

## Mental Health Affecting Factors of the Elderly using Big Data

<sup>1</sup> Chung-Uk Heo, <sup>2\*</sup> Young-Soon Choi

<sup>1</sup>Department of Tourism, Kangwon National University, Samcheok-si, Gangwon-do, 25949, Republic of Korea

<sup>2</sup>Department of Nursing, Kangwon National University, Samcheok-si, Gangwon-do, 25949, Republic of Korea

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### Abstract

*This study was prepared based on data from the 7th National Health and Nutrition Examination Survey, 2018. The demographic characteristics, health behavior, and economic status of 1,653 elderly males and females over 65 years of age were investigated according to stress, depression, and suicide plans. The degree of stress recognition was analyzed to have a significant effect on age and subjective health status in both males and females. The age, subjective health status, and absence of breakfast showed statistically significant differences in the degree of stress recognition among the elderly males. The age, educational background, household income, subjective health status, economic activity, and physical activity showed statistically significant differences in the level of stress recognition among the elderly females. The degree of depression of the male elderly showed statistically significant differences in subjective health status, sleep, physical activity, alcohol consumption, smoking, economic activity, working type, and working hours. The degree of depression of elderly females showed statistically significant differences in subjective health status, physical activity, alcohol consumption, smoking, economic activity, working type, and working hours. The degree of suicide planning of elderly males showed statistically significant differences in educational background and employment type. The degree of suicide planning of elderly females showed statistically significant differences in household income, subjective health status, physical activity, and economic activity. Because of analyzing the relationship between depression and suicide in four groups according to the level of stress recognition, the results of depression and suicide planning showed statistically significant results.*

*Keywords*—elderly, big data, stress, depression, suicide plan

### 1. Introduction

The average life expectancy of the Korean population was 74.9 years old for males and 81.6 years old for females in 2005, and increased to 79.7 years for males and 85.7 years for females in 2017, and it is estimated that by 2035 the average age will be 80 years old with 83.7 years old for males and 88.5 years old for females [1]. In 2000, the elderly population entered an aging society with 7.2%, and in 2017, the elderly population exceeded 14% of the total population, entering an aged society. In 2020, it is expected to increase to 15.7% in the future, reaching 20.3% in 2025, and Korea is expected to enter an ultra-aging society, expected to be 43.9% in 2050 [1].

The increase in the elderly population leads to an increase in elderly care costs, which accounts for about 45% compared to the current total medical care costs, and the ratio is gradually increasing. The total medical expenses in 2017 was 20,752.5 billion won and the total medical expenses in 2018 increased by 10.1% to 77,910.4 billion won. Compared to the total population, medical expenses per senior in 2017 and 2018 increased by 2.9 times, and out-of-pocket medical expenses increased by 2.8 times. Long-term care insurance benefits for the elderly also increased by 23% from 5.6 trillion won in 2017 to 6.7 trillion won in 2018 [2].

Stress is a state of psychological and physical tension experienced in an environment in which it is difficult to adapt. It is a general phenomenon experienced in the life cycle. In any form, it is closely related to human life [3], the elderly are exposed to various psychological and emotional stresses such as physical problems due to aging, retirement, social isolation due to unemployment, economic problems, loss of social roles, and loneliness due to the loss of a friend or spouse [4].

The elderly are psychologically weakened, and as stress increases, chronic diseases, social life skills, and physical activity problems are accompanied [5]. Previous studies have shown that stress has a high correlation with depression and causes psychological disorders [6], other studies have reported that stress is a risk factor for suicidal thoughts in the elderly [7]. In addition, stress has been reported to be closely related to poor quality of life in the elderly, indicating that it is necessary to manage stress in order to improve the health status and quality of life of the elderly [8].

Depression is a psychological phenomenon in which people feel anxious or frustrated and feel invigorated or mild sadness [9], the number of patients treated for depression increased by about 16% in 2015 compared to 2010, 31% were male and 69% were female, not only did it occur intensively between their 50s and 70s, but especially in the very elderly over 80 years of age, the increase rate of depression was more than 90% for both males and females [10].

Recently, the importance of mental health has emerged as a materially rich but emotionally dry situation, and depression has been raised as a major social problem [11]. Depression is a psychological change that occurs more in the second half of life than in the first half, in particular, stress caused by aging is the cause. In addition, the death of the spouse, physical illness, difficulty in economic affairs, feelings of alienation and loneliness, regret for the past years, and other causes, increased depression [12].

According to previous studies, depression in the elderly causes an increase in the number of chronic diseases, sleep disorders, activity disorders, and a decrease in quality of life, indicating that depression and quality of life are closely related [13]. Cognitive function refers to the ability to concentrate, the ability to remember, and the ability to speak language. As we get older, our cognitive function decreases, and the risk of dementia increases [14]. When severe depression comes, it leads from despair and despair to suicide. Depression and suicide show a close correlation, depression in the elderly needs to be managed by seeking attention and effective intervention methods [15].

Changes in the population due to aging are causing various elderly problems such as deterioration in health, economic poverty, loneliness and inability, and is likely to become more serious

as the elderly suicide increases [16]. Changes in health due to aging not only have an important effect on suicidal thoughts, but are also unprepared for old age [17], if poverty, disease and loneliness cannot be resolved, they make an extreme choice of suicide [16]. The suicide rate of the elderly in Korea was 55.5 per 100,000 population, more than three times the average of OECD countries, of these, 1 in 10 experienced suicide thoughts, suicide attempts were 12.5% [18].

The cause of elderly suicide is the loss of role and economic power, and stress due to health deficit is associated with suicide of the elderly, it seems to be related to various losses in social status, role, health, autonomy, and relationships with others in old age, and a follow-up study on the influencing factors is needed [3].

Stress is a factor that induces suicidal thoughts in the elderly. When suicide-related factors such as mental illness are excluded, stress has been reported as a major factor that significantly increases the risk of suicide [19]. In general, the stress experienced by the elderly is very diverse, including personal, environmental, psychological and social factors, and it has been reported that suicidal accidents increase when they cannot cope with these situations [20].

Until now, most studies on depression and suicidal thoughts in the elderly have been conducted by evaluating the quality of life. However, studies on depression and suicide accidents related to stress in the elderly are insufficient. Therefore, in this study, stress, depression, and suicide plans were analyzed according to general characteristics, health behaviors, and economic conditions in males and females aged 65 years or older. In addition, depression and suicide plans according to stress were analyzed. Therefore, it is intended to help create a prevention program for the elderly with mental health problems such as stress, depression, and suicide plans, and provide basic data to prepare for a healthy retirement.

## **2. Research Method**

### **2.1 Research Design**

This study is a research study to confirm the relationship between depression and suicide planning according to stress recognition of elderly males and females.

### **2.2. Research Subjects**

This study targeted the elderly aged 65 or older out of a total of 10,453 people who participated in the health survey, screening survey, and nutrition survey in 2018, the third year of the 7th National Health and Nutrition Survey (2016-2018). Among the respondents, 7,992 people participated in at least one of the health survey, screening survey, and nutrition survey, and the participation rate was 76.5%. By survey area, the participation rate of health surveys and screening surveys was 73.2%, and the participation rate of nutrition surveys was 80.1%. Since the nutrition survey is conducted for all household members by visiting households with participating household members, there is a difference in the number of subjects for health survey and medical examination.

### **2.3. Research Tool**

This study was analyzed with data from 2018, the 3rd year of the 7th National Health and Nutrition Examination Survey in Korea. The data for 2018, consist of a health survey, a screening survey, and a nutrition survey. In this study, gender, age, marital status, educational background, residential area, household income level, subjective health status, sleeping hours, economic activity, working type, working hours, alcohol consumption, smoking, stress level, depression diagnosis, suicide plan, physical activity, and absence of breakfast were analyzed.

