

**Effects of Socioeconomic Position, Health Status, Family Relations on
Life Satisfaction among the Elderly in South Korea**

Min-Soo Jung, MPH, PhD student

Gil-Yong Kim, MPH PhD student

Byong-Hee Cho, PhD

Graduate School of Public Health, Seoul National University, Korea

Corresponding author: Prof. Byong-Hee Cho

Address: School of Public Health, Seoul National University

28 Yeongeon-dong Jongno-gu Seoul 110-799, South Korea

Tel: 82-2-3668-7877

Fax: 82-2-745-9104

E-mail: chob@snu.ac.kr

Abstract

Objectives: Older adults with chronic diseases have the lower life satisfaction and years of life remaining in the status of an aging society, South Korea since 2000. They are placed in the lack of family contacts and poorer health insurances, and economic disadvantaged condition as well. This study investigates family types and the level of health insurance of them and their impacts on life satisfaction.

Methods: Data were obtained from 2006 Korean Longitudinal Study of Ageing. Sample of this study consists of 3,960 Koreans aged 65 years or older have at least one chronic disease. We will measure effects of family types and health insurance conditions on life satisfaction controlling for respondent's socioeconomic factors.

Results: Lower life satisfaction might be significantly associated with small family scale and lower social contacts. In case children and spouse don't co-reside with them particularly, highly significant association with chronic disease prevalence rate and older adults have no family support would be demonstrated. The difference was found in life satisfaction as a level of health insurance with controlling for utilization of medical facilities.

Conclusions: Aging is the common social issue of most countries in East Asia. Consequently, it is required that care givers are divided into personal or family burden and social burden. Life satisfaction and life expectancy related to these two factors of an advanced age population with chronic diseases could be the evidence of policy intervention approach. Lack of social support and medical accessibility increases fragility and disturbs well-being in senescence.

Key words: *The Elderly, Quality of Life, Chronic Disease, Socioeconomic Position, Social Support*

Introduction

Health outcomes, measurements to evaluate the effects of medical care and interventions, used to be determined based on survival rate or life expectancy, but nowadays, acceptance is growing for the argument that conducting an investigation into an holistic quality of life is also important, in addition to quantitative data (Park et al, 2002). As a result, various measures were developed to estimate quality of life (Fayers and Machin, 2000).

A search through the website www.QOLID.org uncovers many survey tools translated into Korean for testing reliability and validity, such as COOP-Charts (Coop-C), Ferrans and Powers Quality of Life Index-Generic version (QLI), a 12-Item Short Form of the Medical Outcome Study (SF-12), a 36-Item Short Form of the Medical Outcome Study (SF-36), EuroQoL (EQ-5D), as well as the WHOQoL (World Health Organization's Quality of Life) and its brief-version.

As the WHO has already defined, "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", notions of health and quality of life are identical (Neugarten and Havighurst, 1961). They put the emphasis on life satisfaction and factors concerning happiness. The concept of life satisfaction, which was formed in advance of the quality of life concept, inquires into a general sense of well-being and meaning. The study of quality of life, thus, must establish constituent determinants of quality of life, subjective happiness, and hypothesis testing by developed measures. More and more research on gerontology is being carried out, particularly concerning the notion of satisfaction (Coke and Twaite, 1995). Senescence is the period during which one faces new living conditions after retirement, and requires the social support of family or acquaintances to cope with illness and isolation. According to studies up to now, especially on the quality of life, the most major determinants of quality were associated with health, because the elderly were most concerned with issues related to health problems (Nussbaum and Sen, 1993). The reality is that physical health influences one's life satisfaction, and there is a vicious cycle in which low satisfaction exerts an adverse effect on mental health. Therefore, older adults need constant attention.

Asia has aged dramatically over the past 10 years (Ho et al., 2001; Cheng et al., 2002). Korea is no exception. The population rate of those aged 65 years or older was 3.1% of the entire population in 1970, but it reached 7.2% in 2000 and is expected to be above 14% by 2018 when Korea will become an aged society

(KNSO, 2005). The rapid increase in the size of this portion of the population has contributed to a variety of changes in social security systems for increased healthcare expenditures and pensions, and has caused a rise in the morbidity rate of those with chronic diseases such as cardiovascular disease. While an aged society is arriving, merely studying the life satisfaction of the aged is not sufficient. Because those comprising senescent populations are apt to be isolated due to their negative self-identification, this could have a negative effect on social unity (Kim, 2003). The purpose of this study is to understand senescence through colorful determinants concerning the life satisfaction of the elderly, in order to provide basic information for healthcare and welfare policy provision of countries which are about to become aged societies.

