



Prevalence of Loneliness and Related Factors Among Older Adults in Taiwan: Evidence From a Nationally Representative Survey

INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 58: 1–8
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DOI: 10.1177/00469580211035745
journals.sagepub.com/home/inq


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Abstract

Background: Loneliness is a common problem among older populations, and very few studies have examined loneliness among older adults in Taiwan.

Aim: This study aimed to understand the prevalence of loneliness and factors associated with it among older adults in Taiwan.

Methods: Data from the Taiwan Longitudinal Study of Aging collected in 2015 were analyzed and involved 4588 participants aged ≥65 years. The outcome variable was a self-reported loneliness question, and independent variables included demographic characteristics, a self-reported health status, physical function, number of comorbidities, cognitive function, and social support. A multivariate logistic regression was used to identify predictors of loneliness.

Results: The prevalence of loneliness among older adults in Taiwan was 10.5%. The multivariate logistic regression showed that old persons who were male, lived alone, perceived that they had a poor health condition, had no spouse, had no job, and had poor emotional support had higher likelihood of feeling lonely.

Conclusions: This study investigated loneliness in a nationally representative sample of older adults and revealed that one-tenth of this older population might experience loneliness which requires immediate action. Special attention should be given to the aforesaid factors in older adults to identify problems and provide interventions as early as possible in order to prevent loneliness and thus reduce the resultant negative effects on physical and mental conditions. Appropriate interventions should be developed to prevent or ameliorate feelings of loneliness among older populations using rigorous research designs such as randomized controlled trials.

Keywords

loneliness, older adults, Taiwan

What do we already know about this topic?

Loneliness is a common problem among older populations, and very few studies have examined loneliness among older adults in Taiwan.

How does your research contribute to the field?

The current study showed that the prevalence of loneliness among older adults in Taiwan was 10.5%.

What are your research's implications towards theory, practice, or policy?

This study can provide a basis for future research on loneliness and a reference for developing policies or care protocols relating to loneliness of older population.



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Introduction

Loneliness is an unpleasant emotional response characterized by subjective feelings that occurs in any age group, but it is more prevalent in older adults due to an increased number of chronic illnesses, declines in physical function, the death of spouse or significant others, or retirement.^{1,2} The prevalence of loneliness among older adults varies from country to country. In 25 European countries, 16.9% of people aged ≥ 80 years were reported to often experience loneliness.³ Other results included 9% of older persons aged ≥ 65 years in the United Kingdom who experienced loneliness,⁴ 43% of people (aged ≥ 60 years) in the United States,⁵ 37.6% of people (aged ≥ 60 years) in India,⁶ 9.9% of people (aged ≥ 50 years) in South Africa,⁶⁻⁸ and about 10%~30% of people (aged ≥ 65 years) in China.⁹⁻¹¹ A study in 2001 showed that 60.2% of older community-dwelling Taiwanese adults (aged ≥ 65 years) suffered a moderate to high level of loneliness, among whom 3.5% experienced a high level of loneliness.¹²

Loneliness negatively affects the physical and psychological health of older adults, exacerbating problems such as high blood pressure, coronary artery disease, depression, cognitive decline, and Alzheimer's disease.¹³⁻¹⁵ Moreover, loneliness was positively associated with falls¹⁶ and was negatively associated with quality of life.¹⁷ It was also found that loneliness increased the risk of heart disease by 29% and stroke by 32%, thereby increasing mortality.^{18,19}

A review study by Cohen-Mansfield et al.¹ in 2016 concluded that loneliness in older adults was significantly associated with demographic variables, such as a female gender, an unmarried status, an older age, a lower income, and a lower educational level. Recent research also showed that living alone, lacking social interactions, and having poor self-reported health were also associated with loneliness.^{20,21}

Taiwan has become an aging society as older adults (those aged ≥ 65 years) constituted 15.95% of its population as of October 2020.²² Issues of loneliness among older persons

should be highlighted because of the rapid growth in the number of older people in Taiwan. However, most research on loneliness in Taiwan targeted older adults living in long-term care facilities.²³⁻²⁶ There is little research available on the loneliness status of older Taiwanese, except one study that focused on community-dwelling older adults, but it is outdated and was limited because it only included older adults in southern Taiwan.¹² Therefore, this study aimed to explore the prevalence of loneliness among older adults in Taiwan and determine related factors using a national long-term survey dataset.