### **2.4. Research Variables**

#### **2.4.1. Independent Variables**

The questions included in the National Health and Nutrition Survey Health Survey were used to define the level of recognition of stress. The question "How much stress do you feel in your daily life?" was answered in 4 groups and used for analysis- ① Feeling very much ② Feeling a lot ③ Feeling a little ④ Feeling hardly.

#### **2.4.2. Dependent Variables**

The dependent variables of this study are depression diagnosed by doctors and whether or not they plan to commit suicide. To define depression and suicide plans, the contents of the questions included in the health survey questionnaire of the National Health and Nutrition Survey were used. Depression is the case when you respond to the question, "Is depression diagnosed by a doctor?" The suicide plan was used in the analysis by answering yes and no to the question "Have you ever made a specific plan to commit suicide in the last year?"

#### **2.4.3. Correction Variables**

Gender, age, marital status, education level, and household income level were analyzed according to demographic and sociological characteristics. Gender was analyzed by dividing into male and female, and the age was targeted to the elderly aged 65 or older, and classified into 65-70 years old, 71-75 years old, and 75-80 years old. Marital status was classified as single or married. Education level was classified into four groups: Elementary school graduation or lower, middle school graduation or higher, high school graduation or higher, and university graduation or higher. The residential areas were classified as rural areas when living in eup and myeon, and urban areas when living in dong. Income levels were classified into four groups: 1 million won or fewer, 1-3 million won, 3-5 million won, and 5 million won or more. Subjective health status, sleep time, drinking, smoking, physical activity, and breakfast were analyzed according to health behavior. The subjective health status was classified into six groups with the question of "How do you think OOO's health is normally?" 1. Very good 2. Good 3. Average 4. Poor 5. Very poor 9. Do not know. The average sleeping time was classified into 6 hours or less, 7-8 hours, and 9 hours or more. In terms of alcohol consumption, those who drank more than one drink per month for one year were classified as the drinking group, and those who drank less than one drink per month were classified as non-drinking groups. Smoking status was classified into smokers and non-smokers according to current smoking status. Physical activity was classified into three groups, yes,

no, and unknown, for moderate-intensity physical activity, and three groups, yes, no, and unknown, for having no breakfast one day before breakfast. As occupational factors, economic activity, employment type, and working hours were analyzed. Economic activity was classified as Yes or No, and employment types were classified as regular, non-regular, and no job and working hours were classified into less than 52 hours and more than 52 hours.

## **2.5. Data Collection Procedure**

This study is a secondary analysis study conducted by integrating raw data from the 7th National Health and Nutrition Survey (2016-2018) conducted by the Korea Centers for Disease Control and Prevention. Health surveys and screening survey were conducted at the mobile screening center, and nutrition surveys were conducted by personal visits to the target households. All items of education, economic activity, and nutrition survey of the health survey were surveyed by interview method, and the areas of health behavior such as smoking and drinking were surveyed by self-reporting.

## **2.6. Data Analysis Method**

This study analyzed the data collected by the health survey, screening survey, and nutrition survey in 2018, the third year of the 7th National Health and Nutrition Survey (2016-2018), using the statistical analysis program SPSS 21.0.

The general characteristics of the study subjects were divided by gender and analyzed for comparison (chi-square test). To find out the difference in the degree of recognition of stress according to demographics, health behaviors, and occupational characteristics, a chi-square test was conducted by dividing into male and female elderly. To find out the difference between depression and suicide plans according to demographics, health behaviors, and occupational characteristics, a cross-analysis (chi-square test) was conducted by dividing into male and female seniors. To find out the difference between depression and suicide plan according to the level of stress recognition, a chi-square test was conducted by dividing into male and female elderly, and the statistical significance level of all analyzes was  $p < 0.05$ .

## **3. Research Results**

### **3.1 General Characteristics Of The Subject**

The subjects of this study were 1,653 elderly people aged 65 or older, and among the subjects, 700 people were male (42.4%) and 953 people (57.6%) females. The age distribution was 65-70 years old, 37.1%, 71-80 years old, 25.9%, and over 80 years old 37.0%. Marital status was 0.9% for unmarried and 99.1% for married.

As for the level of education, 37.0% of males and 71.4% of females graduated from Elementary school, and both males and females had the most education level under Elementary school, 17.6% of high school or above, 16.2.% of middle school, and 9.7% of college graduates or above. As for the residential area, urban 74.3% and rural areas 25.7%. As for the income level, 37.4% were the most at 1 million won or fewer, with 36.56% of 1 million won to 3 million won, 13.3% of 3 million won to 5 million won, and 12.8% of those above 5 million won.

According to the characteristics of health behavior, subjective health status was usually 45.7%, poor 19.7, very poor 10.5%, good 15.8%, and very good 4.3%. Sleep time was 52.8% for 7-8 hours, 26.9% for less than 4 hours, and 20.3% for more than 9 hours. 92.5% of males and 62.8% of females had alcohol consumption, and 15.1% of males and 1.5% of females were daily smokers. 92% of cases were not physically active, and 95.2% of them were absent from breakfast.

As for the professional characteristics, 61.9% of cases were not engaged in economic activities and 32.6% were engaged in economic activities. The proportion of males and females who do not engage in economic activity was 49.9% for males and 68.6% for females. The ratio of non-regular workers was higher, with 1.2% of regular workers and 16.92% of non-regular workers. As for the working hours, 31.7% of those with less than 52 hours and 68.3% of those with more than 52 hours were more than 52 hours in males and females [Table 1].

**Table 1. General Characteristics of the Subject (N, %)**

| Variables                  | Classification     | Male         | Female      | Total        |
|----------------------------|--------------------|--------------|-------------|--------------|
|                            |                    | N=700 (42.4) | N=953(57.6) | N=1653 (100) |
| Age<br>(N=1653)            | 65-70 years        | 267 (38.1)   | 346 (36.3)  | 613 (37.1)   |
|                            | 71-75 years        | 180 (25.7)   | 249 (26.1)  | 429 (25.9)   |
|                            | ≥76 years          | 253 (36.1)   | 358 (37.6)  | 611 (37.0)   |
| Marital status<br>(N=1653) | Married            | 694 (99.1)   | 944 (99.1)  | 1638 (99.1)  |
|                            | Unmarried          | 6 (0.9)      | 9 (0.9)     | 15 (0.9)     |
| Education<br>(N=1520)      | ≤Elementary school | 238 (37.0)   | 626 (71.4)  | 864 (56.8)   |
|                            | Middle school      | 126 (19.6)   | 119 (13.6)  | 245 (16.2)   |
|                            | High school        | 175 (27.2)   | 88 (10.0)   | 263 (17.3)   |
|                            | ≥College           | 104 (16.2)   | 44 (5.0)    | 148 (9.7)    |
| Residence<br>(N=1653)      | City               | 540 (77.1)   | 688 (72.2)  | 1228 (74.3)  |
|                            | Rural              | 160 (22.9)   | 265 (27.8)  | 425 (25.7)   |
| Household                  | <1 million won     | 205 (29.6)   | 409 (43.1)  | 614 (37.4)   |

