist of health- related lifestyle and behaviors [16]. The mediating influence of health behaviors has been increasingly recognized between SES and health [17-19]. In addition, a substantial body of research identified the relationship between social interaction and health [20-24], 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 China; 2) determine the structure between SES, social interaction, and health status among Chinese urban community-dwelling elderly.

## 2.2 Methods

### 2.2.1 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 ≥60 years, as of August 1, 2009 (Table 2-1). 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 2-2).

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.

**Table 2- 1. The geographical distribution of the urban elderly in Tibet**

| City | Sub-district | Community | Number |
|---|---|---|---|
| Lhasa | Gamagongsang | Tongjian | 171 |
| | Jibenggang | Xue | 182 |
| | Gongdelin | Muru | 70 |
| | | Dangba | 88 |
| | | Xingfu | 368 |
| | Bakuo | Bakuo | 167 |
| | Zhaxi | Zhaxi | 45 |
| | Jiri | Jiri | 116 |
| | Chongsaikang | Chongsaikang | 110 |
| Shigatse | Chengbei | Miri | 80 |
| | Chengnan | Jiangluo | 76 |
| | | Bangjiakong | 113 |
| | | Dele | 260 |
| Total | | | 1,846 |

**Table 2- 2. 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 |

### 2.2.2 Data Collection

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

***SES***

SES is the most fundamental cause of health status [25]. Measuring the SES of older adults needs multidimensional indicators, since different SES facets have different meanings and indicate access to different resources [9]. 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 [26]. 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 = <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 = ≥10,000 yuan.

***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 = 1 – 3 people, 3 = 4 – 6 people, 4 = 7 – 9 people, and 5 = ≥10 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.

***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).

### 2.2.3 Hypothesized Model

It was hypothesized, in this study, that (see Figure 2-1): 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.

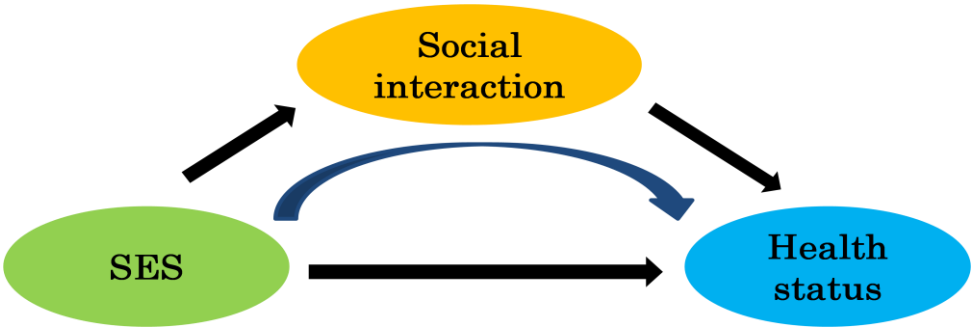


**Figure 2- 1: Hypothesized model between SES, social interaction and health status among Chinese elderly in Tibet**

### 2.2.4 Statistical Analysis

Two levels of analyses were performed with the statistical software programs SPSS and Amos. First, simple frequency analysis was performed to determine personal characteristics of all the samples, using SPSS 19.0 for Windows. The significance of differences between the gender were tested by cross-tabulation and two-tailed chi-squared test. A p-value under 0.05 was considered statistically significant. Second, 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. SEM is a statistical method that combines factor analysis and liner regression. In addition, the multiple path associations between latent constructs assessed on multiple items can be tested simultaneously. Furthermore, SEM takes into account measurement errors and unexplained errors. 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 [27]. The chi-squared test was used to assess the hypothesized model and its improvement from the independence model [28]. 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 [29].

## 2.3 Results

### 2.3.1 Frequency Distribution of Characteristics of Samples

The total number of participants was 1,846, which consisted of 732 men and 1,114 women. Table 2-3 shows the distribution of SES by gender. More than half (54.6%) of the elderly did not get any education; 22.0% of them went to primary school; and only 17.7% got an education in junior high school or higher. Compared with women, men had higher education: 39.9% of the men did not go to school, while 64.2% of the women did not. 28.1% of the men received an education in middle school and higher, while 12.0% of the women received the same. Regarding household income, about 30% of the elderly reported their average monthly household income to be less than 1,000 Chinese yuan, 44.1% of the elderly had a household income between 1,000 to 4,999 yuan, and the remaining 21.6% reported more than 5,000 yuan per month. Similar to situation with educational levels, men reported a higher income compared with women.

Tables 2-4, 2-5 and 2-6 show the characteristics of social interaction by gender. All the p-values are greater than 0.05, indicating that there are no statistical significances between men and women in distributions of frequency, scale and satisfaction of social interaction. Therefore, it was decided most appropriate to describe the characteristics of social interaction among the participants as a whole, rather than between subcategories.

Figures 2-2, 2-3 and 2-4 illustrate the distribution of social interaction. In regard to frequency of social interaction, the elderly people contacted their children most which they do not live with (67.6%); then 51.5% of the elderly people connected their neighbors frequently; followed by friends (41.0%) and siblings (33.9%); the elderly had less communication with their relatives (25.9%). With respect to scale of social interaction, most elderly people had one to three people with whom they were in contact, freely and pleasantly. However, there still were 10.6% to 30.1% older persons that had no one to talk with about their innermost thoughts and feelings. Concerning satisfaction of social interaction, 53.5% elderly men and elderly women were very satisfied with their social interaction; 36.5% elderly people were satisfied with their social interaction; and only 0.9% older adults were very dissatisfied with their social interaction.

**Table 2- 3. Characteristics of SES by gender**

| | Variables | Men | | Women | | Total | | p-value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| Educational level | No education | 292 | 39.9 | 715 | 64.2 | 1,007 | 54.6 | p<0.001 |
| | One to three years in primary school | 122 | 16.7 | 128 | 11.5 | 250 | 13.5 | |
| | Four to six years in primary school | 85 | 11.6 | 72 | 6.5 | 157 | 8.5 | |
| | Junior high school | 83 | 11.3 | 55 | 4.9 | 138 | 7.5 | |
| | High school | 81 | 11.1 | 65 | 5.8 | 146 | 7.9 | |
| | Junior college | 17 | 2.3 | 12 | 1.1 | 29 | 1.6 | |
| | University or higher | 10 | 1.4 | 2 | 0.2 | 12 | 0.7 | |
| | Missing | 42 | 5.7 | 65 | 5.8 | 107 | 5.8 | |
| Household income | <1,000 | 180 | 24.59 | 358 | 32.14 | 538 | 29.1 | p=0.001 |
| | 1,000 – 1,999 | 110 | 15.03 | 213 | 19.12 | 323 | 17.5 | |
| | 2,000 – 2,999 | 58 | 7.92 | 89 | 7.99 | 147 | 8.0 | |
| | 3,000 – 3,999 | 93 | 12.70 | 127 | 11.40 | 220 | 11.9 | |
| | 4,000 – 4,999 | 56 | 7.65 | 68 | 6.10 | 124 | 6.7 | |
| | 5,000 – 5,999 | 40 | 5.46 | 36 | 3.23 | 76 | 4.1 | |
| | 6,000 – 6,999 | 38 | 5.19 | 45 | 4.04 | 83 | 4.5 | |
| | 7,000 – 7,999 | 27 | 3.69 | 30 | 2.69 | 57 | 3.1 | |
| | 8,000 – 8,999 | 29 | 3.96 | 36 | 3.23 | 65 | 3.5 | |
| | 9,000 – 9,999 | 21 | 2.87 | 27 | 2.42 | 48 | 2.6 | |
| | ≥10,000 | 40 | 5.46 | 31 | 2.78 | 71 | 3.8 | |
| | Missing | 40 | 5.46 | 54 | 4.85 | 94 | 5.1 | |

**Table 2- 4. Characteristics of frequency of social interaction by gender**

| | | Children | | Siblings | | Relatives | | Friends | | Neighbors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % |
| Never | Men | 22 | 1.7 | 49 | 5.7 | 43 | 4.3 | 45 | 4.5 | 41 | 3.8 |
| | Women | 40 | 3.1 | 91 | 10.6 | 75 | 7.5 | 67 | 6.7 | 66 | 6.2 |
| Seldom | Men | 47 | 3.7 | 60 | 7.0 | 76 | 7.6 | 70 | 7.0 | 54 | 5.1 |
| | Women | 72 | 5.6 | 91 | 10.6 | 123 | 12.3 | 97 | 9.6 | 97 | 9.1 |
| Sometimes | Men | 85 | 6.6 | 125 | 14.5 | 180 | 18.0 | 140 | 13.9 | 109 | 10.2 |
| | Women | 148 | 11.6 | 152 | 17.7 | 244 | 24.4 | 175 | 17.4 | 151 | 14.1 |
| Often | Men | 204 | 15.9 | 106 | 12.3 | 79 | 7.9 | 129 | 12.8 | 119 | 11.1 |
| | Women | 276 | 21.6 | 135 | 15.7 | 130 | 13.0 | 194 | 19.3 | 213 | 19.9 |
| Every day | Men | 161 | 12.6 | 15 | 1.7 | 14 | 1.4 | 31 | 3.1 | 85 | 8.0 |
| | Women | 224 | 17.5 | 36 | 4.2 | 36 | 3.6 | 59 | 5.9 | 133 | 12.5 |
| Total | | 1,279 | 100.0 | 860 | 100.0 | 1,000 | 100.0 | 1007 | 100.0 | 1,068 | 100.0 |
| p-value | | p=0.705 | | p=0.386 | | p=0.774 | | p=0.730 | | p=0.797 | |

**Table 2- 5. Characteristics of scale of social interaction by gender**

| | | Children | | Siblings | | Relatives | | Friends | | Neighbors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % |
| None | Men | 60 | 4.3 | 113 | 11.0 | 102 | 8.8 | 111 | 9.3 | 124 | 9.4 |
| | Women | 88 | 6.3 | 197 | 19.1 | 153 | 13.2 | 163 | 13.7 | 181 | 13.8 |
| 1 – 3 | Men | 417 | 30.0 | 195 | 18.9 | 133 | 11.5 | 136 | 11.4 | 112 | 8.5 |
| people | Women | 612 | 44.0 | 298 | 28.9 | 211 | 18.2 | 231 | 19.4 | 194 | 14.7 |
| 4 – 6 | Men | 56 | 4.0 | 80 | 7.8 | 131 | 11.3 | 114 | 9.6 | 80 | 6.1 |
| people | Women | 90 | 6.5 | 85 | 8.2 | 215 | 18.6 | 162 | 13.6 | 150 | 11.4 |
| 7 – 9 | Men | 13 | 0.9 | 17 | 1.6 | 46 | 4.0 | 56 | 4.7 | 68 | 5.2 |
| people | Women | 18 | 1.3 | 21 | 2.0 | 63 | 5.4 | 68 | 5.7 | 108 | 8.2 |
| ≥10 | Men | 20 | 1.4 | 12 | 1.2 | 48 | 4.1 | 64 | 5.4 | 125 | 9.5 |
| people | Women | 17 | 1.2 | 13 | 1.3 | 55 | 4.8 | 84 | 7.1 | 174 | 13.2 |
| Total | | 1,391 | 100.0 | 1,031 | 100.0 | 1,157 | 100.0 | 1,189 | 100.0 | 1,316 | 100.0 |
| p-value | | p=0.779 | | p=0.362 | | p=0.684 | | p=0.055 | | p=0.387 | |

**Table 2- 6. Characteristics of satisfaction of social interaction by gender**

| Variables | | Men | | Women | | p-value |
|---|---|---|---|---|---|---|
| | | N | % | N | % | |
| Satisfaction of social interaction | Very dissatisfied | 1 | 0.1 | 0 | 0.0 | p=0.281 |
| | Dissatisfied | 7 | 1.0 | 7 | 0.6 | |
| | Fair | 64 | 8.7 | 101 | 9.1 | |
| | Satisfied | 275 | 37.6 | 384 | 34.5 | |
| | Very satisfied | 363 | 49.6 | 603 | 54.1 | |
| | Missing | 22 | 3.0 | 19 | 1.7 | |

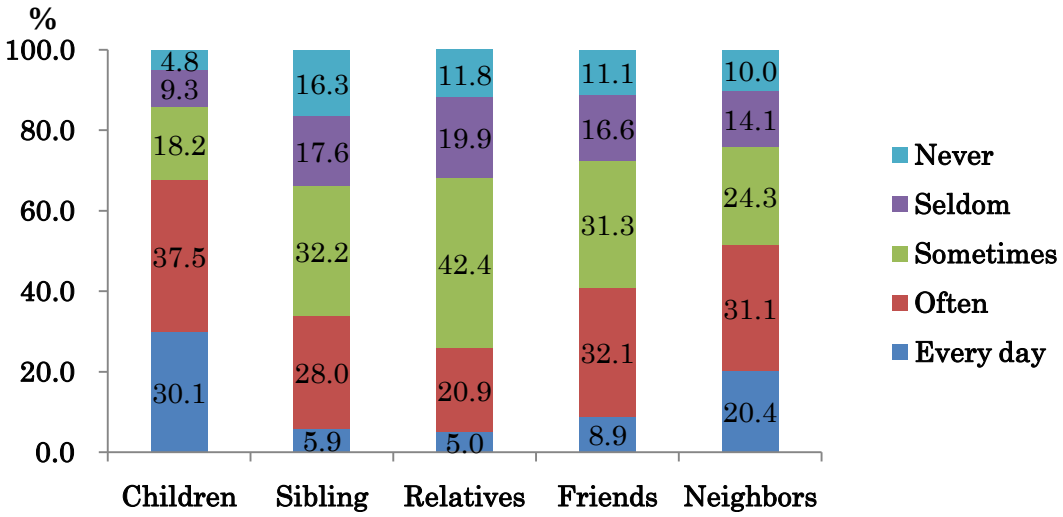


**Figure 2- 2: Distribution of frequency of social interaction**

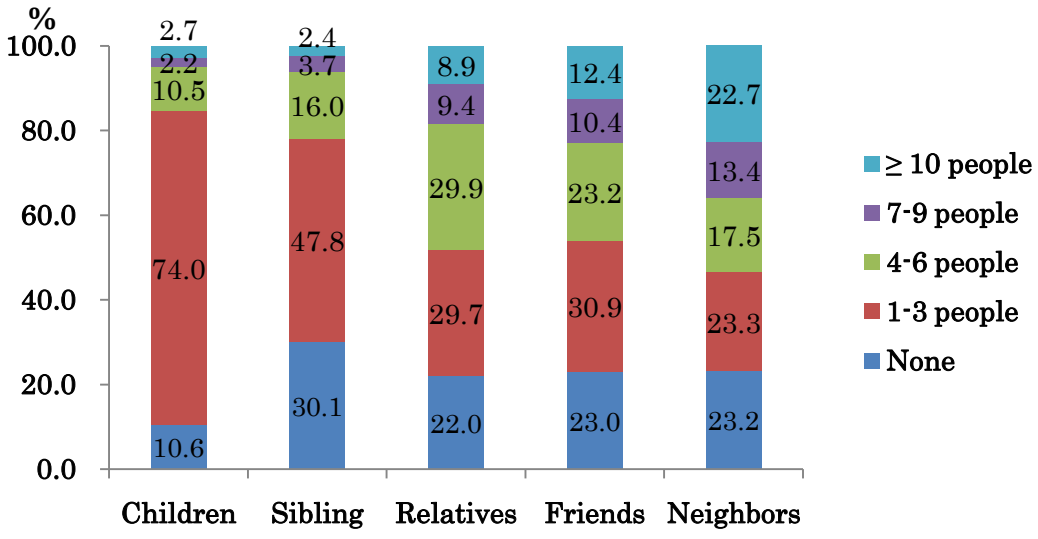


**Figure 2- 3: Distribution of scale of social interaction**

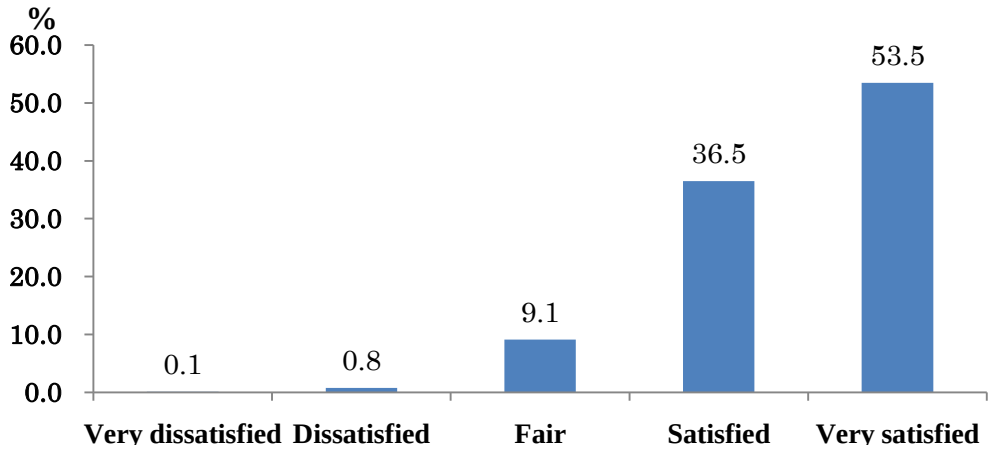


**Figure 2- 4: Distribution of satisfaction of social interaction**

Tables 2-7 and 2-8 show the distribution of health status by gender. Except for hearing, dissatisfaction, passiveness, unfriendliness and failure, all the distributions of observed variables were of statistical significance ($p < 0.005$). The majority of elderly people reported their energy (60.7% for men, 48.1% for women), sleep (71.6% for men, 61.5% for women), diet (86.2% for men, 81.5% for women), hearing (79.8% for men, 77.3% for women), seeing (76.0% for men, 70.5% for women) and activity (79.7% for men, 71.6% for women) as very good and good. Compared with women, men had better self-rated physical health in energy, sleep, diet, seeing and activity. A great number of elderly people also reported good psychological health. They never or seldom felt negative about their life. By comparison, women were more likely to feel lonely, sad, unpopular, and more likely to cry.

**Table 2- 7. Characteristics of physical health by gender**

| Variables | | Men | | Women | | p-value |
|---|---|---|---|---|---|---|
| | | N | % | N | % | |
| Energy | Very bad | 11 | 1.5 | 14 | 1.3 | p<0.001 |
| | Bad | 30 | 4.1 | 104 | 9.3 | |
| | Fair | 225 | 30.7 | 431 | 38.7 | |
| | Good | 284 | 38.8 | 342 | 30.7 | |
| | Very good | 160 | 21.9 | 194 | 17.4 | |
| | Missing | 22 | 3.0 | 29 | 2.6 | |
| Sleep | Very bad | 5 | 0.7 | 14 | 1.3 | p<0.001 |
| | Bad | 28 | 3.8 | 83 | 7.5 | |
| | Fair | 155 | 21.2 | 305 | 27.4 | |
| | Good | 292 | 39.9 | 455 | 40.8 | |
| | Very good | 232 | 31.7 | 231 | 20.7 | |
| | Missing | 20 | 2.7 | 26 | 2.3 | |
| Diet | Very bad | 5 | 0.7 | 11 | 1.0 | p<0.001 |
| | Bad | 13 | 1.8 | 25 | 2.2 | |
| | Fair | 62 | 8.5 | 153 | 13.7 | |
| | Good | 248 | 33.9 | 451 | 40.5 | |
| | Very good | 383 | 52.3 | 457 | 41.0 | |
| | Missing | 21 | 2.9 | 17 | 1.5 | |
| Hearing | Very bad | 6 | 0.8 | 5 | 0.5 | p=0.077 |
| | Bad | 29 | 4.0 | 73 | 6.6 | |
| | Fair | 100 | 13.7 | 164 | 14.7 | |
| | Good | 298 | 40.7 | 466 | 41.8 | |
| | Very good | 286 | 39.1 | 395 | 35.5 | |
| | Missing | 13 | 1.8 | 11 | 1.0 | |
| Seeing | Very bad | 4 | 0.6 | 5 | 0.5 | p=0.034 |
| | Bad | 36 | 4.9 | 85 | 7.8 | |
| | Fair | 125 | 17.1 | 223 | 20.0 | |
| | Good | 346 | 47.3 | 515 | 46.2 | |
| | Very good | 210 | 28.7 | 271 | 24.3 | |
| | Missing | 11 | 1.5 | 15 | 1.4 | |
| Activity | Very bad | 9 | 1.2 | 13 | 1.2 | p<0.001 |
| | Bad | 25 | 3.4 | 60 | 5.4 | |
| | Fair | 98 | 13.4 | 209 | 18.8 | |
| | Good | 321 | 43.9 | 497 | 44.6 | |
| | Very good | 262 | 35.8 | 301 | 27.0 | |
| | Missing | 17 | 2.3 | 34 | 3.1 | |

## Table 2- 8. Characteristics of psychological health by gender

| Variables | | Men | | Women | | p-value | Variables | | Men | | Women | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | | | | N | % | N | % | |
| Loneliness | Every day | 3 | 0.4 | 12 | 1.1 | p=0.017 | Dissatisfaction | Every day | 5 | 0.7 | 7 | 0.6 | p=0.157 |
| | Often | 16 | 2.2 | 31 | 2.8 | | | Often | 11 | 1.5 | 23 | 2.1 | |
| | Sometimes | 136 | 18.6 | 265 | 23.8 | | | Sometimes | 139 | 19.0 | 255 | 22.9 | |
| | Seldom | 221 | 30.2 | 288 | 25.9 | | | Seldom | 246 | 33.6 | 326 | 29.3 | |
| | Never | 340 | 46.5 | 494 | 44.3 | | | Never | 311 | 42.5 | 475 | 42.6 | |
| | Missing | 16 | 2.2 | 24 | 2.2 | | | Missing | 20 | 2.7 | 28 | 2.5 | |
| Sadness | Every day | 3 | 0.4 | 7 | 0.6 | p=0.030 | Unpopularity | Every day | 8 | 1.1 | 1 | 0.1 | p<0.001 |
| | Often | 13 | 1.8 | 23 | 2.1 | | | Often | 1 | 0.1 | 14 | 1.3 | |
| | Sometimes | 138 | 18.9 | 281 | 25.2 | | | Sometimes | 75 | 10.3 | 182 | 16.3 | |
| | Seldom | 213 | 29.1 | 289 | 25.9 | | | Seldom | 193 | 26.4 | 238 | 21.4 | |
| | Never | 337 | 46.0 | 485 | 43.5 | | | Never | 431 | 58.9 | 650 | 58.4 | |
| | Missing | 28 | 3.8 | 29 | 2.6 | | | Missing | 24 | 3.3 | 29 | 2.6 | |
| Passiveness | Every day | 5 | 0.7 | 6 | 0.5 | p=0.057 | Unfriendliness | Every day | 5 | 0.7 | 5 | 0.5 | p=0.149 |
| | Often | 17 | 2.3 | 30 | 2.7 | | | Often | 9 | 1.2 | 16 | 1.4 | |
| | Sometimes | 147 | 20.1 | 289 | 25.9 | | | Sometimes | 76 | 10.4 | 160 | 14.4 | |
| | Seldom | 227 | 31.0 | 308 | 27.7 | | | Seldom | 167 | 22.8 | 248 | 22.3 | |
| | Never | 316 | 43.2 | 454 | 40.8 | | | Never | 454 | 62.0 | 658 | 59.1 | |
| | Missing | 20 | 2.7 | 27 | 2.4 | | | Missing | 21 | 2.9 | 27 | 2.4 | |
| Failure | Every day | 3 | 0.4 | 3 | 0.3 | p=0.432 | Crying | Every day | 1 | 0.1 | 3 | 0.3 | p<0.001 |
| | Often | 5 | 0.7 | 7 | 0.6 | | | Often | 5 | 0.7 | 21 | 1.9 | |
| | Sometimes | 57 | 7.8 | 114 | 10.2 | | | Sometimes | 187 | 25.6 | 389 | 34.9 | |
| | Seldom | 142 | 19.4 | 231 | 20.7 | | | Seldom | 287 | 39.2 | 427 | 38.3 | |
| | Never | 497 | 68.0 | 731 | 65.6 | | | Never | 227 | 31.0 | 248 | 22.3 | |
| | Missing | 28 | 3.8 | 28 | 2.5 | | | Missing | 25 | 3.4 | 26 | 2.3 | |

### 2.3.2 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 [27]. Table 2-9 lists the CFA results.

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 [30]. 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 [31]. They also suggested AVE had better exceed 0.50, which determines whether the set of indicators represent the latent variables [31]. 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.

**Table 2- 9. 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 | 0.70 | 0.33 |
| | | Siblings | 0.48 | | |
| | | Relatives | 0.62 | | |
| | | Friends | 0.72 | | |
| | | Neighbors | 0.57 | | |
| | Scale | Children | 0.40 | 0.74 | 0.38 |
| | | Siblings | 0.50 | | |
| | | Relatives | 0.68 | | |
| | | Friends | 0.76 | | |
| | | Neighbors | 0.66 | | |
| Health status | Physical health | Activity | 0.78 | 0.82 | 0.44 |
| | | Seeing | 0.66 | | |
| | | Hearing | 0.68 | | |
| | | Diet | 0.71 | | |
| | | Sleep | 0.53 | | |
| | | Energy | 0.57 | | |
| | Psychological health | Loneliness | 0.75 | 0.84 | 0.60 |
| | | Dissatisfaction | 0.69 | | |
| | | Crying | 0.48 | | |
| | | Sadness | 0.71 | | |
| | | Passiveness | 0.75 | | |
| | | Unpopularity | 0.80 | | |
| | | Failure | 0.73 | | |
| | | Unfriendliness | 0.78 | | |

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

### 2.3.3 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 2-5, 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.

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 2-10). 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.

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.