Theoretical backgrounds

There is general yet significant relationship between socioeconomic position and individual health status. The higher the socioeconomic position the higher the health status, and conversely, those in a lower socioeconomic position are more likely to have significantly higher mortality, morbidity and disability rates (Kabir, 2003; Jiang, 2002; Liang, 2001; Zimmer, 2001; Liang, 2000). Socioeconomic position impacts health directly, and it indirectly influences health by affecting accessibility to healthcare, living conditions and work (Marmot, 2002). Besides being influenced by health related behaviors such as eating habits, smoking and drinking, those in high socioeconomic positions have a higher understanding of and participation in behaviors that promote health (Lynch, 1996; Lantz, 2001). Previous studies of determinants of the degree of disability and the health status of the elderly focused on sex, age, and disease, while socioeconomic position was considered a confounding variable (Pope, 2001). Moreover, there have been studies on the relationship between socioeconomic position and health for general adults (Beydoun, 2005). However, there are not many studies highlighting the elderly, and most of them emphasize aspects of lifestyle as it relates to their socioeconomic position. Studies have to consider characteristics specific to the elderly (chronic disease, retirement, change in social role, care, age-identity etc).

Therefore, we need to analyze various satisfaction-determining factors specific to the elderly population. In addition, it important to clearly establish the relationship between satisfaction and health while considering the differences after we select satisfaction as the dependant variable so as not to have yet another

study about the quality of life. The characteristic of health is more likely to be attributed to individuals than to socioeconomic position. Furthermore, health can be established as the intermediate factor that affects satisfaction of one's socioeconomic position, by considering the level of life satisfaction. In other words, we need to understand socioeconomic position as a 'root cause' (Link and Phelan, 1995). This issue is of vital importance because it is about whether or not the differences in level of satisfaction are due to aging and disease or to socioeconomic inequity.

Similar studies are found even in Korea. Existing studies show that the health status of the elderly depends on their socioeconomic position and physical health, and more importantly on their relationship with their family. A positive family relationship (degree of social support) improves one's psychological satisfaction and physical health by exerting various mediating and indirect effects on the mechanisms of health, but does not exert a major effect (Kim and Choi, 2000; Kim et al., 2005; Cho, 2005; Kim and Park, 2006). The higher the capacity one has in participating in the activities of daily living, the higher one's 'self-efficacy' (Jang, 2006) is, and higher self-efficacy is related to subjective health status. Another study indicates that greater social support is associated with higher subjective health status and self-efficacy. There is also a significant difference between subjective health status and objective health status concerning the degree of social support for the elderly. A higher number of the elderly with poor social support had a chronic disease as one of the primary indicators addressing objective health status than those with a higher degree of social support (Kim, 2004; Kim, 2006).

More research will not only help us put forward alternative policy possibilities for the elderly in society but also provide opportunities to investigate the multiplicity of lifestyles of the elderly by understanding their level of life satisfaction in an aging society. Although there may exist a causality bias between health outcome and socioeconomic position, life satisfaction, as distinguished from health status, is not the same issue because it refers to the current status and subjective perceptions concerning a variety of factors. And, from the results of this study, we can identify the differences between subjective health status and life satisfaction.

Methods

1. Study population

Data were obtained from KLoSA (Korean Longitudinal Study of Ageing) of the Korea Labor Institute. The purpose of KLoSA is to collect the basic data needed to devise and implement effective social and economic policies to address the trends that emerge in the process of population ageing and systematic build-up of data that can track individuals' labor participation, income and asset status, spending patterns, retirement decisions, impact of social welfare, health, and intra-family transfer of income, and so on. Members of the middle/old aged population (45 years or older¹⁾) were surveyed nationwide, except for Jeju Island. KLoSA surveyed 10,254 participants from 6,171 households in 999 districts in the first baseline survey. The average number of participants per household was 1.7. The basic KLoSA survey will be conducted every even-numbered year, and it started in 2006, mostly using the same survey categories. In addition, after starting in 2007, surveys under special topics not included in the basic survey will be conducted. The first KLoSA baseline survey was conducted over a 6-month period starting in July 2006, and KLoSA adopted Computer Assisted Personal Interviewing (CAPI) as its interview method.²⁾ To match the criteria in international comparative studies on population ageing, the survey categories and topics under the Basic Survey have been drafted in reference to the U.S., UK and European versions of the panel study. Topics under KLoSA are grouped into the following 7 main categories: demographics, family, health, employment, income, assets, subjective expectations, and satisfaction.

The methodological specificities of KLoSA are as follows:

First, the sampling frame of KLoSA comprises enumeration districts (EDs), as identified in the 2005 census by the National Statistical Office_{es}. Under this

1) Many surveys of elderly people in other countries include those aged 50 and over. But KLoSA extends its population to those aged 45-49 because career changes in these middle ages have become an important social issue since the financial crisis in later 1990s, with many people in their late 40s having been laid off from their career jobs. This extended population also enables examination of the relationship between economic activity in the middle ages with that in older ages, and with later life in general (<http://www.kli.re.kr>).

