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RESEARCH

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Impact of the presence of a family member with dementia on the prevalence of depression: a comparison based on household income level

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Abstract

Background Families caring for patients with dementia are more vulnerable to depression. This cross-sectional study compared differences in socioeconomic status and gender related to depression among families of patients with dementia and identified associated factors.

Methods Inequality in depression according to household income level among families of patients with dementia was assessed using the Korean Community Health Survey, which included a sample of over 200,000 participants. Depression prevalence was assessed using the Patient Health Questionnaire-9 (PHQ-9) and each independent variable was calculated. Significant differences were analyzed using the chi-square test. Complex-sample multivariate logistic regression was performed to examine the association between the income levels of families of patients with dementia and depression. Additionally, an analysis of depression, stratified by income level and gender, was conducted.

Results The prevalence of depression among families of patients with dementia was 4.41%. The odds ratio (OR) for depression among families of patients with dementia compared to the population of families without patients with dementia was 1.49. Depression was significantly more likely in families with lower income levels (adjusted OR [aOR]: 2.17, 95% confidence interval [CI]: 2.16–2.18). The magnitude of the impact of having a family member with dementia on depression varied by income level, being highest in the lowest income group (aOR: 1.64, 95% CI: 1.63–1.66) and lowest in the highest income group (aOR: 1.26, 95% CI: 1.24–1.27). Stratification by gender showed that both men and women in families of patients with dementia were more likely to experience depression than those in families without patients with dementia. Women had a higher likelihood of depression across all income levels than men; however, the impact of having a family member with dementia was more pronounced among men, especially those from lower-income groups.

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Conclusions Our findings suggest the necessity for support policies tailored to low-income groups and women among families of patients with dementia. This is crucial given the higher prevalence of depression among families of patients with dementia than among families without patients with dementia.

Keywords Dementia, Depression, Income level, Health inequality

Background

With the aging global population, a growing trend of degenerative diseases such as Alzheimer's disease and dementia has been witnessed. Dementia negatively affects memory, cognitive function, and behavior, ultimately disrupting daily activities [1]. The World Health Organization (WHO) reported that the number of people with dementia worldwide is more than 55 million [2]. In Korea, one out of six older adults is projected to be affected by dementia by 2050 [3]. Dementia significantly escalates socioeconomic costs, including medical expenses and long-term services, imposing a burden at the societal and national levels [4, 5]. In 2019, the global societal costs related to dementia were estimated at $131.34 billion for 55.2 million patients, accounting for 0.76% of the global gross domestic product [6]. Similarly, Korea incurs substantial expenses related to dementia, with the cost of national dementia management reaching 18.7 trillion Korean won (KRW) in 2021, which is equal to 2.1 million KRW per capita [7]. Despite efforts to alleviate the increasing burden on patients with dementia and their caregivers by introducing policies such as long-term care insurance for older adults and a national dementia responsibility system, the burden of economic support carried by patients' families continues to rise. This leads to mental health issues such as depression, increased stress, and reduced quality of life [8–11].

Dementia affects both patients and family caregivers and guardians across physical, psychological, social, and economic aspects of life [12–14]. Family caregivers of patients with dementia are often referred to as "invisible second patients" and play a crucial role in the daily lives of these patients [15]. While caregiving can sometimes contribute to positive psychological effects such as pride and satisfaction [16], it is generally known to induce high levels of stress, anxiety, and depression [15, 17, 18]. Burton et al. [19] reported that family caregivers of patients with dementia spent an average of over 20 h per week on caregiving activities and that this could contribute to feelings of depression and anxiety. Furthermore, Watson et al. [20] investigated the prevalence of depression and anxiety among family caregivers of patients with dementia and found that women and adult-child caregivers were especially likely to experience symptoms of depression.

While the literature has heavily focused on depression in families of patients with dementia, studies exploring mental health inequalities based on the socioeconomic status (SES) of such families are lacking. Low SES is generally associated with higher rates of mental disorders such as depression and anxiety, increased disabilities, and impaired access to healthcare. Lorant et al. [21] conducted a meta-analysis investigating the impact of SES on depression and confirmed a significant correlation between low SES and depression. A relationship between low SES and depression has been consistently observed, regardless of national, regional, gender, and age differences [21–23].

Low income may affect the mental health of family members with dementia, causing increased stress and depression due to a lack of resources for caregiving services and poor access to medical services. This study aimed to assess the prevalence of depression among family members of patients with dementia, compare the differences in depression rates based on the presence of patients with dementia, and examine the implications of dementia-related policies through comparisons based on income level and gender.

