



# Stress and Depression in Family Members of Patients with Dementia in Urban and Rural Communities: Cross-Sectional Surveys in Korea

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## Abstract

**Background:** We compared the associations of socioeconomic factors with stress and depression among family members living with a dementia patient in urban and rural areas of South Korea.

**Methods:** Data were collected from 9,730 (4,560 urban and 5,170 rural) participants in the Korean Community Health Survey from 2014-17. The variable of interest was the presence of a cohabiting dementia patient, and the dependent variables were stress and depression.

**Results:** Family members living with a dementia patient in rural areas had a significantly lower socioeconomic status (education, household income, marital status, and employment) than those living in urban areas ( $p < 0.001$ ). In addition, family members living with a dementia patient in rural areas reported statistically significantly less stress and depression than did those in urban areas after adjusting for related factors (rural stress OR=0.87, 95% CI=0.80-0.95; rural depression OR=0.75, 95% CI=0.66-0.85). Female gender and a low family income were associated with stress and depression in both rural and urban areas. Age, educational attainment, number of family members, marital status, and employment status differed slightly between urban and rural areas.

**Conclusion:** The socioeconomic factors associated with stress and depression differ slightly in the rural and urban areas of South Korea.

**Keywords:** Dementia; Family; Caregiver; Stress; Depression

## Introduction

The rapid increase in the number of patients with dementia due to the aging of the population is a financial issue for not only individuals but also for families and communities. Patients with dementia are characterized by high levels of dependence and a variety of complex needs owing to cognitive impairment, dysfunction, and abnormal behavior. The family members of the patient typically manage these characteristics out-

side the public health system. In this context, the WHO has reported that dementia is an important policy issue for governments (1). Nonetheless, there is a perception that families should be responsible for meeting the economic, emotional, and care needs of elderly relatives with dementia. Although the burden on family caregivers has decreased recently due to the expansion of long-term care insurance, the care of elderly persons



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with dementia should be seen as a social responsibility (2).

Dementia has a marked impact not only on patients but also on their family members. Generally, family caregivers are the patient's primary source of social and emotional support and make a major contribution to disease management. Most family caregivers of patients with dementia are on constant standby, which restricts their social activities and negatively affects their physical and emotional health. Caregivers of patients with dementia experience stress, depression, frustration, guilt, and suicidal ideation at higher frequencies than do non-caregivers; they also deal with physical issues, such as chronic fatigue, dyspepsia, neuralgia, tension, and insomnia (3-9). Caring for an individual with dementia was reported to have a greater impact on the mental state of the caregiver than caring for someone with a physical impairment (9). Therefore, the physical, emotional, and practical problems faced by family members are important issues.

The management of dementia in rural areas is hampered by the limited availability of transportation, facilities, and services (10-12). Caregivers in urban areas have greater access to respite care, home health assistance, and day care than their rural counterparts have (11). In addition, those in urban areas have easier access to information on dementia, facilitating early diagnosis. However, little is known about the risk of stress and depression in the family members of patients with dementia living in urban and rural areas. The ongoing increase in the number of elderly persons with dementia, and the consequent increase in the number of family members of patients with dementia, is an important issue. We analyzed the risk of stress and depression in family members who cohabit with patients with dementia. Age, gender, financial status, poor health, issues with the behavior of the patient with dementia, social support, and family disharmony are associated with depression in caregivers (13-21).

Accordingly, we investigated the relationships of socioeconomic factors with stress and depression in the family members of patients with dementia in urban and rural areas of South Korea.

## Methods

### *Databases*

Data were obtained from the 2014–2017 Korean Community Health Survey (KCHS), a nationwide community-based cross-sectional survey conducted annually since 2008 in 16 metropolitan cities and provinces with 253 regional sites (22). As the KCHS covers a wide variety of health topics, the data can be used to assess the prevalence of personal health behaviors related to the causes of disease. The survey was conducted by trained interviewers in one-to-one interviews based on a protocol and questionnaires. The community health survey was conducted from Aug to Oct in adults  $\geq 19$  yr of age enrolled by a standardized sampling method. We enrolled 9,730 of the 898,118 participants in the 2014–2017 KCHS who cohabited with a patient with dementia and obtained data on their stress and depression. Participants who did not respond to the survey questions on stress and depression were excluded.