2) KLoSA has adopted Computer Assisted Personal Interviewing (CAPI) as its interview method, rather than one of the conventional methods for social surveys, such as Paper and Pencil Interviewing (PAPI). Interviewers read out questions to respondents from screens and enter their responses immediately. CAPI is often used for large-scale and repetitive public surveys in many Western countries. KLoSA has a long and complicated questionnaire and conducts a repetitive survey for a long-term over a large-scale sample. CAPI is therefore considered to be most appropriate. The processing and interviewing system for CAPI is Blaise, which was developed by Statistics Netherlands in 1986. Detailed information about Blaise can be found at its homepage (<http://www.blaise.com/onlinehelp>).

framework, the number of apartment EDs and ordinary housing (non-apartment) EDs totaled 261,237, excluding island areas and institutions (social welfare facilities). For Wave One, 1,000 sample EDs were selected, with the aim of securing a maximum valid sample size of 10,000 persons, from six households per sample ED. This was decided on the basis of the fact that the average number of household members aged 45 and over was 1.67 in the 2000 census.

Second concerns the use of weighting. In general, sample surveys aim to correctly estimate the parameters of the population, e.g. its mean, ratio, etc. However, the sample design of KLoSA was not based on equal probability sampling. Instead, it was based on systematic sampling, after samples had been allocated first by region (city or province) and then by type of housing (apartment or ordinary housing, i.e. non-apartment). Under this approach, parameter estimations based on the simple mean or the ratio of the sample can be biased. In order to produce unbiased estimators, we used weighting, which takes into account the selection probabilities and response rates of each sample. The benchmark adjustment based on other types of external information also needs to be considered. Even if each sample has the same selection probability, we must consider unit non-response as well as item non-response rates. Additionally, if the information received at the time of a survey is not same as that considered initially when designing the sampling, the benchmark weight adjustment must be considered so that the parameters can be properly estimated. In short, KLoSA uses weighting in order to produce unbiased parameter estimators. The weighting formula is $\text{Weight} = \text{a reciprocal of sampling rate}^*$, $\text{a reciprocal of response rate}^*$, and benchmarking weight.

In this study, we combined the individual data with the household data of the elderly to use for analysis. The total number of participants 65 years or older was 7,574; 4,155 males and 2,419 females.

2. Variable explanation and measurement tools

Explanatory variables included demographic factors (age and marital status), socioeconomic factors (education, economic satisfaction, and the number of living sons and daughters)³⁾, health related behaviors (physical activity, smoking, and drinking), health status (chronic diseases, depression, ADL, cognitive function score, and satisfaction with health status), social security (health insurance and private

3) Economic satisfaction and number of living sons and daughters are alternative variables each of income level and household size.

insurance), family variables (satisfaction with relationship with sons and daughters, and socioeconomic position of the children's generation) and social participation and residence (participation in social activity and size of residence). Binomial variables were sex (reference: male), marital status (reference: none), chronic diseases (reference: without chronic disease), depression (reference: without depression), health insurance/medical aid (reference: recipient of medical aid), and private insurance (reference: purchasing). The response variable is a scale of life satisfaction. This study model was based on the "Life Satisfaction Model" by Coke and Twaite (1995), and it complimented and was modified for the conditions in Korea. CES-D10, MMSE-K, and the cognitive function score were calculated and suggested by KLoSA. The validity and reliability of each of these measurement tools were tested.

3. Method

The analysis procedures were as follows: First, we identified characteristics of the elderly sample as sorts of variables, and examined and recorded the status of the elderly with chronic diseases by descriptive statistics. Second, we diagnosed the mean difference among the main variables using a T-test. Third, we applied multiple regression analysis in stages to go into 7 determinants that comprise the quality of life, and scrutinized the effects of each factor, coefficient of variation, and R-square.

Results

1. General characteristics

The general characteristics found in sample populations are as follows. The average age of the elderly participants was 73.01 years old, the number of co-living generations per household was 1.44, the number of households was 3.87, the number of existing sons and daughters averaged 3.87, and the number of existing brothers and sisters averaged 2.16. The average amount of pocket money the elderly received from their children was 128,800 won, and the number of chronic diseases was 0.76.

[insert table 1 about here]

We ascertained the frequency and percentage of each of the general conditions of the elderly. 34.8% graduated from elementary school, and when combined with those who were illiterate this group reached 35.9%. 62.5% were married, and 42.1% lived in urban areas. 16.1% of the elderly worked, 90.5% subscribed to health insurance (workplace/local), and 9.0% were receiving medical aid. 7.4% subscribed to private health insurance.