|                                      |                 |            |            |             |
|--------------------------------------|-----------------|------------|------------|-------------|
| income<br>(N=1640)                   | 1-3 million won | 279 (40.3) | 319 (33.6) | 598 (36.5)  |
|                                      | 3-5 million won | 107 (15.5) | 111 (11.7) | 218 (13.3)  |
|                                      | >5 million won  | 101 (14.6) | 109 (11.5) | 210 (12.8)  |
| Subjective health status<br>(N=1608) | Very good       | 39 (5.7)   | 30 (3.2)   | 69 (4.3)    |
|                                      | Good            | 136 (19.9) | 118 (12.8) | 254 (15.8)  |
|                                      | Usually         | 309 (45.2) | 425 (45.9) | 734 (45.7)  |
|                                      | Bad             | 120 (17.6) | 197 (21.3) | 317 (19.7)  |
|                                      | Very bad        | 48 (7.0)   | 121 (13.1) | 169 (10.5)  |
|                                      | Unknown         | 31 (4.5)   | 34 (3.7)   | 65 (4.0)    |
| Sleep time<br>(N=1514)               | ≤6 hours        | 153 (23.9) | 254 (29.3) | 407 (26.9)  |
|                                      | 7-8 hours       | 357 (55.7) | 442 (51.0) | 799 (52.8)  |
|                                      | >9 hours        | 131 (20.4) | 171 (19.7) | 308 (20.3)  |
| Economic activity<br>(N=1608)        | Yes             | 272 (43.7) | 258 (26.5) | 524 (32.6)  |
|                                      | No              | 311 (49.9) | 667 (68.6) | 996 (61.9)  |
|                                      | Unknown         | 40 (6.4)   | 48 (4.9)   | 88 (5.5)    |
| Employment status<br>(N=1608)        | Regular         | 11 (1.6)   | 9 (1.0)    | 20 (1.2)    |
|                                      | Non-regular     | 109 (16.0) | 162 (17.5) | 271 (16.9)  |
|                                      | No occupation   | 523 (76.6) | 706 (76.3) | 1229 (76.4) |
|                                      | Unknown         | 40 (5.9)   | 48 (5.2)   | 88 (5.5)    |
| Working hours/wk<br>(N=1608)         | <52 hours       | 252 (36.9) | 258 (27.9) | 510 (31.7)  |
|                                      | ≥52 hours       | 431 (63.1) | 667 (72.1) | 1098 (68.3) |
| Drinking                             | Yes             | 632 (92.5) | 581 (62.8) | 1213 (75.4) |

|                                |                    |            |            |             |
|--------------------------------|--------------------|------------|------------|-------------|
| (N=1608)                       | No                 | 48 (7.0)   | 330 (35.7) | 378 (23.5)  |
|                                | Unknown            | 3 (0.4)    | 14 (1.5)   | 17 (1.1)    |
| Smoking<br>(N=1608)            | Every day          | 103 (15.1) | 13 (1.4)   | 116 (7.2)   |
|                                | Sometimes          | 11 (1.6)   | 3 (0.3)    | 14 (0.9)    |
|                                | Smoked in the past | 428 (62.7) | 25 (2.7)   | 453 (28.2)  |
|                                | Never smoked       | 136 (19.9) | 869 (93.9) | 1005 (62.5) |
|                                | Unknown            | 5 (0.7)    | 15 (1.6)   | 20 (1.2)    |
| Stress recognition<br>(N=1589) | VHSRG              | 20 (2.9)   | 43 (4.7)   | 63 (4.0)    |
|                                | HSRG               | 72 (10.6)  | 155 (17.0) | 227 (14.3)  |
|                                | LSRG               | 351 (51.7) | 400 (44.0) | 751 (47.3)  |
|                                | VLSRG              | 236 (34.8) | 312 (34.3) | 548 (34.5)  |
| Depression<br>(N=1537)         | Yes                | 23 (3.5)   | 87 (9.8)   | 110 (7.2)   |
|                                | No                 | 627 (96.5) | 800 (90.2) | 1427 (92.8) |
| Suicidal plan<br>(N=1585)      | Yes                | 13 (1.8)   | 22 (2.4)   | 35 (2.2)    |
|                                | No                 | 663 (98.2) | 887 (97.6) | 1550 (97.8) |
| Physical activity<br>(N=1608)  | Yes                | 20 (2.9)   | 29 (3.1)   | 49 (3.0)    |
|                                | No                 | 626 (91.7) | 854 (92.3) | 1480 (92.0) |
|                                | Unknown            | 37 (5.4)   | 42 (4.5)   | 79 (4.9)    |
| No breakfast<br>(N=1492)       | Yes                | 583 (95.6) | 838 (95.0) | 1421 (95.2) |
|                                | No                 | 27 (4.4)   | 44 (5.0)   | 71 (4.8)    |

VHSRG=Very high stressed recognition group, HSRG=High stressed recognition group, LSRG=Low stressed recognition group, VLSRG=Very low stressed recognition group,

### 3.2 The Degree of Recognition of Stress According to General Characteristics

The characteristics according to the level of stress recognition of the elderly males and females were identified in terms of age, marital status, education level, residential area, and income level as demographic characteristics. As characteristics according to health behavior, subjective health status, sleep time, physical activity, alcohol consumption, smoking, and absence of breakfast were confirmed.

Male's stress recognition level was 20 in the VHSCG (2.9%), 72 in HSCG (10.6%), 351 in the LSCG (51.7%), and 236 in the VLSCG (34.8%), Females were VHSCG 43 (4.7%), HSCG 155 (17.0%), LSCG 400 (44.0%), and VLSCG 312 (34.6%). Both males and females appeared in the order of LSCG, VLSCG, HSCG, and VHSCG.

The degree of stress recognition of elderly males and females had a significant effect on age and subjective health status. The age ( $p < .001$ ), subjective health status ( $p < .05$ ), and absence of breakfast ( $p < .001$ ) showed a statistically significant difference in the degree of stress recognition among the male elderly. The level of stress recognition of elderly females is age ( $p < .001$ ), educational background ( $p < .05$ ), household income ( $p < .05$ ), subjective health status ( $p < .001$ ), and economic activity ( $p < .05$ ), physical activity ( $p < .05$ ) showed statistically significant differences.

Elderly males aged 65-70 showed stress VHSCG and HSCG, and subjective health status showed stress VHSCG when their perceived health recognition was bad. As for the level of stress recognition of elderly females, it was found that 65-70 years old showed VHSCG, those who had graduated from Elementary school showed VHSCG, and those whose household income was less than 1 million won showed VHSCG. Subjective health status was indicated by VHSCG when the health awareness perceived by the person was normal or bad. In economic activity, the case of not doing economic activity was found to be VHSCG, and in case of physical activity, the case of not doing physical activity showed VHSCG [Table 2]-[Table 3].