Methods

Data and study population

The data analyzed in this study was drawn from the Community Health Survey conducted by the Korea Centers for Disease Control and Prevention. This annual nationwide survey is conducted to produce regional health statistics for the planning of local health and medical services. The survey employs a stratified sampling method. In the first stage, one or more points in dong, eup, or myeon (neighborhoods, towns, or villages) are selected based on housing types and stratified by Tong·Ban/Ri (neighborhood unit). Probability-proportional-to-size sampling is then used to extract sample points. Subsequently, systematic sampling is applied to select sample households. The survey involves interviewing approximately 900 individuals aged 19 years and older at each of the 255 public health centers nationwide, resulting in the participation of approximately 220,000 individuals. Trained surveyors visit the selected households directly and conduct one-on-one interviews. The 2019 Community Health Survey initially comprised 229,099 participants. After excluding 5,842 participants with missing data on sociodemographic characteristics, health behaviors, or depression, the current study's sample population comprised 223,257 individuals. A comparison of general characteristics (sex and age) between the included and excluded participants revealed no statistically significant differences.

Dependent variable

The dependent variable was depression, which was assessed using the Patient Health Questionnaire-9 (PHQ-9) [24]. The PHQ-9 is a screening tool that has been used to assess depression in the Community Health Survey and other national surveys, such as the National Health and Nutrition Examination Survey in the United States and the Korea National Health and Nutrition Examination Survey. In Korea, the PHQ-9 has been validated for its specificity and sensitivity as a reliable tool for assessing depression [25, 26]. The PHQ-9 comprises nine items that assess the frequency of experiencing various aspects of depressive symptoms over the preceding two weeks, including pleasure, sadness, sleep disturbance, energy level, appetite, feelings of failure, concentration, slow speech or restlessness, and thoughts of self-harm or suicide. Each item is scored on a four-point Likert scale, where 0 = "not at all," 1 = "on several days," 2 = "more than a week," and 3 = "nearly every day." The scores for each item are summed, and a total score of 10 or more is generally indicative of major depression [27, 28]. This study applied the same cutoff score for identifying depression.

Independent variables

The presence of a family member with dementia was an independent variable, which was based on whether a family member had been diagnosed with dementia by a doctor. Therefore, we used the following survey question: "Is there a family member in your household who has been diagnosed with dementia by a doctor?" Respondents were asked to answer "yes" or "no." SES was an independent variable that was operationalized by income. Income is a widely used indicator in health equity research because it directly measures individual material resources. It holds significance as an indicator because income levels are closely related to health, with a higher likelihood of poor health in lower-income strata [21, 22, 29]. In this study, income level was categorized into tertiles (high, middle, and low) based on household-equivalized income and calculated by dividing household income by the square root of the number of household members.

We included factors related to depression and other relevant determinants of mental health as independent variables based on a review of previous studies on mental health risk factors [21, 30]. Demographic variables included gender (men or women) and age group (19–34, 35–64, or ≥65 years). Socioeconomic variables included marital status (married or unmarried), education level (≤middle school, ≤high school, or college and above), employment status (economically active or inactive), and residential area (urban or rural). Health behavior variables included current smoking status, high-risk drinking behavior, and moderate-to-high physical activity level. Current smoking status distinguished between "current smokers" (those who smoked daily or occasionally) and "non-smokers" (those who used to or never smoked). High-risk drinking behavior was defined as the consumption of more than seven drinks (or five cans of beer) for men and more than five drinks (or three cans of beer) for women at least twice a week over the past year. A moderate-to-high physical activity level was determined based on engagement in vigorous physical activity for at least 20 min a day, three or more days a week, or moderate physical activity for at least 30 min a day, five or more days a week, in the past week.

Statistical analysis

The prevalence of depression was calculated for each factor, and the Rao-Scott chi-square test was used to assess the statistical difference in the prevalence of depression between groups. Complex-sample multivariate logistic regression, adjusted for confounding variables, was performed to examine the association between the income level among families with patients with dementia and depression. Subgroup analyses were conducted by stratifying income level and gender. Statistical significance was set at $P<0.05$. Weights reflecting the sampling design of the study were applied using the weights provided in the raw data by the Korea Disease Control and Prevention Agency (KCDC). SAS 9.4 (SAS Institute, Cary, NC, USA) was used for statistical analysis.

Results

Table 1 presents the general characteristics of the participants and the prevalence of depression according to each factor. The total number of participants was 223,257, and the weighted number of participants was 41,554,317. The men-to-women ratio was similar, and the 30–64 years age group had the highest population (56.79%). The majority (41.91%) of the participants had a college degree or higher. Economically active individuals accounted for 63.64% of the sample. The distribution by income level showed the highest percentage in the high-income group (44.37%). The proportion of families with patients with dementia was 6.14%.