The KCHS was approved by the Institutional Review Board of the Korea Centers for Disease Control and Prevention.

### *Variables*

The independent variables were age group, gender, educational attainment, family income, number of family members, marital status, and employment status. The subjects were categorized as 19–29, 30–39, 40–49, 50–59, 60–69, or  $> 70$  yr of age. Educational attainment was classified as less than elementary school, middle school, high school, or college or above. Household income was categorized into less or more than 2,000,000 Korean won (more than 1,697 USD). The subjects were classified as having two, three, or four or more family members. Marital status was categorized as married, separated or divorced, and single. Regarding employment status, the subjects were divided into employed and unemployed. Area of residence was categorized as urban or rural according to the administrative district in which the subject resided.

Stress was measured by a single questionnaire

item: “How often do you feel stress in your daily life?” The possible responses were very often, a lot, a little, and rarely. For use as an outcome measure, the item was dichotomized as ‘often’ (very often or a lot) or ‘little’ (a little or rarely). Depression was measured by a single questionnaire item: “Have you ever felt sad or desperate for more than 2 consecutive years during the past one year so that it interferes with your daily life?” The possible responses were yes and no.

### Statistical analyses

We compared the categorical data according to area of residence using chi-square tests. Multiple logistic regressions were performed to identify socioeconomic factors significantly associated with the outcomes. Moreover, a set of subgroup

analyses was performed to identify the independent effects of socioeconomic factors. Odds ratios (ORs) with 95% confidence intervals were calculated and values of  $P < 0.05$  were considered indicative of statistical significance. Data were analyzed using SPSS (Chicago, IL, USA) statistical software (ver. 18.0), and the Complex Samples module to adjust for stratification, clustering, and weight.

## Results

### Characteristics of subjects

The characteristics of the subjects (4,560 urban and 5,170 rural) are listed in Table 1.

**Table 1:** Demographic characteristics of the subjects

Variable	Total		Urban (n = 4,560)		Rural (n = 5,170)		P <sup>a</sup>
	No.	% (SE)	No.	% (SE)	No.	% (SE)	
Age (yr)	55.98	0.21	54.83	0.23	59.37	0.44	
19–29	684	12.1 (0.4)	455	13.2 (0.4)	229	8.9 (0.8)	< 0.001
30–39	571	8.1 (0.3)	348	8.9 (0.4)	223	5.7 (0.5)	
40–49	1,096	13.9 (0.4)	583	14.5 (0.5)	513	11.9 (0.6)	
50–59	2,096	23.4 (0.4)	1,002	23.2 (0.5)	1,094	23.9 (0.7)	
60–69	1,636	14.8 (0.4)	727	14.5 (0.4)	909	15.6 (0.6)	
≥ 70	3,647	27.8 (0.5)	1,445	25.7 (0.5)	2,202	34.0 (0.9)	
Gender							
Male	4,405	48.1 (0.4)	1,993	47.1 (0.5)	2,412	51.1 (0.7)	< 0.001
Female	5,325	51.9 (0.4)	2,567	52.9 (0.5)	2,758	48.9 (0.7)	
Educational attainment							
Elementary school	3,682	25.5 (0.4)	1,185	20.8 (0.5)	2,497	39.4 (0.9)	< 0.001
Middle school	1,271	11.6 (0.3)	585	11.3 (0.4)	686	12.4 (0.5)	
High school	2,437	28.0 (0.5)	1,252	28.4 (0.5)	1,185	26.8 (0.9)	
College or more	2,340	34.9 (0.5)	1,538	39.5 (0.6)	802	21.4 (0.9)	
Household income, won							
Less than 2,000,000	5,014	41.2 (0.7)	1,848	37.1 (0.8)	3,166	53.2 (1.2)	< 0.001
Over 2,000,000	4,716	58.8 (0.7)	2,712	62.9 (0.8)	2,004	46.8 (1.2)	
No. of family members							
2	3,699	30.3 (0.6)	1,422	27.7 (0.7)	2,277	37.8 (1.2)	< 0.001
3	2,945	29.1 (0.7)	1,287	28.1 (0.8)	1,658	32.1 (1.1)	
≥ 4	3,086	40.6 (0.8)	1,851	44.2 (0.9)	1,235	30.1 (1.5)	
Marital status							
Married	6,866	64.2 (0.5)	2,947	61.5 (0.6)	3,919	72.1 (0.9)	< 0.001
Separated or divorced	1,502	13.2 (0.3)	720	13.4 (0.4)	782	12.3 (0.5)	
Single	1,362	22.7 (0.4)	893	25.1 (0.5)	469	15.6 (0.9)	
Employment status							
Unemployed	4,851	49.0 (0.5)	2,468	50.2 (0.6)	2,383	45.6 (0.9)	< 0.001
Employed	4,879	51.0 (0.5)	2,092	49.8 (0.6)	2,787	54.4 (0.9)	
Stress status							
Little	6,204	63.0 (0.5)	2,911	62.8 (0.6)	3,293	63.4 (0.8)	0.551
Often	3,526	37.0 (0.5)	1,649	37.2 (0.6)	1,877	36.6 (0.8)	
Depressive status							
No	8,485	87.0 (0.3)	3,938	86.6 (0.4)	4,547	88.3 (0.5)	< 0.05
Yes	1,245	13.0 (0.3)	622	13.4 (0.4)	623	11.7 (0.5)	