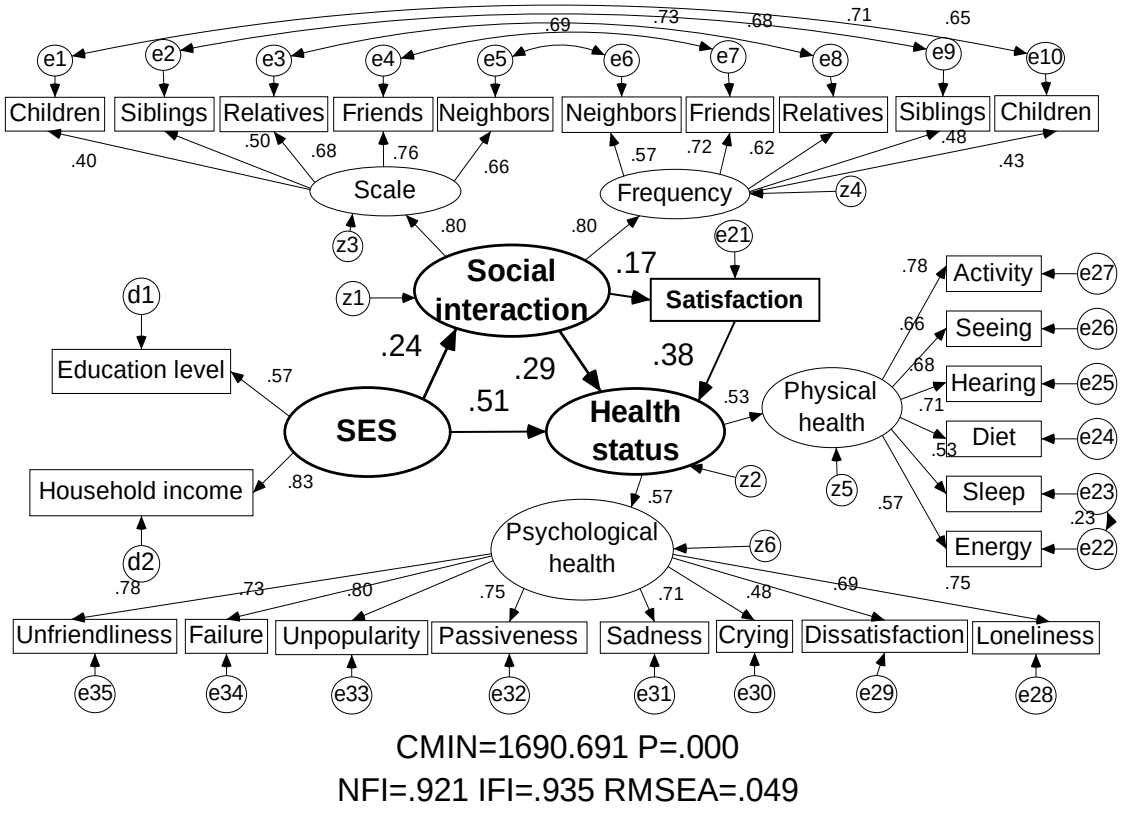


**Figure 2- 5: Structural analysis between SES, social interaction and health status among Chinese elderly**

**Table 2- 10. 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 |

## 2.4 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 [13]. This is because education can increase employment opportunities, which can lead to higher-paying jobs [32,33]. 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 [12,34]. In contrast, however, Braveman and his fellows insisted that educational level could not represent the key aspects of economic status [35]. Zimmer and House also found income predicated functional health better [36]. 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 SRH status [37]. Two German studies also observed the mediating effect of social interaction [4,38]. However, Klein et al. did not specifically focus on elderly people, who consist of the majority with health problems. They realized that SRH, 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) [39]. A Danish study has denied the explanatory role of social interaction as well [40]. 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. A final concern regards the particularity of minority areas, which comprise more than 90% of Tibetan ethnic groups. However, being influenced by Chinese traditional culture, Tibetan people broadly share the same morals and ethics with the majority Han people. To some extent, the pattern which appeared in the cities of Tibet can represent other cities in China.

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.

## 2.5 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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# Chapter 3 The Mediating Effect of Social Interaction on the Association between Socioeconomic Status and Health Status among Japanese Elderly in Tama City

## 3.1 Introduction

The proportion of elderly individuals in the Japanese population represents the highest in the world due to increasing longevity and declining fertility [1]. Undoubtedly, older people presently constitute the majority of those in poor health. Thus, the determinants of health in old age have become a growing concern.

A wide variety of research has consistently indicated that SES affects people's health. A social gradient in health can be identified in Japan [2-5], as is the case in western countries [6-9]: the higher an individual's SES, the better his or her health. In addition, SES also has cumulative effects [10] that become more obvious with age. Socioeconomic differences in health inequalities become increasingly greater with advanced age [11]. SES inequalities in health among young adults are not as obvious as those in older adults. Diminishing the health inequalities which are caused by social stratification calls for the understanding of the underlying pathways from that connect SES and health.

In medical sociology, social determinants of health have been divided into three levels based on causal relationship: 1) proximal factors that consist of health-related lifestyle and behaviors; 2) mid-range factors, such as social interaction and relationships; and 3) distal factors, including social structure and stratification [12].

While the mediating influences of health-related lifestyles and behaviors have already been demonstrated between SES and health [12-14], the mediating effect of social interaction on socioeconomic inequalities in health is far less clear.

So far, only a few studies that demonstrated inconsistent results have examined whether social interaction has a mediating influence on the association between SES and health. A study conducted in eastern Germany revealed that social interaction is an important explanatory factor for health inequalities (SRH) in both men and women age 20 – 81 years [15]. Similarly, Vonneilich et al. observed that social interaction substantially contributes to the explanation of SES differences in subjective health among middle-aged and elderly individuals (45 – 75 years) in Germany [16]. However, another survey in Germany of 682 people age 60 and over suggested a contrasting result that the mediating effect of social interaction on the relationship between SES and health (SRH, depression and functional limitations) among the elderly is weak [17]. An

American survey also suggested the lack of an explanatory role for social interaction in understanding socioeconomic inequalities in health [18]. Moreover, a Danish study indicated that low financial assets and poor social interactions exerted negative impacts on mobility independently, and provided no evidence for a contribution of social integration on socioeconomic differences to the onset of disability [19].

Accordingly, it remains unclear whether the widely known socioeconomic differences in health can be partly explained by the effects of social interaction. No broad conclusions about the mediating influence of social interaction have been able to be drawn, let alone those for elderly people. Additionally, the indicators of health have been incomplete, consisting of just subjective health or physical health. Furthermore, the statistical analysis of logistic regression, which is widely used in existing studies, is not suitable for mechanism research, because this method cannot reflect indirect effects between variables, and respective analyses would also yield inconsistent results.

The purpose of this study was to establish the extent to which SES and health status are associated in Japan; to investigate the structural associations between SES, social interaction and health status; and to clarify whether social interaction has a mediating role among Japanese elderly men and women.

## 3.2 Methods

### 3.2.1 Research Population

Tama City is located in the western suburbs of metropolitan Tokyo, and was formed in the late 1960s. In 1975, approximately 3.6% of the total population consisted of older adults [20]. Forty years later, as young adults have gradually reached old age, the proportion of elderly has increased remarkably. A self-reported questionnaire on health condition, consisting of SES, leisure activity, health status and needs for long-term care as well, was mailed to all of the elderly residents age ≥65 years in Tama City in September 2001 [5,21,22]. In total, 13,195 elderly individuals responded to the questionnaire, for a response rate of 80.2%. Three years later, in 2004, a follow-up study was conducted, and 8,558 elderly participated again. Because the characteristics of people age ≥85 years differ from those of other elderly groups [23], and this group had many missing values with respect to the main variables in this study, we restricted the present analyses to people age 65 – 84 years. The study comprised 7,907 elderly individuals age 65 – 84 years (3,754 men, 4,150 women) (Table 3-1). Only the cross-sectional data in baseline year of 2001 were applied in this chapter.

The retrieved data were confidential, and the study abided by the ethical consideration provided by Tokyo municipal administration bureau. In addition, the Ethics Committee of Tokyo Metropolitan University approved the designs and procedures of the study. All participants were fully informed of the purpose and nature of the investigation, and provided their consent.

**Table 3- 1. Distribution of samples by age and gender**

| | Men | | Women | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| 65 – 69 year | 1,814 | 48.3 | 1,775 | 42.8 | 3,589 | 45.4 |
| 70 – 74 year | 1,074 | 28.6 | 1,141 | 27.5 | 2,215 | 28.0 |
| 75 – 79 year | 585 | 15.6 | 834 | 20.1 | 1,420 | 18.0 |
| 80 – 84 year | 281 | 7.5 | 400 | 9.6 | 681 | 8.6 |
| Total | 3,754 | 100.0 | 4,150 | 100.0 | 7,904 | 100.0 |

### 3.2.2 Measures

***SES***

SES refers to an individual's relative position in the social standing, and can be operationalized as levels of income and education, since income represents an individual's economic status and education represents an individual's social status [24]. Income was defined as equivalent annual household income in Japanese yen (1$ ≈ 100 Japanese yen), and measured with the following five-point ordinal indicator: 1 = <1 million yen; 2 = 1 – 3 million yen; 3 = 3 – 5 million yen; 4 = 5 – 9 million yen; 5 = >9 million yen. Education level was measured with the following three-point ordinal variable: 1 = Up to junior high school; 2 = High school; and 3 = University or higher.

***Social interaction***

Indicators of social interaction consisted of social contact and social participation. Individuals were asked about how often they socialized with their neighbors and friends regarding social contact. Response options were categorized at four different levels: no contact at all, once a month, 3 – 4 times a week, and every day. The participants were assigned 1 – 4 points if they selected the responses above. Social participation was assessed by two questions regarding volunteering and leisure activity: "Did you go in for volunteering in your community?" was answered with 1 = Not at all; 2 = Occasionally; and 3 = Regularly; and "Did you attend leisure activities in your community?" was answered with 1 = No and 2 = Yes.

***Health status***

Because SES might differently affect dimensions of health, subjective health and physical health, which were shown to be important in previous research [25,26], were employed in the present analyses. Estimation of subjective health is an established health measure [27,28]. It was measured by asking participants to respond to the following two questions on SRH and SRH compared to the previous year: "How would you evaluate your health at present?" on a 4-point Likert scale: 1 = Poor, 2 = Fair, 3 = Good, and 4 = Excellent, and "Do you think you are as healthy as previous year?" on a

3-point Likert scale, 1 = Worse, 2 = Have no idea, and 3 = Same, with a higher score indicating better perceived health.

Physical health, which was treated as the other indicator of health status, was measured using basic activities of daily living (BADL) and instrumental activities of daily living (IADL). Respondents were queried about the amount of difficulty they experienced performing eight different tasks. The BADL score was based on three items: toileting, bathing, and going outside; it is derived from the Barthel Index of Activities of Daily Living [29]. Individuals receive 1 point if they could conduct themselves without assistance, and 0 points were assigned to those who required assistance. The BADL score was calculated based on these three items, with the overall scores ranging in value from 0 to 3. A higher score indicated better basic living competence. The IADL score was determined by summing the points assigned to the following activities: purchasing daily goods; preparing daily meals; making transactions at the bank; managing one's pension and insurance; and reading newspapers and books [30]. The scores ranged from 0 to 5 points, with higher scores indicating better instrumental activity competence.

### 3.2.3 Statistical Analyses

Three levels of analyses were performed with statistical software from SPSS and Amos. First, basic descriptive statistics were generated for research population by gender. A Chi-square test was applied to determine whether men and women were distributed differently among the main variables. Then, Spearman's rank correlation coefficients were calculated to identify the relationships between health status and all independent variables, including education level, equivalent income, contact with neighbors and friends, leisure activity, and volunteering. All reported p-values were based on two-tailed tests. P-value $\leq 0.05$ was considered to be statistically significant. Third, structural equation modeling (SEM) estimated using the maximum likelihood method was conducted to investigate the structural relationship between SES, social interaction, and health status. SEM is a statistical method that contains the estimation of models with regressions among latent variables. It permits measurement errors and regression of a dependent variable on more than one indicator directly. In addition, relationships between latent variables measured on multiple items are tested

simultaneously. Multiple-group analysis was utilized to make comparisons between men and women. Fitness indices of models were assessed with Normalized Fit Index (NFI), the Incremental Fit Index (IFI), the Root Mean Square Error of Approximation (RMSEA), and chi-square (CMIN). When NFI and IFI values were close to 1.0, and RMSEA was ≤0.05, the model was regarded as good.

### 3.2.4 Hypothesis

This study included four hypotheses: (Hypothesis [H] 1) SES associated with health status positively; (H2) SES had a positive impact on social interaction; (H3) social interaction exerted a positive impact on health status; and (H4) social interaction could play a mediating role on SES–health status (Figure 3-1).

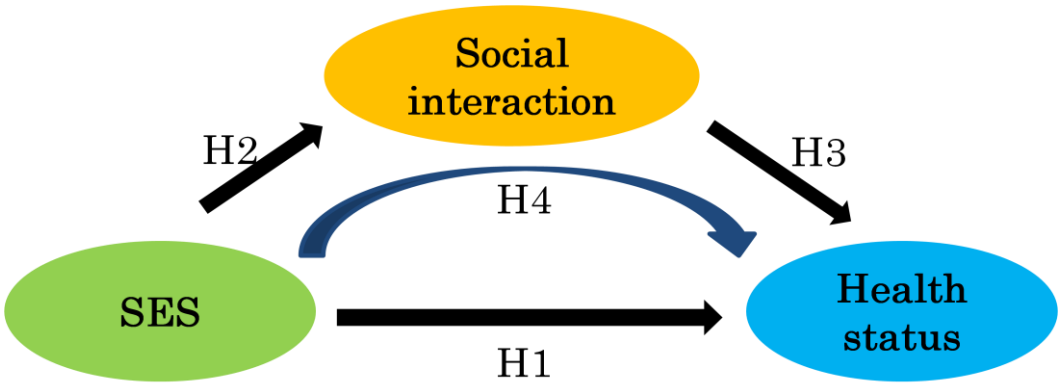


**Figure 3- 1: Hypothesis of relationship between SES, social interaction, and health status**

## 3.3 Results

### 3.3.1 Distribution of Main Variables

The total number of participants was 7,904, including 3,754 elderly men and 4,150 elderly women. Descriptive statistics suggested that all observed variables were distributed significantly differently by gender (p-values <0.01, Table 3-2, 3-3 and 3-4).

Men were seven times more likely to achieve a university education than women (39.3% verse 5.6%). Most elderly women went to high school (38.5%). The majority of elderly households received an income of one to five million Japanese yen a year (72.7% for men, and 66.0% for women). In addition, 17.2% elderly men and 8.9% elderly women reported they earned more than five million a year. Compared with women, men had a better SES with a higher annual income and educational attainment.

More than one-third of the participants had contact with their neighbors three to four times a week. Over half of elderly men (52.4%) and women (58.2%) contacted their neighbors sometimes (once a month and 3 – 4 times a week), while 31.1% men and 20.8% women had no contact with their neighbors at all. In addition, about half did not engage any kinds of leisure activity. The majority of elderly citizens did not take part in volunteering. Compared with men, women reported more frequent social contact and social participation.

Regarding health status, most of participants received higher scores on all domains of BADL score, IADL score, SRH and SRH compared to the previous year. Men performed better in basic activity of daily living (BADL), while women had a better performance in instrumental activity of daily living (IADL). Compared with women, men were more likely to report excellent and good health, even compared to the previous year of the survey.

**Table 3- 2. Characteristics of SES by gender**

| Variables | | Men (N = 3,754) | | Women (N = 4,150) | | Total (N = 7,904) | | p-value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| Education level | Junior high school | 884 | 23.5 | 1,963 | 47.3 | 2,847 | 36.0 | p<0.001 |
| | High school | 1,168 | 31.1 | 1,599 | 38.5 | 2,767 | 35.0 | |
| | University or higher | 1,474 | 39.3 | 234 | 5.6 | 1,708 | 21.6 | |
| | Missing | 228 | 6.1 | 354 | 8.5 | 582 | 7.4 | |
| Equivalent income | <1 million | 111 | 3.0 | 502 | 12.1 | 613 | 7.8 | p<0.001 |
| | 1 – 3 million | 1,475 | 39.3 | 1,772 | 42.7 | 3,247 | 41.1 | |
| | 3 – 5 million | 1,254 | 33.4 | 969 | 23.3 | 2,223 | 28.1 | |
| | 5 – 9 million | 488 | 13.0 | 269 | 6.5 | 757 | 9.6 | |
| | >9 million | 158 | 4.2 | 101 | 2.4 | 259 | 3.3 | |
| | Missing | 268 | 7.1 | 537 | 12.9 | 805 | 10.2 | |

**Table 3- 3. Characteristics of social interaction by gender**

| Variables | | Men (N= 3,754) | | Women (N= 4,150) | | Total (N= 7,904) | | p-value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| Frequency of contact with neighbors and friends | No contact at all | 1,168 | 31.1 | 863 | 20.8 | 2,031 | 25.7 | p<0.001 |
| | Once a month | 898 | 23.9 | 790 | 19.0 | 1,688 | 21.4 | |
| | 3 – 4 times a week | 1,069 | 28.5 | 1,625 | 39.2 | 2,694 | 34.1 | |
| | Every day | 469 | 12.5 | 592 | 14.3 | 1,061 | 13.4 | |
| | Missing | 150 | 4.0 | 280 | 6.7 | 430 | 5.4 | |
| Leisure activity | No | 1,870 | 49.8 | 2,061 | 49.7 | 3,931 | 49.7 | p<0.001 |
| | Yes | 1,724 | 45.9 | 1,741 | 42.0 | 3,456 | 43.8 | |
| | Missing | 160 | 4.3 | 348 | 8.4 | 508 | 6.4 | |
| Volunteering | Not at all | 2,579 | 68.7 | 2,781 | 67.0 | 5,360 | 67.8 | p<0.001 |
| | Occasionally | 646 | 17.2 | 711 | 17.1 | 1,357 | 17.2 | |
| | Regularly | 449 | 12.0 | 468 | 11.3 | 917 | 11.6 | |
| | Missing | 80 | 2.1 | 190 | 4.6 | 270 | 3.4 | |

**Table 3- 4. Characteristics of health status by gender**

| Variables | | Men (N = 3,754) | | Women (N = 4,150) | | Total (N = 7,904) | | p-value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| BADL score | 0 | 15 | 0.4 | 18 | 0.4 | 33 | 0.4 | p<0.001 |
| | 1 | 10 | 0.3 | 14 | 0.3 | 24 | 0.3 | |
| | 2 | 258 | 6.9 | 415 | 10.0 | 673 | 8.5 | |
| | 3 | 3,380 | 90.0 | 3,611 | 87.0 | 6,991 | 88.4 | |
| | Missing | 91 | 2.4 | 92 | 2.2 | 183 | 2.3 | |
| IADL score | 0 | 40 | 1.1 | 45 | 1.1 | 85 | 1.1 | p<0.001 |
| | 1 | 36 | 1.0 | 57 | 1.4 | 93 | 1.2 | |
| | 2 | 54 | 1.4 | 56 | 1.3 | 110 | 1.4 | |
| | 3 | 72 | 1.9 | 83 | 2.0 | 155 | 2.0 | |
| | 4 | 390 | 10.4 | 222 | 5.3 | 612 | 7.7 | |
| | 5 | 3,071 | 81.8 | 3,564 | 85.9 | 6,635 | 83.9 | |
| | Missing | 91 | 2.4 | 123 | 3.0 | 214 | 2.7 | |
| SRH | Poor | 155 | 4.1 | 212 | 5.1 | 367 | 4.6 | p<0.001 |
| | Fair | 413 | 11.0 | 609 | 14.7 | 1,022 | 12.9 | |
| | Good | 2,496 | 66.5 | 2,729 | 65.8 | 5,225 | 66.1 | |
| | Excellent | 666 | 17.7 | 564 | 13.6 | 1,230 | 15.6 | |
| | Missing | 24 | 0.6 | 36 | 0.9 | 60 | 0.8 | |
| SRH compared to the previous year | Worse | 494 | 13.2 | 865 | 20.8 | 1,359 | 17.2 | p<0.001 |
| | Have no ideas | 895 | 23.8 | 1,155 | 27.8 | 2,050 | 25.9 | |
| | Same | 2,329 | 62.0 | 2,074 | 50.0 | 4,403 | 55.7 | |
| | Missing | 36 | 1.0 | 56 | 1.3 | 92 | 1.2 | |

### 3.3.2 Bivariate Analysis

Table 3-5 displays the bivariate correlation between all independent variables — education level, equivalent income, contact with neighbors and friends, leisure activity, volunteering — and health status among elderly men and women. All of the potential predictors were positively and significantly associated with IADL score, SRH, and SRH compared to the previous year, indicating that an increase in the value of independent variables could lead to a better health status. However, some exceptions of no statistical significance appeared between indicators of equivalent income, social interaction, and BADL score.

**Table 3- 5. Bivariate analysis between health status and independent variables by gender**

| Predictors | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | BADL score | IADL score | SRH | SRH compared to the previous year | BADL score | IADL score | SRH | SRH compared to the previous year |
| Education level | 0.075** | 0.072** | 0.073** | 0.057** | 0.037** | 0.131** | 0.088** | 0.077** |
| Equivalent income | 0.003 | 0.054** | 0.112** | 0.107** | 0.019 | 0.152** | 0.094** | 0.110** |
| Contact with neighbors and friends | 0.003 | 0.135** | 0.206** | 0.178** | 0.026 | 0.161** | 0.204** | 0.187** |
| Leisure activity | 0.032 | 0.160** | 0.256** | 0.233** | 0.010 | 0.224** | 0.289** | 0.255** |
| Volunteering | 0.006 | 0.108** | 0.132** | 0.100** | 0.031* | 0.149** | 0.176** | 0.137** |

Notes: *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). SHR: self-rated health.

### 3.3.3 Structural Analysis

As shown in Figures 3-2 and 3-3, four latent endogenous variables (social interaction, health status, subjective health and physical health) and one latent exogenous variable (SES) were included in structural analysis among elderly dwellers of Tama City in Japan. Of these variables, "SES", "social interaction" and "health status" were considered as primary latent variables, and "subjective health" and "physical health" were regarded as secondary latent variables of "health status". Single-headed arrows represent regression paths. Coefficient values indicate whether the relationship between two variables is positive or negative and how strong the relationship is. The model fit the data reasonably well. The Normalized Fit Index (NFI) and Incremental Fit Index (IFI) exceeded the recommended value of 0.9, and the Root Mean Square Error of Approximation (RMSEA) was 0.029 (<0.05). All loadings were statistically significant ($p < 0.001$). SES and social interaction accounted for a large portion of the variance in health status which was an endogenous latent variable ($R^2 = 0.32$ for elderly men, $R^2 = 0.46$ for elderly women). The model depicted how individuals transitioned from their SES to health status by means of social interaction. SES had a positive direct impact on social interaction (0.26 for men, 0.40 for women); and social interaction just exerted a direct impact on health status (0.51 for men, 0.57 for women); SES not only directly affected health status (0.14 for men, 0.21 for women), but also demonstrated an indirect effect via social interaction ($0.26 \times 0.51 = 0.13$ for men, $0.40 \times 0.57 = 0.23$ for women), manifesting the mediating role of social interaction between SES and health status. Compared to the standardized coefficient of education level (0.42 for elderly men, 0.37 for elderly women), equivalent income contributed larger effects to social interaction and health status (0.64 for elderly men, 0.49 for elderly women). This model indicated that individuals with an advantageous SES would tend to have higher levels of social interaction, and would subsequently have a higher chance of achieving a better health status, particularly subjective health (0.82 for elderly men, 0.74 for elderly women). Among these findings, it was noteworthy that social interaction appeared to substantially explain differences in the associations between SES and health status. Therefore, all four hypotheses were confirmed.

Table 3-6 presents the standardized direct, indirect, and total effects of SES and

social interaction on health status by gender using multiple-group analysis that was conducted to determine whether the coefficients between main variables are significantly different between elderly men and women. According to the standardized direct effects, social interaction had a large effect on health status (0.51 for men, 0.57 for women). The direct impact of SES was a slightly greater on social interaction (0.26 for men, 0.40 for women) than on health status (0.14 for men, 0.21 for women). Therefore, SES may be more likely to indirectly affect health status by means of social interaction rather than directly. Moreover, all of the associations were more pronounced among elderly women, no matter whether due to standardized direct, indirect, or total effects.

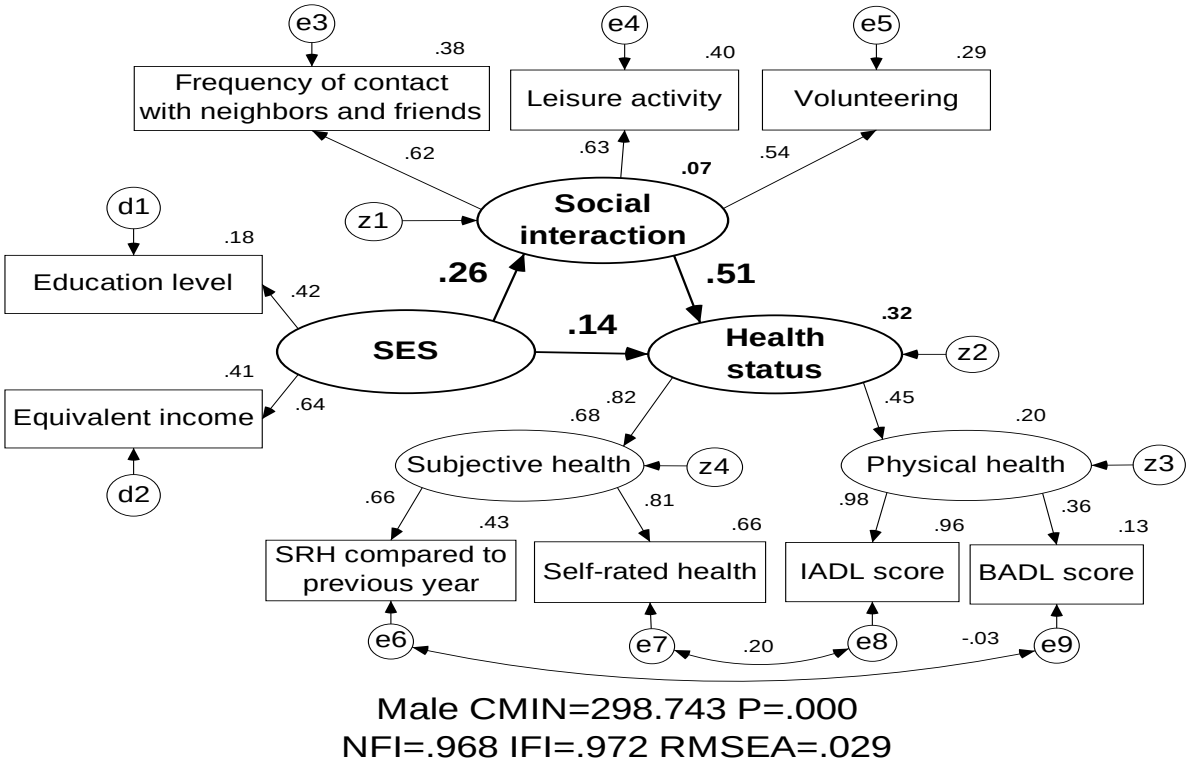


**Figure 3- 2: Structural analysis of SES, social interaction, and health status among Japanese suburban elderly men.**

(d1 – d2 and e3 – e9 are measurement errors; z1 – z4 are unexplained errors in model. SES: socioeconomic status. SRH: self-rated health. BADL: basic activities of daily living. IADL: instrumental activities of daily living. NFI: Normalized Fit Index. IFI: the Incremental Fit Index. RMSEA: the Root Mean Square Error of Approximation.)