The prevalence of depression in the total sample was 3.21%, with a higher prevalence among women (4.20%) than in men (2.20%). The prevalence was highest in the 65 years and older age group at 4.90%, followed by the 19–34 years and 35–64 years age groups. The prevalence of depression was significantly higher in participants with a low level of education ($P<0.001$), reaching 5.36% among those with a middle school education or lower. There was a higher prevalence of depression among participants who were unmarried, divorced, or widowed (4.69%) than among married participants (2.38%). Meanwhile, there was a lower prevalence of depression among

Table 1 General characteristics and prevalence of depression according to different factors

		Study population		Prevalence of depression (PHQ-9 ≥ 10)			
		N/n (Weighted)	**%**	**N/n (Weighted)**	**%**	**Std Error**	***P* value**
Factor		*N* = 223,257 (41,554,317)	100.00	*N* = 7,257 (1,332,706)	3.21	5.07	
Gender	Men	100,051 (20,638,629)	49.67	2,174 (453,726)	2.20	6.16	< 0.001
	Women	123,206 (20,915,688)	50.33	5,083 (878,980)	4.20	7.71	
Age group	19–34	33,504 (10,042,707)	24.17	1,162 (365,981)	3.64	11.6	< 0.001
	35–64	116,978 (23,596,764)	56.79	2,707 (578,953)	2.45	5.90	
	≥ 65	72,775 (7,914,845)	19.05	3,388 (387,772)	4.90	11.08	
Marital status	Not married	74,736 (14,950,898)	35.98	3,754 (700,567)	4.69	9.83	< 0.001
	Married	148,521 (26,603,419)	64.02	3,503 (632,139)	2.38	5.39	
Education	Middle school	81,623 (8,705,974)	20.95	3,888 (466,416)	5.36	11.35	< 0.001
	High school	73,569 (15,433,200)	37.14	1,981 (478,954)	3.10	8.45	
	College and above	68,065 (17,415,142)	41.91	1,388 (387,336)	2.22	6.81	
Income level	High	75,343 (18,435,901)	44.37	1,387 (377,721)	2.05	6.62	< 0.001
	Middle	74,915 (14,439,687)	34.75	1,873 (420,326)	2.91	8.25	
	Low	72,999 (8,678,729)	20.89	3,997 (534,658)	6.16	12.75	
Job status	Inactive	84,605 (15,110,385)	36.36	4,503 (753,572)	4.99	9.92	< 0.001
	Economically active	138,652 (26,443,932)	63.64	2,754 (579,134)	2.19	5.33	
Area of residence	Urban	124,652 (33,723,421)	81.16	4,081 (1,088,682)	3.23	5.93	0.280
	Rural	98,605 (7,830,896)	18.85	3,176 (244,024)	3.12	8.44	
Smoking status	No	186,897 (33,801,182)	81.34	5,974 (1,047,612)	3.10	5.42	< 0.001
	Yes	36,360 (7,753,135)	18.66	1,283 (285,094)	3.68	12.15	
High-risk drinking	No	198,221 (36,100,914)	86.88	6,542 (1,152,940)	3.19	5.28	0.502
	Yes	25,036 (5,453,403)	13.12	715 (179,765)	3.30	14.24	
Physical activity	No	171,363 (31,656,864)	76.18	6,120 (1,097,647)	3.47	5.99	< 0.001
	Yes	51,894 (9,897,453)	23.82	1,137 (235,058)	2.37	9.01	
Dementia	No	210,555 (39,004,620)	93.86	6,671 (1,220,361)	3.13	5.14	< 0.0001
	Yes	12,702 (2,549,697)	6.14	586 (112,345)	4.41	19.22	

Table 2 Effects of gender, dementia status, and income level on the occurrence of depression

		Total			Men			Women		
		aOR[a]	95% CI	*P* value	aOR[b]	95% CI	*P* value	aOR[b]	95% CI	*P* value
Gender	Men	Reference								
	Women	2.09	(2.08–2.10)	< 0.001						
Income level	High	Reference			Reference			Reference		
	Middle	1.28	(1.27–1.28)	< 0.001	1.25	(1.24–1.26)	< 0.001	1.27	(1.26–1.28)	< 0.001
	Low	2.17	(2.16–2.18)	< 0.001	2.15	(2.13–2.17)	< 0.001	2.05	(2.04–2.07)	< 0.001
Dementia	No	Reference			Reference			Reference		
	Yes	1.49	(1.48–1.50)	< 0.001	1.18	(1.16–1.19)	< 0.001	1.68	(1.67–1.69)	< 0.001

aOR, adjusted odds ratio; CI, confidence interval

[a] Adjusted for gender, age group, marital status, education level, income level, job status, area of residence, smoking status, high-risk drinking, physical activity, and dementia status