SE, standard error; household income is in Korean won.

<sup>a</sup>Significance according to chi-square test in complex sample survey data analysis according to urban and rural area

The percentages were weighted to be representative of the national population. The mean ages of the residents of urban and rural areas were 54.8 and 59.4 yr, respectively. In urban areas, a larger proportion of females than males were living with a patient with dementia, the opposite was true in rural areas. The proportion of subjects with a college-or-higher education was higher in urban areas, and the proportion with a less-than-elementary-school education was higher in rural areas. The mean household income was more than 2 million won in urban areas and less than 2 million won in rural areas. The proportion of married subjects was higher in rural areas, and that of single subjects was higher in urban areas. The residents of urban areas were more likely to experience stress or depression than were those

of rural areas (37.2% vs. 36.6% and 13.4% vs. 11.7%, respectively). The distributions of other socioeconomic factors were similar between residents of urban and rural areas.

***Stress and depression by area of residence***

The results of the multiple logistic regression analyses of the risk of stress and depression among the family members of patients with dementia in urban and rural areas are shown in Table 2. The risk of stress and depression was lower in residents of rural than of urban areas. The differences were statistically significant after adjusting for age, gender, educational attainment, and household income, number of family members, marital status, and employment status.

**Table 2:** Risk of stress and depression according to area of residence

<i>Area</i>	<i>Stress</i>		<i>Depression</i>	
	OR	95% CI	OR	95% CI
Urban	1.00		1.00	
Rural	0.87	0.80–0.95	0.75	0.66–0.85

OR, odds ratio; CI, confidence interval

Adjusted for age, gender, educational attainment, household income, number of family members, marital status, and employment status

***Socioeconomic factors associated with stress***

The incidence of depressive symptoms varies geographically. The results of the multiple logistic regression analyses of socioeconomic factors predictive of stress are listed in Table 3. Among urban residents, family members > 50 yr of age living with a patient with dementia had lower odds of experiencing stress than did those < 20 yr of age. No such relationship was detected in residents of rural areas. In both urban and rural areas, female family members living with a patient with dementia were more likely to be stressed than were male family members. Family

members with a high-school-or-better education who were living with a patient with dementia had a significantly lower risk of stress than did those with an elementary-school-or-lower education; this was the case in both urban and rural areas. Similarly, a household income of more than 2 million won was associated with a lower risk of stress in both urban and rural areas. In urban areas, the risk of stress decreased as the number of family members increased. In both urban and rural areas, family caregivers who were separated divorced, or single had a lower risk of stress than did married caregivers.