Methods

Research Design

For this study, we conducted a secondary analysis of data from the Taiwan Longitudinal Survey on Aging (TLSA) carried out by the Health Promotion Administration (of the Ministry of Health and Welfare; MOHW).²⁷ Since the completion rate of each wave of the TLSA exceeded 80%, the collected data covered a representative sample of the total population of Taiwan. The target population of the TLSA was Taiwanese who had registered their household in 311 villages, towns, and cities in Taiwan before the end of 1988 and was aged ≥ 60 years. The TLSA consisted of random sampling in a stratified multistage manner, followed by continuous tracking every 3 or 4 years. Sampling was additionally conducted over two nationally representative age groups of 50~66 and 50~56 years in 1996 and 2003, respectively, using the sampling method in the baseline survey.

In 2015, to overcome analytical limitations caused by a failure to include subjects in mountain indigenous townships and an insufficient number of samples due to factors such as sample loss and death, TLSA re-sampled a nationally representative middle-aged population aged ≥ 50 years in Taiwan as the survey area for long-term tracking. Ultimately, 8300 people were included in the 2015 dataset.

Data Sources and Research Subjects

With a sample aged ≥ 65 years in the 2015 TLSA as research subjects, this study conducted a cross-sectional analysis, in which post-stratification weighting was assigned according to sampling weights. The total number of samples after weighting was 4588 participants. Data were originally collected using face-to-face interview questionnaires by trained interviewers.

Instruments

Loneliness. Loneliness was measured in the TLSA using the Center for Epidemiologic Studies Depression (CES-D) scale.²⁸ In this scale, there is an item, "Did you feel lonely in the last week?", with responses of "never," "rarely,"

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“sometimes,” and “often.” All subjects who answered “sometimes” or “often” were classified as “lonely,” and those who answered “never” or “rarely” were classified as “not lonely.” Many previous studies used this single item as a measurement tool for loneliness.²⁹⁻³³ According to a previous study,³⁴ the degree of loneliness measured by a single item was highly correlated with results measured using multiple items.

Demographic characteristics, health status, and social support. These items were selected according to the literature, and details are described here.

Demographic characteristics. Subjects were divided into male and female in terms of gender. Regarding age, subjects were categorized into a young-old group aged 65~74 years, an old-old group aged 75~84 years, and an oldest-old group aged ≥ 85 years according to an international classification of older adult populations.³⁵ In terms of the degree of education, participants were divided into ≤ 6 years and >6 years. In terms of residential region, subjects were classified into “urban” which covers special municipalities, provincial cities, and county-controlled cities, and “rural” which includes townships and villages according to the administrative divisions of Taiwan. In terms of ethnicity, participants self-described themselves as being Hoklo, Hakka, mainlanders, or other. There were two categories of marital status: “with” a spouse meaning the subject was married or lived with a spouse and “without” a spouse meaning the subject was widowed, divorced, separated, or never married. As far as religion, there were two categories of “with religion” and “no religion.”

Health status variables. These included a self-reported health status, physical function, number of comorbidities, and cognitive function. The self-reported health status referred to one’s self-reported physical health, classified as “good,” “neither good nor poor,” and “poor.” In terms of visual and hearing impairments, subjects were classified into “with visual and/or hearing impairments” and “with no visual or hearing impairments” according to their answers to the questions, “Can you see things clearly even with glasses?” and “Can you hear sounds clearly even with a hearing aid?” Physical activity function was measured by the Katz Activities of Daily Living (ADLs) scale, which includes 6 items: eating, getting in and out of bed, walking indoors, putting on and taking off clothes, bathing, and toileting. Those who had difficulty with one of the items scored 1, otherwise 0, so the total score of each subject ranged 0~6, with a higher score indicating worse physical activity function.³⁶ The number of comorbidities was a count of the total number of 17 diseases suffered by a subject. These included hypertension, diabetes, heart disease, stroke, cancer, malignant tumors, respiratory disease, arthritis, gastric disease, hepatobiliary disease, cataracts, glaucoma, hyperlipidemia, kidney stones, gout, mental illness, and kidney disease. Cognitive function was