[b] Adjusted for age group, marital status, education level, income level, job status, area of residence, smoking status, high-risk drinking, physical activity, and dementia status

Table 3 Effects of a family member with dementia on depression stratified by gender and income level

Sample	Income level	Dementia aOR	95% CI	*P* value
Total	High	1.26	(1.24–1.27)	< 0.001
	Middle	1.59	(1.57–1.60)	< 0.001
	Low	1.64	(1.63–1.66)	< 0.001
Men	High	0.80	(0.78–0.82)	< 0.001
	Middle	1.14	(1.12–1.17)	< 0.001
	Low	1.61	(1.58–1.63)	< 0.001
Women	High	1.56	(1.54–1.59)	< 0.001
	Middle	1.84	(1.81–1.86)	< 0.001
	Low	1.66	(1.64–1.68)	< 0.001

Adjusted for age group, marital status, education level, income level, job status, area of residence, smoking status, high-risk drinking, and physical activity. aOR, adjusted odds ratio; CI, confidence interval

economically active participants (2.19%) than among those who were economically inactive (4.99%). The prevalence of depression was significantly higher in the lower-income group (6.16%) than in the middle- (2.91%) and high-income (2.05%) groups ($P<0.001$). The prevalence of depression among families of patients with dementia was 4.41%, which was significantly higher than that in families without a patient with dementia (3.13%).

Table 2 shows the results of the complex-sample multivariate logistic regression to examine the impact of gender, income level, and the presence of a family member with dementia on the occurrence of depression after adjusting for other variables. The odds ratio (OR) for depression was higher among women (2.09, 95% confidence interval [CI] 2.08–2.10) than men. Participants in the lower-income group had a higher OR for depression (2.17, 95% CI 2.16–2.18) than those in the higher income group. The impact of income level on depression was higher in both men and women participants, with the OR being higher among men (2.15, 95% CI 2.13–2.17) than women (2.05, 95% CI 2.04–2.07).

The OR for depression among families with patients with dementia was 1.49 (95% CI 1.48–1.50), indicating a higher likelihood of depression compared with families without patients with dementia. When stratified by gender, both men and women in families with patients with dementia had a higher likelihood of depression than those in families without patients with dementia, with women showing a higher OR (adjusted OR [aOR]: 1.68, 95% CI 1.67–1.69) than men (aOR: 1.18, 95% CI 1.16–1.19).

Table 3 shows the impact of the presence of a family member with dementia on depression stratified by gender and income level. The effect size of the impact on depression by the presence of a family member with dementia was largest in the lowest income group (aOR 1.64, 95% CI 1.63–1.66) and smallest in the highest income group (aOR 1.26, 95% CI 1.24–1.27). This trend was consistent when stratified by gender; it was evident in men with family members with dementia (aOR 1.61, 95% CI 1.58–1.63). Moreover, the impact of the presence of a family member with dementia on depression was higher in women participants across all income levels.

Discussion

This study examined the influence of the presence of a family member with dementia on depression. Data from the Korea Community Health Survey were used to identify mental health inequalities related to gender and the income level of families caring for patients with dementia.

The prevalence of depression in the sample population was 3.21%. Gender-based differences in depression rates were observed, with women exhibiting a higher prevalence than men. The highest depression rate was found in the 65 years and older age group. Further, there was a significant correlation between income level and depression rates, with lower income associated with higher depression rates. These findings align with research indicating that factors such as gender, age, and income level are associated with depression [21–23, 31].

Families that had a family member with dementia constituted 6.14% of the Community Health Survey participants in this study. The depression rate among these families was relatively higher than that in families without a family member with dementia, even after controlling for confounding variables. Stratifying the results by gender consistently supported these findings, aligning with a previous study by Park et al. [32], which reported higher depression rates among families with patients with dementia than among those without.