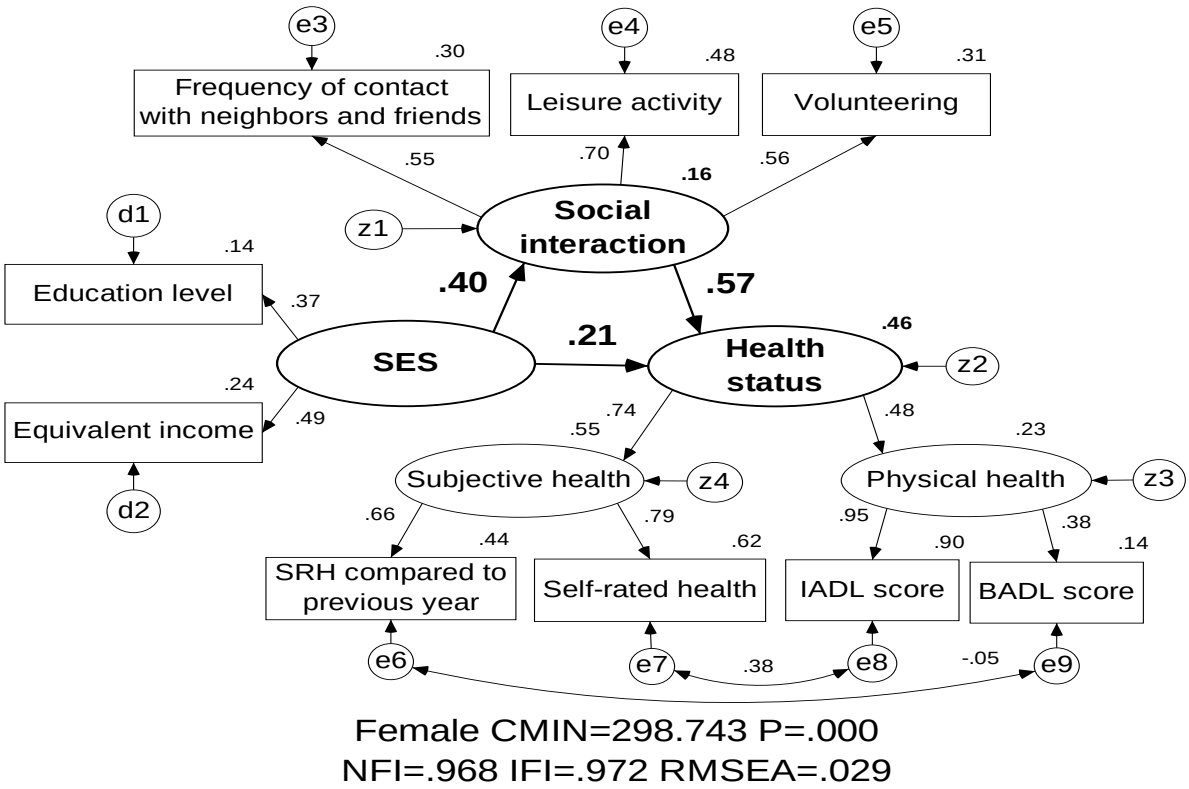


**Figure 3- 3: Structural analysis of SES, social interaction, and health status among Japanese suburban elderly women.**

(d1 – d2 and e3 – e9 are measurement errors; z1 – z4 are unexplained errors in model. SES: socioeconomic status. SRH: self-rated health. BADL: basic activities of daily living. IADL: instrumental activities of daily living. NFI: Normalized Fit Index. IFI: the Incremental Fit Index. RMSEA: the Root Mean Square Error of Approximation.)

**Table 3- 6. Standardized direct, indirect, and total effects by gender**

| Standardized effects | | Male | Female |
|---|---|---|---|
| Direct | SES → Social interactions | 0.26 | 0.40 |
| | Social interactions → Health status | 0.51 | 0.57 |
| | SES → Health status | 0.14 | 0.21 |
| Indirect | SES → Social interaction → Health status | 0.13 | 0.23 |
| Total | SES → Health status | 0.28 | 0.44 |
| Coefficient of determination ($R^2$) | | 0.32 | 0.46 |

### 3.4 Discussion

This population-based study examined the mediating effect of social interaction on socioeconomic inequalities in health status by SEM among Japanese suburban elderly men and women. Generally speaking, high levels of education and income lead to frequent contact with neighbors and friends, active participation in volunteering and leisure activities; all of these may therefore contribute to better health status (especially subjective health) of Japanese community-dwelling elderly aged 65 to 84 years. Regarding gender differences, the mediating impact of social interaction was more pronounced among elderly women than men. The results of this study may have important implications for policy as well as future research.

Previous studies have not found a consistent mediating effect of social interaction on the association between SES and health status. The results of the present study support those of two German studies that demonstrated that social interaction is an important explanatory factor for health inequalities [15,16]. However, Klein et al. did not focus on elderly individuals who account for the majority of people with health problems. Furthermore, the indicator of health status in the two German studies was confined to SRH, and did not include objectively measured health indicators. As these authors noted, SRH may generate bias; thus, both subjective health and physical health indicators were integrated into the present analysis.

Our findings differ from those of another German survey of 682 older individuals [17]. However, the small sample size of their study was a limitation. A Danish study also failed to demonstrate an explanatory role of social interaction [19]. In previous studies, logistic regression has been frequently used to assess the association between SES and health. However, this method is not suitable for conducting a mechanism study, because it can reflect neither covariant relationships nor indirect impacts between variables, both of which are crucial to mechanism studies. In addition, respective analyses would yield inconsistent results, as suggested by Klein et al. [15].

The results of the present study suggest that SES significantly affects social interaction. In other words, people with an advantageous SES are more inclined to interact with others, for several reasons. First, contact with friends, participation in volunteering and leisure activities require adequate financial support. The common way

for Japanese people to meet their friends is by drinking coffee in a cafe or eating dinner in a restaurant. Furthermore, volunteering and leisure activities, to some extent, rely on having sufficient capital. Second, people with a high SES have a strong motivation to maintain a healthy lifestyle [31], understand the meaning of life [32], and achieve self-actualization [15]. “Ikigai” is a popular Japanese word that is generally used to indicate the source of value in life or things that make one life worthwhile. Sufficient evidence suggests that elderly Japanese people with ikigai have a decreased risk of all-cause mortality [33]. Rapid advances in knowledge and technology have enabled young people to dominate modern society, while the elderly have gradually lost their leading position [34]. In addition, decreased physical function, discomforting psychology and increased leisure time can lead older individuals to feel lonely and useless. Social contact and participation may enable elderly people to achieve a state of increased self-efficacy and a sense of belonging and coherence, which constructs the concept of ikigai [35].

Rich social connections and frequent participation in social activities appear to be protective against physical function decline [36], cognitive decline [37], and to allow achievement of better SRH by providing more opportunity to go out for exercise, promoting access to information about health and health-related behaviors, providing emotional support to better cope with stress, and offering tangible help [38-42]. In the present study, social interaction had a great effect on health status, suggesting that people with better social interaction have better SRH and high-level performance ability.

The neo-materialism regarding the issue of socioeconomic differences in health inequalities states that income level reflects an individual’s power of consumption, housing conditions, nutritional status, and access to health-care resources. Additionally, education level is a measure of individual access to social, psychological, and economic resources. Thus, people with a high SES have more access to medical and other social resources, and are characterized by greater consumption of high-quality and low-fat diets compared to people of low SES [43]. Furthermore, high SES individuals have a strong awareness of health, and have a greater ability to manage their own health risks. This represents the direct pathway through which SES influences health status.

People with a disadvantage SES usually suffer enormous pressure due to the reduced control over their lives and work [44]. High-quality social interactions and relationships can partly relieve this stress. The present findings also indicate that social interaction is more beneficial to subjective health than physical health. It follows that the mediating role of social interaction on health status is reflected more in subjective health via psychological pathways. Therefore, compared with high social class, the low social class urgently requires more social interaction in order to resolve health inequalities.

The unique strengths of the present study are: (1) its large-scale design allowed analysis of the structural relationships between SES, social interaction, and health status among Japanese senior citizens; (2) by focusing on the elderly, who account for majority of vulnerable individuals, the mediating impacts of social interaction were verified by SEM; and (3) multidimensional measures of health status were applied in the analyses. However, one of the limitations is that only elderly individuals age 65 – 84 years were analyzed. Further research is required to examine the structural relationships of these associations among the oldest old (≥85 years). Another limitation of this study is the cross-sectional design, which only allowed the results to show associations between variables and not causal relationships.

### 3.5 Conclusion

In summary, social interaction may partly explain SES differences in health status among elderly people, especially women. The promotion of both social contact and social participation, as an economical and effective prevention, can help encourage self-actualization and adaptive coping strategies that can lead to better health of individuals with low social classes, and as a result, can reduce health disparities between the classes. Improving social interaction could be a measure for reducing the inequalities in health status by SES among the Japanese suburban community-dwelling elderly.

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# Chapter 4 The Effects of Socioeconomic Status and Personal Behaviors on Health among Suburban Japanese Community-dwelling Elderly over Six-year Follow-up

## 4.1 Introduction

Given the rapid growth of the elderly population, determinants of health in later life have garnered much attention. A substantial body of evidence indicates that health differences related to SES, such as SRH [1-3], functional status [4,5], and mortality [6-9], persist into old age, regardless of whether SES is measured by levels of income, years of education, or occupational class. Individuals living under less-advantaged socioeconomic conditions are more likely to have worse health and a higher risk of mortality than socioeconomically advantaged individuals.

Considering multiple etiologic factors, in addition to genetic and physical factors, health problems and diseases are also caused by a wide variety of social determinants which serve as the basis for inequalities in health [10]. On the basis of causal distance to health, all social determinants can be divided into three levels: 1) proximal factors, 2) mid-range factors, and 3) distal factors. Proximal factors, which can be easily changed by individuals, are closest to health and include health-related lifestyles and behaviors. Social relationships and social support are regarded as mid-range factors. Distal factors cover social structure and stratification, over which people have the least control. Given that recognizing the relationship between SES and health may shed less light upon policy due to limited resources, are there any effective, more economical methods to reduce health disparity by SES?

In this study, social interaction has been taken into consideration as an explanation for health disparities for several reasons. First, social interaction is related to SES [11-13]. Second, social interactions with other people are a crucial part of daily life for elderly people, and the linkages between social interaction and health are well-documented [14-22]. Social interaction may be beneficial for promoting access to health-related behaviors and information concerning health [23,24] and may provide greater opportunities to participate in physical activity [25], render emotional support for coping with stress [26], and offer tangible help [27].

Sufficient evidence has shown that health-related lifestyles may partially explain health differences associated with SES [28-34]. However, whether social interaction can also explain health disparity by SES remains largely unexplored [12,35]. Few studies have examined the underlying mechanisms by which SES is linked to health through

personal behaviors. Furthermore, gender differences should be addressed in separate models since controlling for these differences might hinder a comprehensive understanding of the essence of gender differences [33], while most previous studies have treated gender as a control variable.

Accordingly, the present study aimed to: 1) investigate the mechanism by which SES affected health by means of individual efforts among Japanese elderly suburban community-dwellers over a 6-year period; and 2) examine the extent to which these associations varied by age and gender separately in order to detect potential patterns of associations.

## 4.2 Material and Methods

### 4.2.1 Data

In September 2001, a baseline survey was conducted in Tama City, Japan, where people have a higher life expectancy at birth and the lowest long-term care needs in Tokyo [36]. A follow up survey was carried out in September 2004. First, a self-administered questionnaire on health and other factors relating to the elderly was distributed to all 16,462 residents age ≥65 years. In total, 13,195 elderly individuals responded. Three years later, an identical questionnaire was sent to the surviving participants, of whom 8,558 responded. In Japan, a death must be reported to the Resident Registration Bureau with a death certificate within seven days by law. The survival status of each participants as of 31th August 2007 was checked using the resident registry data maintained at the municipal hall. Among those who did not participate in the follow-up survey, 914 had died, 505 had moved to other areas, and 3,218 did not respond. In order to gain an accurate understanding of the explanatory effects of personal behaviors, the study was restricted to the younger elderly (65 – 74) and older elderly (75 – 84). Of the 8,162 original eligible respondents, 258 observations were excluded owing to missing data on the primary variables. This resulted in an analysis sample of 7,904 comprised of 2,888 younger elderly men, 866 older elderly men, 2,916 younger elderly women, and 1,234 older elderly women.

Confidentiality of the data was maintained, and the study abided by the ethical standards of the Tokyo Municipal Administration Bureau. All participants were fully informed of the purpose and nature of the investigation, and provided their written consent.

### 4.2.2 Variables

This study analyzed SES and social interaction in 2001, healthy lifestyle in 2004, health status 2004, and the number of survival days from 2004 to 2007.

***SES***

Income, education, and occupation are considered to be three conventional indicators of SES. However, occupational status is less relevant in the elderly because the majority have left the working population some time ago [37,38]. Therefore, only data on education and equivalent income from the baseline survey were examined.

Education, defined as the highest level completed, was categorized as 1 = Junior high school or below; 2 = Senior high school; or 3 = University or higher. Total annual household income was adjusted for family size by dividing the income by the square root of the number of persons in the household. Income was expressed in Japanese yen(¥) with one US dollar being equivalent to approximately ¥ 100. Participants indicated their income level by selecting from one of five categories on a five-point Likert scale defined as follows: 1 = <1 million; 2 = 1 – 3 million; 3 = 3 – 5 million; 4 = 5 – 9 million; 5 = ≥9 million.

***Social interaction***

Social interaction was operationalized as social contact and social participation in 2001. Social contact was measured by a single question: “How often do you connect with your neighbors and friends? ” Response options included: 1 = No contact at all, 2 = Once a month, 3 = Three to four times a week, and 4= Every day. Social participation was assessed by two questions: 1) “Did you attend volunteering in your community? ” and 2) “Did you take part in leisure activities in your community? ” Possible responses for the first question included: 1 = Not at all, 2 = Occasionally, and 3 = Regularly. Respondents selected 1 = No or 2 = Yes for the second question.

***Healthy lifestyle***

Two measures of lifestyle were considered: 1) healthy dietary score in 2004 and 2) healthy practice score in 2004.

Analyzing large-scale questionnaire data, empirical studies of Tama City on dietary and lifestyle habits have examined the associations between survival days, Japanese traditional dietary patterns, and lifestyle [39-41]. Based on these prior findings, eight healthy dietary habits were selected as following: 1) consuming meat one to four days a week, 2) consuming fish one to four days a week, 3) consuming bean products more than five days a week, 4) consuming salt-cured food more than five days a week, 5) consuming milk and milk products every day, 6) consuming fruits every day, 7) consuming vegetables every day, and 8) consuming fried food three to six days a week. One point was assigned to each item. Total number of points was then summed to calculate the healthy dietary score, which ranged from 0 to 8 points, with a higher score representing a more favorable dietary pattern.

The healthy practice score was derived in the same manner as the healthy dietary score, combining the points for six factors, which resulted in a possible range of 0 to 6 points. The six factors included in the healthy practice score were: 1) having breakfast every day, 2) moderate alcohol consumption everyday (with a different pattern of binge drinking), 3) never smoking during the lifetime, 4) six to nine hours of sleep every night, 5) participating in physical activity no less than once a week, and 6) having a body mass index (BMI) of 21 – 25 kg/m2. Higher scores reflected better practice habits.

***Health***

Health outcome measures included health status from a qualitative perspective of life and survival days as a quantitative measure of life.

SRH and activity of daily living have been routinely used to interpret the comprehensive health status of older adults [4,8,23]. Each respondent was required to assess their health at the time of the survey on a four-point Likert scale ranging from poor to excellent, providing a subjective evaluation of their health status. Derived from Barthel Index of Activities of Daily Living [42], the basic activity of daily living (BADL) score was calculated by allocating one point each for toileting, bathing, and going outside independently, if the respondent could conduct themselves without assistance. A score of 0 was assigned to those who reported difficulties or inability to perform these activities. The BADL score varied between 0 and 5 points. A higher score

indicated better competency in basic living. The instrumental activity of daily living (IADL) score was generated by summing the points assigned to five items: 1) purchasing daily goods, 2) preparing daily meals, 3) making transactions at the bank, 4) managing one' s pension and insurance, and 5) reading newspapers and books [43]. The IADL score was coded "1" if the participant could perform these activities without help, and "0" if otherwise. The IADL scores ranged from 0 to 5, with higher scores indicating better instrumental health.

"Survival days" were measured from 1 September 2004, the date of the first follow-up study, to the earlier of either the date of death or 31th August 2007, which signified the end of the study.

### 4.2.3 Research Hypothesis

It was hypothesized that (Figure 4-1): 1) SES, social interaction, and healthy lifestyle were positively and significantly associated with health status and survival days; 2) personal behaviors, such as social interaction and lifestyle, may have explanatory effects on health inequalities by SES; and 3) all associations varied by age and gender, and exhibited unique patterns among the age and gender subgroups.

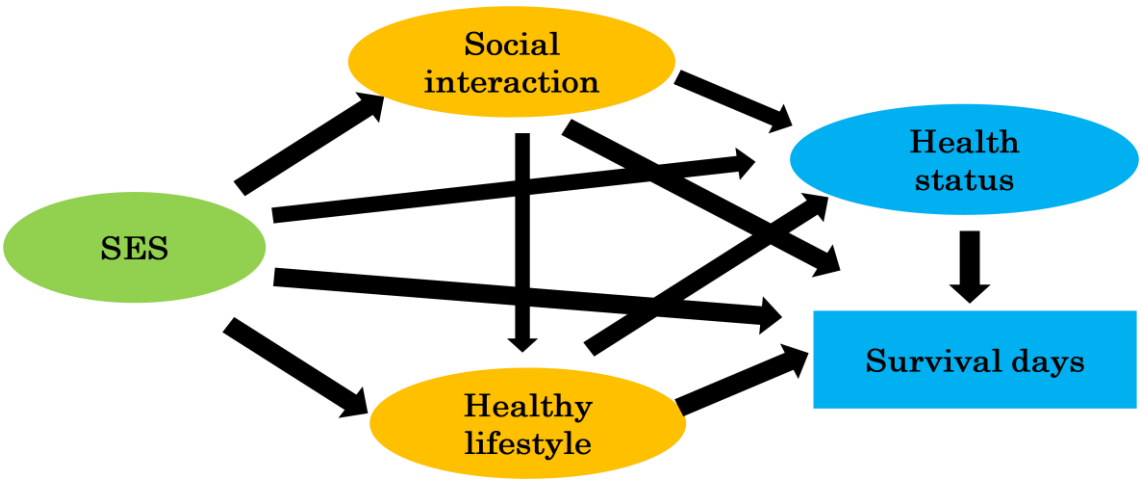



**Figure 4- 1: Conceptual model between SES, social interaction, healthy lifestyle health status, and survival days**

### 4.2.4 Statistical Analyses

The analyses were performed in four steps. First, BADL score, IADL score, healthy dietary score, and practice score were calculated; bivariate correlation were applied to determine the relationship between two variables by using SPSS 19.0 software package for windows. Second, 3-year cumulative survival rates were calculated by Kaplan-Meier Method; Log-rank tests were used to compare the survival curves by SES, social interaction, healthy lifestyle and health status. Third, factor analysis was conducted to identify several underlying factors from an initial set of observed variables. At last, structural equation modeling (SEM), estimated using maximum likelihood techniques with Amos 17.0 software package, was performed to demonstrate the relationships between SES and health outcomes through social interaction and lifestyles. SEM is a multivariate analysis technique that permits measurement errors and latent variables in the model. In measurement model, Hair and colleagues pointed out that a sufficiently large factor loading indicates a model with good convergent validity [44]. Tabachnick and Fidell [45] suggested that a model exhibits good convergent validity when factor loading values are $\geq$0.55, and acceptable convergent validity when the values of factor loading are $\geq$0.40. Multiple-group analysis was performed to compare the differences between age and gender subgroups under the same conditions. In structural model, the fit indices of the models were evaluated with chi-square (CMIN), the Normalized Fit Index (NFI), the Incremental Fit Index (IFI), and the Root Mean Square Error of Approximation (RMSEA). Generally speaking, a model with NFI and IFI values of $\geq$0.90, and a RMSEA $\leq$0.05 is considered to demonstrate adequate fit to the data. Statistical significance was defined as a two-tail p-value $\leq$0.05.

## 4.3 Results

### 4.3.1 Bivariate Correlation Analysis Results

The bivariate relationships between variables by age and gender are listed in Tables 4-1, 4-2, 4-3 and 4-4. The majority of the variables were significantly associated among Japanese elderly with some exceptions. For younger elderly men, volunteering did not show a significant relationship with education level and equivalent income; BADL score was not associated with equivalent income; and there was no association between survival and education level, leisure activity and volunteering. Among older elderly men, education level and equivalent income had no significant relationships with volunteering, BADL score, IADL score, SRH and survival days. Except for correlations between volunteering and equivalent income, and survival days, as well the correlation between survival days and contact with neighbors and friends, all associations were significant among younger elderly women. For older elderly women, no significant associations were found between education level and contact with neighbors and friends, healthy dietary score, healthy practice score, BADL score, IADL score, SRH and survival days; while equivalent income had no significant associations with SRH and survival days.

**Table 4- 1. Bivariate relationship between variables among younger elderly men**

| | Education level 01 | Equivalent income 01 | Leisure activity 01 | Contact with neighbors and friends 01 | Volunteering 01 | Healthy dietary score 04 | Healthy practice score 04 | BADL score 04 | IADL score 04 | SRH 04 | Survival days 04-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Education level 01 | 1.000 | | | | | | | | | | |
| Equivalent income 01 | .291*** | 1.000 | | | | | | | | | |
| Leisure activity 01 | .164*** | .139*** | 1.000 | | | | | | | | |
| Contact with neighbors and friends 01 | .042* | .122*** | .395*** | 1.000 | | | | | | | |
| Volunteering 01 | .020 | .031 | .324*** | .392*** | 1.000 | | | | | | |
| Healthy dietary score 04 | .089*** | .114*** | .115*** | .059** | .050* | 1.000 | | | | | |
| Healthy practice score 04 | .113*** | .146*** | .222*** | .145*** | .099*** | .251*** | 1.000 | | | | |
| BADL score 04 | .045* | .018 | .140*** | .111*** | .077*** | .125*** | .257*** | 1.000 | | | |
| IADL score 04 | .059* | .044* | .167*** | .128*** | .082*** | .100*** | .230*** | .625*** | 1.000 | | |
| SRH 04 | .084*** | .079*** | .194*** | .174*** | .112*** | .131*** | .270*** | .359*** | .339*** | 1.000 | |
| Survival days 04 to 07 | .031 | .047* | .024 | .048* | .016 | .074*** | .145*** | .167*** | .167*** | .223*** | 1.000 |

Notes: *** p <0.001; ** p <0.01; * p <0.05.

01, 04,07 indicate the year of 2001, 2004, and 2007, respectively.

SRH: self-rated health; BADL: basic activity of daily living; IADL: instrumental activity of daily living

**Table 4- 2. Bivariate relationship between variables among older elderly men**

| | Education level 01 | Equivalent income 01 | Leisure activity 01 | Contact with neighbors and friends 01 | Volunteering 01 | Healthy dietary score 04 | Healthy practice score 04 | BADL score 04 | IADL score 04 | SRH 04 | Survival days 04-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Education level 01 | 1.000 | | | | | | | | | | |
| Equivalent income 01 | .222*** | 1.000 | | | | | | | | | |
| Leisure activity 01 | .074* | .098** | 1.000 | | | | | | | | |
| Contact with neighbors and friends 01 | -.091* | .066 | .423*** | 1.000 | | | | | | | |
| Volunteering 01 | -.039 | .034 | .358*** | .439*** | 1.000 | | | | | | |
| Healthy dietary score 04 | .083* | .104** | .130*** | .054 | .040 | 1.000 | | | | | |
| Healthy practice score 04 | .073* | .131*** | .236*** | .237*** | .154*** | .325*** | 1.000 | | | | |
| BADL score 04 | -.040 | .055 | .229*** | .212*** | .117** | .209*** | .358*** | 1.000 | | | |
| IADL score 04 | -.020 | .050 | .268*** | .227*** | .179*** | .126*** | .318*** | .672*** | 1.000 | | |
| SRH 04 | .000 | .088* | .249*** | .241*** | .132*** | .115** | .360*** | .466*** | .394*** | 1.000 | |
| Survival days 04-07 | .026 | -.005 | .159*** | .152*** | .070* | .207*** | .252*** | .357*** | .276*** | .290*** | 1.000 |

Notes: *** p <0.001; ** p <0.01; * p <0.05.

01, 04,07 indicate the year of 2001, 2004, and 2007, respectively.

SRH: self-rated health; BADL: basic activity of daily living; IADL: instrumental activity of daily living

**Table 4- 3. Bivariate relationship between variables among younger elderly women**

| | Education level 01 | Equivalent income 01 | Leisure activity 01 | Contact with neighbors and friends 01 | Volunteering 01 | Healthy dietary score 04 | Healthy practice score 04 | BADL score 04 | IADL score 04 | SRH 04 | Survival days 04-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Education level 01 | 1.000 | | | | | | | | | | |
| Equivalent income 01 | .160*** | 1.000 | | | | | | | | | |
| Leisure activity 01 | .106*** | .127*** | 1.000 | | | | | | | | |
| Contact with neighbors and friends 01 | .039* | .088*** | .414*** | 1.000 | | | | | | | |
| Volunteering 01 | .080*** | .031 | .371*** | .353*** | 1.000 | | | | | | |
| Healthy dietary score 04 | .077*** | .152*** | .155*** | .109*** | .092*** | 1.000 | | | | | |
| Healthy practice score 04 | .081*** | .150*** | .240*** | .159*** | .136*** | .226*** | 1.000 | | | | |
| BADL score 04 | .068*** | .091*** | .185*** | .131*** | .112*** | .159*** | .163*** | 1.000 | | | |
| IADL score 04 | .109*** | .093*** | .174*** | .136*** | .115*** | .149*** | .156*** | .567*** | 1.000 | | |
| SRH 04 | .051*** | .056** | .216*** | .178*** | .165*** | .110*** | .209*** | .382*** | .370*** | 1.000 | |
| Survival days 04-07 | .063** | .042* | .047* | .025 | .014 | .080*** | .074*** | .137*** | .169*** | .175*** | 1.000 |

Notes: *** p <0.001; ** p <0.01; * p <0.05.

01, 04,07 indicate the year of 2001, 2004, and 2007, respectively.