[insert table 2 about here]

2. T-test for the presence of chronic diseases

We explored the mean comparison of primary health-related risk factors after distinguishing groups based on the presence of major 7 chronic diseases in the survey. As a result, members of the vulnerable group had chronic diseases and scored significantly lower in: the number of intimate friends contacted (<0.033), eating status for the prior two days (<0.015), subjective health status (<0.001), economic satisfaction (<0.001), and satisfaction concerning quality of life (<0.001) than the members of other groups who did not have chronic diseases. On the other hand, the vulnerable group scored significantly high in: amount of regular pocket money they received from their children (<0.012), ADL (<0.001), IADL (<0.001), and BMI index (<0.016).

[insert table 3 about here]

3. Determinants of quality of life among the elderly

In probing determinants of the quality of life of the elderly, we examined hierarchical multiple regression analysis as a gender difference. The model was set in 7 stages, and the explanation variance included demographic factors (age and marital status), socioeconomic factors (education, economic satisfaction, and number of living sons and daughters)⁴, health related behaviors (amount of physical activity, smoking, and drinking), health status (chronic disease, depressions, ADL, cognitive function score, and satisfaction concerning health status), social security (health insurance and private insurance), family variables (satisfaction with their

4) Economic satisfaction and number of living sons and daughters are alternative variables each of income level and household size.

relationship with their sons and daughters, and socioeconomic position of their children), and social participation and residence (participation in social activity and magnitude of residence).

Based on the results of the analysis, the final model was made up of 20 factors in 7 different categories, and results of the male (adj. $R^2=0.575$) and female (adj. $R^2=0.586$) subjects illustrated a statistically similar explanatory ability, except that the female subject score was a little higher. The most efficient variable was economic satisfaction, of which B was 0.320, and the second most efficient was satisfaction concerning their relationship with their children, of which B was 0.311. An adverse complexion was observed in female subjects. This was demonstrated by the results of satisfaction concerning their relationship with their children, of which B was 0.383, and economic satisfaction, of which B was 0.257. And, health status satisfaction was the second most efficient variable. The B for male subjects was 0.212, and for female subjects B was 0.199.

[insert table 4, 5 about here]

Discussion

This study was distinct from previous studies on the quality of life of the elderly which inspected the types of satisfaction elaborately, and established a causality model which confirmed how and by how much the subjective indicators constructing the life of the elderly impacted on their overall satisfaction. While subjective health status is associated with life satisfaction, the latter merely subsumes the former. However, the inverse is not the case. Thus, concerning the aspect of life satisfaction of the elderly, it should be investigated in more detail concerning how it is affected by economic status, educational level, the number of children, the degree of healthy behaviors, the experience of depression, activities of daily living, cognitive function, the status of health insurance, relationship and contact with children, social participation, and residence, including gender, age, disease, and disability.

Through the results of our study, we determined that the level of satisfaction in the areas of economic status, health status and relationships, which are in the same dimension as satisfaction, are related positively and respectively to life satisfaction in general without multicollinearity. This demonstrates that satisfaction is comprised of a variety of factors apart from health. The elderly can

be satisfied when they have sufficient economic strength, health, and a good relationship with their sons and daughters. On the other hand, their satisfaction also requires the physical capability of activity in their daily lives, and they should be free from depression. Otherwise, life satisfaction is significantly lower. As this study shows, life satisfaction was higher in the case of a combination of the higher three positive factors (economic status, own health, relationship with children) and the lower two negative factors (ADL, depression). However, there were gender difference concerning the negative factors. For example, males were more sensitive to factors concerning the activities of daily living, while females were more susceptible to the effects of depression. Generally, the findings of pre-existing studies were supported by the results of this study, in that the degree of health status is a primary determinant in constructing the lives of senescent people (Evashwick, 1996; Guralnik and LaCroix, 1992).

Gender difference is a very important variable in social science research and in the demographic approach. This is the mechanism that generates rudimentary differences in specific social phenomena. These differences seem to be reflected more remarkably in the elderly than in those at other age periods of the life cycle, because marriage status is most often changed naturally and men and women agonize about aging and death in different ways. Moreover, they perceive their old age as a new living condition in different ways. These tendencies were addressed in this study.

In the female group, the loss of marital status decreased life satisfaction. Even though the coefficient value was not high compared to that of other variables, it is considered that females are more sensitive to being alone. And the higher the cognitive function score of females, the higher life satisfaction was, to a significant degree. This is shown by the fact that they have a positive attitude toward life even at an advanced age, and this is validated by a good memory and the absence of dementia. The number of those having private health insurance was statistically significant in males only, while those in the group without it ranked significantly lower in terms of life satisfaction. The extent of private insurance in Korea, aside from the nationwide public health insurance coverage that the entire population has, is associated with alternative variables that reflect the level of one's economic affluence. In the respect that males are more responsive to economic satisfaction than females, older male adults who do not have private insurance are seen to be economically vulnerable. However, a male's life satisfaction was increased by frequent contact with children and the socioeconomic position of his children, but

this was not the case for a female. The level of social activity was also significant. Most older adults who retired after a long period of employment were satisfied with their lives when they continued to maintain a high level of social activity. Also, there is a tendency for the elderly to see the social success of children as their own success. Meantime, among males, the smoking group was higher in life satisfaction than the non-smoking group. This result is hard to interpret and must continue to be studied.