**Table 2. Stress Perception Level According to General Characteristics of Male Elderly (N=679) (N, %)**

| Variables      | Classification | VHSRG     | HSRG       | LSRG        | VLSRG       | p-value |
|----------------|----------------|-----------|------------|-------------|-------------|---------|
|                |                | N=20(2.9) | N=72(10.6) | N=351(51.7) | N=236(34.8) |         |
| Age            | 65-70 years    | 9 (1.3)   | 35 (5.2)   | 134 (19.7)  | 82 (12.1)   | .049    |
|                | 71-75 years    | 2 (0.3)   | 18 (2.7)   | 102 (15.0)  | 54 (8.0)    |         |
|                | ≥76 years      | 9 (1.3)   | 19 (2.8)   | 115 (16.9)  | 99 (14.6)   |         |
| Marital status | Married        | 20 (2.9)  | 71 (10.5)  | 347 (51.1)  | 235 (34.6)  | .748    |
|                | Unmarried      | 0 (0.0)   | 1 (0.1)    | 4 (0.6)     | 1 (0.1)     |         |

|                          |                    |          |          |            |            |       |
|--------------------------|--------------------|----------|----------|------------|------------|-------|
| Education                | ≤Elementary school | 7 (1.0)  | 33 (4.9) | 153 (22.5) | 82 (12.1)  | .612  |
|                          | Middle school      | 4 (0.6)  | 12 (1.8) | 62 (9.1)   | 48 (7.1)   |       |
|                          | High school        | 4 (0.6)  | 16 (2.4) | 102 (15.0) | 53 (7.8)   |       |
|                          | ≥College           | 2 (0.3)  | 10 (1.5) | 51 (7.5)   | 40 (5.9)   |       |
| Residence                | City               | 17 (2.5) | 57 (8.4) | 266 (39.2) | 184 (27.1) | .723  |
|                          | Rural              | 3 (0.4)  | 15 (2.2) | 85 (12.5)  | 52 (7.7)   |       |
| Household income         | <1 million won     | 9 (1.3)  | 29 (4.3) | 92 (13.5)  | 69 (10.2)  | .078  |
|                          | 1-3 million won    | 6 (0.9)  | 21 (3.1) | 158 (23.3) | 89 (13.1)  |       |
|                          | 3-5 million won    | 2 (0.3)  | 7 (1.0)  | 52 (7.7)   | 42 (6.2)   |       |
|                          | >5 million won     | 3 (0.4)  | 15 (2.2) | 47 (6.9)   | 33 (4.9)   |       |
| Subjective health status | Very good          | 2 (0.3)  | 3 (0.4)  | 13 (1.9)   | 21 (3.1)   | <.001 |
|                          | Good               | 3 (0.4)  | 10 (1.5) | 61 (9.0)   | 61 (9.0)   |       |
|                          | Usually            | 4 (0.6)  | 25 (3.7) | 173 (25.5) | 107 (15.8) |       |
|                          | Bad                | 5 (0.7)  | 21 (3.1) | 60 (8.8)   | 34 (5.0)   |       |
|                          | Very bad           | 5 (0.7)  | 12 (1.8) | 27 (4.0)   | 4 (0.6)    |       |
|                          | Unknown            | 1 (0.1)  | 1 (0.1)  | 17 (2.5)   | 9 (1.3)    |       |
| Sleep time<br>(N=1514)   | ≤6 hours           | 2 (0.3)  | 21 (3.1) | 80 (11.8)  | 50 (7.4)   | .320  |
|                          | 7-8 hours          | 12 (1.8) | 32 (4.7) | 192 (28.3) | 121 (17.8) |       |
|                          | >9 hours           | 3 (0.4)  | 17 (2.5) | 59 (8.7)   | 51 (7.5)   |       |

|                              |                    |          |           |            |            |       |
|------------------------------|--------------------|----------|-----------|------------|------------|-------|
| Economic activity            | Yes                | 8 (1.2)  | 32 (4.7)  | 138 (20.3) | 94 (13.8)  | .389  |
|                              | No                 | 9 (1.3)  | 39 (5.7)  | 193 (28.4) | 129 (19.0) |       |
|                              | Unknown            | 3 (0.4)  | 1 (0.1)   | 20 (2.9)   | 13 (1.9)   |       |
| Employment status            | Regular            | 0 (0.0)  | 1 (0.1)   | 5 (0.7)    | 5 (0.7)    | .498  |
|                              | Non-regular        | 3 (0.4)  | 12 (1.8)  | 62 (9.1)   | 32 (4.7)   |       |
|                              | No occupation      | 14 (2.1) | 58 (8.5)  | 264 (38.9) | 188 (27.7) |       |
|                              | Unknown            | 3 (0.4)  | 1 (0.1)   | 20 (2.9)   | 13 (1.9)   |       |
| Working hours/week           | <52 hours          | 8 (1.2)  | 31 (4.6)  | 133 (19.6) | 80 (11.8)  | .513  |
|                              | ≥52 hours          | 12 (1.8) | 41 (6.0)  | 218 (32.1) | 156 (23.0) |       |
| Drinking                     | Yes                | 3 (0.4)  | 4 (0.6)   | 22 (3.2)   | 18 (2.7)   | .449  |
|                              | No                 | 17 (2.5) | 68 (10.0) | 329 (48.5) | 218 (32.1) |       |
| Smoking                      | Every day          | 0 (0.0)  | 14 (2.1)  | 58 (8.5)   | 31 (4.6)   | .189  |
|                              | Sometimes          | 1 (0.1)  | 3 (0.4)   | 4 (0.6)    | 3 (0.4)    |       |
|                              | Smoked in the past | 12 (1.8) | 43 (6.3)  | 226 (33.3) | 147 (21.6) |       |
|                              | Never smoked       | 7 (0.0)  | 12 (1.8)  | 62 (9.1)   | 56 (8.2)   |       |
|                              | Unknown            | 0 (0.1)  | 0 (0.0)   | 1 (0.1)    | 0 (0.0)    |       |
| Physical activity (moderate) | Yes                | 1 (1.8)  | 4 (0.6)   | 11 (1.6)   | 4 (0.6)    | .381  |
|                              | No                 | 12 (0.3) | 67 (9.9)  | 322 (47.4) | 219 (32.3) |       |
|                              | Unknown            | 2 (2.1)  | 1 (0.1)   | 18 (2.7)   | 13 (1.9)   |       |
| No breakfast                 | Yes                | 14 (0.6) | 53 (7.8)  | 294 (43.3) | 205 (30.2) | <.001 |
|                              | No                 | 4        | 6 (0.9)   | 12 (1.8)   | 5 (0.7)    |       |

**Table 3. Stress Perception Level According to General Characteristics of Female Elderly (N=679) (N, %)**

| Variables        | Classification     | VHSRG      | HSRG         | LSRG         | VLSRG        | p-value |
|------------------|--------------------|------------|--------------|--------------|--------------|---------|
|                  |                    | N=43(4.7%) | N=155(17.0%) | N=400(44.0%) | N=312(34.6%) |         |
| Age              | 65-70 years        | 18 (2.0)   | 57 (6.3)     | 179 (19.7)   | 79 (8.7)     | <.001   |
|                  | 71-75 years        | 12 (1.3)   | 38 (4.2)     | 109 (12.0)   | 79 (8.7)     |         |
|                  | ≥76 years          | 13 (1.4)   | 60 (6.6)     | 112 (12.3)   | 154 (16.9)   |         |
| Marital status   | Married            | 41 (4.5)   | 154 (16.9)   | 398 (43.7)   | 310 (34.1)   | .091    |
|                  | Unmarried          | 2 (0.2)    | 1 (0.1)      | 4 (0.4)      | 2 (0.2)      |         |
| Education        | ≤Elementary school | 32 (3.5)   | 113 (12.4)   | 252 (27.7)   | 226 (24.8)   | .042    |
|                  | Middle school      | 9 (1.0)    | 15 (1.6)     | 63 (6.9)     | 32 (3.5)     |         |
|                  | High school        | 1 (0.1)    | 13 (1.4)     | 48 (5.3)     | 26 (2.9)     |         |
|                  | ≥College           | 1 (0.1)    | 6 (0.7)      | 23 (2.5)     | 14 (1.5)     |         |
| Residence        | City               | 27 (3.0)   | 116 (12.7)   | 300 (33.0)   | 215 (23.6)   | .128    |
|                  | Rural              | 16 (1.8)   | 39 (4.3)     | 100 (11.0)   | 97 (10.7)    |         |
| Household income | <1 million won     | 22 (2.4)   | 68 (7.5)     | 152 (16.7)   | 153 (16.8)   | .009    |
|                  | 1-3 million won    | 14 (1.5)   | 48 (5.3)     | 147 (16.2)   | 92 (10.1)    |         |
|                  | 3-5 million won    | 2 (0.2)    | 28 (3.1)     | 46 (5.1)     | 27 (3.0)     |         |