SRH: self-rated health; BADL: basic activity of daily living; IADL: instrumental activity of daily living

**Table 4- 4. Bivariate relationship between variables among older elderly women**

| | Education level 01 | Equivalent income 01 | Leisure activity 01 | Contact with neighbors and friends 01 | Volunteering 01 | Healthy dietary score 04 | Healthy practice score 04 | BADL score 04 | IADL score 04 | SRH 04 | Survival days 04-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Education level 01 | 1.000 | | | | | | | | | | |
| Equivalent income 01 | .114** | 1.000 | | | | | | | | | |
| Leisure activity 01 | .114** | .149*** | 1.000 | | | | | | | | |
| Contact with neighbors and friends 01 | .038 | .074* | .471*** | 1.000 | | | | | | | |
| Volunteering 01 | .137*** | .088* | .431*** | .423*** | 1.000 | | | | | | |
| Healthy dietary score 04 | -.019 | .137*** | .131*** | .070* | .078* | 1.000 | | | | | |
| Healthy practice score 04 | .033 | .112** | .247*** | .217*** | .173*** | .225*** | 1.000 | | | | |
| BADL score 04 | -.037 | .112** | .249*** | .222*** | .162*** | .232*** | .259*** | 1.000 | | | |
| IADL score 04 | .045 | .152*** | .283*** | .248*** | .172*** | .224*** | .286*** | .684*** | 1.000 | | |
| SRH 04 | .005 | .038 | .265*** | .209*** | .206*** | .139*** | .244*** | .496*** | .476*** | 1.000 | |
| Survival days 04-07 | -.021 | .028 | .070* | .087* | .072* | .143*** | .146*** | .289*** | .204*** | .173*** | 1.000 |

Notes: *** p <0.001; ** p <0.01; * p <0.05.

01, 04,07 indicate the year of 2001, 2004, and 2007, respectively.

SRH: self-rated health; BADL: basic activity of daily living; IADL: instrumental activity of daily living

### 4.3.2 Survival Analysis Results

The estimated survival rates of all participants during 2004 to 2007 were calculated by the Kaplan-Meier method. Among the participants, 438 had died during follow-up and 7,466 were alive on 31th August 2007. Overall the median survival time was 1037.44 days (younger elderly women 1051.43 days, older elderly women 1025.45 days, younger elderly men 1040.64 days and older elderly men 996.79 days). That is, elderly women lived longer than elderly men (96.1% versus 92.6%), and survival rates were bigger for younger elderly than older elderly (96.4% verse 91.4%).

Figure 4-2 to Figure 4-11 illustrate the survival time for SES, social interaction, healthy lifestyle and health status by Kaplan-Meier survival curves among Japanese participants, respectively. Long-rank tests suggested that there were significant differences between education level, equivalent income, leisure activity, frequency of contact with neighbors and friends, volunteering, healthy dietary score, healthy practice score, BADL score, IADL score, and SRH ($p < 0.05$). Survival rates decreased with the increased levels of the main variables. Elderly people with a low SES (education up to junior school and annual household income under one million Japanese yen) had a higher risk of mortality than those with a high SES (Figures 4-2 & 4-3). The elderly who had leisure activity, frequent contacts with others, as well as regular and occasional volunteering, were more likely to live longer than those with less social contact and social participation (Figures 4-4, 4-5 & 4-6). Survival rates also decreased among older adults with low scores in healthy dietary score, healthy practice score, BADL score, IADL score and SRH. The survival rate was 98.3% among participants with 8 points of healthy dietary score, and only 85.1% among participants with 0 points during three years (Figure 4-7). A large gap in terms of survival rates existed between the elderly scored 6 points and 0 points on the healthy practice score (survival rates 97.7% verse 64.5%) (Figure 4-8). In addition, a good performance in basic activity of daily living and instrumental activity of daily living, as well self-reported health, increased the likelihood of longevity among older adults (Figures 4-9, 4-10 & 4-11). The differences between highest score and lowest score were most pronounced on BADL score (60.9% verse 96.4%), followed by IADL score (71.6% verse 96.4%) and SRH (75.8% verse 97.5%).

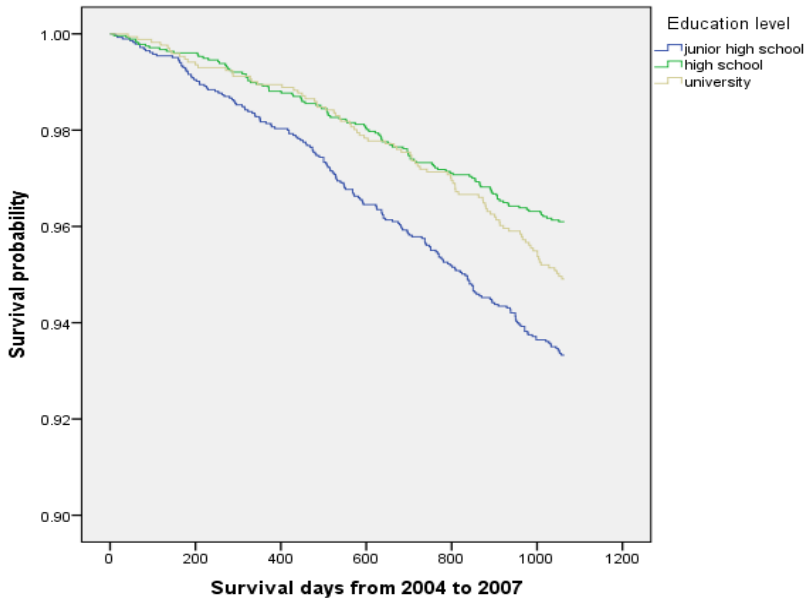



**Figure 4- 2: Kaplan-Meier survival curves by education level 2001 (log-rank p<0.001)**

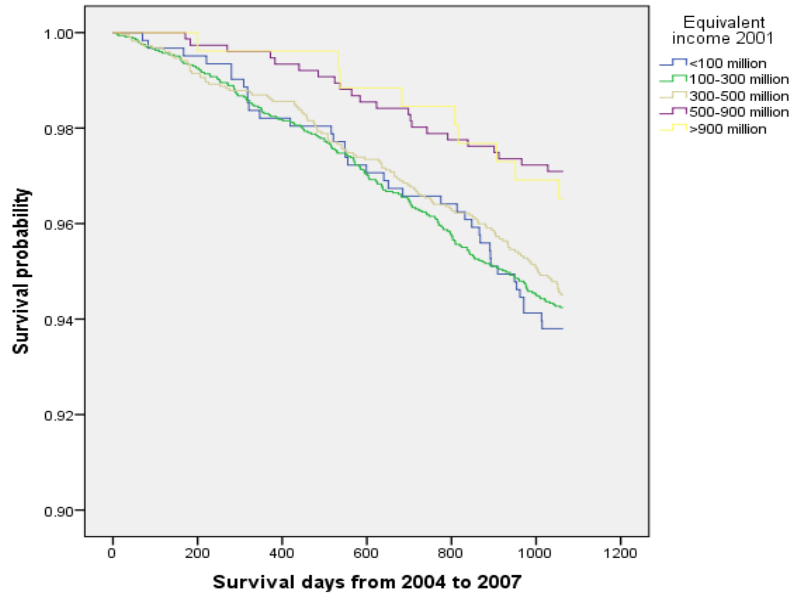



**Figure 4- 3: Kaplan-Meier survival curves by equivalent income 2001 (log-rank p=0.013)**

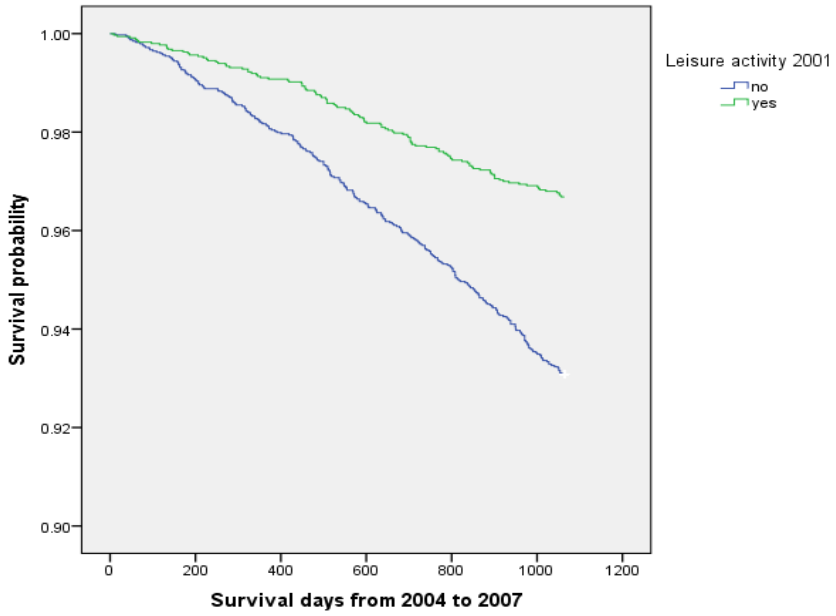



**Figure 4- 4: Kaplan-Meier survival curves by leisure activity 2001 (log-rank p<0.001)**

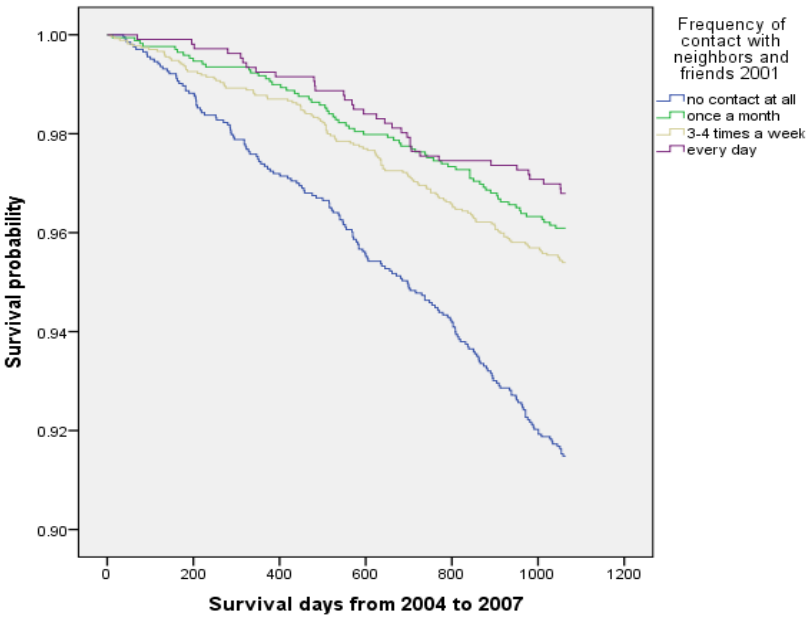



**Figure 4- 5: Kaplan-Meier survival curves by frequency of contact with neighbors and friends 2001 (log-rank p<0.001)**

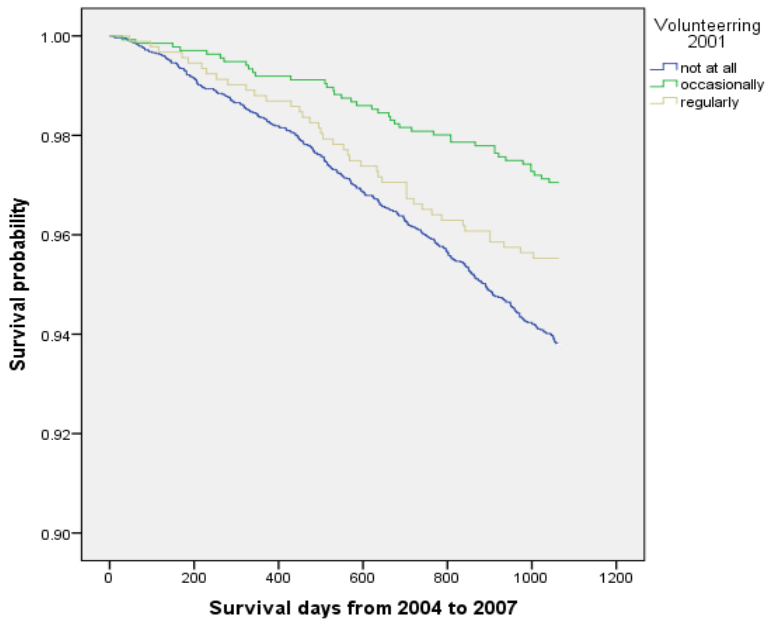



**Figure 4- 6: Kaplan-Meier survival curves by volunteering 2001 (log-rank p<0.001)**

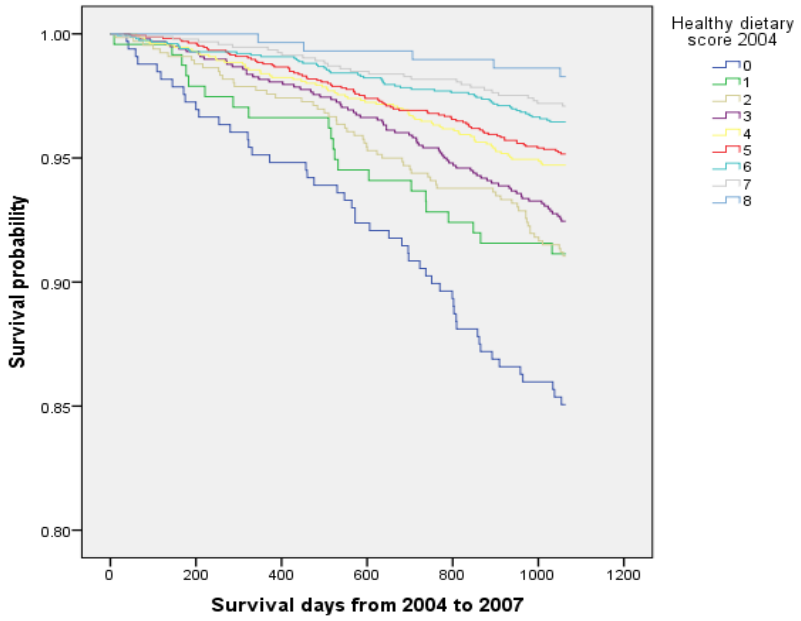



**Figure 4- 7: Kaplan-Meier survival curves by healthy dietary score 2004 (log-rank p<0.001)**

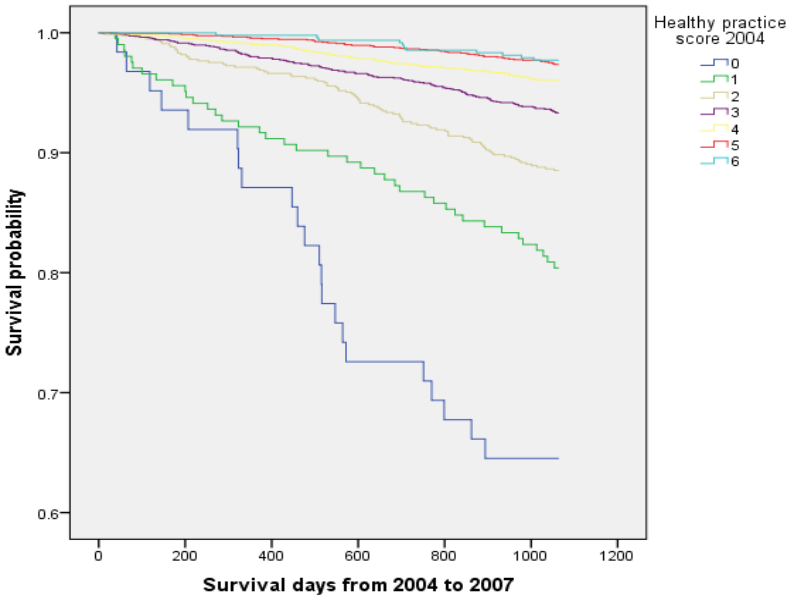



**Figure 4- 8: Kaplan-Meier survival curves by healthy practice score 2004 (log-rank p<0.001)**

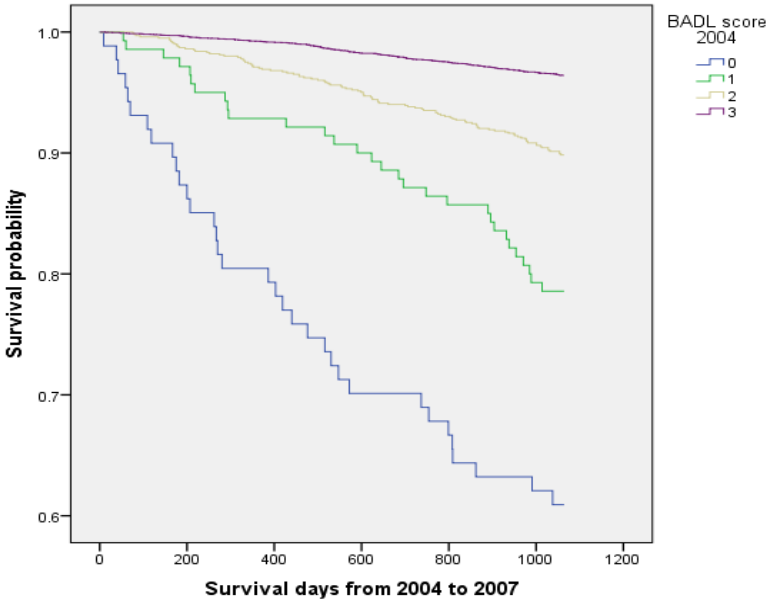



**Figure 4- 9: Kaplan-Meier survival curves by BADL score 2004 (log-rank p<0.001)**

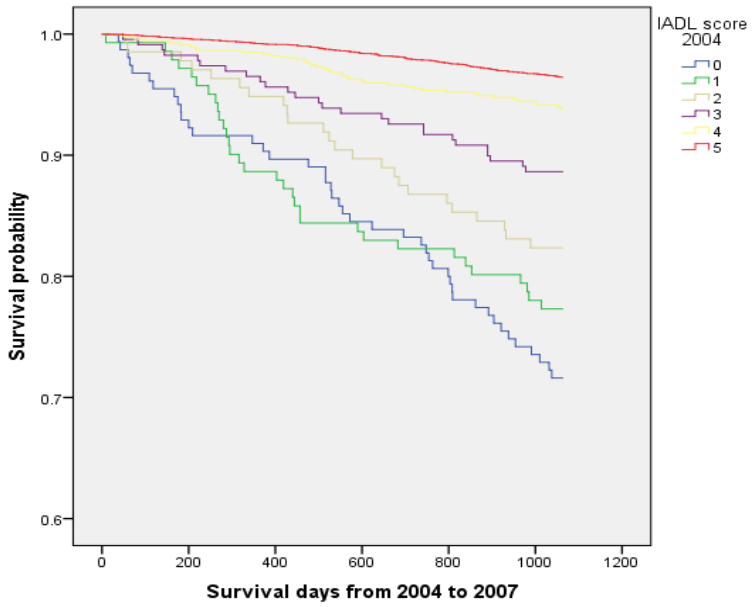



**Figure 4- 10: Kaplan-Meier survival curves by IADL score 2004 (log-rank p<0.001)**

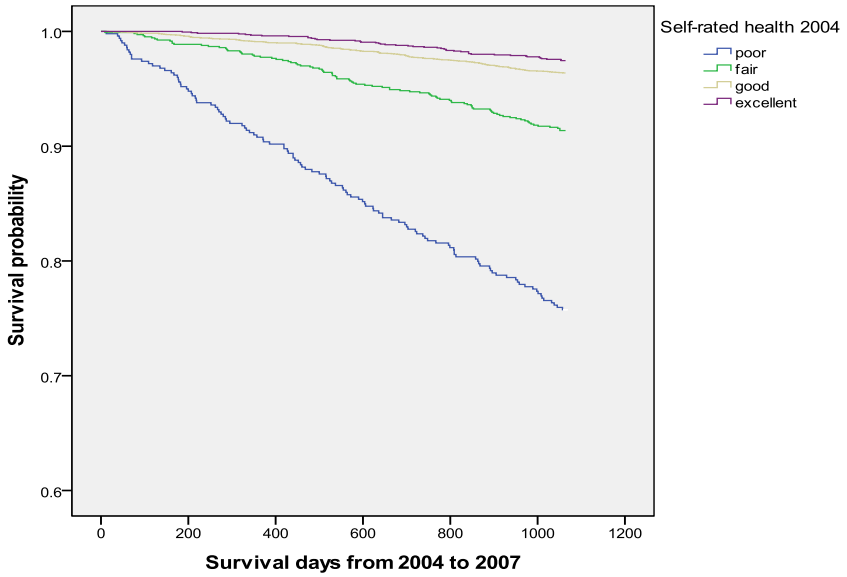



**Figure 4- 11: Kaplan-Meier survival curves by SRH 2004 (log-rank p<0.001)**

### 4.3.3 Factor Analysis Results

Factor analysis was performed on a data set of 11 observed variables using SPSS 19.0. Measure of sampling adequacy by Kaiser-Meyer-Olkin (KMO) and measure of adequacy of correlation matrices by Bartlett's test of sphericity were tested in the analysis. As shown in Table 4-5, a KMO of 0.742 with significance indicated suitability of this factor analysis.

**Table 4- 5. KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | .742 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 9510.837 |
| | df | 55 |
| | Sig. | .000 |

**Table 4- 6. The results of factor analysis**

| | Component | | | |
|---|---|---|---|---|
| | **Factor 1** | **Factor 2** | **Factor 3** | **Factor 4** |
| BADL score 04 | .847 | .182 | .156 | .202 |
| IADL score 04 | .832 | .214 | .143 | .182 |
| SRH 04 | .684 | .276 | .126 | .216 |
| Survival days from 2004 to 2007 | .438 | .005 | .049 | .369 |
| Contact with neighbors and friends 01 | .203 | .781 | .014 | .177 |
| Volunteering 01 | .142 | .761 | .051 | .068 |
| Leisure activity 01 | .260 | .749 | .253 | .227 |
| Education level 01 | .136 | .061 | .813 | -.006 |
| Equivalent income 01 | .099 | .123 | .775 | .221 |
| Healthy dietary score 04 | .132 | .114 | .057 | .852 |
| Healthy practice score 04 | .375 | .279 | .251 | .645 |
| Cumulative contribution % | 25.6 | 38.5 | 50.0 | 59.2 |

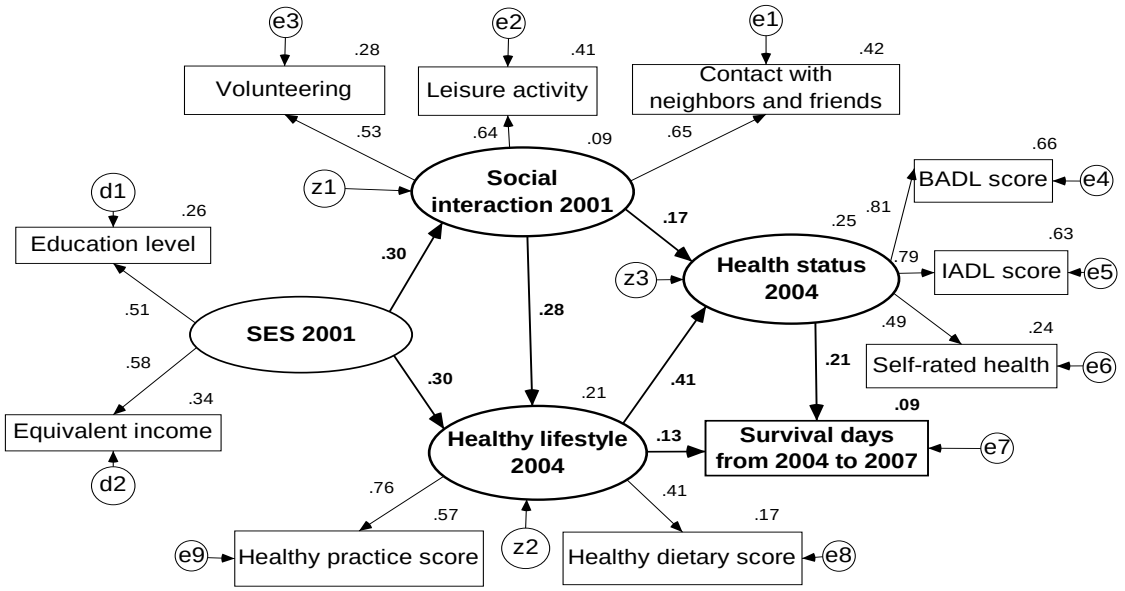
Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

According to the factor loadings in the rotated component matrix (Table 4-6), latent variable Factor 1 was characterized by health related measurements, including quality of life — "health status in 2004" and quantity of life — "survival days from 2004 to 2007". Latent variable Factor 2 was defined as "social interaction in 2001", covering frequency of contact with neighbors and friends, hobby activity and volunteering. Latent variable Factor 3 was named as "SES in 2001", including education level and equivalent income. Latent variable Factor 4 was identified as "healthy lifestyle in 2004", containing healthy dietary score and healthy practice score. The four latent variables explained 59.2% of the total variance.

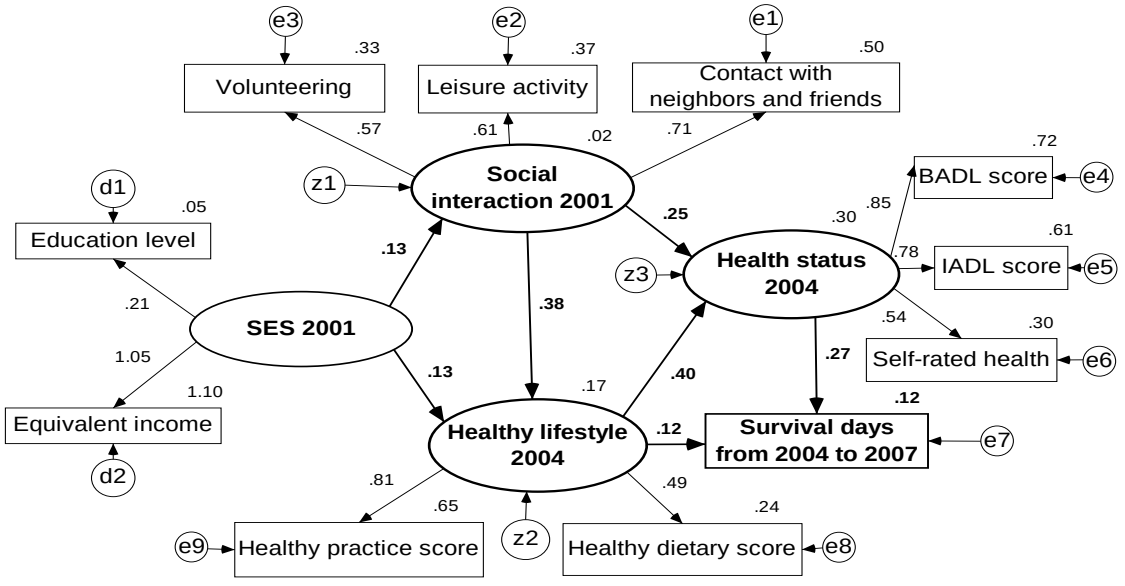
### 4.3.4 Structural Analysis Results

The NFI (0.950), IFI (0.962), and the RMSEA (0.020) confirmed goodness of fit of the conceptual model examining the explanatory effects of social interaction and healthy lifestyle on the association between SES and health. Except for the direct effects of "SES 2001" on "health status 2004" and on "survival days from 2004 to 2007", as well as the direct effect of "social interaction 2001" on "survival days from 2004 to 2007", all path coefficients in the model were statistically significant ($p < 0.001$). Therefore, no statistically significant relationships between these latent variables were removed from the hypothesized model. As shown in Figures 4-12, 4-13, 4-14 and 4-15, the final model exhibited a strong goodness-of-fit, with the NFI (0.949), IFI (0.961) and the RMSEA (0.020) meeting the criteria for adequate fit (>0.900 for the NFI and IFI, and <0.050 for the RMSEA).