Finally, residence factors addressed different statistical directions for both males and females. The life satisfaction of females was higher for those living in metropolis areas but that of male was higher for those living in the provinces. This is speculated as an effect caused by a combination of family types and gender differences, which are not specifically attributes of residence itself. While males perceive their children moving to urban cities as social success, females, in the other hand, prefer living together with their children. They consider that specific family type as very important, as one in which they can feel direct emotional satisfaction. Higher life satisfaction among males is associated with frequency of contact with their children who are separated from the family. Of course, this may be the case because the social support of the family is the key factor. However, closer inspection of this inference is required.

The primary discourse of gerontology in Korea recently has highlighted the concept of successful aging in contradistinction to universal aging. This notion accentuates the idea that physical ability for independent living and social participation for living lively are major components of successful aging (Park and Lee, 2007). Rowe and Kahn (1998), for instance, ascertained that social habits are more important determinants of physical and mental health than genetic factors. They proposed, furthermore, beyond the perspectives of previous gerontology theories which distinguish pathological aging and normal aging, to divide normal aging into 'ordinary aging' and 'successful aging'.

The notion of 'productive aging', used similarly in the context of successful aging, focuses on economic efficiency. This is the discussion against traditional discourse that recognizes the elderly as incapable and dependant beings. It tries to reevaluate the role of the elderly and ultimately suggests alternative solutions to problems of the elderly. Anyhow, existing considerations deal with aging as merely a physical problem. Old age, as this study, is organized by various factors.

Above all, social participation was somewhat disregarded (Everard et al, 2000). Social participation, maintaining intimate relationships with others, and doing

regular activities significantly contribute to successful aging and the well-being of the elderly. In other words, these considerably facilitate the formation of a positive identity, and this is a significant factor. Reciprocity through social support is beneficial to health and longevity as well (Antonucci, 1985). As defined by MeSH, social support means a "supportive system which cooperates and encourages one to cope with individual physical or emotional disorder for a better life". Research discussing the relationship between social support and health related factors conclude that social support exerts a positive influence on health.

Social activity, as another aspect of old age, is defined as the generic term for all behaviors that allow one to be able to maintain external relationships and contacts. These include entire sets of behaviors such as body management in one's microcosm, as well as housework and outdoor activities, and especially describe long-term and fixed relationships. Recent studies of social activity discussed the contribution of social activity, like physical activity, to improved health and its function in reducing the mortality rate (Glass et al., 1999; Mendes de Leon et al., 2003). Finally, social support and social activity are both sides of the same coin. Improving the life satisfaction of the elderly requires setting up the environment for active social participation and establishing reciprocal supportive relationships in making family policy.

More fundamentally, the physical health of the elderly population should be improved. In old age, generally, the prevalence of many kinds of chronic diseases involving the musculoskeletal, cardiovascular, digestive, respiratory and endocrine systems increase so much that they cause a lowering of physical functions. This dysfunction of the body has an impact on one's quality of life. Previous studies also showed differences in the levels of psychological diseases, hypertension, physical and mental disorders and healthcare utility, and the degree of social support was significant after controlling for gender and early health status in long term cohort studies (Shye et al., 1995; Yasuda et al., 1997). Thus, satisfactory medical conditions also must be maintained for improving the quality of life in one's later years.

Above all, the final requirement is to reduce socioeconomic inequality. This is the hardest problem to solve. Nonetheless, it must continue to be addressed. Socioeconomic conditions can cause conflicts among members of the elderly population, and these can be deepened as the result of social classification. This is because these structural conditions are constructed throughout course of their entire lives and are transferred to their children's generation. Therefore, improving

the physical equity of society is necessary for a happy aging society.