|                          |                |          |            |            |            |       |
|--------------------------|----------------|----------|------------|------------|------------|-------|
|                          | >5 million won | 5 (0.5)  | 11 (1.2)   | 53 (5.8)   | 31 (3.4)   |       |
| Subjective health status | Very good      | 1 (0.1)  | 3 (0.3)    | 14 (1.5)   | 12 (1.3)   | <.001 |
|                          | Good           | 2 (0.2)  | 13 (1.4)   | 43 (4.7)   | 59 (6.5)   |       |
|                          | Usually        | 15 (1.6) | 45 (4.9)   | 209 (23.0) | 154 (16.9) |       |
|                          | Bad            | 14 (1.5) | 48 (5.3)   | 82 (9.0)   | 52 (5.7)   |       |
|                          | Very bad       | 11 (1.2) | 40 (4.4)   | 41 (4.5)   | 27 (3.0)   |       |
|                          | Unknown        | 0 (0.0)  | 6 (0.7)    | 11 (1.2)   | 8 (0.9)    |       |
| Sleep time               | ≤6 hours       | 14 (1.5) | 44 (4.8)   | 117 (12.9) | 78 (8.6)   | .822  |
|                          | 7-8 hours      | 23 (2.5) | 69 (7.6)   | 191 (21.0) | 156 (17.1) |       |
|                          | >9 hours       | 6 (0.7)  | 31 (3.4)   | 78 (8.6)   | 62 (6.8)   |       |
| Economic activity        | Yes            | 19 (2.1) | 46 (5.1)   | 118 (13.0) | 69 (7.6)   | .034  |
|                          | No             | 24 (2.6) | 101 (11.1) | 268 (29.5) | 229 (25.2) |       |
|                          | Unknown        | 0 (0.0)  | 8 (0.9)    | 14 (1.5)   | 14 (1.5)   |       |
| Employment status        | Regular        | 0 (0.0)  | 4 (0.4)    | 3 (0.3)    | 2 (0.2)    | .198  |
|                          | Non-regular    | 11 (1.2) | 26 (2.9)   | 79 (8.7)   | 46 (5.1)   |       |
|                          | No occupation  | 32 (3.5) | 117 (12.9) | 304 (33.4) | 250 (27.5) |       |
|                          | Unknown        | 0 (0.0)  | 8 (0.9)    | 14 (1.5)   | 14 (1.5)   |       |
| Working hours/week       | <52 hours      | 18 (2.0) | 46 (5.1)   | 118 (13.0) | 76 (8.4)   | .082  |
|                          | ≥52 hours      | 25 (2.7) | 109 (12.0) | 282 (31.0) | 236 (25.9) |       |

|                                 |                    |          |            |            |            |      |
|---------------------------------|--------------------|----------|------------|------------|------------|------|
| Drinking                        | No                 | 16 (1.8) | 57 (6.3)   | 137 (15.1) | 119 (13.1) | .794 |
|                                 | Yes                | 21 (2.3) | 98 (10.8)  | 263 (28.9) | 192 (21.1) |      |
|                                 | Unknown            | 0 (0.0)  | 0 (0.0)    | 0 (0.0)    | 1 (0.1)    |      |
| Smoking<br>(N=1608)             | Every day          | 2 (0.2)  | 0 (0.0)    | 7 (0.8)    | 4 (0.4)    | .251 |
|                                 | Sometimes          | 0 (0.0)  | 2 (0.2)    | 0 (0.0)    | 1 (0.1)    |      |
|                                 | Smoked in the past | 0 (0.0)  | 5 (0.5)    | 12 (1.3)   | 8 (0.9)    |      |
|                                 | Never smoked       | 41 (4.5) | 146 (16.0) | 381 (41.9) | 298 (32.7) |      |
|                                 | Unknown            | 0 (0.0)  | 0 (0.0)    | 0 (0.0)    | 1 (0.1)    |      |
| Physical activity<br>(moderate) | Yes                | 5 (0.5)  | 6 (0.7)    | 13 (1.4)   | 5 (0.5)    | .023 |
|                                 | No                 | 38 (4.2) | 142 (15.6) | 374 (41.1) | 296 (32.5) |      |
|                                 | Unknown            | 0 (0.0)  | 7 (0.8)    | 13 (1.4)   | 11 (1.2)   |      |
| No breakfast                    | Yes                | 36 (4.0) | 140 (15.4) | 357 (39.2) | 272 (29.9) | .771 |
|                                 | No                 | 1 (0.1)  | 5 (0.5)    | 20 (2.2)   | 14 (1.5)   |      |

### 3.3. Depression According to General Characteristics

The characteristics of the elderly males and females according to the degree of depression were identified in terms of age, marital status, education level, residential area, and income level as demographic and sociological characteristics. Characteristics according to health behavior were confirmed by subjective health status, sleep time, physical activity, drinking, smoking, and absence of breakfast. As for occupational characteristics, economic activity, employment type, and working hours were checked. Among the male elderly, 23 (3.5%) were diagnosed with depression, and 627 (96.5%) were not diagnosed. Of the elderly females, 87 (9.8%) were diagnosed with depression, and 900 (90.2%) were not diagnosed with depression, indicating that female seniors were more diagnosed with depression.

The degree of depression was analyzed to have a significant effect on subjective health status, physical activity, alcohol, smoking, economic activity, working type, and working hours in both male and female elderly. The degree of depression in the elderly male was statistically significant in the subjective health status ( $p < .001$ ), sleep ( $p < .05$ ), physical activity ( $p < .001$ ), drinking ( $p < .001$ ), smoking ( $p < .001$ ), economic activity ( $p < .001$ ), working type ( $p < .001$ ), working hours ( $p < .001$ ). The degree of depression in elderly females was subjective health status ( $p < .001$ ), physical activity ( $p < .001$ ), drinking ( $p < .001$ ), smoking ( $p < .001$ ), economic activity ( $p < .001$ ), working type ( $p < .001$ ), and working hours ( $p < .001$ ) showed statistically significant differences.

The subjective health status of male elderly people was found to have depression when their recognition of their health was poor, and 7-8 hours of sleep time was found to be depressed, and when they did not do physical activity There was a high degree of depression in the case of drinking, and the degree of depression was high in the case of smoking. As for the economic activity, which is a professional characteristic, depression was found in the case of non-economic activity, the type of employment was depression in the case of no job or non-regular employment, and depression in the case of working hours longer than 52 hours. As for the subjective health status of elderly females, depression was found when their perceived health recognition was normal or poor, and depression was found when they did not do physical activity and the degree of depression was high in the case of drinking alcohol, and the degree of depression was high in the case of not smoking [Table 4].