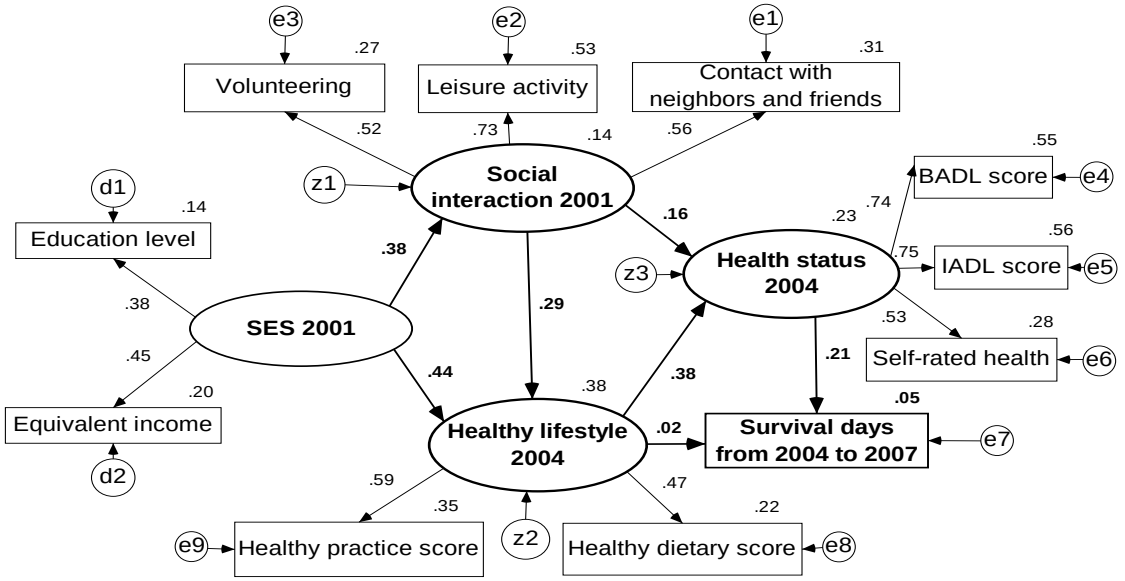

Younger male CMIN=616.414 P=.000
NFI=.949 IFI=.961 RMSEA=.020

**Figure 4- 12: Structural model between SES, social interaction, healthy lifestyle, health status, and survival days among younger male.**



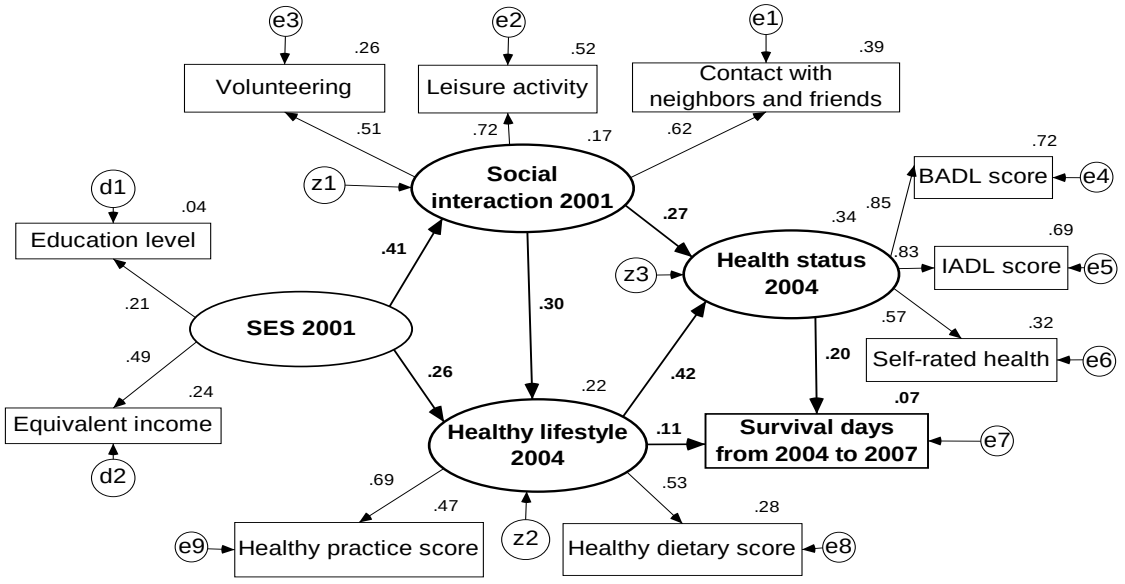

Older male CMIN=616.414 P=.000
NFI=.949 IFI=.961 RMSEA=.020

**Figure 4- 13: Structural model between SES, social interaction, healthy lifestyle, health status, and survival days among older male.**




Younger female CMIN=616.414 P=.000
NFI=.949 IFI=.961 RMSEA=.020

**Figure 4- 14: Structural model between SES, social interaction, healthy lifestyle, health status, and survival days among younger female.**




Older female CMIN=616.414 P=.000
NFI=.949 IFI=.961 RMSEA=.020

**Figure 4- 15: Structural model between SES, social interaction, healthy lifestyle, health status, and survival days among older female**

***Measurement Model***

A good measurement model should exhibit both reliability and validity. Four latent variables were included in this structural analysis. Cronbach's Alpha ranged from 0.445 to 0.688 ("SES 2001" 0.461, "social interaction 2001" 0.605, "healthy lifestyles 2004" 0.445, and "health status 2004" 0.688) (Table 4-7). A Cronbach's Alpha ≥0.70 is often used as the criteria for high reliability (with the minimum value of 0.35). All scales in the current study met the criteria and demonstrated acceptable reliability [46].

**Table 4- 7. Evaluation of measurement model**

| Latent variables | Indicators | Standardized factor loadings | | | | Cronbach's α (Alpha) |
|---|---|---|---|---|---|---|
| | | Younger men | Older men | Younger women | Older women | |
| SES 2001 | Education level | 0.51 | 0.21 | 0.38 | 0.21 | 0.461 |
| | Equivalent income | 0.58 | 0.97 | 0.44 | 0.49 | |
| Social interaction 2001 | Contact with neighbors and friends | 0.65 | 0.71 | 0.56 | 0.62 | 0.605 |
| | Leisure activity | 0.64 | 0.61 | 0.73 | 0.72 | |
| | Volunteering | 0.53 | 0.57 | 0.52 | 0.51 | |
| Healthy lifestyle 2004 | Healthy dietary score | 0.41 | 0.49 | 0.47 | 0.53 | 0.445 |
| | Healthy practice score | 0.76 | 0.81 | 0.59 | 0.69 | |
| Health status 2004 | BADL score | 0.81 | 0.85 | 0.74 | 0.85 | 0.688 |
| | IADL score | 0.79 | 0.78 | 0.75 | 0.83 | |
| | SRH | 0.49 | 0.54 | 0.53 | 0.57 | |

In the model examining younger elderly males, the factor loadings for "SES 2001" on education level and equivalent income were 0.51 and 0.58, respectively. Three indicators (volunteering, leisure activity and contact with neighbors and friends) were used to measure "social interaction 2001", and produced factor loadings of 0.53, 0.64, and 0.65. The path coefficients from "healthy lifestyle 2004" to healthy practice score and healthy dietary score were 0.76 and 0.41, respectively. The factor loadings of "health status 2004" on BADL score, IADL score, and SRH were 0.81, 0.79, and 0.49,

respectively. All scales demonstrated acceptable validity of the measurement model among younger elderly males, as indicated by factor loading values >0.41, which satisfied the critical value of 0.40. Table 4-7 presents the factor loadings of the other models for older elderly males, younger elderly females, and older elderly females, which all showed acceptable validity with the exception of education level among older elderly men and women.

***Structural Model***

The latent variables, "SES 2001", "social interaction 2001", and "healthy lifestyle 2004", were positively and significantly linked to "health status" and "survival days from 2004 to 2007" among all participants, indicating that the stronger independent variables were, the more likely elderly people had lived longer with good health. This finding, therefore, supported the first hypothesis.

In Figures 4-12, 4-13, 4-14, and 4-15, observed variables are enclosed in rectangular boxes and latent variables are enclosed in elliptical shapes. Single-headed arrows indicate the direction of relationship between variables. The coefficients indicate the strength of the correlations, with larger values representing a stronger relationship between two variables. The modified model depicted the underlying path way from "SES 2001" to "survival days from 2004 to 2007" by means of "social interaction 2001", "healthy lifestyle 2004", and "health status 2004". "Health status 2004" only demonstrated direct effects on survival days; healthy lifestyle not only exerted a direct effect on survival days, but also affected it indirectly via health status. SES and social interaction only indirectly affected survival days. The amount of variance in health status explained by SES, social interaction and healthy lifestyle was 25% for younger elderly males ($R^2$ = 0.25), 30% for older elderly males ($R^2$ =0.30), 23% for younger elderly females ($R^2$ = 0.23), and 34% for older elderly females ($R^2$ = 0.34). SES, social interaction, healthy lifestyle, and health status accounted for 9% , 12%, 5%, and 7% of the variance in survival days among younger elderly men ($R^2$ = 0.09), older elderly men ($R^2$ = 0.12), younger elderly women ($R^2$ = 0.05), older elderly women ($R^2$ = 0.07), respectively. In other words, social interaction and healthy lifestyle had moderating roles, which may contribute partially to socioeconomic inequalities in health status and

survival days. This thereby confirmed the second hypothesis.

Table 4-8 presents the standardized direct, indirect, and total effects of the structural equation modeling by age and gender. Consistent with predictions, the associations between SES, health status, and survival days via social interaction and healthy lifestyle differed by age and gender. According to standardized total effects, healthy lifestyle exerted the largest effects on health status (0.430 for elderly men, 0.442 for elderly women), compared to social interaction (0.307 for elderly men, 0.304 for elderly women) and SES (0.216 for elderly men, 0.324 for elderly women). Social interaction demonstrated much greater influence on health status among older elderly (0.401 for men, 0.394 for women) than younger elderly (0.283 for men, 0.271 for women). The impact of SES on health status was more pronounced among women than men (0.324 > 0.216). With regard to survival days, it was noteworthy that health status had the largest influence compared to any other predictors, and exerted a slightly greater effect in elderly men (0.245) than in elderly women (0.223). Both social interaction and healthy lifestyle were more pronounced in the old-old than the young-old (social interaction: 0.152 > 0.096 for men, 0.111 > 0.063 for women; healthy lifestyle: 0.226 > 0.221 for men, 0.191 > 0.102 for women), and in men versus women (social interaction: 0.114 > 0.085; healthy lifestyle: 0.239 > 0.163). The impact of SES on survival days, similar to that on health status, was slightly more pronounced among women than men (0.108 > 0.105), thereby validating the third hypothesis.

Figures 4-16 & 4-17 illustrate the standardized effects of SES, social interaction, healthy lifestyle, and health status on survival days by age and gender, respectively. The effects of social interaction and healthy lifestyle on survival days were more significant among older elderly than younger elderly, more significant among elderly men than elderly women.

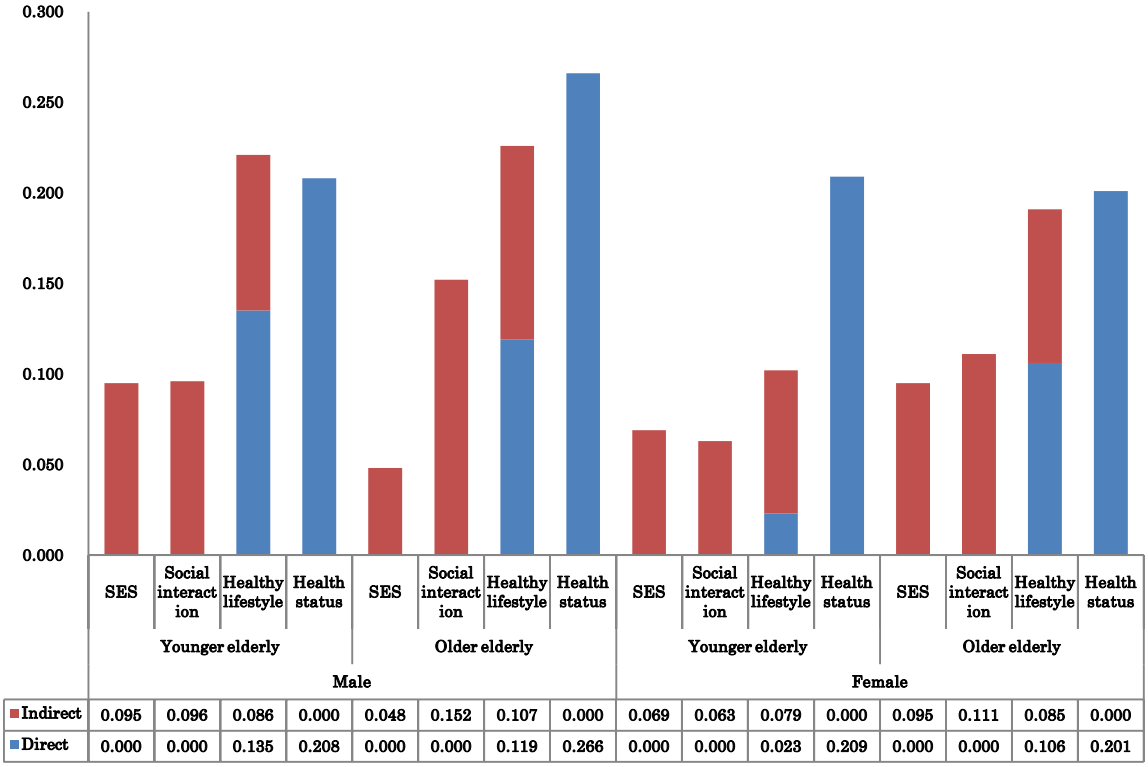
Figures 4-18 & 4-19 illustrate the standardized effects of SES, social interaction and healthy lifestyle on health status by age and gender. SES exerted a slightly greater effect on health status among elderly women than elderly men. Social interaction and healthy lifestyle demonstrated larger impacts on health status than SES did among younger elderly men, older elderly men, younger elderly women and older elderly women.

**Table 4- 8. Standardized direct, indirect, and total effects by age and gender**

| | **Male** (N=3,754) | | | **Female** (N=4,150) | | |
|---|---|---|---|---|---|---|
| | **65 – 74** (N=2,888) | **75 – 84** (N=866) | **Total** [a] | **65 – 74** (N=2,916) | **75 – 84** (N=1,234) | **Total** [a] |
| **Standardized direct effect** | | | | | | |
| SES → Social interaction | 0.301 | 0.130 | 0.265 | 0.380 | 0.412 | 0.412 |
| SES → Healthy lifestyle | 0.299 | 0.125 | 0.313 | 0.440 | 0.258 | 0.450 |
| Social interaction → Healthy lifestyle | 0.275 | 0.382 | 0.287 | 0.292 | 0.301 | 0.275 |
| Social interaction → Health status | 0.169 | 0.248 | 0.184 | 0.160 | 0.267 | 0.183 |
| Healthy lifestyle → Health status | 0.414 | 0.400 | 0.430 | 0.381 | 0.422 | 0.442 |
| Healthy lifestyle → Survival days | 0.135 | 0.119 | 0.133 | 0.023 | 0.106 | 0.064 |
| Health status → Survival days | 0.208 | 0.266 | 0.245 | 0.209 | 0.201 | 0.223 |
| **Standardized indirect effect** | | | | | | |
| SES → Health status | 0.209 | 0.102 | 0.216 | 0.271 | 0.271 | 0.324 |
| SES → Survival days | 0.095 | 0.048 | 0.105 | 0.069 | 0.095 | 0.108 |
| Social interaction → Survival days | 0.096 | 0.152 | 0.114 | 0.063 | 0.111 | 0.085 |
| Healthy lifestyle → Survival days | 0.086 | 0.107 | 0.105 | 0.079 | 0.085 | 0.098 |
| **Standardized total effect** | | | | | | |
| SES → Health status | 0.209 | 0.102 | 0.216 | 0.271 | 0.271 | 0.324 |
| Social interaction → Health status | 0.283 | 0.401 | 0.307 | 0.271 | 0.394 | 0.304 |
| Healthy lifestyle → Health status | 0.414 | 0.400 | 0.430 | 0.381 | 0.422 | 0.442 |
| SES → Survival days | 0.095 | 0.048 | 0.105 | 0.069 | 0.095 | 0.108 |
| Social interaction →Survival days | 0.096 | 0.152 | 0.114 | 0.063 | 0.111 | 0.085 |
| Healthy lifestyle →Survival days | 0.221 | 0.226 | 0.239 | 0.102 | 0.191 | 0.163 |
| Health status →Survival days | 0.208 | 0.226 | 0.245 | 0.209 | 0.201 | 0.223 |

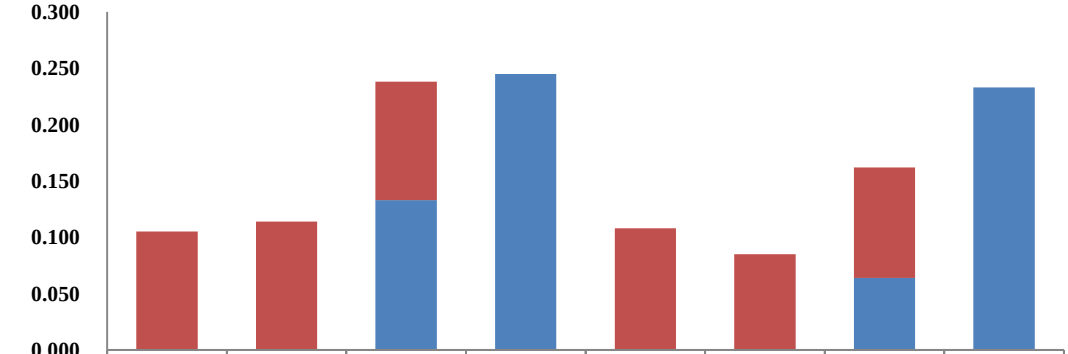
Notes: All the standardized direct effects were significant ($p < 0.05$).

Total [a] indicates the effects by gender (male & female)



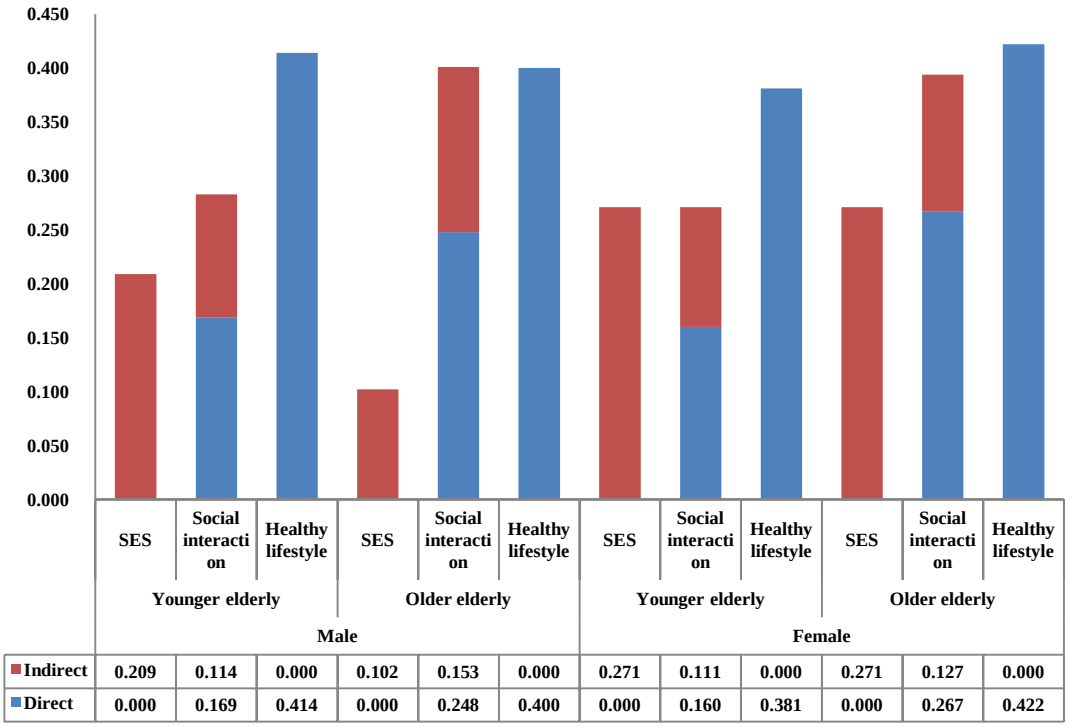

| | SES | Social interaction | Healthy lifestyle | Health status | SES | Social interaction | Healthy lifestyle | Health status | SES | Social interaction | Healthy lifestyle | Health status | SES | Social interaction | Healthy lifestyle | Health status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Younger elderly | | | | Older elderly | | | | Younger elderly | | | | Older elderly | | | |
| | Male | | | | | | | | Female | | | | | | | |
| Indirect | 0.095 | 0.096 | 0.086 | 0.000 | 0.048 | 0.152 | 0.107 | 0.000 | 0.069 | 0.063 | 0.079 | 0.000 | 0.095 | 0.111 | 0.085 | 0.000 |
| Direct | 0.000 | 0.000 | 0.135 | 0.208 | 0.000 | 0.000 | 0.119 | 0.266 | 0.000 | 0.000 | 0.023 | 0.209 | 0.000 | 0.000 | 0.106 | 0.201 |

**Figure 4- 16: Standardized effects of SES, social interaction, healthy lifestyle, and health status on survival days by age and gender**



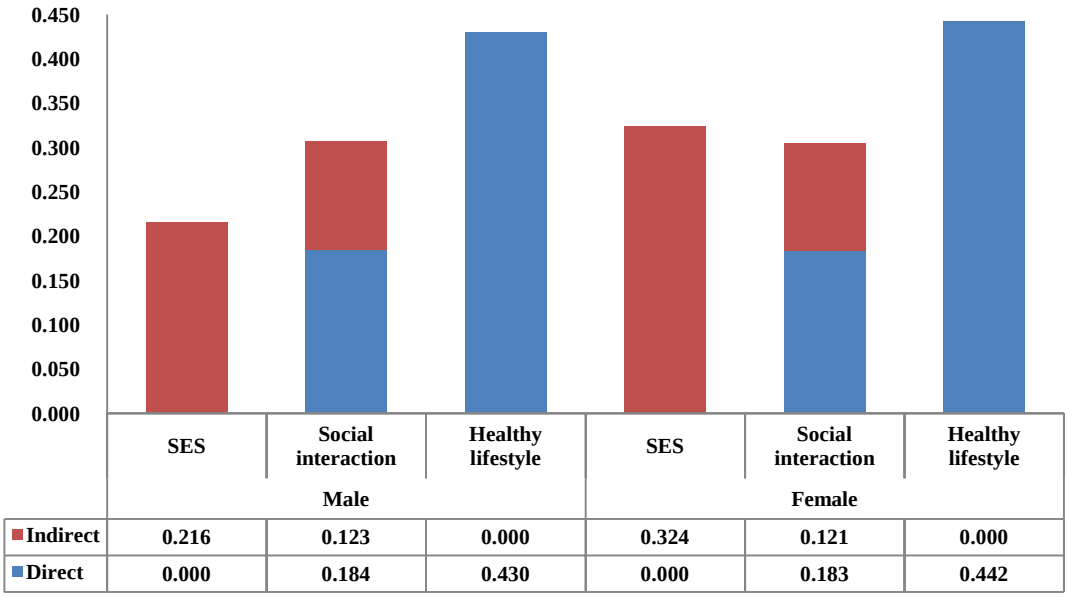

| | SES | Social interaction | Healthy lifestyle | Health status | SES | Social interaction | Healthy lifestyle | Health status |
|---|---|---|---|---|---|---|---|---|
| | Male | | | | Female | | | |
| Indirect | 0.105 | 0.114 | 0.105 | 0.000 | 0.108 | 0.085 | 0.098 | 0.000 |
| Direct | 0.000 | 0.000 | 0.133 | 0.245 | 0.000 | 0.000 | 0.064 | 0.233 |

**Figure 4- 17: Standardized effects of SES, social interaction, healthy lifestyle, and health status on survival days by gender**




| | Male | | | | | | Female | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Younger elderly | | | Older elderly | | | Younger elderly | | | Older elderly | | |
| | SES | Social interaction | Healthy lifestyle | SES | Social interaction | Healthy lifestyle | SES | Social interaction | Healthy lifestyle | SES | Social interaction | Healthy lifestyle |
| Indirect | 0.209 | 0.114 | 0.000 | 0.102 | 0.153 | 0.000 | 0.271 | 0.111 | 0.000 | 0.271 | 0.127 | 0.000 |
| Direct | 0.000 | 0.169 | 0.414 | 0.000 | 0.248 | 0.400 | 0.000 | 0.160 | 0.381 | 0.000 | 0.267 | 0.422 |

**Figure 4- 18: Standardized effects of SES, social interaction, and healthy lifestyle on health status by age and gender**




| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | SES | Social interaction | Healthy lifestyle | SES | Social interaction | Healthy lifestyle |
| Indirect | 0.216 | 0.123 | 0.000 | 0.324 | 0.121 | 0.000 |
| Direct | 0.000 | 0.184 | 0.430 | 0.000 | 0.183 | 0.442 |

**Figure 4- 19: Standardized effects of SES, social interaction, and healthy lifestyle on health status by gender**

## 4.4 Discussion

This population-based cohort study provided insights into the associations between SES, social interaction, healthy lifestyle, health status, and survival days, and showed how the patterns of relationships varied by age and gender among elderly Japanese suburban community-dwelling residents aged 65 – 84 at a 6-year follow-up. The results were consistent with our expectations that robust, positive associations exist between SES, social interaction, healthy lifestyle, and health. Higher SES was related to better health status and longer survival time. In addition, personal behaviors may in part have contributed to health disparities by SES. Furthermore, the effects of personal behaviors exhibited different patterns among age-gender subgroups. Unfortunately, SES had indirect effects other than direct effects on health, which was different from what we hypothesized previously in Figure 4-1.