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Table 1. Mean and Standard deviation of major continuous variables

| Characteristics | N | Mean | Std. Dev. |
|--|-------|--------|-----------|
| Age | 4,155 | 73.01 | 6.31 |
| Number of households | 4,005 | 1.44 | 0.96 |
| Number of household members | 4,155 | 2.68 | 1.43 |
| Number of living sons and daughters | 4,155 | 3.87 | 1.69 |
| Number of living brothers and sisters | 4,143 | 2.16 | 1.92 |
| Number of grandchildren | 4,141 | 6.57 | 4.19 |
| Degree of meetings with children [*] | 4,155 | 19.62 | 12.01 |
| Degree of contacts with children [*] | 4,155 | 13.07 | 9.23 |
| Frequency of contacts with intimate persons [†] | 4,155 | 6.49 | 3.06 |
| Degree of participation on social activity [†] | 4,155 | 5.99 | 6.03 |
| Amount of regular pocket money given by children | 4,150 | 12.88 | 50.56 |
| Subjective health status [†] | 4,155 | 1.61 | 0.959 |
| Eating history during the past 2 days [*] | 4,155 | 5.80 | 0.685 |
| Number of chronic diseases | 4,122 | 0.76 | 0.84 |
| Average premium of national health insurance per month | 1,980 | 6.59 | 7.34 |
| BMI(Kauff index) | 3,930 | 22.96 | 6.43 |
| ADL | 4,155 | 0.36 | 1.32 |
| IADL | 4,155 | 1.13 | 2.53 |
| MMSE-K | 4,155 | 21.42 | 7.09 |
| Future living condition (Negative) ⁱⁱ | 4,155 | 41.12 | 26.42 |
| Socioeconomic position of children's generation(Positive) ⁱ | 4,155 | 59.04 | 23.27 |
| Probability of national security for old age population ⁱ | 4,155 | 25.45 | 23.24 |
| Probability of unification of Korea ⁱ | 4,155 | 28.59 | 22.77 |
| Probability of economic recession ⁱ | 4,155 | 43.30 | 21.18 |
| Quality of life(happiness) ⁱ | 3,011 | 56.95 | 22.78 |
| Satisfaction on own health status ⁱ | 4,155 | 48.05 | 25.66 |
| Satisfaction on own economic status ⁱ | 4,155 | 41.86 | 24.65 |
| Satisfaction on relationship with a spouse ⁱ | 2,599 | 69.40 | 21.03 |
| Satisfaction on relationship with children ⁱ | 4,060 | 69.66 | 21.71 |
| Weight (kg) | 4,067 | 58.29 | 10.35 |
| Height (cm) | 3,949 | 159.82 | 8.87 |

[†]10 point ordinal scale(10: almost everyday ~ 1: at times annually, 0: never)

[†]Likert 5 point scale(5: very good ~ 1: very bad)

^{*}Total summation of every child's response score using above 10 point scales

^{**}Yes or No of having meal during the past 2 days

ⁱ10/100point interval scale (0: not very satisfied ~ 100: very satisfied)

ⁱⁱ10/100point interval scale(0: might be very good ~ 100: might be very bad)

Table 2. General characteristics

| Characteristics | Frequency | Percentage |
|---|-----------|------------|
| Education | | |
| not educated (illiteracy) | 613 | 14.8 |
| not educated (literacy) | 876 | 21.1 |
| elementary | 1445 | 34.8 |
| middle | 469 | 11.3 |
| high | 489 | 11.8 |
| college and above | 260 | 6.3 |
| Marital status | | |
| marrying | 2,599 | 62.6 |
| other (bereavement, separation, divorce, unmarried) | 1,556 | 37.4 |
| Residence | | |
| metropolis | 1,748 | 42.1 |
| mid/small town | 1,207 | 29.0 |
| the provinces | 1,200 | 28.9 |
| Currently at work | | |
| at work | 669 | 16.1 |
| not at work | 3,486 | 83.9 |
| Currently smoking | | |
| yes | 631 | 15.2 |
| no | 482 | 11.6 |
| Drinking | | |
| yes | 1,141 | 27.5 |
| no | 3,014 | 72.5 |
| Physical activity | | |
| yes | 1,308 | 31.5 |
| no | 2,847 | 68.5 |
| National Health Insurance/medical aid | | |
| NHI(workplace/local) | 3,762 | 90.5 |
| medical aid(level 1/2) | 375 | 9.0 |
| NHI(workplace/local) | | |
| workplace | 2,446 | 58.9 |
| local | 1,308 | 31.5 |
| Private health insurance | | |
| purchasing | 306 | 7.4 |
| not purchasing | 3,839 | 92.4 |
| Major chronic diseases | | |
| hypertension | 1,642 | 39.5 |
| diabetes | 679 | 16.3 |
| cancer | 112 | 2.7 |
| chronic pulmonary disease | 148 | 3.6 |
| liver disease (except for fatty liver) | 63 | 1.5 |
| cardiac disease | 316 | 7.6 |
| cerebrovascular disease | 204 | 4.9 |
| Disability determined | 341 | 8.2 |
| Arthritis and Rheumatoid arthritis patients | 1,084 | 26.1 |
| Difficulty of daily living by pain | 1,729 | 41.6 |
| CES-D10 diagnosis of depression | 1,837 | 44.2 |