**Table 4. Depression According to General Characteristics (N, %)**

| Variables      | Classification     | Male (N=650) |              | p-value | Female (N=887) |              | p-value |
|----------------|--------------------|--------------|--------------|---------|----------------|--------------|---------|
|                |                    | Yes=23(3.5)  | No=627(96.5) |         | Yes=87(9.8)    | No=800(90.2) |         |
| Age            | 65-70 years        | 7 (1.1)      | 247 (38.0)   | .250    | 39 (4.4)       | 287 (32.4)   | .112    |
|                | 71-75 years        | 6 (0.9)      | 159 (24.5)   |         | 22 (2.5)       | 210 (23.7)   |         |
|                | ≥76 years          | 10 (1.5)     | 221 (34.0)   |         | 26 (2.9)       | 303 (34.2)   |         |
| Marital status | Married            | 23 (3.5)     | 622 (95.7)   | .367    | 86 (9.7)       | 792 (89.3)   | .816    |
|                | Unmarried          | 0 (0.0)      | 5 (0.8)      |         | 1 (0.1)        | 8 (0.9)      |         |
| Education      | ≤Elementary school | 7 (1.1)      | 231 (35.5)   | .849    | 58 (6.5)       | 568 (64.0)   | .672    |

|                          |                 |          |           |       |          |            |       |
|--------------------------|-----------------|----------|-----------|-------|----------|------------|-------|
|                          | Middle school   | 5 (0.8)  | 12 (18.6) |       | 13 (1.5) | 106 (12.0) |       |
|                          | High school     | 6 (0.9)  | 16 (26.0) |       | 11 (1.2) | 77 (8.7)   |       |
|                          | ≥College        | 5 (0.8)  | 99 (15.2) |       | 3 (0.3)  | 41 (4.6)   |       |
| Residence                | City            | 18 (2.8) | 48 (74.6) | .576  | 67 (7.6) | 579 (65.3) | .087  |
|                          | Rural           | 5 (0.8)  | 14 (21.7) |       | 20 (2.3) | 221 (24.9) |       |
| Household income         | <1 million won  | 8 (1.2)  | 18 (28.3) | .299  | 38 (4.3) | 346 (39.0) | .299  |
|                          | 1-3 million won | 11 (1.7) | 24 (37.5) |       | 33 (3.7) | 260 (29.3) |       |
|                          | 3-5 million won | 1 (0.2)  | 98 (15.1) |       | 7 (0.8)  | 96 (10.8)  |       |
|                          | >5 million won  | 3 (0.5)  | 95 (14.6) |       | 9 (1.0)  | 93 (10.5)  |       |
| Subjective health status | Very good       | 1 (0.2)  | 38 (5.8)  | <.001 | 1 (0.1)  | 29 (3.3)   | <.001 |
|                          | Good            | 2 (0.3)  | 13 (20.5) |       | 5 (0.6)  | 112 (12.6) |       |
|                          | Usually         | 8 (1.2)  | 30 (46.3) |       | 36 (4.1) | 387 (43.6) |       |
|                          | Bad             | 9 (1.4)  | 11 (16.9) |       | 24 (2.7) | 176 (19.8) |       |
|                          | Very bad        | 3 (0.5)  | 56 (8.6)  |       | 21 (2.4) | 99 (11.2)  |       |
|                          | Unknown         | 0 (0.0)  | 0 (0.0)   |       | 0 (0.0)  | 0 (0.0)    |       |

|                    |               |          |                        |       |          |            |       |
|--------------------|---------------|----------|------------------------|-------|----------|------------|-------|
| Sleep time         | ≤6 hours      | 1 (0.2)  | 15 <sub>2</sub> (23.4) | .042  | 24 (2.7) | 230 (25.9) | .993  |
|                    | 7-8 hours     | 14 (2.2) | 31 <sub>3</sub> (48.2) |       | 43 (4.8) | 399 (5.0)  |       |
|                    | >9 hours      | 8 (1.2)  | 12 <sub>3</sub> (18.9) |       | 14 (1.6) | 160 (18.0) |       |
| Economic activity  | Yes           | 7 (1.1)  | 26 <sub>5</sub> (40.8) | <.001 | 27 (3.0) | 225 (25.4) | <.001 |
|                    | No            | 16 (2.5) | 35 <sub>5</sub> (54.6) |       | 58 (6.5) | 568 (64.0) |       |
|                    | Unknown       | 0 (0.0)  | 7 (1.1)                |       | 2 (0.2)  | 8 (0.9)    |       |
| Employment status  | Regular       | 0 (0.0)  | 11 (1.7)               | <.001 | 0 (0.0)  | 9 (1.0)    | <.001 |
|                    | Non-regular   | 3 (0.5)  | 10 <sub>6</sub> (16.3) |       | 22 (2.5) | 140 (15.8) |       |
|                    | No occupation | 20 (3.1) | 50 <sub>3</sub> (77.4) |       | 63 (7.1) | 643 (2.5)  |       |
|                    | Unknown       | 0 (0.0)  | 7 (1.1)                |       | 2 (0.2)  | 8 (0.9)    |       |
| Working hours/week | <52 hours     | 7 (1.1)  | 24 <sub>5</sub> (37.7) | <.001 | 30 (3.4) | 228 (25.7) | <.001 |
|                    | ≥52 hours     | 16 (2.5) | 38 <sub>2</sub> (58.8) |       | 57 (6.4) | 572 (4.5)  |       |
| Drinking           | No            | 2 (0.3)  | 38 (5.8)               | <.001 | 30 (3.4) | 288 (32.5) | <.001 |
|                    | Yes           | 21 (3.2) | 58 <sub>9</sub> (90.6) |       | 56 (6.3) | 512 (57.7) |       |
|                    | Unknown       | 0 (0.0)  | 1 (0.2)                |       | 1 (0.1)  | 2 (0.2)    |       |
|                    | Every day     | 4 (0.6)  | 93 (14.3)              | <.001 | 1 (0.1)  | 11 (1.2)   | <.001 |

|                              |                    |         |           |       |          |            |       |
|------------------------------|--------------------|---------|-----------|-------|----------|------------|-------|
| Smoking                      | Sometimes          | 0 (0.0) | 10 (1.5)  |       | 0 (0.0)  | 3 (0.3)    |       |
|                              | Smoked in the past | 1 (1.8) | 40 (62.3) |       | 5 (0.6)  | 19 (2.1)   |       |
|                              | Never smoked       | 4 (0.6) | 11 (18.2) |       | 79 (8.9) | 764 (86.1) |       |
|                              | Unknown            | 0 (0.0) | 1 (0.2)   |       | 2 (0.2)  | 3 (0.3)    |       |
| Physical activity (moderate) | Yes                | 0 (0.0) | 20 (3.1)  | <.001 | 4 (0.5)  | 25 (2.8)   | <.001 |
|                              | No                 | 2 (3.5) | 60 (92.8) |       | 83 (9.4) | 771 (86.9) |       |
|                              | Unknown            | 0 (0.0) | 4 (0.6)   |       | 0 (0.0)  | 4 (0.5)    |       |
| No breakfast                 | Yes                | 2 (3.4) | 51 (79.7) | .508  | 75 (8.5) | 709 (79.9) | .814  |
|                              | No                 | 1 (0.2) | 26 (4.0)  |       | 6 (0.7)  | 34 (3.8)   |       |

### 3.4. Suicide Planning According to General Characteristics

The characteristics according to the degree of suicide planning of the elderly males and females were identified in terms of age, marital status, education level, residential area, and income level as demographic characteristics. As characteristics according to health behavior, subjective health status, sleep time, physical activity, alcohol consumption, smoking, and absence of breakfast were identified. As for occupational characteristics, economic activity, employment type, and working hours were checked. Among the male elderly, 13 (1.9%) suicide plan group and 663 (98.1%) non-suicide plan group. Among the elderly females, 22 people (2.4%) in the suicide plan group and 887 people (97.6%) in the non-suicide plan group.

The degree of suicide planning of elderly males showed a statistically significant difference between educational background ( $p < .05$ ) and employment type ( $p < .001$ ). The degree of suicide planning of elderly females showed a statistically significant difference in household income ( $p < .05$ ), subjective health status ( $p < .05$ ), physical activity ( $p < .05$ ), and economic activity ( $p < .05$ ).