Consisted with the majority of prior research, advantageous SES was related to better health status and longer survival time in both elderly men and women. In comparison, SES exerted a slightly greater effect on health status among elderly women than elderly men, while the effects of SES on survival days were mostly comparable among elderly men and women.

It is worth pointing out that health status was the most crucial determinant of survival days, especially for elderly men. It is well known that elderly Japanese women have the highest life expectancy in the world, but they are more likely to receive the long-term care insurance [47], which has been implemented by the Japanese government in order to provide dispensable support and nursing care for the ill as well as those who cannot live independently. In contrast, elderly Japanese men in poor health status die earlier than Japanese women; therefore, efforts should be made to improve the health status of elderly Japanese men are required.

It is also noteworthy that SES had no direct influence on health outcomes. In addition, compared with SES, the effects of personal factors accounted for more of the variance in health, indicating that good social interaction and a healthy lifestyle had an even more important impact on health. Thus, individuals may attenuate health inequalities depending on individual efforts to promote social interaction and healthy lifestyle. This finding is somewhat consistent with a study conducted in a national

probability sample of 2,200 elderly Japanese people which found that during a three-year period, social participation indirectly affected mortality through functional status and SRH, whereas social contact did not significantly impact mortality [48]. However, the study did not examine the associations with social background, which may represent a limitatyion since social structures shape individual behaviors [49].

Social interaction and healthy lifestyle in particular played a more prominent role in determining longevity among the old-old than in the young-old, and among men than among women. Several possible explanations are offered. First, men usually suffer great pressure from work and are more likely to smoke and consume alcohol, while these behaviors are less prevalent among women [33]. In addition, Japanese women are less involved in the labor market. They have greater opportunity to keep physically active, to get enough sleep, and to participate in a variety of hobbies or volunteer activities, etc, which are the key determinants of health. Therefore, elderly men should pay closer attention to their lifestyles and social interactions. Considering age differences, the old-old elderly tend to feel lonely and experience negative emotions with the decline in their physical health. This results in a need to spend more time with other people in order to mediate psychological anguish and produce new social roles instead of losing ones with age. Furthermore, social participation and social contact can avail more opportunities to go outside and satisfy needs for safety, belonging, esteem and self-actualization which, in turn, are located at the top of the pyramid of Maslow's hierarchy of needs [50]. Moreover, social interaction can also create a sense of meaning and coherence in the lives of older adults [23]. Such characteristics have been shown to slow down the consequences of physical impairment in activities of daily life [51].

The present study has both strengths and limitations. This was a prospective population-based cohort study of older adults. Using a mailed questionnaire survey, the response rate was relatively high at both baseline and follow-up. Multiple-Group Analysis revealed different patterns between the age-gender subgroups. The quality (health status) and quantity (survival days) of life has been addressed with equal attention. Modeling survival days as a continuous variable instead of a dichotomous status (alive or not) enables us to perform the structural equation analysis. However, persons aged 85 and above were excluded from the analysis, so that the number of

deaths during six-year follow up may have been underestimated. Thus, in the current study, a small percentage of the variance in survival days was explained by SES, personal behaviors, and health status. The explanatory effects of personal behaviors on SES–health should be further analyzed in the oldest-old elderly. In addition, some items comprising the healthy dietary pattern in this study may only be suitable for Japanese people. This pattern was closely linked to the Japanese traditional dietary practice of consuming a light diet with less oil. Regular consumption of fried food provides unsaturated fatty acids needed by human body. Even though pickled vegetables are not the first choice for good health, they may still supply vitamins to those who lack fresh vegetables. Consequently, fried food and salt-cured foods were included in the healthy dietary pattern in the study, although they are unhealthy for other general populations.

## 4.5 Conclusions

In conclusion, preventing illness requires that individuals are able to diminish health inequalities through their own efforts in conjunction with financial support from the government, since personal behaviors may in part contribute to the SES gradient among the Japanese elderly. The key to prolonging the survival of elderly people is to promote health status by means of social interaction and healthy lifestyle, especially for elderly men.

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# Chapter 5 Conclusions and Implications

## 5.1 Main Findings

The study aimed to: 1) investigate the relationship between SES and health status of elderly people in two Asian countries — Japan and China; 2) inquire the mediating influence of social interaction on the association between SES and health status among elderly people in both Japan and China; and 3) examine the mechanism of SES–health through social interaction and healthy lifestyle, and the age-gender related differences on the mechanism among elderly Japanese community-dwellers.

Chapter 2 and 3 verified the associations of SES–health status, and the mediating effect of social interaction using cross-sectional data from Tama City in Japan and two cities in Tibet — Lhasa and Shigatse, respectively. Chapter 4, a longitudinal study, examined the SES–health mechanism of elderly citizens in Tama City. The results of each chapter are as following.

In second chapter, 1,979 elderly individuals aged ≥60 years in 28 communities from 7 sub-districts of Lhasa City and 10 communities from 2 sub-districts of Shigatse City were invited to participate in a questionnaire based survey in 2009. Of them, 1,846 elderly answered, giving a response rate of 93.2%. SES was operationalized as education level and household income; social interaction was measured by frequency and scale of contact with their children, siblings, relatives, friends and neighbors, as well as satisfaction of social interaction; indicators of health status included physical health and psychological health. In regard to frequency of social interaction, the elderly people contacted their children (who did not live with them) the most (67.6%); followed by neighbors (51.5%), friends (41.0%), siblings (33.9%) and relatives (25.9%). With respect to scale of social interaction, most elderly people had between one and three people with whom they were in contact, freely and pleasantly. Concerning satisfaction of social interaction, the majority of elderly people were satisfied. 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 indirect effect, SES exerted a larger direct impact on health status, especially on psychological health. In conclusion, like western countries, people with higher SES were more likely to have better health status in China. In addition, social interaction played a mediating role on the association of SES–health status. (Figure 5-1)

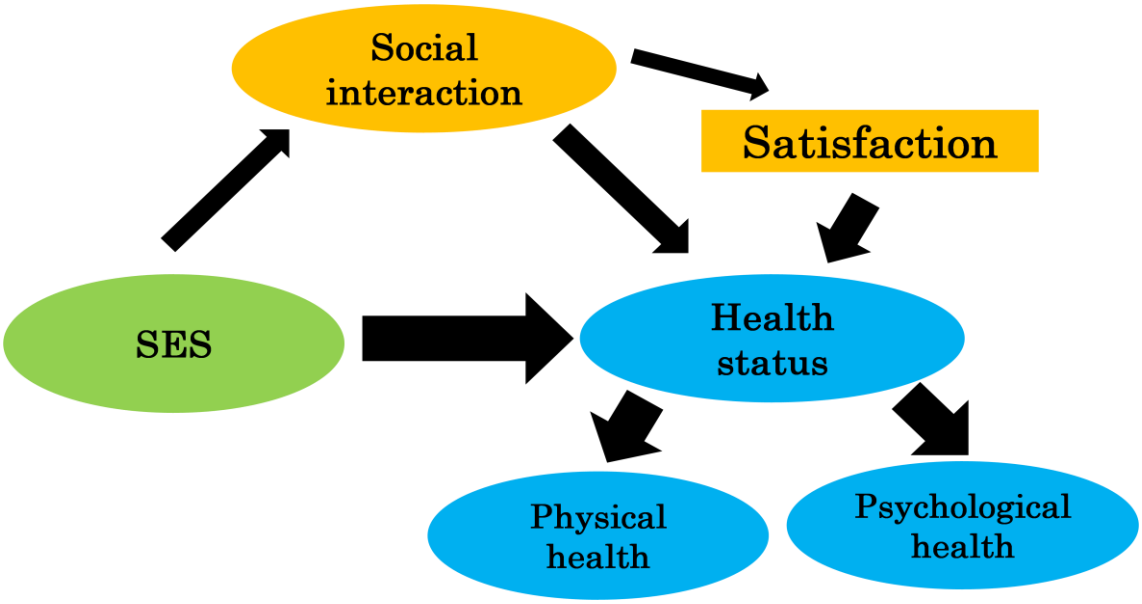


**Figure 5- 1: The structural analysis of SES, social interaction, and health status among elderly Chinese people**

Chapter 3 conducted a similar analysis in Tama City of Japan. A self-administered questionnaire was mailed to all of the elderly residents aged ≥65 years in 2001. SES was measured by equivalent income and educational attainment; social interaction was assessed by social contact and social participation; health status was operationalized as physical health and subjective health. The results showed that SES had a positive direct impact on social interaction (0.26 for male, 0.40 for female); and social interaction exerted a direct and positive effect on health status (0.51 for male, 0.57 for female); SES not only directly affected health status (0.14 for male, 0.21 for female), but also demonstrated an indirect effect via social interaction (0.13 for male, 0.23 for female), especially on subjective health (0.82 for elderly men, 0.74 for elderly women). All associations were more pronounced among elderly women. Compared with direct impact, SES was more likely to exert an indirect impact on health status by means of social interaction. In conclusion, social interaction may partly explain SES differences in health status, especially for elderly women. (Figure 5-2)

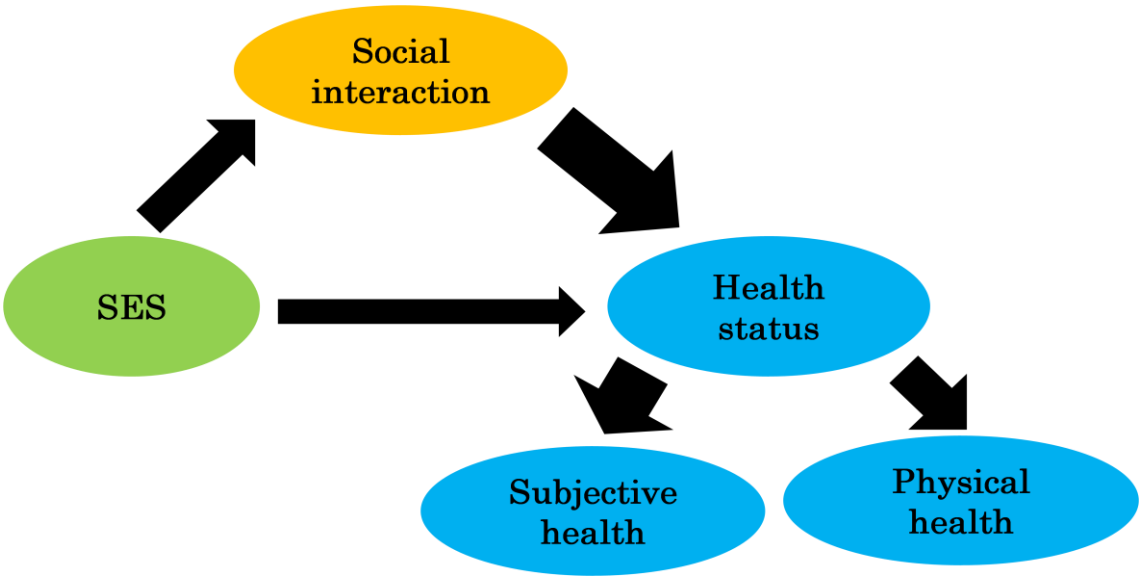


**Figure 5- 2: The structural analysis of SES, social interaction, and health status among elderly Japanese people**

In Chapter 4, a prospective cohort study was conducted to investigate whether social interaction and healthy lifestyle could decrease health disparity by SES among Japanese suburban community-dwelling elderly, and to determine whether patterns of associations varied by age and gender. Beginning in 2001, 7,904 elderly residents of Tama City were followed for six years through self-administered questionnaires and registries. SES had no direct impact on health outcomes (health status 2004 and survival days from 2004 to 2007), but had indirect effects through social interaction and healthy lifestyle. Health status exerted the strongest influence on survival days regardless of age and gender. In summary, older individuals are able to reduce the effects of health inequalities by personal behaviors in addition to financial support from the government. The key to prolonging survival in elderly people is to promote health status through social interaction and a healthy lifestyle, especially in elderly men. (Figure 5-3)

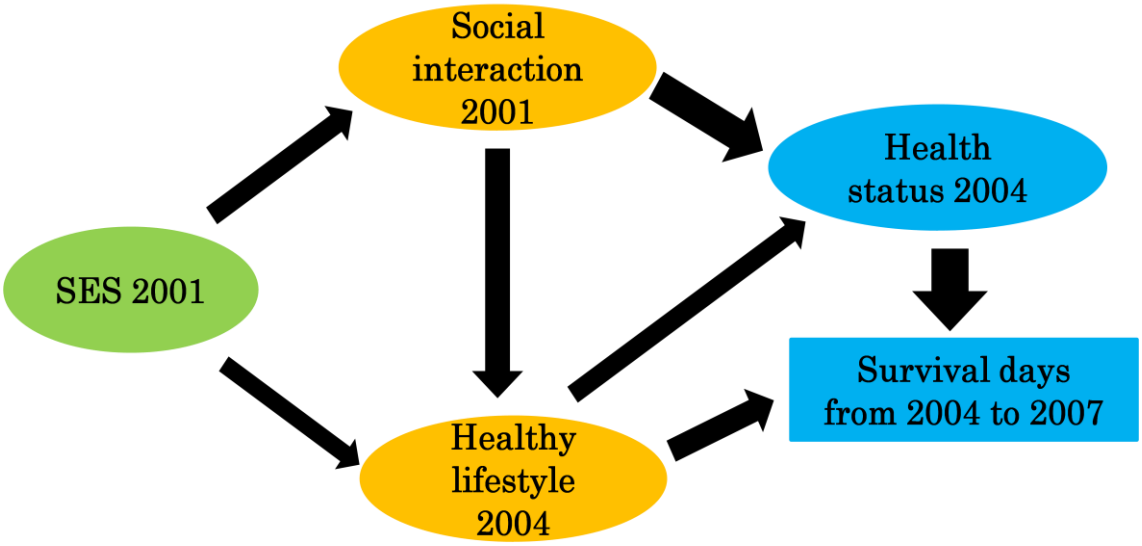


**Figure 5- 3: The structural analysis of SES, social interaction, healthy lifestyle, health status and survival days among elderly Japanese people over six years follow-up**

Therefore, notable conclusions are as below in accordance with the hypothesized model of this dissertation, as shown in Figure 1-8 (pp.19).

(1) SES has a positive and direct effect on health status in the same year among elderly citizens in both Japan and China (Figure 5-1 and Figure 5-2). Namely, older individuals with higher SES are more likely to have better health status. However, in the longitudinal study of Japan (Figure 5-3), "SES 2001" exerted no direct impact on health status of three years later — "health status 2004".

(2) In the longitudinal study, "SES 2001" exerted no direct effect on "survival days from 2004 to 2007" among elderly suburban Japanese community-dwellers (Figure 5-3).

(3) SES indirectly affected health status of the same year by means of social interaction. That is, social interaction played a mediating role on the association between SES and health status for both Japanese and Chinese elderly (Figure 5-1 and Figure 5-2).

(4) "SES 2001" indirectly affected "survival days from 2004 to 2007" by means of social interaction (Fig. 5-3).

(5) SES exerted an indirect impact on health status of three years later — "health

status 2004” by means of healthy lifestyle (Figure 5-3).

(6) SES indirectly affected “survival days from 2004 to 2007” by means of healthy lifestyle (Figure 5-3).

(7) “Survival days from 2004 to 2007” was positively associated with “SES 2001”, “social interaction 2001”, “healthy lifestyle 2004” and “health status 2004” (Figure 5-3). Every increase in value of SES, social interaction, healthy lifestyle, and health status could result in a unit of growth in survival days.

(8) Country differences between Japan and China existed among cross-sectional study between SES, social interaction, and health status (Figure 5-1 and Figure 5-2). In detail, SES exerted a larger indirect effect on health status by social interaction among Japanese elderly people; while SES exerted a larger direct effect on health status among Chinese elderly people. In addition, age and gender differences existed among the longitudinal study between “SES 2001”, “social interaction 2001”, “healthy lifestyle 2004”, “health status 2004”, and “survival days from 2004 to 2007” in Japan (Figure 5-3). The effect of social interaction on survival days, as well as the effect of healthy lifestyle on survival days were more pronounced among older elderly (versus younger elderly) and elderly men (versus elderly women).

### 5.2 Comparison between Japan and China

In the structural analysis among SES, social interaction, and health status, SES had a positive and significant direct impact on health status in the same year of both elderly Chinese and Japanese citizens. By comparison, in the model of elderly people of China, SES exerted a larger direct effect on health status (purple arrows in figure 5-4); while SES exerted a larger indirect effect on health status by means of social interaction in Japan (orange arrows in figure 5-4).

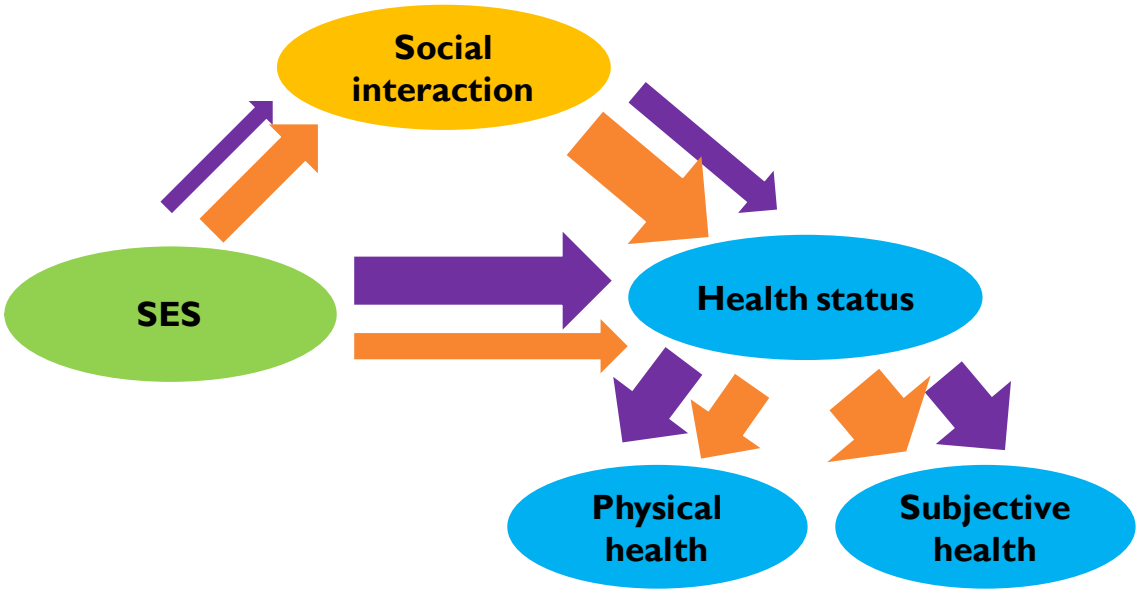


**Figure 5- 4: Comparison of structural relationships between Japan and China**
(Note: Orange arrows indicate the effects in Japan; purple arrows indicate the effects in China.)

There are three possible reasons for this. Firstly, it is the gap between the rich and the poor. According to the United Nations Development Programme (UNDP) in 2007, the ratio of richest 10% to poorest 10% (R/P 10%), or the ratio of richest 20% to poorest 20% (R/P 20%) was one method to indicate inequality in income or expenditure [1]. A lower value indicates a more egalitarian society. R/P 10% and R/P 20% were 21.6 and 12.2 in China, but 4.5 and 3.4 in Japan, respectively. Japan is one of the most egalitarian nations in the world. The health and welfare system of Japan together with its unique

culture may have served to minimize the effect of socioeconomic differences on health outcomes. The gap between the rich and the poor is relatively small. No matter how rich or poor, individuals who meet the requirements are entitled to social services such as long-term care insurance. The Gini coefficient is commonly regarded as an international measure of inequality of income distribution or consumption expenditure among individuals or households, in which 0 represents perfect equality and 1 represents perfect inequality. Figure 5-5 illustrates the Gini coefficients of working age population and retirement age population in Japan from 1985 to 2009. The inequality among retirement age population has been declining, while it has been increasing among working age population. The Gini coefficients in Japan ranged from 0.304 to 0.369. However, according to China Statistical Yearbook, the Gini coefficient was above 0.4 since 2000, which is a critical point indicating greater income inequality (Figure 5-6). If the Gini coefficient reached to 0.6, income disparity was extremely serious. In 2008, the Gini index reached the highest record, 0.491, and then gradually declined. A huge gap exists between the rich and the poor in China, resulting in a larger direct effect on health status. Secondly, the development level of society also contributes to this. As mentioned in Chapter 1, there is a thirty-year time lag regarding the development of society between Japan and China. Japan is a developed country. The basic needs of food, clothing and medical care were already satisfied, and higher level needs then emerged in people's lives. Because China is a developing country, basic needs still need to be improved in some areas and among some populations. Therefore, the direct effect of SES would decrease along the development of society, while the indirect effect of SES on health by means of personal behaviors or other factors would increase. Thirdly, it may because the different usage of variables or areas. The hypothesized models used in two countries were the same, but indicators were slightly different. In addition, the study population in China was from the metropolitan area of the two cities, while it was from the suburban area in Japan.

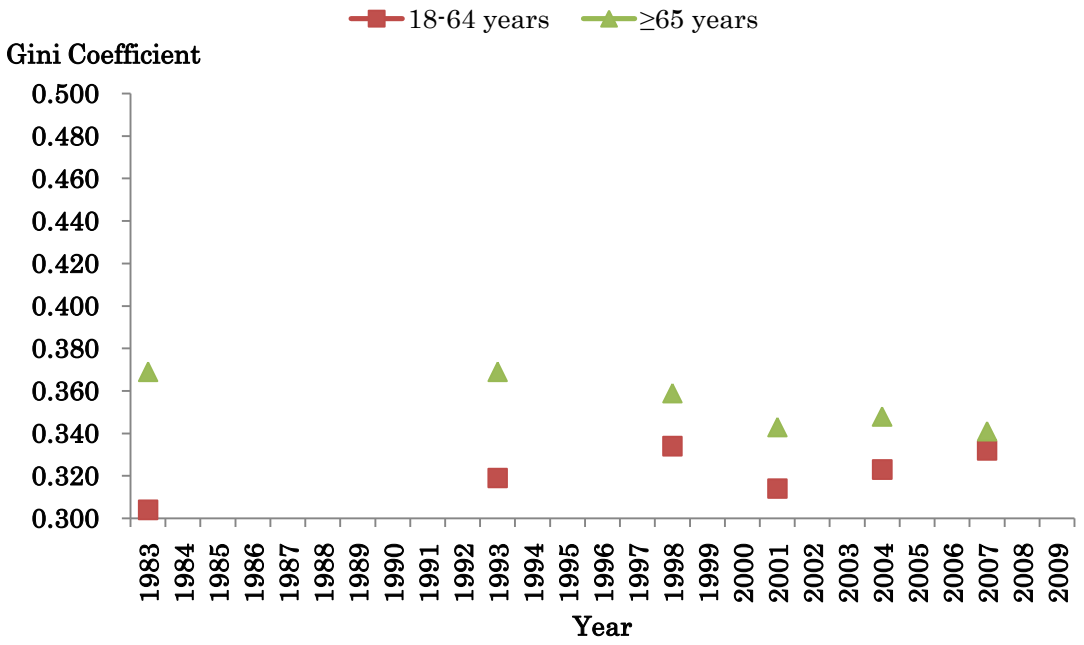


**Figure 5- 5: Gini coefficients from 1985 to 2009 in Japan** [2]

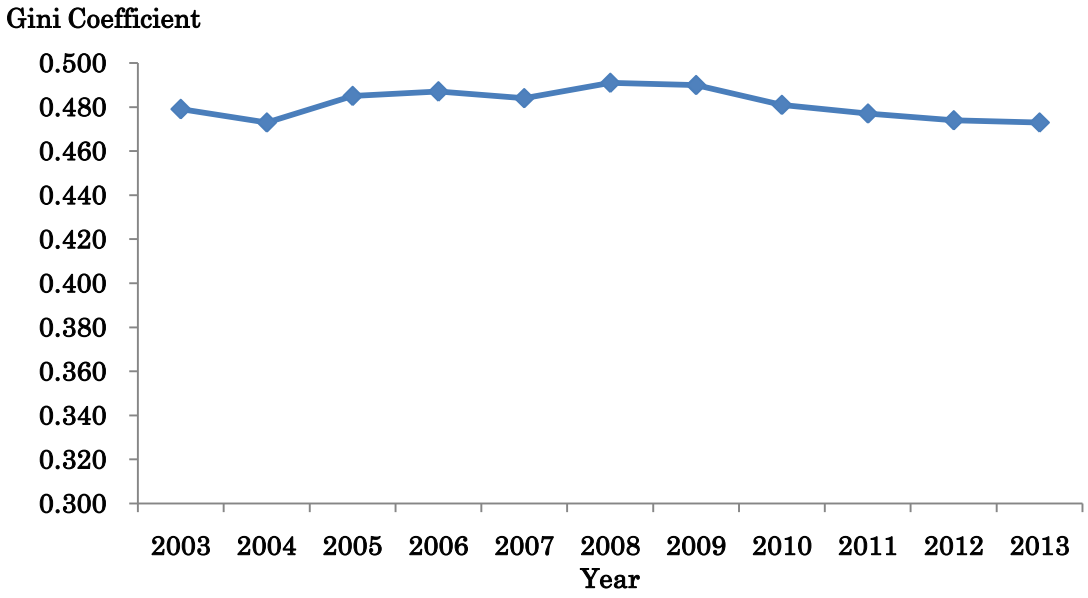


**Figure 5- 6: Gini coefficients from 2003 to 2013 in China** [3]

## 5.3 Implications

It was concluded that social interaction played an explanatory role on the association of SES–health status among elderly Japanese and Chinese people. SES had positive direct and indirect impacts on the health status of Japanese and Chinese elderly in a cross-sectional analysis between SES, social interaction, and health status. However, in the longitudinal analysis for Japan, the direct impact of SES on health status of three years later disappeared. SES was more likely to indirectly affect health outcomes (health status and survival days) among Japanese elderly by means of personal behaviors, such as social interaction and healthy lifestyle. In addition, the effects of social interaction on survival days and the effects of healthy lifestyle on survival days were more pronounced among older elderly than younger elderly; and these associations were more pronounced among elderly men than elderly women.