Table 3. Test of mean differences of major variables

| Variables | without chronic diseases | | with chronic diseases | | p-value |
|---|--------------------------|-----------|-----------------------|-----------|---------|
| | Mean | Std. Err. | Mean | Std. Err. | |
| Age | 72.98 | 0.16 | 72.99 | 0.12 | 0.992 |
| Number of households | 1.46 | 0.02 | 1.43 | 0.02 | 0.445 |
| Number of household members | 2.69 | 0.03 | 2.66 | 0.03 | 0.438 |
| Number of living sons and daughters | 3.87 | 0.04 | 3.86 | 0.04 | 0.772 |
| Number of living brothers and sisters | 6.56 | 0.10 | 6.57 | 0.09 | 0.899 |
| Number of grandchildren | 2.16 | 0.04 | 2.17 | 0.04 | 0.919 |
| Degree of meetings with children | 19.46 | 0.27 | 19.71 | 0.25 | 0.492 |
| Degree of contacts with children | 13.05 | 0.21 | 13.03 | 0.19 | 0.934 |
| Frequency of contacts with intimate persons | 7.61 | 0.07 | 7.41 | 0.07 | <0.033 |
| Degree of participation on social activity | 5.80 | 0.14 | 6.20 | 0.13 | <0.034 |
| Amount of regular pocket money given by children | 10.84 | 0.98 | 14.75 | 1.20 | <0.012 |
| Eating history during the past 2 days | 5.83 | 0.01 | 5.78 | 0.02 | <0.015 |
| Subjective health status | 2.88 | 0.02 | 2.40 | 0.02 | <0.001 |
| Average premium of national health insurance per month | 6.71 | 0.25 | 6.51 | 0.22 | 0.557 |
| Number of inpatient days | 23.57 | 3.11 | 22.10 | 1.51 | 0.634 |
| ADL index | 0.23 | 0.02 | 0.44 | 0.03 | <0.001 |
| IADL index | 0.90 | 0.05 | 1.26 | 0.06 | <0.001 |
| MMSE-K score | 21.56 | 0.16 | 21.43 | 0.15 | 0.545 |
| Kauff index (BMI) | 22.70 | 0.21 | 23.20 | 0.07 | <0.016 |
| Future living condition (Negative) | 41.58 | 0.60 | 40.73 | 0.57 | 0.304 |
| Socioeconomic position of children's generation(Positive) | 58.81 | 0.53 | 59.22 | 0.49 | 0.574 |
| Probability of national security for old age population | 25.69 | 0.54 | 25.31 | 0.49 | 0.600 |
| Probability of unification of Korea | 29.27 | 0.53 | 28.08 | 0.48 | 0.094 |
| Probability of economic recession | 43.41 | 0.49 | 43.20 | 0.45 | 0.743 |
| Satisfaction on own health status | 52.87 | 0.56 | 44.22 | 0.55 | <0.001 |
| Satisfaction on own economic status | 43.57 | 0.55 | 40.58 | 0.53 | <0.001 |
| Satisfaction on relationship with a spouse | 69.58 | 0.59 | 69.37 | 0.58 | 0.805 |
| Satisfaction on relationship with children | 70.18 | 0.49 | 69.33 | 0.48 | 0.212 |
| Satisfaction on quality of life | 58.47 | 0.50 | 55.87 | 0.50 | <0.001 |

*p-value<0.05

Table 4. Hierarchical multiple regression analysis of socioeconomic position, health behavior, social insurance, and social support (Male, N=1,736)

| Variables | Model I | Model II | Model III | Model IV | Model V | Model VI | Model VII |
|--|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| Age | -0.095*** | -0.056** | -0.050* | 0.000 | 0.010 | 0.009 | 0.007 |
| Marital status [€] | 0.104*** | 0.076*** | 0.076*** | 0.065*** | 0.061*** | 0.017 | 0.018 |
| Education [€] | | 0.061** | 0.039 | 0.005 | 0.002 | 0.021 | 0.006 |
| Satisfaction on own economic status [€] | | 0.602*** | 0.591*** | 0.415*** | 0.398*** | 0.318*** | 0.320*** |
| Number of living sons and daughters [€] | | 0.081*** | 0.083*** | 0.067*** | 0.058** | -0.025 | -0.031 |
| Physical activity [€] | | | -0.070*** | -0.027 | -0.024 | -0.026 | -0.014 |
| Smoking [€] | | | 0.055** | 0.049** | 0.049** | 0.042* | 0.041* |
| Drinking [€] | | | -0.045* | -0.002 | 0.001 | -0.007 | -0.007 |
| Chronic disease [€] | | | | 0.018 | 0.017 | -0.004 | -0.004 |
| CES-D10 | | | | -0.086*** | -0.080*** | -0.049** | -0.044* |
| Depression [€] | | | | | | | |
| ADL index [€] | | | | -0.066** | -0.064** | -0.082*** | -0.081*** |
| Cognitive function score [€] | | | | 0.003 | 0.005 | -0.007 | -0.010 |
| Satisfaction on health status [€] | | | | 0.287*** | 0.282*** | 0.214*** | 0.212*** |
| NHI/medical aid [€] | | | | | -0.068*** | -0.001 | 0.000 |
| Private health insurance [€] | | | | | -0.049** | -0.046** | -0.046** |
| Satisfaction on relationship with children [€] | | | | | | 0.310*** | 0.311*** |
| Degree of meetings with children [€] | | | | | | 0.073** | 0.088** |
| Socioeconomic position of children's generation [€] | | | | | | 0.072*** | 0.076*** |
| Degree of participation on social activity [€] | | | | | | | 0.039* |
| Residence (Metro/mid/prov) | | | | | | | -0.045* |
| adj. R ² changed | 0.021 | 0.408 | 0.416 | 0.488 | 0.494 | 0.572 | 0.575 |
| | | +0.387 | +0.008 | +0.072 | +0.006 | +0.078 | +0.003 |