As for the academic background of male elders, those who had graduated from Elementary school or lower had a high degree of suicide planning, and as for the employment type, those without a

job had a high suicide plan.

The degree of suicide planning was found to be higher when the household income of the elderly females was less than 1 million won. As for subjective health status, the degree of suicide planning was high when the self-perceived health recognition was normal or bad, and the degree of suicide planning was high when the person did not engage in physical activity, and the degree of suicide planning was higher when the person did not engage in economic activity [Table 5].

**Table 5. Suicidal Plan According to General Characteristics (N, %)**

| Variables        | Classification     | Male (N=676) |              | p-value | Female (N=909) |              | p-value |
|------------------|--------------------|--------------|--------------|---------|----------------|--------------|---------|
|                  |                    | Yes=13(1.9)  | No=663(98.1) |         | Yes=22(2.4)    | No=887(97.6) |         |
| Age              | 65-70 years        | 2 (0.3)      | 257 (38.0)   | .221    | 23 (2.5)       | 316 (34.8)   | .810    |
|                  | 71-75 years        | 5 (0.7)      | 171 (25.3)   |         | 1 (0.1)        | 231 (34.2)   |         |
|                  | ≥76 years          | 6 (0.9)      | 253 (34.8)   |         | 8 (1.2)        | 330 (48.8)   |         |
| Marital status   | Married            | 13 (1.9)     | 658 (97.3)   | .907    | 21 (3.1)       | 879 (96.7)   | .199    |
|                  | Unmarried          | 0 (0.0)      | 5 (0.7)      |         | 1 (0.1)        | 8 (0.9)      |         |
| Education        | ≤Elementary school | 10 (1.5)     | 228 (33.7)   | .021    | 17 (1.9)       | 605 (66.6)   | .264    |
|                  | Middle school      | 2 (0.3)      | 124 (18.3)   |         | 2 (0.2)        | 117 (7.4)    |         |
|                  | High school        | 1 (0.1)      | 173 (25.6)   |         | 0 (0.0)        | 88 (5.6)     |         |
|                  | ≥College           | 0 (0.0)      | 103 (15.2)   |         | 19 (2.1)       | 44 (2.8)     |         |
| Residence        | City               | 10 (1.5)     | 513 (75.9)   | .593    | 14 (1.5)       | 644 (40.6)   | .240    |
|                  | Rural              | 3 (0.4)      | 150 (22.2)   |         | 5 (0.6)        | 243 (15.3)   |         |
| Household income | <1 million won     | 8 (1.2)      | 190 (28.1)   | .057    | 17 (1.9)       | 317 (20.0)   | .012    |
|                  | 1-3 million        | 3 (0.4)      | 269 (39.8)   |         | 4 (0.4)        | 297 (32.7)   |         |

|                          |                 |          |            |       |          |            |      |
|--------------------------|-----------------|----------|------------|-------|----------|------------|------|
|                          | won             |          |            |       |          |            |      |
|                          | 3-5 million won | 2 (0.3)  | 101 (14.9) |       | 1 (0.1)  | 102 (11.2) |      |
|                          | >5 million won  | 0 (0.0)  | 98 (14.5)  |       | 0 (0.0)  | 106 (11.7) |      |
| Subjective health status | Very good       | 2 (0.3)  | 37 (5.5)   | .504  | 1 (0.1)  | 29 (3.2)   | .011 |
|                          | Good            | 2 (0.3)  | 133 (19.7) |       | 1 (0.1)  | 115 (12.7) |      |
|                          | Usually         | 5 (0.7)  | 304 (45.0) |       | 6 (0.7)  | 417 (45.9) |      |
|                          | Bad             | 2 (0.3)  | 118 (17.5) |       | 6 (0.7)  | 190 (20.9) |      |
|                          | Very bad        | 2 (0.3)  | 45 (6.7)   |       | 5 (0.6)  | 114 (12.5) |      |
|                          | Unknown         | 0 (0.0)  | 26 (3.8)   |       | 3 (0.3)  | 22 (2.4)   |      |
| Sleep time               | ≤6 hours        | 8 (1.2)  | 147 (21.7) | .135  | 8 (0.9)  | 245 (27.0) | .355 |
|                          | 7-8 hours       | 6 (0.9)  | 351 (51.9) |       | 9 (1.0)  | 430 (47.3) |      |
|                          | >9 hours        | 1 (0.1)  | 129 (19.1) |       | 2 (0.2)  | 174 (19.1) |      |
| Economic activity        | No              | 3 (0.4)  | 269 (39.8) | .238  | 7 (0.8)  | 294 (32.3) | .047 |
|                          | Yes             | 10 (1.5) | 359 (53.1) |       | 12 (1.3) | 610 (67.1) |      |
|                          | Unknown         | 0 (0.0)  | 35 (5.2)   |       | 3 (0.3)  | 33 (3.6)   |      |
| Employment status        | Regular         | 0 (0.0)  | 11 (1.6)   | <.001 | 0 (0.0)  | 9 (1.0)    | .093 |
|                          | Non-regular     | 2 (0.3)  | 107 (15.8) |       | 5 (0.6)  | 156 (17.2) |      |
|                          | No occupation   | 11 (1.6) | 510 (75.4) |       | 14 (1.5) | 689 (75.8) |      |
|                          | Unknown         | 0 (0.0)  | 35 (5.2)   |       | 3 (0.3)  | 33 (3.6)   |      |
| Working hours/w          | <52 hours       | 2 (0.3)  | 250 (37.0) | .082  | 9 (1.0)  | 248 (27.3) | .138 |
|                          | ≥52 hours       | 1 (1.6)  | 413 (61.1) |       | 13 (1.4) | 639 (70.3) |      |

|                              |                    |          |            |      |          |            |      |
|------------------------------|--------------------|----------|------------|------|----------|------------|------|
| Week                         |                    | 1        |            |      |          |            |      |
| Drinking                     | No                 | 2 (0.3)  | 43 (6.4)   | .212 | 13 (1.4) | 316 (34.8) | .075 |
|                              | Yes                | 11 (1.6) | 620 (91.7) |      | 9 (1.0)  | 571 (62.8) |      |
|                              | Unknown            | 0 (0.0)  | 0 (0.0)    |      | 0 (0.0)  | 1 (0.1)    |      |
| Smoking                      | Every day          | 1 (0.1)  | 102 (15.1) | .095 | 1 (0.1)  | 12 (1.3)   | 375  |
|                              | Sometimes          | 1 (0.1)  | 10 (1.5)   |      | 0 (0.0)  | 3 (0.3)    |      |
|                              | Smoked in the past | 6 (0.9)  | 421 (62.3) |      | 1 (0.1)  | 24 (2.6)   |      |
|                              | Never smoked       | 5 (0.7)  | 130 (19.2) |      | 20 (2.2) | 847 (93.2) |      |
|                              | Unknown            | 0 (0.0)  | 0 (0.0)    |      | 0 (0.0)  | 1 (0.1)    |      |
| Physical activity (moderate) | Yes                | 0 (0.0)  | 20 (3.0)   | .576 | 0 (0.0)  | 29 (3.2)   | .021 |
|                              | No                 | 13 (1.9) | 611 (90.4) |      | 19 (2.1) | 830 (91.3) |      |
|                              | Unknown            | 0 (0.0)  | 32 (4.7)   |      | 3 (0.3)  | 28 (3.1)   |      |
| No breakfast                 | Yes                | 10 (1.5) | 554 (82.0) | .405 | 17 (1.9) | 786 (86.5) | .22+ |
|                              | No                 | 1 (0.1)  | 26 (3.8)   |      | 2 (0.2)  | 38 (4.2)   |      |

#### 4. Discussion

This study analyzed stress, depression, and suicide plans according to general characteristics, health behaviors and economic conditions in males and females aged 65 years or older, and also analyzed depression and suicide plans according to stress. With the age of aging, the elderly population is rapidly increasing, and as a result, stress, depression, and suicide, which are mental health problems of the elderly, are also increasing. Therefore, it is intended to help create a prevention program for the elderly with mental health problems such as stress, depression, and suicide plans, and provide basic data to prepare for a healthy retirement through this.