Along with remarkably increase in proportion of elderly people in Japan, the number of elderly who were disabled or need assistance with activities of daily living also increased. The dramatic increase in the elderly population and women's changing roles in the family and in the labor market have raised public and governmental concerns over the care of Japanese elderly people [4]. The Long-term Care Insurance System has been established as a scheme to support needs for care since April 2000, with the number of users rapidly increasing. In April 2000, 1.49 million Japanese elderly people required this service, reaching 3.29 million in April 2005 [5]. As the utilization of this system steadily increases, total expenditure is simultaneously growing. It is difficult to seek a balance between meeting needs and containing costs. Based on Japanese experiences and lessons, it is important to develop home and community-based long-term care in China. However, lack of long-term care services is an urgent issue for both urban and rural Chinese residents. According to the national survey of China on urban and rural disabled elderly people, 33 million elderly individuals were disabled in 2010, accounting for 19.0% of the total elderly population [6]. It was estimated that 40 million people require long-term care service in 2015, including support levels and care levels [6]. The national welfare systems, such as Long-term Care Insurance, can provide support to level economic inequalities and their subsequent impact on health. However, policy development and implementation are

always restricted by resources. If people could increase the length of living into old age as well as decrease disability to a minimum extent before death, the government will not need to make provision for a large medical expenditure in the future. Therefore, as shown in Figure 5-7, preventive means are required to deal with health problems that rose from rapid population aging in Japan and China.

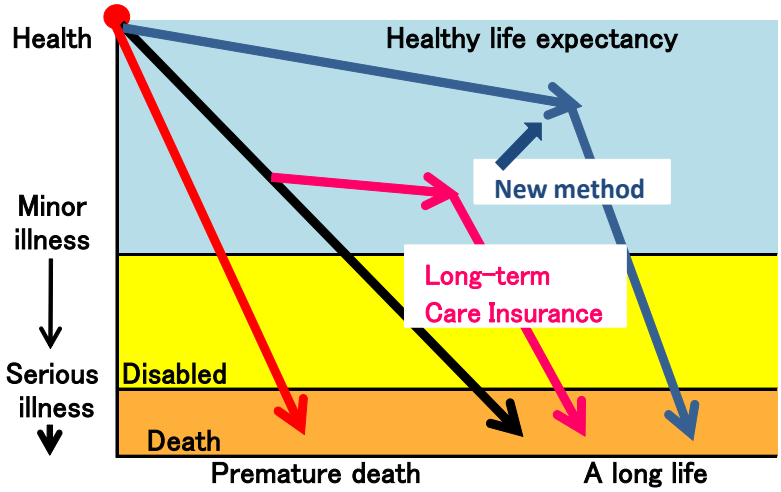


**Figure 5- 7: Prevention and healthy life expectancy [7]**

Some implications can be drawn from the conclusions. Firstly, an economical and effective preventive method for ill-health was suggested, with older individuals being able to diminish health inequalities through their own efforts, which can be treated as a complement of financial support from the government, since personal behaviors may in part contribute to the SES gradient among the Japanese elderly and the Chinese elderly.

Secondly, interventions to improve health status of elderly people need to be country-specific, taking the development level of each country into consideration in making health policy and providing health education. Social interaction played a mediating role on the association of SES and health status among both Japanese elderly people and Chinese elderly people. These associations varied between Japan and China. For instance, compared with the direct impact, SES exerted a greater indirect impact on health status via social interaction among Japanese elderly people. It means that improving social interaction could be a better choice to promote health status of Japanese elderly people. While, the mediating role of social interaction was proved

between SES and health status among Chinese elderly people, increasing household income and education seems more effective since SES demonstrated a greater direct effect than an indirect effect in the structural equation modeling.

Thirdly, interventions to improve health outcomes of elderly people need to be age-specific and gender-specific. The age-gender related differences on the association of SES–health should also be addressed. In promoting social interaction and healthy lifestyle, priority should be given to the old-old elderly (aged 75 – 84) and elderly males. In the structural analysis of cohort study in Japan, the effects of social interaction on survival days and the effects of healthy lifestyle on survival days were more pronounced among older elderly than younger elderly; and these associations were more pronounced among elderly men than elderly women.

## 5.4 Strengths of the Study

There are several strengths in this study. Firstly, to the best of our knowledge, it is the first study to identify the mediating role of social interaction played between SES and health status among elderly both Japanese and Chinese people by using a large sample size. Secondly, it applied a comprehensive approach to investigate the SES–health mechanism by means of personal behaviors. In addition, the multidimensional measures of health were applied to the analyses, and the quality (health status) and quantity (survival days) of life received equal attention. Further, a questionnaire was employed to collect data, and the response rates were relatively high both in Japan and China. Finally, trained community workers conducted the interview in China in order to collect information among participants who were unable to read and write.

## 5.5 Limitations and Future Issue

The results of this study must be considered in light of limitations.

(1) Study design: Specifically, as the Chinese survey was only cross-sectional in design, we are not able to fully capture the dynamic nature of health outcomes. The results about Chinese elderly are mainly of a descriptive nature, rather than causal relationships.

(2) Study sample: Neither the Japanese elderly nor Chinese elderly study employed a nationally representative sample of older adults. In addition, samples of China were collected from the Tibet Autonomous Region; and samples of Japan were collected from the suburban area of Tokyo. However, both cities are influenced by traditional culture of their own countries. The differences between Japan and China should be larger than that between Tibet and Han areas in China, or that between Tama City and 23 special wards. To some extent, they can be representative of each country at the national level.

(3) Study indicator: Some indicators used in Japanese survey differed from that in Chinese survey. For instance, equivalent household income was employed to indicate SES in Japanese analysis, while household income was employed in Chinese analysis. The indicators of social interaction and health status were also different in Japan and China to some extent. In addition, lifestyle indicators were only included in follow-up study.

Given the results and limitations of this study, there is a need for further research to verify external validity and reliability by employing a nationally representative data set, and using same questionnaire in each country. A longitudinal study is also required to be conducted in China. Among Japanese samples, only elderly aged 65 – 84 years were included into analyses, thus further research is necessary to better examine the structural relationships of these associations for the oldest old (aged 85 and over). Furthermore, an intervention study on the effectiveness of social interaction and healthy lifestyle on health status and survival days is warranted.

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Shuo Wang

2014.8

# Abstract (In Japanese)

# 学 位 論 文 要 旨

論文題名

高齢者における社会経済的要因と健康との関連構造：日中比較研究

A Structural Relationship between Socioeconomic Status and Health among the Elderly: A Comparative Study between Japan and China

（ふりがな）　ワン　シュオ

学位申請者　王　碩　㊞

（ 学位論文要旨 ）

平均寿命の延伸と共に出生数が急激に低下し、少子高齢社会が急速に進む日本と共に、遅れて高齢社会を迎える中国において、健康を規定する要因を明確にすることは、社会保障面からも意義が高いことである。本論文は、高齢者の健康を規定する要因として、個人レベルでの制御可能な生活習慣と共に、社会関係性や社会経済的要因との関連構造を日中比較し、今後の健康施策に活かすための科学的エビデンスを明確にすることを研究目的としている。

まず、中国チベット自治区ラサ市に住む60歳以上高齢者1,846人を対象に、健康規定要因について調査を実施した。高齢者は、子どもや近隣や友人などとの社会関係を保ちながら精神面も安定した生活を送り、身体的健康と精神的健康は、社会経済的要因からの直接的な効果だけではなく、社会関係性を経由して間接的に規定される事を明確にしている。

次に、日本の都市郊外に居住している65歳以上高齢者7,904人を対象に実施したアンケート調査（2001年）に基づくデータを分析した結果、中国での調査結果と同様の結果が示されたものの、社会経済的要因が健康を直接に規定するよりも社会関係性

を経由する間接効果が大きいことを明確にした。

また、日本の都市郊外居住高齢者の生存を6年間追跡し、生存日数に対する社会経済的要因からの直接効果は統計学的にみて有意ではないものの、社会経済的要因から直接に規定される社会関係性や身体的精神的健康の維持を経て間接的に規定される事を明確にした。

本研究の主要な成果は、日中の高齢者において、健康度に対する社会経済的要因からの効果は、直接的な効果を持つと共に、社会関係性を経由する間接効果も見られることを明確にしている点である。また社会経済的要因から健康度に対する日中比較研究では、中国高齢者は日本高齢者に比べて、やや大きな直接効果を示すのに対し、日本では社会関係性を経た間接的な効果が大きい可能性を提示していることである。また、日本の都市郊外居住高齢者の生存維持のためには、社会経済的要因から直接に規定されるよりも、社会関係性を経て間接的に規定される因果構造を世界で初めて明確にしている。

このように、日本と中国の調査により、高齢者の健康を規定する社会経済的要因と社会的関係性との関連構造に関する科学的なエビデンスを創出していることから、高齢者の健康を延伸させるための健康支援において、日本と中国の国別でみた社会経済的要因の位置づけと意義が明確となったものである。

今後の効果的な健康づくり施策においては、このような科学的なエビデンスに基づいて社会経済的要因の位置づけを踏まえると共に、国別特性を考慮した対応が有効である可能性を提示したことが、学術的にみて応用価値のあるものといえる。同時に、本論文では、代表的なサンプル選定、追跡調査による因果構造、評価指標の統一性などの研究課題も明示している。

# APPENDIX A: Questionnaire for Tibet Autonomous Region

亲爱的老年朋友：

您好！

为了不断提高民族地区老年人的生活质量，为国家制定民族地区老年人的社会保障政策提供基础依据，我们实施了西藏老年人健康生活状况问卷调查。本次调查数据只用于反映民族地区老年人整体状况与基本需求，仅做全体统计分析不做个人分析，我们将严格保密您的个人隐私。衷心感谢您的积极配合。

中央民族大学

民族地区老年人健康生活课题组

| | | | | | |
|---|---|---|---|---|---|
| **问卷编号** | | **姓　　名** | | **性　　别** | ①男性　　②女性 |
| **出生日期** | | **民　　族** | | **户口所在地** | |
| **住　　址** | | **身份证号** | | **本市居住时间** | |
| **现在工作** | ①完全退休　②兼职工作　③全职工作　④从未在外工作过 | | | **退休前职业** | |
| **教育程度** | ①没上过学　②小学 1-3 年 ③小学 4-6 年　④初中　⑤高中/中专　⑥大学专科　⑦大学本科及以上 | | | | |
| **同居家人** | ①配偶　②儿子　③儿媳　④女儿　⑤女婿　⑥孙子女　⑦兄弟姐妹　⑧亲戚　⑨其他_____ **共**_____**人** | | | | |

**1. 您最近一年来的身体状况如何？（只选择一个对应的程度画上○，患病和症状可以多选）**

| | | | | | |
|---|---|---|---|---|---|
| **精力状况** | ①很充沛 | ②比较充沛 | ③一般 | ④常疲劳 | ⑤很疲劳 |
| **睡眠状况** | ①从无失眠 | ②偶有失眠 | ③有时失眠 | ④经常失眠 | ⑤每晚失眠 |
| **饮食状况** | ①很正常 | ②稍有减少 | ③明显减少 | ④严重减少 | ⑤极少进食 |
| **听力状况** | ①很清楚 | ②稍有减退 | ③明显减退 | ④严重减退 | ⑤完全丧失 |
| **视力状况** | ①很清楚 | ②稍有减退 | ③明显减退 | ④严重减退 | ⑤完全丧失 |
| **活动状况** | ①很自如 | ②稍有减退 | ③明显减退 | ④严重减退 | ⑤完全丧失 |
| **感觉自己 健康状况** | ①很好 | ②比较好 | ③一般 | ④不太好 | ⑤很不好 |
| **医生确诊** | ①高血压 | ②心脏病 | ③胃肠病 | ④呼吸道病 | ⑤关节炎　⑥ |
| **自己感觉** | ①头痛 | ②眩晕 | ③胃肠不适 | ④呼吸困难 | ⑤心悸心慌　⑥ |

**2.您平时自己能不能独自完成下列日常活动？（不管平时做不做只要能做，只在一个对应程度空格里画〇）**

| 生活能力 | ①完全没 | ②稍有 | ③比较 | ④很困难 | ⑤完全不 | 生活能力 | ①完全没 | ②稍有 | ③比较 | ④很困难 | ⑤完全不 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 做饭 | | | | | | 交水电费 | | | | | |
| 洗衣服 | | | | | | 到银行存取钱 | | | | | |
| 打扫卫生 | | | | | | 读报刊读书 | | | | | |
| 按说明服药 | | | | | | 办理医疗费等手续 | | | | | |
| 剪指（趾）甲 | | | | | | 关心收集健康信息 | | | | | |
| 管理财物 | | | | | | 帮人出主意想办法 | | | | | |
| 打电话 | | | | | | 护理照顾病人 | | | | | |
| 乘公交车 | | | | | | 外出走亲访友 | | | | | |
| 去商店买东西 | | | | | | 使用手机发短信 | | | | | |
| 去医院看病 | | | | | | 使用计算机 | | | | | |

**3.您的居住与生活环境如何？**

| （1）住房与设备（只选择一个对应类型画上〇，设施和电器可以多选） | | |
|---|---|---|
| 住房产权 | ①自有产权 ②租借私房 ③租借公房 ④儿女家 ⑤其他 | 住房面积_____平方米 居住楼层_____层 |
| 住房设施 | ①厨房 ②室内厕所 ③煤气 ④自来水 ⑤浴室 ⑥阳台 ⑦庭院 ⑧电梯 ⑨其他_____ | |
| 家用电器 | ①电视机 ②影碟机 ③微波炉 ④洗衣机 ⑤电冰箱 ⑥住宅电话 ⑦手机 ⑧空调器 ⑨计算机 ⑩其他_____ | |

（2）生活方便程度与环境好坏程度（只在一个对应程度的空格里画〇）

| | ①很 | ②比较 | ③一般 | ④不太 | ⑤很不 | ⑥不 | | ①很好 | ②比 | ③一般 | ④不 | ⑤很 | ⑥不 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 出行乘车 | | | | | | | 安全状况 | | | | | | |
| 购物就餐 | | | | | | | 卫生状况 | | | | | | |
| 娱乐场所 | | | | | | | 绿化状况 | | | | | | |
| 医院看病 | | | | | | | 噪音状况 | | | | | | |
| 邻里聚会 | | | | | | | 邻里关系 | | | | | | |

4.您近一段时间的心情如何？（只在一个对应程度的空格里画〇）

| | ①每天 | ②经常 | ③有时 | ④很少 | ⑤从不 | | ①每天 | ②经常 | ③有时 | ④很少 | ⑤从不 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 您为一些小事担心 | | | | | | 您说话比平时少 | | | | | |
| 您不太想吃东西 | | | | | | 您觉得很寂寞、孤单 | | | | | |
| 您虽有家人亲戚的劝解，仍是觉得闷闷不乐 | | | | | | 您觉得您所做的每件事都很不顺利 | | | | | |
| 您觉得自己同他人一样好 | | | | | | 您热爱生命很享受人生 | | | | | |
| 您没办法专心做事 | | | | | | 您觉得很悲哀 | | | | | |
| 您觉得心情很不好 | | | | | | 您觉得别人不喜欢您 | | | | | |
| 您觉得未来充满希望 | | | | | | 您做事提不起精神 | | | | | |
| 您觉得很担心、害怕 | | | | | | 您觉得人人都不友善 | | | | | |
| 您睡不安稳 | | | | | | 您觉得这一生是失败了 | | | | | |
| 您觉得很快乐 | | | | | | 您曾经哭过 | | | | | |

5.您的得到的生活支持与帮助如何？

| （1）您的6种需求是否能够得到满足？（只在一个对应程度空格里画〇） | | | | | | | （2）主要由谁提供的帮助？ |
|---|---|---|---|---|---|---|---|
| | ①总是能得到 | ②大部分能得到 | ③有时候能得到 | ④很少得到 | ⑤从未得到 | ⑥自己不需要 | 可以多选并由多至少排序（将①—⑯的编号填在空格里） |
| 生病时的照顾护理 | | | | | | | |
| 家务料理 | | | | | | | |
| 金钱或实物帮助 | | | | | | | |
| 倾述心里话 | | | | | | | |
| 商量自己的重要事情 | | | | | | | |
| 外出陪伴 | | | | | | | |
| ①配偶 ②儿子 ③儿媳 ④女儿 ⑤女婿 ⑥孙子女 ⑦兄弟姐妹 ⑧其他亲戚 ⑨保姆 ⑩邻居 ⑪朋友同事 | | | | | | | |
| ⑫养老服务机构的服务员 ⑬社会组织的人 ⑭宗教组织的人 ⑮街道社区居委会的人 ⑯其他_____ | | | | | | | |

| （3）当上述①-⑪人员需要帮助时您能够给予帮助的人有谁？（将编号填在空格里，可多选） | ①总是给予帮助 | ②大部分时候给予帮助 | ③有时候给予帮助 | ④很少给予帮助 | ⑤不能给予帮助 | ⑥他们不需要 |
|---|---|---|---|---|---|---|
| | | | | | | |

6.您的精神文化休闲娱乐生活如何？（只在一个对应程度的空格里画上〇）

| | ①每天 | ②经常 | ③有时 | ④偶尔 | ⑤从不 | | ①每天 | ②经常 | ③有时 | ④偶尔 | ⑤从不 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 打麻将打牌 | | | | | | 买卖股票基金 | | | | | |
| 玩棋类 | | | | | | 买彩票 | | | | | |
| 酒吧囊玛厅 | | | | | | 使用计算机 | | | | | |
| 茶馆 | | | | | | 玩电子游戏 | | | | | |
| 在家看电视 | | | | | | 读书写作 | | | | | |
| 听广播乐曲 | | | | | | 看报纸杂志 | | | | | |
| 自己弹奏乐器 | | | | | | 书法绘画摄影 | | | | | |
| 唱歌跳舞 | | | | | | 收藏古董集邮 | | | | | |
| 电影院看电影 | | | | | | 设计服装做手工 | | | | | |
| 看藏戏听音乐 | | | | | | 养植花草 | | | | | |
| 散步 | | | | | | 饲养猫狗等宠物 | | | | | |
| 运动活动 | | | | | | 辅导孙子女学习 | | | | | |
| 转经 | | | | | | 与人聊天 | | | | | |
| 念经 | | | | | | 其他_____ | | | | | |

7.您的人际交往状况如何？

| （1）您与共同居住家人相处 | 您和同居家人的关系好坏 | | | | | 您和同居家人谈话沟通的频度 | | | | | 沟通交流联系方式（选择下列编号 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ①很好 | ②比较好 | ③一般 | ④不太好 | ⑤不好 | ①每天 | ②经常 | ③有时 | ④偶尔 | ⑤从不 | |
| 配偶 | | | | | | | | | | | |
| 儿子 | | | | | | | | | | | |
| 媳妇 | | | | | | | | | | | |
| 女儿 | | | | | | | | | | | |
| 女婿 | | | | | | | | | | | |
| 孙子女 | | | | | | | | | | | |
| 其他人_____ | | | | | | | | | | | |
| （2）您与非共同居住的周围人 | 您有几位在一起感到心情舒畅无话不谈 | | | | | 您和他们联系交流的频度 | | | | | ①面对面②电话③传真④手机短信 |
| | ①10 | ②7-9 | ③4-6 | ④1-3 | ⑤ 没有 | ①每天 | ②经常 | ③有时 | ④偶尔 | ⑤从不 | |
| 子女 | | | | | | | | | | | |
| 兄弟姐妹 | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 其他亲戚 | | | | | | | | | | | |
| 朋友 | | | | | | | | | | | |
| 邻居 | | | | | | | | | | | |
| 其他 | | | | | | | | | | | |

| (3) 您参与组织团体活动的情况 | ①每天 | ②经常 | ③有时 | ④偶尔 | ⑤从不 | 活动主要内容 |
|---|---|---|---|---|---|---|
| 您参加社区居委会组织的活动或者召开的会议吗？ | | | | | | |
| 您参加老年人一些娱乐休闲的集体活动吗？ | | | | | | |
| 您参加街道社区的公益活动吗？（如志愿者，帮人做好事） | | | | | | |
| 您参加家人亲朋好友一起外出二日以上的旅游吗？ | 年四次 | 年三次 | 年二次 | 年一次 | 从不 | |

8. 您家庭的收入与支出状况

| (1) 您家庭平均每月总收入（家庭的各种收入合计）大约是多少？_____（只在下面选择一个对应序号填入） |
|---|
| ①1000 元以下　②1000-1999 元　③2000-2999 元　④3000-3999 元　⑤4000-4999 元　⑥5000-5999 元 |
| ⑦6000-6999 元　⑧7000-7999 元　⑨8000-8999 元　⑩9000-9999 元　⑪10000 元以上 |
| (2) 您自己是否享有医疗保险：①有　②无； 住院个人负担_____%；门诊个人负担_____%；药房个人负担_____%； |
| (3) 您夫妻的主要来源平均月收入大约是多少？ |

| 基本收入 | 金额 | 兼职经营收入 | 金额 | 抚养费收入 | 金额 |
|---|---|---|---|---|---|
| 退休金收入 | | 兼职工资性收入 | | 儿子给您的赡养费 | |
| 低保金收入 | | 经营性收入 | | 女儿给您的赡养费 | |
| 抚恤金收入 | | 财产出租利息性收入 | | 其他的抚养费 | |

(4) 您夫妻的主要支出平均月费用大约是多少？

| 基本生活支出 | 金额 | 社交文化支出 | 金额 | 健康护理支出 | 金额 |
|---|---|---|---|---|---|
| 食品费用 | | 红白喜事等人情往来的费用 | | 住院治病个人负担费用 | |
| 衣着费用 | | 打麻将打牌等游戏的费用 | | 门诊治病个人负担费用 | |
| 家庭用品费用 | | 饭店就餐茶馆喝茶的费用 | | 药房买药个人负担费用 | |
| 交通费用 | | 看戏电影听歌等的费用 | | 民间治病个人负担费用 | |
| 手机电话通信费 | | 购买书籍报纸杂志等的费用 | | 血糖仪血压计助听器等医疗器械费用 | |
| 水电费用 | | 捐赠给寺庙等宗教活动费用 | | 老年人护理用品与护理人工的费用 | |

9. 您对目前自己的生活总体的满意程度如何？（只在一个对应空格里画〇）

| | ①很满意 | ②比较满意 | ③一般 | ④不太满意 | ⑤很不满意 | | ①很满意 | ②比较满意 | ③一般 | ④不太满意 | ⑤很不满意 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **对得到帮助** | | | | | | **对家庭收入支出** | | | | | |
| **对人际关系** | | | | | | **对居住与环境** | | | | | |
| **对娱乐活动** | | | | | | **对自己健康状况** | | | | | |
| **对自己婚姻** | | | | | | **对生活总体状况** | | | | | |
| **对子女孝敬** | | | | | | **您认为自己幸福** | ①很幸福 | ②比较幸福 | ③一般 | ④不太幸福 | ⑤很不幸福 |

10. 您目前的生活中有何困扰？

| |
|---|
| (1) 您在家庭收入与支出方面的主要困扰 |
| (2) 您在身体健康与心理方面的主要困扰 |
| (3) 您在人际关系与交往方面的主要困扰 |
| (4) 您在居住与生活环境方面的主要困扰 |
| (5) 您对老年人社会保障政策有什么建议 |

**谢谢您的合作，祝您身体健康阖家幸福**

# APPENDIX B: Questionnaires for Tama City

〒206-0024

様

# いきいきとした高齢者社会のためのアンケート調査 ―お願い

多摩市長　　鈴木邦彦

平素より多摩市の保健福祉行政に対しましては、格別のご理解・ご協力をいただき、ありがとうございます。

このたび、６５歳以上の全高齢者に対し、アンケート調査を実施いたします。この調査は、高齢者の生活実態を把握し、市の保健福祉計画策定に役立てるとともに、回答される方々が、「寝たきりや痴呆をできる限り遅らせ、生活の満足度と主観的な健康感を高め、日々生活に役割を持ち楽しく暮らす」ことの意義を再認識していただくことも、目的の一つに考えております。

今回の調査では、調査内容の検討から調査内容の分析等の作業について、東京都立大学都市研究所のご協力をいただいております。

皆様のご返送いただいたアンケートは、全てコンピュータにより統計分析し、本調査以外には使用いたしませんが、保健福祉制度の利用が必要と思われる方にはお声がけさせていただくことも考えております。

なお、一部の方々に対し、この調査を補完しより内容を高めるために、交通手段や住宅環境等の問題について訪問調査を考えております。ご協力をお願いいたします。

平成１３年９月２７日

## 記入方法

１．お答えは、番号　を○でかこんでください。　例－　１・２・③・４

２．調査票は、同封した封筒に入れ、１０月１２日までにご返送ください。

お問い合わせ

多摩市健康福祉部在宅福祉課

電話　３７５－８１１１内線2621

この調査票は、出来るだけ、ご本人がお答えください。ご本人がお答え出来ない場合にはご家族の方が記入されても結構です。その際は、ご本人の立場でお答えください。

問1　この調査はどなたが回答されましたか　　1）本人　2）本人以外の方

問2　ご本人以外が回答された場合は、その理由を選んでください。

1）多忙　2）病気・けが　3）入院中　4）不在
5）　　・理解力なし　　6）拒否　7）その他

問3　現在のお住まいに自分も含めて何人でくらしていますか？　　＿＿＿人

問4　現在、誰と一緒にくらしていますか？当てはまるすべてに○を囲んでください。

1）一人暮らし　2）配偶者（夫または妻）　3）子供
4）子供の嫁　5）孫　6）その他

問5　あなたのお住まいについておたずねします

5－1　現在のお住まいは、次のどれにあたりますか

1）戸建て住宅　2）集合住宅（1階～5階）　3）集合住宅（6階以上）

5－2　現在のお住まいは何階にあたりますか？　　[　　]階

5－3　現在のお住まいの所有形態は次のどれにあたりますか？

1）持ち家（分譲）　2）借家（賃貸）

5－4　現在のお住まいにエレベーターはありますか　　1）ある　2）ない

5－5　現在のお住まいには何年間住んでいますか？　　約＿＿＿＿年

5－6　現在のお住まいに今後も住み続けたいですか？

1）今の住居に住み続けたい　3）どちらでもない
2）できれば他の住居に移りたい

問6　あなたのお体の状態について、お尋ねします

6－1 最近、痛みを感じる所があれば、すべてに○をつけてください。

1）腰　2）膝　3）腕　4）足　5）首
6）肩　7）背中　8）その他　9）なし

6－2　あなたが、現在治療を受けている疾病がありますか、あてはまるものすべてに○をつけてください。

1）高血圧　2）脳卒中（脳梗塞、脳出血、くも膜下出血など）　3）糖尿病
4）心臓病（心筋梗塞、狭心症、不整脈など）　5）肝臓病　6）その他
7）なし

問7　普段から治療を受けたり健康について相談をする「主治医」について伺います。

7－1　主治医（歯科を除く）は、いらしゃいますか　1）いる　2）いない

7－2　主治医は多摩市にいらしゃいますか　1）多摩市内　2）多摩市外

7－3　その医師の診療科目は何ですか

1）内科　2）整形外科　3）外科　4）その他

7－4　歯科の主治医は、いらっしゃいますか　1）いる　2）いない

7－5　歯の主治医は多摩市にいらっしゃいますか　1）多摩市内　2）多摩市外

問8　あなたの生活機能や、生活の満足度、生活習慣について、お尋ねします。

8－1　自分で日用品の買い物ができますか？　1）はい　2）いいえ

8－2　自分で食事の用意ができますか？　1）はい　2）いいえ

8－3　自分でトイレに行けますか？　1）はい　2）いいえ

8－4　自分でお風呂に入れますか　1）はい　2）いいえ

8－5　自分で預貯金の出し入れができますか？　1）はい　2）いいえ

8－6　自分で年金や保険の書類が書けますか？　1）はい　2）いいえ

8－7　新聞や書物を読んでいますか？　1）はい　2）いいえ

8－8　一人で隣近所に外出ができますか？

1）一人でできる　2）介助がいればできる　3）できない

8－9　あなたが利用する主な交通手段はなんですか１つだけ○をつけてください

1）徒歩のみ　2）自転車　3）バイク　4）バス　5）タクシー

6）電車　7）自動車（運転）　8）自動車（同乗）　9）その他

8－10　外出した際の歩行時間はどれくらいですか？　約＿＿＿＿分

8－11　日中あなたは、寝床にどのくらい就いていますか

1）ほとんど床から離れている　2）離れている時間の方がやや長い

3）床についている時間の方がやや長い　4）ほとんど床についている

問9　あなたの生活満足度と日常生活習慣についておたずねします。

9－1　あなたはご自分で健康だと思いますか

1）とても健康である　2）まあまあ健康である

3）あまり健康ではない　4）健康でない

9－2　昨年とくらべて同様に元気だと思いますか？

1）はい　2）いいえ　3）どちらともいえない

9－3　あなたのご自身の生活に満足していますか

1）はい　　2）いいえ　　3）どちらともいえない

9－4　お酒を飲んでいますか

1）ほとんど飲まない　2）週1～2回　3）週3～4回　4）ほぼ毎日

9－5　タバコを吸っていますか

1）以前から吸わない　　2）やめた　　3）吸っている

問10　あなたの地域活動や趣味活動についてお伺いします。

10－1　地域活動やボランティア活動をしていますか

1）よくしている　　2）たまにする　　3）ほとんどしていない

10－2　趣味活動を積極的にされていますか

1）活発にしている　　2）活発ではない

10－3　上記で「活発でない」とお答えになられた方は、その理由をどのようにお考えですか、該当するものに○をつけてください（2つまで）

1）仲間はいるが活動の場がたりない　　2）活動費用の負担が大変である
3）自分の希望する活動が近くでされていない　4）新しい仲間がみつけられない
5）新しい人と交わるのは気後れする　　6）意欲が乏しい
7）忙しくて時間がない　　8）特に理由はない