*P<0.05, **P<0.01, ***P<0.001

ⁱDependent Variables: Likert 5 point scale (1point: lowest quality of life, 5point: highest quality of life)

[€]Binomial Variables: reference group is predicted that their status or quality of life is lower

[€]Continuous Variables: 3 point or 5 point Likert scale

Table 5. Hierarchical multiple regression analysis of socioeconomic position, health behavior, social insurance, and social support (Female, N=2,419)

| Variables | Model I | Model II | Model III | Model IV | Model V | Model VI | Model VII |
|--|----------|----------|-----------|-----------|-----------|-----------|-----------|
| Age | -0.312 | 0.025 | 0.033 | 0.073*** | 0.082*** | 0.067*** | 0.069 |
| Marital status [Ⓒ] | 0.110*** | 0.021 | 0.025 | 0.023 | 0.023 | -0.012 | -0.014*** |
| Education [Ⓒ] | | 0.086*** | 0.074*** | 0.021 | 0.012 | 0.019 | 0.021 |
| Satisfaction on own economic status [Ⓒ] | | 0.601*** | 0.597*** | 0.400*** | 0.379*** | 0.261*** | 0.257*** |
| Number of living sons and daughters [Ⓒ] | | 0.063*** | 0.064*** | 0.077*** | 0.052*** | -0.008 | -0.007 |
| Physical activity [Ⓒ] | | | -0.050** | -0.023 | -0.027 | -0.007 | -0.008 |
| Smoking [Ⓒ] | | | 0.017 | 0.009 | 0.010 | -0.004 | -0.005 |
| Drinking [Ⓒ] | | | -0.037* | -0.021 | -0.021 | -0.015 | -0.016 |
| Chronic disease [Ⓒ] | | | | 0.026 | 0.028 | 0.026 | 0.027 |
| CES-D10 | | | | -0.124*** | -0.111*** | -0.069*** | -0.069*** |
| Depression [Ⓒ] | | | | | | | |
| ADL index [Ⓒ] | | | | 0.005 | 0.001 | -0.035* | -0.032* |
| Cognitive function score [Ⓒ] | | | | 0.095*** | 0.096*** | 0.070*** | 0.071*** |
| Satisfaction on health status [Ⓒ] | | | | 0.257*** | 0.251*** | 0.199*** | 0.199*** |
| NHI/medical aid [Ⓒ] | | | | | -0.137*** | -0.055*** | -0.056*** |
| Private health insurance [Ⓒ] | | | | | -0.012 | -0.004 | -0.002 |
| Satisfaction on relationship with children [Ⓒ] | | | | | | 0.385*** | 0.383*** |
| Degree of meetings with children [Ⓒ] | | | | | | 0.023 | 0.013 |
| Socioeconomic position of children's generation [Ⓒ] | | | | | | 0.028 | 0.026 |
| Degree of participation on social activity [Ⓒ] | | | | | | | 0.021 |
| Residence (Metro/mid/prov) | | | | | | | 0.038** |
| adj. R ² changed | 0.012 | 0.401 | 0.404 | 0.475 | 0.492 | 0.585 | 0.586 |
| | | +0.389 | +0.003 | +0.071 | +0.017 | +0.093 | +0.001 |

*P<0.05, **P<0.01, ***P<0.001

ⁱDependent Variables: Likert 5 point scale (1point: lowest quality of life, 5point: highest quality of life)

[Ⓒ]Binomial Variables: reference group is predicted that their status or quality of life is lower

[Ⓒ]Continuous Variables: 3 point or 5 point Likert scale