evaluated with the Short Portable Mental Status Questionnaire (SPMSQ). The questionnaire contains 10 questions about memory, orientation, and calculation,³⁷ with 1 point for an incorrect answer and 0 points for a correct answer. Therefore, the total score of each subject ranged 0~10, with a higher score indicating worse cognitive function.

Relevant social support variables. These included one’s current living arrangement, employment, economic satisfaction, and emotional social support, of which living arrangement mainly measured whether an older person lived alone. In terms of employment, subjects were classified into “employed” and “unemployed.” Emotional support was measured by answers of older people to the two questions, “Is there someone who listens to your thoughts?” and “Is there someone who cares about you?” A 5-point Likert scale was used for scoring, with 1 point indicating the worst and 5 points indicating the best. The total score ranged 2~10 points, with a higher score indicating better emotional support.³⁸

Data Analysis

Data analyses were performed with SPSS ver. 21.0 for Windows (IBM, Armonk, NY, USA). Independent variables and the prevalence of loneliness were analyzed with descriptive statistics using the frequency, percentage, mean, and standard deviation (SD). In addition, univariate and multivariate logistic regression analyses were conducted to explore factors contributing to loneliness.

Ethical Considerations

The study protocol was reviewed and approved by the Taipei Medical University Joint Institutional Review Board (TMU-JIRB). The source of the data herein was TLSA files provided by the MOHW. All of the data files were encrypted, such that any identifiers that could be linked to personal identity and any connections to other data had been removed, to ensure protection of the research subjects’ rights of confidentiality and privacy.

Results

Characteristics of Participants

In total, 4588 subjects were included in the study. Among them, 2396 (52.2%) were female, 2580 (56.2%) were aged 65~74 years, 3465 (75.5%) lived in cities, and 3177 (69.4%) had received ≤ 6 years of education. In addition, 62.2% of subjects had a spouse, 74.3% were Hoklo people, and 89.5% had religious beliefs.

Regarding their health status, 1784 (38.9%) subjects self-reported a health status of “neither good nor poor,” followed by 1497 participants (32.6%) who thought that their health

Table 1. Characteristics of Participants (N = 4588).

Demographic Variables	N	%
Gender		
Male	2192	47.8
Female	2396	52.2
Age (years)		
65~74	2580	56.2
75~84	1475	32.2
>85	533	11.6
Residence		
Urban	3465	75.5
Rural	1123	24.5
Education [#]		
≤6 years	3177	69.4
>6 years	1400	30.6
Marital status		
No spouse	1737	37.8
With a spouse	2851	62.2
Ethnicity [#]		
Hoklo	3409	74.3
Hakka	693	15.1
Mainlander	386	8.4
Other	100	2.2
Self-reported health		
Good	1497	32.6
Neither good or poor	1784	38.9
Poor	1307	28.5
Vision impairment [#]		
No	3006	65.9
Yes	1558	34.1
Hearing impairment [#]		
No	3491	76.4
Yes	1080	23.6
Living status		
Not alone	4126	90.0
Alone	462	10.0
Working status		
No work	3845	83.8
Employed	743	16.2
Religion [#]		
No religion	480	10.5
With religion	4105	89.5
Income [#]		
Not enough	2016	49.3
Sufficient	2073	50.7
Loneliness [#]		
No	3668	89.5
Yes	428	10.5
Mean (SD)		
Comorbidities	2.65	(1.94)
ADLs	1.53	(4.36)
SPMSQ	0.67	(1.13)
Emotional support	8.21	(1.43)

Abbreviations: ADLs, Activities of Daily Living; SPMSQ, Short Portable Mental Status Questionnaire; SD, standard deviation.