問11　あなたの家庭環境と人間関係についてお伺いします。

11－1　外出することはどのくらいありますか

1）ほとんど毎日　　2）週3～4回　3）月に1回ぐらい　4）めったにしない

11－2　友人や近所の方とおつきあいをしていますか

1）ほとんど毎日　　2）週3～4回　3）月に1回ぐらい　4）めったにしない

11－3　身の回りにちょっとした用事やお使いをしてくれる人がいますか

1）沢山いる　　2）数人はいる　3）ほとんどいない　4）いない

11－4　去年1年間のあなた方（ご夫婦の合計）の収入はどのくらいでしたか（年金や仕送りも含めます）

1）なし
2）100万円未満
3）100～200万円未満
4）200～300万円未満
5）300～400万円未満
6）400～500万円未満
7）500～700万円未満
8）700～800万円未満
9）800～900万円未満
10）900～1000万円未満
11）1000万円以上
12）答えたくない。

福祉制度の充実について伺います

問１２　第２次多摩市健康福祉推進プランについて、お伺いします。特に充実させていくべきだと思われる施策をお選びください（２つまで）。また、新たな施策がある場合には具体的に記入してください。

１）健康づくり　　２）在宅ケア　　３）いきがいづくり
４）居住環境の整備　　５）施設の整備
６）具体的内容（　　）

問１３　お住まいの地域で暮らしつづけるうえで、どのようなサービスを充実させていくべきか、特に希望されるサービス（施策）をお選びください（２つまで）

１）外出時の移動を支援するサービス　２）緊急時の援助　３）生活費の援助
４）保健婦などの相談体制　５）高齢者向け住宅の充実
６）いきがい活動や自立を支えるサービス　７）趣味活動の場の確保
８）地域医療（往診やかかりつけ医）の充実
９）買い物の利便　１０）その他　１１）特に望むものはない

介護保険制度について　お伺いします。

問１４　あなたは、現在介護保険制度の要介護認定を受けていますか

１）受けていない　２）受けている

問１５　あなたは、現在介護保険サービスを受けていますか

１）受けていない　２）受けている

問１６　多摩市の６５歳以上高齢者の介護保険料は、所得に応じて５段階となっています。あなたのご意見をお聞かせください。

１）今と同じでよい
２）高額所得者からより多く徴収し、所得の低い人の保険料を安くしたほうが良い
３）所得の低い人の保険料を安くし、その分をみんなで負担し合うのが良い
４）その他（　　）
（所得の低い人とは市民税が課税されていない世帯に属す方などをいいます。）

ご協力　ありがとうございました。

このアンケート調査につきましては、今後の高齢者施策を検討していく上で、大変重要な資料になると考えております。集計の過程では、市が所有している資料を活用し、より有意義なものにしていきたいと考えております。

また、回答内容を見せて頂く中で、市の保健福祉サービスの対象と思われる方々には、ご案内をさしあげたいと考えておりますので宜しくお願いいたします。

# いきいきした高齢社会のためのアンケート調査のお願い

多摩市長　渡辺　幸子

平素より、多摩市の福祉行政に格別のご理解、ご協力をいただきありがとうございます。

このたび、多摩市では、高齢者の生活実態を把握し、一人ひとりの方が健康で、いきいきと暮らせる施策の充実を図るため、市内にお住まいの６５歳以上の皆様に対しアンケート調査を実施いたします。

この調査は、多摩市の高齢者保健福祉計画及び介護保険事業計画を策定するための貴重な資料となるとともに、「寝たきりや痴呆をできる限り遅らせ、健康で楽しく暮らす」ための重要な調査と考えております。また、地域の中で安心して生活していただけるよう、支援を必要とする方が気軽に相談いただける仕組みづくりに役立ててまいりたいと考えております。

なお、調査の中で答えたくない質問があれば、無理にお答えいただく必要はありません。そのまま次の質問にお進みください。

また、途中までのご回答でも結構です。なお、本調査にご協力いただけない場合でも、不利益が生じることはありません。

今回の調査は、東京都立大学都市研究所と共同で実施しており、皆様にご回答いただいたアンケート結果は、全てコンピュータで数量的に処理し、統計分析いたしますので、個人情報が外部に漏れることはありません。また、本アンケートの調査結果は、調査の目的以外には使用いたしません。

以上の趣旨等をご理解いただき、アンケート調査にご協力のほど、よろしくお願い申し上げます。

平成１６年９月６日

**記入方法**

1　ご回答は番号を○で囲み、（　　）内に数字か文字をご記入ください。
2　この調査票は、できるだけご本人がお答えください。
3　ご本人が回答できない場合には、ご家族の方が記入されても結構ですが、ご本人の立場でお答えください。

● 調査票は、ご記入の上、このまま同封の返信用封筒に入れ、**9月24日までにご投函ください。**

● お問い合わせ先　　多摩市健康福祉部高齢福祉課　高齢福祉係
電話　042－338－6807
（**問16～問28については**）介護保険課　介護保険係
電話　042－338－6901

# 調査票

（ここから調査開始です）

問１　あなたご自身についてご記入ください。

| | | |
|---|---|---|
| １　年齢 | 満（　　）歳 | 平成16年９月１日現在 |
| ２　性別 | １）男性　　２）女性 | |
| ３　身長 | （　　）センチメートル | 肥満度を算定します |
| ４　体重 | （　　）キログラム | |

問２　回答された方におたずねします

問２－１　この調査はどなたが回答されましたか。

１）本人　　２）本人以外

問２－２　ご本人以外が代理回答された場合は、その主な理由を<u>１つ</u>○で囲んでください。

１）多忙　　２）病気・けが　　３）入院・入所中　　４）不在
５）痴呆・理解力なし　６）聴力障害　７）視力障害　８）言語障害
９）答えたくない　10）その他（　　）

問３　ご家族のことをおたずねします。

問３－１　現在、誰と一緒にくらしていますか？該当する<u>すべて</u>を○で囲み、<u>合計人数</u>もご記入ください　※２世帯住宅は同居に含みます。

１）一人暮らし　　２）配偶者　　３）子供　　４）孫　　５）親
６）兄弟姉妹　　７）その他（　　）

合計人数（　　）人　　※ご自分を含めた人数です

問３－２　身の回りの世話や用事をしてくれる人はどなたですか？
該当する<u>すべて</u>を○で囲んでください。

１）家族・親族　２）友人　３）近所の人　４）ホームヘルパー
５）その他　　６）なし

問３－３　緊急時に連絡の取れる方はいらっしゃいますか。

１）いる　　２）いない

問３－４　もし震災が起きたら、近くの一時避難場所まで避難できますか。

１）自分でできる　　２）介助があればできる　　３）できない

問４　お住まいについておたずねします。

問４－１　現在のお住まいは、次のどれにあたりますか。

１）集合住宅（エレベータなし）　　２）集合住宅（エレベータあり）
３）戸建て住宅・２階建てタウンハウス

問４－２　<u>問４－１で１）の集合住宅（エレベータなし）にお住まいの方</u>に、居住階や転居希望についておたずねします。

・居住階は何階ですか？（　　）階
１）できれば低層階に移りたい　　２）いまのままで良い

問４－３　現在のお住まいは、次のどれにあたりますか。

１）持ち家　　２）借家

問４－４　現在のお住まいに今後も住み続けたいですか。

１）今の住居に住み続けたい　　２）できれば他の住居に移りたい
３）どちらとも言えない

問５　「かかりつけ医」やお体の状態についておたずねします。

問５－１　治療や健康について相談をする「かかりつけ医」がいますか？

１）いる　　２）いない

問５－２　現在治療を受けている病気の<u>すべて</u>を○で囲んでください。

１）高血圧　　２）脳卒中（脳梗塞、脳出血、くも膜下出血など）
３）糖尿病　　４）心臓病（心筋梗塞、狭心症、不整脈など）
５）肝臓病　　６）高脂血症　　７）がん　　８）うつ病　　９）痴呆
10）虫歯・歯周病　　11）胃腸病　　12）目の病気（白内障など）
13）骨・関節の病気（骨粗鬆症、関節症など）
14）呼吸器系の病気（気管支喘息、慢性気管支炎など）
15）その他（　　）　　16）なし

問５－３　過去１年間に入院したことがありますか。

１）はい（病名　　）（延べ入院日数　　日間／年）
２）いいえ

問５－４　最近、痛みを感じる所があれば、すべてを○で囲んでください。

１）首　　２）肩　　３）腕　　４）背中　　５）腰　　６）膝
７）足　　８）その他（　　）　　９）なし

問５－５　問５－４で痛みを感じる所があった方におたずねします。
最も痛い場所の痛みの程度を、１つだけ○で囲んでください。

１）弱い痛み　２）中程度の痛み　３）強い痛み　４）最悪の痛み

問５－６　過去１年間に転倒や、転倒に伴う骨折をしたことがありますか。

１）骨折なしの転倒　　２）骨折ありの転倒　　３）転倒なし
※転倒した場所はどこですか　（１）家の中　（２）家の外

問５－７　過去１年間に体重の変化がありましたか。

１）約（　）キロ増加した　２）約（　）キロ減少した　３）変化なし

問６　ふだんの生活についておたずねします。

| | |
|---|---|
| １.自分で日用品の買い物ができますか。 | １)はい　２)いいえ |
| ２.自分で食事の用意ができますか。 | １)はい　２)いいえ |
| ３.自分でトイレに行けますか。 | １)はい　２)いいえ |
| ４.トイレが間に合わず失禁することがありますか。 | １)はい　２)いいえ |
| ５.自分でお風呂に入れますか。 | １)はい　２)いいえ |
| ６.自分で預貯金の出し入れができますか。 | １)はい　２)いいえ |
| ７.自分で請求書の支払いができますか。 | １)はい　２)いいえ |
| ８.自分で年金や保険の書類が書けますか。 | １)はい　２)いいえ |
| ９.新聞や書物を読んでいますか。 | １)はい　２)いいえ |
| 10.続けて１キロぐらい歩くことができますか。 | １)はい　２)いいえ |
| 11.転ぶのが怖くて外出を控えることがありますか。 | １)はい　２)いいえ |
| 12.健康についての記事や番組に関心がありますか。 | １)はい　２)いいえ |
| 13.友人の家を訪ねることがありますか。 | １)はい　２)いいえ |
| 14.家族や友人の相談にのることはありますか。 | １)はい　２)いいえ |
| 15.病人を見舞うことはできますか。 | １)はい　２)いいえ |
| 16.若い人に自分から話しかけることはありますか。 | １)はい　２)いいえ |

問７　運動やスポーツの習慣についておたずねします。

問７－１　運動やスポーツをどの位していますか。

１）ほぼ毎日　　２）週３～４回位　　３）週１～２回位
４）月１～２回位　　５）していない

問７－２　１日の平均的な運動時間や、定期的にするようになってどの位ですか。（問７－１で５）に回答した方を除く）

平均（　　）分位/日　　継続期間（　　）年位

問７－３　運動やスポーツを行う際の仲間はいますか。（問７－１で５）に回答した方を除く）

１）10 人以上の人と　　２）数人の人と　　３）いない

問８　現在の食生活ついておたずねします。

問８－１　次の項目ごとに摂取回数を１つ○で囲んでください。

| | 毎日食べる | 週5~6日 | 週3~4日 | 週1~2日 | 食べない |
|---|---|---|---|---|---|
| １．肉料理 | 1 | 2 | 3 | 4 | 5 |
| ２．大豆食品（豆腐・納豆など） | 1 | 2 | 3 | 4 | 5 |
| ３．卵・卵料理 | 1 | 2 | 3 | 4 | 5 |
| ４．背の青い魚（サバ・サンマなど） | 1 | 2 | 3 | 4 | 5 |
| ５．乳製品（牛乳・ﾁｰｽﾞ・ﾖｰｸﾞﾙﾄなど） | 1 | 2 | 3 | 4 | 5 |
| ６．果物 | 1 | 2 | 3 | 4 | 5 |
| ７．野菜料理（生野菜、煮物など） | 1 | 2 | 3 | 4 | 5 |
| ８．塩蔵品（塩サケ・漬物・梅干など） | 1 | 2 | 3 | 4 | 5 |
| ９．味付けの濃い物 | 1 | 2 | 3 | 4 | 5 |
| 10．油を使う料理（揚げ物、炒め物等） | 1 | 2 | 3 | 4 | 5 |
| 11．朝食 | 1 | 2 | 3 | 4 | 5 |
| 12．おやつ・間食 | 1 | 2 | 3 | 4 | 5 |

問８－２　１日の食事回数は何回ですか。

１）１回　　２）２回　　３）３回　　４）４回以上

問８－３　ひとりで食事をする回数は、１日のうち何回ですか。

１）３回以上　　２）２回　　３）１回　　４）１回もない

問９　健康感や日常の生活習慣についておたずねします。

問９－１　ご自分で健康だと思いますか。

１）健康である　　２）まあまあ健康である
３）あまり健康ではない　　４）健康でない

問９－２　昨年とくらべて元気だと思いますか。

１）はい　　２）いいえ　　３）どちらともいえない

問９－３　現在の生活に満足していますか。

１）はい　　２）いいえ　　３）どちらともいえない

問９－４　お酒はどの位飲んでいますか。

１）ほぼ毎日飲む　　２）週３～４回位飲む
３）週１～２回位飲む　　４）ほとんど飲まない

問９－５　タバコを吸っていますか。

１）吸っている　　２）やめた（　　年前）　　３）以前から吸わない

問９－６　<u>問９－５で１）又は２）とお答えになった方</u>におたずねします。

喫煙本数：１日平均（　　）本程度（だった）
喫煙期間：お よ そ（　　）年

問９－７　昼間寝床から離れていますか。

１）ほとんど寝床から離れている　　２）寝床から離れている時間の方が長い
３）寝床についている時間の方が長い　　４）ほとんど寝床についている

問９－８　毎日、大体何時間の睡眠（昼寝を含む）をとっていますか。

１）６時間未満　　２）６時間～９時間未満　　３）９時間以上

問９－９　毎日の生活でイライラやストレスを感じていることがあれば、
あてはまるもの<u>すべて</u>を○で囲んでください。

１）人間関係（家族・親戚など）　　２）仕事上のこと
３）自分や家族の健康　　４）家族の介護　　５）住居
６）子供・孫の育児・教育　　７）近所づきあい　　８）なし
９）その他（　　）

問１０　地域活動や楽しみや生きがいについておたずねします。

問１０－１　地域活動やボランティア活動をしていますか。

１）している　　２）たまにする　　３）ほとんどしていない

問１０－２　<u>問１０－１で２）又は３）とお答えになった方</u>におたずねします。活動しづらい理由があれば、<u>主な理由を２つ</u>○で囲んでください。

| | |
|---|---|
| １）活動の場が少ない | ２）活動費用がかかる |
| ３）希望する活動がない | ４）仲間がみつけられない |
| ５）人と交わるのは気後れする | ６）意欲がわかない |
| ７）時間がない | ８）何をしていいか分からない |
| ９）出かけるのがおっくう | 10）特に理由はない |

問１０－３　楽しみや生きがいは何ですか、あてはまるものを<u>５つまで</u>○で囲んでください。

１）運動・スポーツ、あるいは散歩など体を動かすこと
２）趣味・娯楽・読書　　３）知人や友人・近所とのつきあい
４）サークル・地域活動
（町会、高齢者クラブ、ボランティア・社会貢献などへの参加）
５）旅行など　　６）家族との団らん
７）仕事（アルバイト、内職を含む）　　８）孫・ひ孫の世話
９）生涯学習（パソコン・俳句・英会話など）
10）家庭菜園　　11）園芸　　12）森や樹木とのふれあい
13）ハイキング　　14）登山　　15）とくにない
16）その他（　　）

問１１　生活環境についておたずねします。

問１１－１　一人で隣近所に外出ができますか。

１）できる　　２）介助があればできる　　３）できない

問１１－２　バスや電車を使って一人で外出できますか。

１）できる　　２）介助があればできる　　３）できない

問１１－３　日常的に利用している主な交通手段を<u>２つ</u>○で囲んでください。

| | | | |
|---|---|---|---|
| １）自転車 | ２）バイク | ３）バス | ４）タクシー |
| ５）リフト付き福祉タクシー | ６）電車・モノレール | | |
| ７）自動車（自分で運転） | ８）自動車（同乗） | | |
| ９）その他（　　） | 10）なし | | |

問１１－４　外出回数（隣近所を含む）は、どのくらいですか。

１）ほぼ毎日　　２）週３～４回位　　３）週１～２回位
４）月２～３回以下　　５）月１回以下

問１１－５　友人や近所の方とのお付き合いをしていますか。

１）ほぼ毎日　　２）週３～４日　　３）週１～２日　　４）月３回以下

問１１－６　近くに、ちょっとした用事やお使いをしてくださる人がいますか。

１）たくさんいる　　２）数人いる　　３）ほとんどいない　　４）いない

問１１－７　昨年１年間の収入はどのくらいでしたか。

１）ご本人（　　）万円　　２）配偶者（　　）万円
３）答えたくない

問１１－８　経済的に満足していますか。

１）満足している　　２）まあまあ満足している
３）あまり満足していない　　４）満足していない

問１１－９　現在、収入のあるお仕事をしていますか。

１）している　　２）していない

問１１－１０　<u>問１１－９で１）とお答えになった方</u>へ、収入になる仕事をされる日数は何日ですか。

１）ほぼ毎日　　２）週３～４日位　　３）週１～２日位
４）月２～３日　　５）月１日以下

問１１－１１　最後に卒業した学校はどちらですか。該当する番号を○で囲んでください。　　※（　　）内は就学年数

１）尋常小学校（６）　　２）旧制高等小学校（２または３）
３）実業学校（３）　　４）旧制中（女）学校（４または５）
５）旧制専門学校（４）　　６）新制小学校
７）新制中学校　　８）新制高等学校
９）専門学校　　10）短期大学　　11）大学（旧制も含む）
12）大学院　　13）その他　　14）学校にはいかなかった
15）答えたくない

問１２　自分が年を重ねることについて、どう思われますか。

問１２－１　自分の考えに近いものを、**１つ**○で囲んでください。

１）良いことだ　　２）良くないことだ　　３）どちらともいえない

問１２－２　自分の役割について、年を重ねるにつれてどのように感じていますか。当てはまるものを**１つ**○で囲んでください。

１）重要になった　　２）あまり変わらない　３）重要でなくなった

問１３　「病気は、自分自身で気をつけることで、防ぐことができる」といった考え方について、どのように思われますか?
当てはまるものを**１つ**○で囲んでください。

１）その通りである　　２）そうではない　　３）どちらともいえない

問１４　市の福祉についておたずねします。

問１４－１　在宅介護支援センターをご存じですか？

１）知っている　　２）知らない

問１４－２　いきがいデイサービスセンターをご存じですか？

１）知っている　　２）知らない

問１４－３　市で特に充実させるべき高齢者福祉に関する施策は次のどれですか。**３つまで**選んでください。

１）在宅介護支援センター等身近な相談窓口
２）見守り・ささえあい施策
３）介護予防・筋力向上トレーニング教室の開催
４）会食・食事配達サービス　　５）外出支援・移動サービス
６）痴呆に関する学習会　　７）成年後見制度に関する学習会
８）住宅の住み替え促進施策
９）その他（＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）
（＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）

問１５　一人暮らし、または高齢者のみの世帯の方におたずねします。

問１５－１　緊急連絡先を、市役所または在宅介護支援センターに伝えることを希望されますか？

１）はい　　２）いいえ

問１５－２　健康や介護などのことで、市役所または在宅介護支援センターにご相談したいことがありますか？

１）はい　　２）いいえ

**ここからの質問（問16から問28）は、要介護認定（要支援認定含む）を受けている方に伺います。**
**要介護認定を受けていない方は、以上で質問は終了となります。最後のページ下段をご覧ください。**

問１６　現在、本人が認定されている要介護度は、次のうちどれですか。

１）要支援　　２）要介護１　　３）要介護２　　４）要介護３
５）要介護４　　６）要介護５

問１７　現在、要介護認定を受けているご本人は、８月中に介護保険サービスを利用しましたか。

１）利用した　　２）利用していない

問１８　問１７－で２）とお答えになった方へ、介護保険サービスを利用しない理由はなんですか。主な理由を１つ○で囲んでください。

１）家族で介護しているので、制度を利用する必要がない
２）利用したいサービスがない
３）利用者負担がかかるため、利用したくても利用できない
４）サービス利用の方法や手続きがよくわからない
５）治療が必要なため、医療機関へ入院している

問１９　ケアプランのことについておたずねします。現在のケアプラン（サービスの利用内容）について、満足していますか。

１）とても満足している　　２）まあまあ満足している
３）あまり満足していない。　　４）不満である

問２０　問１９で３）又は４）とお答えになった方へ、ケアプランに不満な理由はなんですか。該当するすべてを○で囲んで下さい。

１）本人や家族の希望が反映されていない
２）希望した回数や時間が確保されていない
３）希望したサービスが入っていない
４）希望しないサービスが入っている
５）希望する事業者のサービスが入っていない

問２１　ケアプランを作成するときに**誰に相談しましたか。**
**該当するすべてを**○で囲んで下さい。

１）ケアマネジャー
２）家族
３）友人・知人
４）誰にも相談しないで、本人だけで作成した
５）ケアマネジャーが本人に相談なく勝手に作成した
６）家族が本人に相談なく勝手に作成した

問２２　ケアマネジャー（ケアプランを作成する事業者）をどのようにして選びましたか。あてはまるものを**１つだけ**○で囲んでください。

１）介護保険になる前から利用していた事業者
２）市から提供された事業者名簿「Ｗｅ　ａｒｅ　ケアマネジャー」（ケアマネジャー写真入りパンフレット）を参考にして選んだ
３）新聞の折込や事業者からの宣伝、ダイレクトメール（ハガキなど）を見て
４）知人、友人からの情報（クチコミなど）で選んだ
５）在宅介護支援センターの職員から話を聞いて選んだ
６）家族が選んできた

問２３　担当のケアマネジャーをかえることができるのを知っていますか。どちらかを○で囲んでください。

１）知っている　　２）知らなかった

問２４　現在の担当ケアマネジャーは本人にとって何人目ですか。
どちらかに○を囲んでください。

１）初めて（１人目）　　２）２人目以上

問２５　**問２４で２）とお答えになれた方**へ、
ケアマネジャーがかわった（かえた）理由は何ですか。
主な理由を**１つだけ**○で囲んでください。

１）ケアマネジャーと意見が合わなかったため
２）ケアマネジャーが適切なサービスをしてくれなかったため
３）ケアマネジャーはよくやってくれたが、事業所の都合のため
４）本人の都合のため。（転居、入院等）

問２６　ケアマネジャーは、少なくとも月に１回以上は利用者のお宅を訪問することとなっていますが、現在のケアマネジャーは月に１回以上は訪問に来ていますか。あてはまるものを**１つだけ**○で囲んでください。

１）月１回以上は、訪問に来てくれている
２）２ケ月に１回位は、訪問に来てくれている
３）３ケ月に１回位は、訪問に来てくれている
４）全くと言っていいほど、訪問には来てくれていない

問２７　介護保険の「利用票」をケアマネジャーから受け取っていますか。あてはまるものを**１つだけ**○で囲んでください。

１）受け取っている　　２）受け取っていない　　３）わからない

問２８　ケアマネジャーと契約を結ぶとき，契約の内容等について説明がありましたか。あてはまるものを**１つだけ**○で囲んでください。

１）本人にわかりやすい説明があった
２）本人には、むずかしかったが一応の説明はあった
３）本人には、説明はなく、ケアマネジャーに言われるままに契約した
４）家族が契約したのでよくわからない

これで質問は終了です。長い時間ご協力いただきまして、誠にありがとうございました。
恐れ入りますが、記入ミス・記入もれがないか、もう一度お確かめの上、同封の返送用封筒に回答票（アンケート用紙）を入れ、ご投函ください。

福祉や介護のことでご相談がありましたら、
多摩市役所　高齢福祉課　相談支援担当（電話　３３８－６８４６）
までお電話ください。