The level of stress recognition of the 65-year-old male and female was in the order of LSCG, VLSCG,, HSCG, and VHSCG. Elderly males aged 65-70 showed VHSCG and HSCG, and subjective health

status showed VHSCG when their perceived health recognition was bad. As for the level of stress recognition of elderly females, it was found that 65-70 years old showed VHSCG, and the academic background was found to show VHSCG in the case of graduating from Elementary school or below. VHSCG was found when household income was less than 1 million won. VHSCG appears to be a case of inaction of economic activity, and it appears that there is a lot of stress due to economic causes. Subjective health status was indicated by VHSCG when the health awareness perceived by the person was normal or bad. As for physical activity, non-physical activity appears to show VHSCG, and older females appear to experience more stress in unhealthy situations where physical activity is restricted.

The stress of the elderly is caused by the death of a spouse, serious illness, and life events that occur while living, such as health problems due to aging, economic problems related to retirement, and feelings of alienation due to loss of roles [21]. They must adapt to the rapidly changing social culture and experience different forms of stress in all age groups due to the psychological pressure caused by excessive competition [11].

Among them, the elderly become a nuclear family due to changes in the family structure and psychological changes such as physical changes due to deterioration in health due to aging, role changes and economic power due to retirement, and bereavement of neighbors. not only does the support of parents become difficult, but also the social adaptation of the elderly becomes difficult and stress is experienced [11].

When looking at the diagnosis rate of depression among the elderly males and females, the elderly males were 3.5% and the elderly females were 9%, showing a relatively higher percentage of female elderly. This can be seen as a result in agreement with the previous studies surveyed with 1.24% males and 4.69% females even in a study based on the diagnosis of depression by doctors [22].

As for the subjective health status of male and female elderly, depression was found when their perceived health awareness was poor, and depression was found when they did not do physical activity. It seems that the degree of depression is higher when the health status perceived by the elderly males and females is poor and physical movement is restricted. Both drinking and smoking showed a high degree of depression, Tae-Seok Kim et al. reported that smoking could lead to depression given the strong neurophysiological effects of nicotine [23], depression also appears to increase the likelihood of drinking and smoking. The elderly males and females were depressed when they did not engage in economic activities, the employment type was depression when there was no job or non-regular workers, and those who worked more than 52 hours had depression. This is consistent with previous studies showing that employment patterns affect depression [24].

During the past year, the rate of suicide planning among the elderly males and females was 2.2%, the elderly males were 1.9%, and the elderly females were 2.4%, which was higher in the elderly females, In a national survey on mental health and well-being in Australia, in the study of residents of the Australian community, the suicide plan was 0.7% for males and 1.0% for females, showing a relatively higher proportion of suicide plans in Korea. [25]. Also, similar to Korea, females had a higher rate of suicidal thoughts than males [26]. This did not show much difference from previous research results [26].

The fact that females have more suicide plans than males shows similar results to depression, which is higher in elderly females, indicating the need for prevention and management activities to reduce depression and suicide.

The degree of suicide planning of elderly males showed statistically significant differences in educational background and employment type. This is a result of low education and low economic levels affecting suicide, the results are similar to previous studies showing that low economic level, unemployment, and low education level have an effect on suicide [22]. The degree of suicide planning of elderly females showed statistically significant differences in household income, subjective health status, physical activity, and economic activity. Similar to depression, suicide plans are also affected by the economic stability of households, such as household income, employment type, and economic activity, and above all, the need for a welfare system that can guarantee adequate household income is required.

Because of analyzing the relationship between depression and suicide in four groups according to the level of stress recognition, the results of depression and suicide planning showed statistically significant results. In other words, the higher the level of recognition of stress, the higher the degree of depression and suicide plans. In previous studies, stress has been studied as a major risk factor for depression and suicide planning, showing similar results [27]. Jeon's research showed that the stressed group had a higher number of times of transitioning suicide thoughts to suicide attempts [28], a study by Fujino et al reported that the suicide incidence rate of the stressed group was more than three times higher than that of the stressed group [29]. In addition, even if there is a suicidal thought, it is reported that those who are active in solving the problem of stress have lower attempts at suicide than those who are passive [30-34], people with stress appear to need interventions to strengthen their problem-solving skills. Since the risk of elderly suicide is increased by perceived stress rather than the life event itself, it is very important to assess the stress perceived by the elderly from negative life events that trigger suicidal behavior in order to prevent elderly suicide [19].

This study compared and analyzed the level of stress recognition of elderly males and females in Korea using data from the National Health and Nutrition Survey, and confirmed the relationship between depression and suicide according to the level of stress recognition of elderly males and females. Therefore, it is intended to help create a prevention program for the elderly with mental health problems such as stress, depression, and suicide plans, and provide basic data to prepare for a healthy retirement through this.

## **5. Conclusion**

This study is based on data from 2018, the 3rd year of the 7th National Health and Nutrition Survey (2016-2018). The demographic characteristics, health behaviors, and occupational characteristics of 1,653 elderly males and females over 65 years of age were investigated according to stress, depression, and suicide plans.

The results of this study are as follows.

First, the cognitive levels of stress in 65-year-old males and females were all in the order of LSRG, VLSRG, HSRG, and VHSR. The level of stress recognition was analyzed to have a significant effect on age and subjective health status in both males and females, and the level of stress recognition of the elderly males showed statistically significant differences in age, subjective health status, and absence of breakfast. The age, educational background, household income, subjective health status, economic activity, and physical activity showed statistically significant differences in the level of stress recognition among the elderly females.

Second, it was analyzed that the degree of depression had a significant effect on subjective health status, physical activity, alcohol consumption, smoking, economic activity, working type, and working hours in both 65-year-old males and females, the rate of depression diagnosis was higher in female seniors than male seniors. The degree of depression of the male elderly showed statistically significant differences in subjective health status, sleep, physical activity, alcohol consumption, smoking, economic activity, working type, and working hours. The degree of depression of elderly females showed statistically significant differences in subjective health status, physical activity, alcohol consumption, smoking, economic activity, working type, and working hours.

Third, it was found that the degree of suicide planning of elderly males showed statistically significant differences in academic background and employment type. The degree of suicide planning of elderly females showed statistically significant differences in household income, subjective health status, physical activity, and economic activity.

Fourth, because of analyzing the relationship between depression and suicide in four groups according to the level of stress recognition, the results of depression and suicide planning showed statistically significant results. In other words, it was found that the higher the level of stress recognition, the higher the depression and suicide plans.

The following suggestions are made based on the results of this study.

First, there is a need for continuous research and attention on factors influencing stress recognition, depression, and suicide according to the general characteristics of elderly males and females.

Second, there is a need for follow-up studies on depression and suicide according to stress recognition of elderly males and females.

Third, research and interest in the development and application of intervention programs to solve the mental health-related problems of the elderly males and females will be needed.

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### **Journal Article**

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