[#]With missing data.

was “good,” and 1307 subjects (28.5%) who thought that their health was “poor.” The average number of comorbidities was 2.65 ± 1.94 ; the mean ADLs score was 1.53 ± 4.36 , and the mean SPMSQ score was 0.67 ± 1.13 ; 1558 subjects (34.1%) reported visual impairment, and 1080 subjects (23.6%) reported hearing impairment. In terms of relevant social support, 4126 subjects (90%) lived together with their families, 3845 subjects (83.8%) were unemployed, and 2073 subjects (50.7%) were satisfied with their financial status. The mean score of emotional support was 8.21 ± 1.43 (Table 1).

Prevalence of Loneliness and its Related Factors

The prevalence of loneliness among older adults in Taiwan was found to be 10.5%. A univariate logistic regression analysis showed that gender, age, level of education, marital status, self-reported health, visual impairment, hearing impairment, number of comorbidities, ADLs, cognitive function (SPMSQ), living alone, employment status, economic status, and emotional support were statistically significant associated with loneliness. Tests for multicollinearity among all of the independent variables confirmed that all of the variance inflation factors (VIFs) were <2 , indicating no collinearity among these independent variables. The multivariate logistic regression analysis further showed that subjects who were male (adjusted odds ratio (AOR): 1.4; 95% confidence interval (CI): 1.07~1.90), had no spouse (AOR: 4.16; 95% CI: 3.05~5.68), had a poor self-reported health condition (AOR: 3.83; 95% CI: 2.60~5.64), lived alone (AOR: 1.83; 95% CI: 1.30~2.57), were unemployed (AOR: 2.38; 95% CI: 1.47~3.86), and had low emotional support (AOR: 1.47; 95% CI: 1.35~1.61) had a significantly higher likelihood of feeling lonely (Table 2). The Hosmer–Lemeshow test ($P = 0.117$) verified that this was an appropriate model.

Discussion

The current study showed that the prevalence of loneliness in older Taiwanese was 10.5%, which despite similarities to 9.0% in the United Kingdom, 9.7% in South Africa and 11.6% in Norway,^{4,7,8} and it significantly differed from prevalences in most countries. This may be attributed to differences in subjects, research tools, and research methods, or disparities in cultural and social backgrounds. For instance, Theeke (2009) measured loneliness in older adults aged ≥ 65 years using a single item and concluded that 19.3% of that age group suffered from loneliness in the United States,³⁹ but another American study that used the UCLA (University

Table 2. Univariate and Multivariate Logistic Regression Models Predicting Loneliness and Other Covariates.

Independent Variable	Univariate			Multivariate Logistic		
	OR	95% CI	P	AOR	95% CI	P
Gender (female)	0.73	0.60~0.90	0.003**	1.40	1.07~1.90	0.02*
Age (ref >75 years)	0.39	0.29~0.54	<0.001***	0.94	0.58~1.52	0.79
Residence in an urban area	1.00	0.80~1.26	0.981	0.97	0.70~1.36	0.88
Low educational level	1.61	1.27~2.03	<0.001***	0.88	0.65~1.21	0.44
No spouse	4.75	3.83~5.89	<0.001***	4.16	3.05~5.68	<0.001***
Hoklo (ref other)	0.46	0.27~0.80	0.006**	1.17	0.98~1.39	0.08
Poor self-reported health	5.74	4.31~7.65	<0.001***	3.83	2.60~5.64	<0.001***
Visual impairment	1.96	1.60~2.40	<0.001***	1.11	0.83~1.48	0.47
Hearing impairment	1.84	1.46~2.31	<0.001***	0.81	0.58~1.14	0.23
Number of comorbidities	1.21	1.15~1.27	<0.001***	1.07	0.99~1.15	0.06
ADLs	1.12	1.09~1.16	<0.001***	1.02	0.97~1.08	0.41
SPMSQ	1.23	1.13~1.34	<0.001***	1.06	0.95~1.17	0.30
Living alone	3.55	2.76~4.54	<0.001***	1.83	1.30~2.57	<0.001***
No employment	3.86	2.56~5.81	<0.001***	2.38	1.47~3.86	<0.001***
No religion	0.97	0.67~1.36	0.846	0.78	0.59~1.04	0.08
Poor economic status	3.86	2.56~5.81	<0.001***	1.28	0.97~1.70	0.09
Poor emotional support	1.67	1.56~1.78	<0.001***	1.47	1.35~1.61	<0.001***