**Table 3:** Socioeconomic factors associated with stress

<i>Variable</i>	<i>Stress often/N</i>	<i>Percent-age</i>	<i>Urban</i>		<i>Rural</i>	
			OR	95% CI	OR	95% CI
Age (yr)						
19–29	224	10.4	1.00		1.00	
30–39	220	8.6	1.16	0.94–1.44	1.52	0.92–2.50
40–49	396	13.8	0.95	0.76–1.20	1.29	0.87–1.92
50–59	770	22.4	0.78	0.62–0.98	1.32	0.91–1.91
60–69	589	15.4	0.74	0.56–0.96	1.16	0.77–1.74
≥ 70	1,327	29.4	0.67	0.50–0.89	1.07	0.72–1.59
Gender						
Male	1,329	41.0	1.00		1.00	
Female	2,197	59.0	1.45	1.32–1.58	2.05	1.81–2.32
Educational attainment						
Elementary school	1,432	28.9	1.00		1.00	
Middle school	476	12.7	0.94	0.80–1.11	0.95	0.77–1.17
High school	861	27.7	0.86	0.74–0.99	0.81	0.68–0.97
College or more	757	30.7	0.73	0.62–0.86	0.77	0.59–0.99
Household income, won						
Less than 2,000,000	2,039	47.9	1.00		1.00	
More than 2,000,000	1,487	52.1	0.65	0.58–0.72	0.75	0.63–0.88
No. of family members						
2	1,505	34.6	1.00		1.00	
3	1,016	28.3	0.83	0.72–0.95	0.88	0.74–1.04
≥ 4	1,005	37.1	0.84	0.74–0.96	0.82	0.66–1.01
Marital status						
Married	2,625	68.1	1.00		1.00	
Separated or divorced	449	11.1	0.61	0.54–0.70	0.56	0.47–0.66
Single	452	20.8	0.81	0.68–0.97	0.86	0.63–1.18
Employment status						
Unemployed	1,755	50.6	1.00		1.00	
Employed	1,771	49.4	1.07	0.96–1.19	1.05	0.91–1.22

OR, odds ratio; CI, confidence interval

### ***Socioeconomic factors associated with depression***

Table 4 lists the socioeconomic factors predictive of depression. Residents of urban areas > 30 yr of age living with a patient with dementia were at greater risk of depression than were those < 20 yr of age; this was also the case for residents of rural areas 50–60 yr of age. In both urban and rural areas, females living with a patient with dementia were more likely to be stressed than were males. Depression was less common in those in both urban and rural areas with a household in-

come of more than 2 million won. The risk of depression was lower in the employed compared to the unemployed, irrespective of residence in an urban or a rural area. In urban areas, a high-school-or-better education was significantly associated with a lower risk of depression compared to an elementary-school education, and being separated or divorced was associated with a significantly decreased risk of depression. The risk of depression decreased as the number of family members increased in both urban and rural areas.

Table 4: Socioeconomic factors associated with depression

Variable	Experi- encing depression /N	Percent- age	Urban		Rural	
			OR	95% CI	OR	95% CI
Age (yr)						
19–29	50	5.7	1.00		1.00	
30–39	54	6.4	1.96	1.42–2.69	1.27	0.65–2.48
40–49	117	12.0	2.24	1.58–3.17	1.45	0.79–2.66
50–59	253	21.0	2.00	1.41–2.84	2.02	1.10–3.69
60–69	217	17.0	1.66	1.09–2.50	1.93	1.03–3.60
≥ 70	554	37.9	1.59	1.03–2.44	1.48	0.78–2.79
Gender						
Male	403	31.9	1.00		1.00	
Female	842	68.1	1.91	1.64–2.23	2.08	1.74–2.48
Educational attainment						
Elementary school	575	37.3	1.00		1.00	
Middle school	179	14.7	0.93	0.74–1.15	1.01	0.81–1.26
High school	270	23.1	0.63	0.50–0.78	1.00	0.79–1.27
College or more	221	24.8	0.66	0.51–0.84	1.04	0.77–1.42
Family income, won						
Less than 2,000,000	834	57.6	1.00		1.00	
More than 2,000,000	411	42.4	0.67	0.55–0.80	0.69	0.56–0.86
No. of family members						
2	643	45.0	1.00		1.00	
3	336	26.4	0.75	0.61–0.92	0.64	0.51–0.81
≥ 4	266	28.5	0.68	0.55–0.84	0.60	0.46–0.79
Marital status						
Married	877	69.0	1.00		1.00	
Separated or divorced	225	14.6	0.71	0.58–0.87	1.05	0.83–1.32
Single	143	16.4	1.14	0.90–1.45	1.10	0.75–1.62
Employment status						
Unemployed	790	64.9	1.00		1.00	
Employed	455	35.1	0.64	0.53–0.77	0.62	0.51–0.76