The impact of the presence of patients with dementia on depression in family members indicates greater vulnerability associated with lower income. This trend was observed across both genders, with women exhibiting a higher likelihood of depression than men. According to the 2019 Community Health Survey, the primary burdens associated with dementia are emotional and economic challenges [33]. This suggests that the influence of income level on depression may intensify due to the overwhelming responsibilities involved in caring for patients with dementia. Lower-income families caring for patients with dementia may face increased economic difficulties as the costs of medications, hospital expenses, and diagnostic tests increase. The challenges in affording specialized care services contribute to a higher likelihood of burden on family members. Moreover, the lack of social support in low-income environments makes it necessary for family members to dedicate substantial time to caring for patients at home. This can lead to restricted social activities, deterioration in emotional well-being, and social isolation for family members [19].

Regarding the impact of income on depression by gender, our results revealed the tendency for the gender gap in depression to widen for men participants as income levels decreased. Although women participants exhibited a lower-income-related disparity in depression rates, they exhibited higher depression rates than men participants across all income levels. This aligns with the findings of previous studies reporting higher levels of depression among women in caregiving roles for patients with dementia [34]. In Korea, traditional gender roles often involve men taking on the primary economic responsibility, while women typically assume the primary caregiving role [35]. Regarding men, the disparity based on SES was clear, likely because economic activities have a greater impact on men. This is particularly evident in the context of dementia caregiving, wherein studies show that 27% of caregivers resign from their jobs, and 15% reduce their working hours following the onset of dementia in a family member [9]. These findings highlight the impact of dementia caregiving on hindering economic activities, especially for men from low-income backgrounds.

This study aimed to derive foundational data for the development of effective policies for families providing care for a family member with dementia. Consistent with the ongoing trend in Korea, the discussion calls for a continued effort to address the challenges posed by dementia through national policies and comprehensive support systems. Thus, policies should be developed on a national scale to secure infrastructure for dementia care and provide economic assistance and caregiving support to help alleviate the burden on individuals and society. The Korean government has initiated various efforts to contribute to dementia care, starting with the establishment of a comprehensive dementia management plan in 2008 [36]. Other initiatives such as easing the financial burden of dementia-related medical expenses, providing family counseling fees, and supporting community dementia centers have also been implemented. However, despite such efforts, government resources remain inadequate, particularly in terms of emotional support for families dealing with dementia and economic assistance for vulnerable populations [37–39].

The responsibility of caring for patients with dementia should not only involve patients' families but society as a whole, and it is challenging to comprehensively evaluate the impact of such efforts. The WHO has announced the “Global Action Plan on the Public Health Response to Dementia 2017–2025” as part of the national dementia joint response plan. While recommending that all countries establish dementia management plans, the WHO emphasized that support for informal and formal caregivers providing care to patients with dementia and their families is crucial in dementia care. Strengthening the social support system and providing effective support services to families of patients with dementia are essential to reduce depression rates. In particular, policy efforts are needed to offer regular and professional counseling services, enabling emotional support for families of patients with dementia. Additionally, developing educational programs for families is crucial to enhance their understanding and provide appropriate care in their interactions with the family member who has dementia.

This study has some limitations. First, the depression prevalence rates were based on a self-report measures rather than a formal diagnostic evaluation. As such, there is the potential for self-report bias, such as social desirability and recall bias, which can affect the results. However, the use of the PHQ-9 as a tool for measuring depression is deemed reliable for comparison with other studies related to the topic, as it is widely used in national surveys. Second, the data source used in the study is comprehensive in terms of health-related information but lacks specific details about the characteristics of patients with dementia, such as the severity of their symptoms and the duration of the illness. Future research should address these limitations by conducting studies that include data on the characteristics of patients with dementia, their relationships with family caregivers, and living arrangements.

Conclusion

In conclusion, sustained policy efforts are crucial for providing economic support and emotional assistance to low-income families dealing with dementia. This study underscores the pressing need for ongoing governmental initiatives that are tailored to address the unique challenges faced by these families. By implementing comprehensive policies, including those for financial aid and psychological support, governments can effectively alleviate the burdens experienced by families of patients with dementia and enhance the overall well-being of patients and their families.

Abbreviations

CI	Confidence interval
KRW	Korean won
OR	Odds ratio
PHQ-9	Patient Health Questionnaire-9
SES	Socioeconomic status
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1

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Author contributions

Conceptualization, M-H.C., M-H.C.; data curation: M-H.C., M-H.M.; writing—original draft, M-H.C, M-H.M., S-W.K.; writing- review & editing: M-H.C, M-H.M., S-W.K. All authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of the Pusan National University Hospital (No. 55-2023-016). All the participants provided written informed consent to participate in the Korea Community Health Survey. The survey was conducted after explaining to the participants that the results would only be used for statistical purposes and that confidentiality was guaranteed. Informed consent was waived for this study because of its use of anonymous archival data.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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