Abbreviations: AOR, adjusted odds ratio; ADLs, Activities of Daily Living; CI, confidence interval; OR, odds ratio; SPMSQ, Short Portable Mental Status Questionnaire.

*P < 0.05; ** P < 0.01; *** P < 0.001.

Note: The variance inflation factor variable was less than the standard value.

of California, Los Angeles) Loneliness Scale as the measurement tool found that 43% of older adults felt lonely.⁵ Of note, definitions of older adults in different studies may have varied. For example, studies have defined older adults as people aged ≥ 50 years,^{7,40} ≥ 60 years,^{41,42} and ≥ 65 years.^{8,39} Different research methods may have been adopted; for example, some studies performed regional surveys using a cross-sectional research design,^{8,12,41,43} while others conducted a secondary analysis of data collected from databases.^{7,11,40,44}

A 2001 study revealed that 60.2% of older Taiwanese experienced a moderate to high degree of loneliness.¹² That prevalence is substantially higher than results from this study, which is possibly because this study collected samples throughout Taiwan, but the study by Wang et al. collected samples only from southern rural communities of Taiwan. Another possible reason is that Wang et al.'s study was carried out using the UCLA scale and divided the score range into low level of loneliness (20~40 points), medium level of loneliness (41~60 points), and high level of loneliness (61~80 points) by the researchers, which differed from most studies.^{42,43} Furthermore, the study by Wang et al.¹² was performed in 2001, a gap of many years from this study, which may be one of the reasons for the difference. Overall, it is clear that loneliness has become a mental health problem in older Taiwanese. Therefore, it is necessary to develop public health policies and plans that are designed to address this problem.

Through a multivariate logistic regression analysis, this study found that gender, lacking a spouse, having poor self-reported health, living alone, being unemployed, and having poor emotional support were contributing factors to loneliness, among which, gender and lacking a spouse were two demographic variables that were significantly associated with loneliness. Men had a 0.73-fold (95% CI: 0.60~0.90) lower prevalence of loneliness than women according to the univariate analysis, suggesting that women are more likely to experience loneliness, a result consistent with most studies;^{1,7,40} however, after other variables were added into the model using a multivariate logistic regression, the opposite conclusion was drawn, that is, men were more likely to experience loneliness (AOR: 1.40; 95% CI: 1.07~1.90). This reversal may be attributed to the traditional Taiwanese notion that "men rule the outside, women rule the inside." To be specific, men generally dedicate themselves to careers at an early age, working outside the home, and have more social activities, but once retired, they may experience an inability to adapt to decreased social interactions as well as increased isolation, thereby becoming more prone to loneliness. In addition, women are more willing to express their emotions, while men are generally reluctant to discuss their feelings with others⁴⁵ and prefer to hide them deeply in their hearts, which makes men more vulnerable to loneliness.

Older adults without a spouse feel lonelier than those with a spouse,^{1,7,43} and results of the present study were consistent by finding that older adults without a spouse had a 4.16-fold

higher prevalence of loneliness than those with a spouse. This may be due to the family-centered notion of Taiwanese. With an advancing age and changing family structure, one's spouse may turn out to be the most important person providing emotional support. This accounts for the consistent conclusion in both domestic and foreign studies that emotional support from and attachment to a spouse can reduce the sense of loneliness of older adults. Hence, it is recommended that platforms for making friends should be established or training designed to improve older adults' social skills could be provided, in an attempt to offer those without a spouse more opportunities to get to know others and thus reduce their loneliness.