## Discussion

We analyzed the associations of socioeconomic factors with stress and depression among family members living with a dementia patient in urban and rural areas of South Korea. In the urban and rural communities, 37.2% and 36.6%, respectively, of the subjects experienced stress and 13.4% and 11.7%, respectively, experienced depression. The rates of self-reported depression were described among community-dwelling caregivers of individuals with dementia of 30–83% (23), higher than the values in this study. This may be because

the subjects in this study included non-caregiver family members.

As it is likely that family caregivers in rural areas have access to fewer services and receive less support than their urban counterparts, they may experience higher levels of stress and depression (2,24). However, the risk of stress and depression was lower in family members living with patients with dementia who resided in rural compared to urban areas. This suggested that residents of rural areas have tighter-knit communities and thus receive more support from family and neighbors, enhancing their mental health (2,11). Urban care-



givers may be more concerned about their social life and social isolation and are exposed to different stressors than rural caregivers (11).

Female gender, low household income, and a separated or divorced marital status were associated with stress and depression in both urban and rural areas. This was not in agreement with a prior report that females experience less stress because they receive greater emotional support from relationships (25). Female caregivers of dementia patients tend to experience greater difficulty than males due to their child care and housework responsibilities (18,19).

The risk of depression increased with age, suggesting that the health condition of the family member deteriorates and the degree of dependence of the dementia patient increases as a function of age. However, the opposite tendency was observed for stress. The urban residents may have been influenced by other factors, such as education, employment, and disruption of their social life due to caring for a family member. Furthermore, stress and depression decreased as the number of cohabiting family members increased, likely due sharing the burden of care. The factors influencing stress and depression were similar in urban and rural areas. In rural areas, stress and age were not related to the number of family members, and the experience of depression was not related to educational attainment or marital status. In both urban and rural areas, economic activity, but not stress, was related to the risk of depression.

Two prior studies found no evidence of a link between area of residence and the depressive symptoms of a caregiver (26,27). However, these studies involved small samples within a particular geographic region (2). In a recent national study with 205 participants, the cultural values, such as the emphasis on family and familial relationships, of rural caregivers affected their health status, but residence in a rural area did not exert such an effect (2). Rural caregivers often believe that family members should be responsible for care (2,28). Additionally, rural caregivers gain satisfaction from caregiving (2). However, it is possible that differences between our results and those of oth-

er studies may relate to differences in the subjects and cultures examined (29).

This study had several limitations. First, we did not analyze care experience, support, skill, disease-related factors, and characteristics of the dementia patient, sleep duration, or relationships with family members. Additionally, the care-imposed burden on family members was neither measured nor adjusted. Analysis of these variables may have altered the results. In addition, as data were collected at the individual level, direct claims about population-level effects cannot be made.

Second, although the sample was representative of the general population of South Korea, this study used cross-sectional data from 2014–2017, which limits the generalizability of the results. Moreover, the cross-sectional design precluded examination of the causality of the associations of socioeconomic factors with emotional stress and depression. Thus, our findings should be confirmed by further studies focusing on different times. Although we defined family members as those cohabiting during the survey, contributions to patient care may change if a dementia patient survives for a long time.

## **Conclusion**

Our results provided insight into the relationships between socioeconomic factors and perceived stress and depression in residential areas. As our findings reflected Korean culture, a comparison between our results and data from other Asian countries may provide insight into cultural differences in the associations between socioeconomic factors and health status according to the area of residence of family members living with patients with dementia.

## **Ethical considerations**

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission,

redundancy, etc.) have been completely observed by the authors.

## Conflicts of interest

The author declares that there is no conflict of interest.

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