The univariate analysis of health-related factors showed that older adults with a low ADL score, multiple comorbidities, visual impairment, hearing impairment, poor cognitive function, or poor self-reported health were more likely to experience loneliness, which is consistent with most of the literature.^{7,20,33,44,46,47} However, results of the multivariate analysis showed that there was a significant difference only between older adults with and those without poor self-reported health, with the former having a 3.83-fold higher prevalence of loneliness (95% CI: 2.60~5.64) than the latter.

Self-reported health plays an important role in perceiving loneliness. Despite poor physical conditions, as long as there is sufficient systematic support, the effects of physiological factors can be alleviated, including the deterioration of body functions, chronic diseases, and restrictions on daily physical activities.⁴⁸ This means that an individual's perception of their own health can retard the decline in physical functions and progression of diseases, thereby relieving the discomfort brought about by functional degeneration and diseases. Since the self-reporting of health is based on an individual's subjective feelings about their health status, it is a subjective health indicator, while the number of comorbidities, visual and hearing impairments, and poor cognitive function are objective health indicators. Results of this study indicated that subjective feelings and perceptions could better predict loneliness than objective values. Hence, it is recommended that medical staff pay more attention to the self-perceptions of older adults and view self-reported health conditions as an important assessment item.

The multivariate analysis of relevant social support showed that older adults who lived alone, were unemployed, or had poor social support were more prone to loneliness.^{1,41} These findings are consistent with most research; for example, people living alone are more likely to be lonely,^{8,41} unemployed people are more prone to loneliness than those who are employed,^{40,41} and people with poor social support are more prone to loneliness.^{9,40}

A meta-analysis study indicated that improving social skills (e.g., social recreation), increasing social support (e.g., through home visits), providing chances for social interaction (e.g., via the computer, Internet, or telephone), and recognizing abnormal social cognitions (e.g., cognitive behavioral

therapy) were interventions which improved or reduced feelings of loneliness in the literature. Of these interventions, addressing maladaptive social cognition was most successful.⁴⁹ However, one review suggested that more rigorous research designs such as randomized controlled trials are necessary to examine the effects of interventions in improving loneliness among older adults in the future.²

Limitations

The main scales used in this study were all questionnaires, which may have led to recall bias and missing values. Nonetheless, this study adopted nationwide sampling with a survey completion rate of more than 80%, so it is a rare nationally representative sample of older adults in Taiwan. Therefore, results of this study can confidently be extrapolated to elucidate factors relating to loneliness among older adults aged ≥ 65 years in Taiwan.

Conclusions

This study investigated loneliness and its associated factors in a nationally representative sample of older adults, and results indicated that the prevalence of loneliness among older adults in Taiwan has reached 10.5%, a rate that requires great attention. Results of this study also revealed that being male, having no spouse, having poor self-reported health, living alone, being unemployed, and having poor emotional support were the main factors associated with loneliness. Therefore, special attention should be given to the aforesaid factors in older adults to identify problems and provide interventions as early as possible in order to prevent loneliness and thus reduce the resultant negative effects on physical and mental conditions. Moreover, the findings of this study can provide a basis for future research on loneliness and a reference for developing mental health policies for older populations.

Acknowledgments

The authors express their gratitude to the staff at the Health Promotion Administration, Ministry of Health and Welfare, Taiwan for data gathering, and to all of the participants for their participation.

Author Contribution

All authors meet the authorship criteria and are in agreement with the content of the manuscript. PHH, MJC, CLK, SFW, and YHC conceived and designed the study. PHH, MJC, and YHC analyzed and interpreted the data. PHH and YHC wrote the paper. All authors approved the final version for submission.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Ministry of Science and Technology in Taiwan (grant no.: MOST109-2314-B-038-115, 2020).

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