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Original Research Article

Prevalence of multimorbidity in Thailand: a multilevel analysis of a population-based survey

Nirun Intarut[1]*, Parinya Srihatrai[2], Narongsak Chantawang[3]

[1]Department of Health Systems Science, Mahasarakham University, Mueang, Maha Sarakham, Thailand
[2]Department of Ophthalmology, Mahasarakham University, Mueang, Maha Sarakham, Thailand
[3]School of Applied Thai Traditional Medicine, Mahasarakham University, Mueang, Maha Sarakham, Thailand

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***Correspondence:**
Dr. Nirun Intarut,
E-mail: nirun.i@msu.ac.th

ABSTRACT

Background: The objective of the study was to estimate the prevalence of multimorbidity and to analyze the factors related to multimorbidity using multilevel analysis.
Methods: The data from the 2017 National Health and Welfare Survey was used. In total, 27,960 families and 65,781 participants were analyzed. Multilevel logistic regression analysis with 2-levels was performed to assess independent risk factors for the multimorbidity.
Results: Of 14,353 participants analyzed, 20.4% (95% confidence interval (CI): 20.1, 20.7) of those showed multimorbidity. 59% were females; 74.4% were 56-66 years, 68.7% had primary school level education, and 63.8% were reported being married. Multilevel multiple logistic regression results showed that the prevalence of multimorbidity was higher in females (adjusted OR (AOR): 1.2, 95% CI: 1.1, 1.3), older participants had higher risk of multimorbidity than younger people (p value for trend <0.01), married (AOR: 1.2; 95% CI: 1.0, 1.4), widowed or divorced (AOR: 1.3; 95% CI: 1.1, 1.5).
Conclusions: A high prevalence of multimorbidity in older patients was found. Tailored disease prevention programs and health care provider are needed to design and service for multimorbidity patients.

Keywords: Multimorbidity, Aging, Chronic disease, Multilevel analysis

INTRODUCTION

The prevalence of multimorbidity is high in both developed and developing countries.[1] Clearly, multimorbidity tends to be more complicated to cure than does single disease.[2] Reports have shown that multimorbidity has associated mortality, disability, a high rate of burden of disease, and complexity of treatment. Chronic diseases most often occurred among old people and also in working adults.[3]

Studies have reported the prevalence of multimorbidity, risk factors related to multimorbidity, epidemiology and interventions.[4,5] Reviews have shown that the multimorbidity rate was distributed across age group, gender, and socioeconomic status. Therefore, this study aimed to estimate the prevalence of multimorbidity in Thailand, and to analyze the factors related to multimorbidity using multilevel analysis.

METHODS

Design and sampling

This cross-sectional study used the data from the National Health and Welfare Survey that was carried out in March,

2017. Stratified two-stage sampling was used for selecting participants. Bangkok and provinces were identified as strata and enumeration area (EA) and family was specified to stage one sampling and stage two sampling, respectively. 1,990 EA were randomly sampled from 127,460 EA. Among those, in 2nd stage sampling, 27,960 households were randomly sampled in five regions of Thailand (Bangkok, Central, North, Northeast, and South). In total, 27,960 families and 65,781 participants were included in the survey. Participants who lived in a familiar and aged 20 years or older were included in this analysis.

Variables

Multimorbidity was assessed with the consecutive question; "In the past 1 month, have you experienced chronic disease?"; responses were either "no" or "yes". If they reported "yes", they reported a chronic disease in response to the following question; "Have you been diagnosed with a chronic disease by a doctor or health staff?" They could specify up to five chronic diseases such as hypertension, diabetes cancer etc. The consecutive questions were reported only for outpatients. Multimorbidity was defined using the World Health Organization (WHO) definition.[6] If participants who reported two chronic diseases or more, they were classified to multimorbidity. In addition, if they reported one chronic disease, they were classified to chronic disease.

Wealth index

Wealth index was used a proxy indicator to socioeconomic status (SES).[7,8] We constructed the wealth index by using household durable assets (housing materials, toilet or latrine access, phone ownership, or agricultural land). We presented an index of household wealth by dividing scores into quintile levels. The first quintile means the poorest; second quintile means poor; the third quintile means medium; the fourth quintile means rich and the fifth quintile means the richest. Calculation of the wealth index was as described the Intarut et al.[9]

Gender (male, female), age in years (≤25, 26-35, 36-45, 46-55, 56-66, 67-75, 76-85, ≥86), education levels (not attended, primary school, secondary school, university), and marital status (single, married, widowed, divorce, married but separated) was used in our analysis.

Statistical analysis

We calculated the prevalence of multimorbidity and presented it as frequency and percentages. In the univariate analysis, we tested the association between the categorical variables and the prevalence of multimorbidity by using a chi-square test.

We tested the variables at 2 levels; level 1 (individual level) and level 2 (family level). Individual variables was composed of gender, age in years, education levels, marital status, and multimorbidity. For the family level, we tested the socioeconomic (wealth index).

Multilevel logistic regression analysis with 2-levels was performed to assess independent risk factors for the multimorbidity. The intraclass correlations were estimated to describe the variation of the prevalence of multimorbidity across a family's SES. The R program version 3.6.1 and epiDisplay version 3.5.0.1 were used to perform all analyses.[10,11]

RESULTS

Table 1 shows the distribution of socio-economic factors by chronic disease. Of 14,353 participants, 20.4% (95% CI: 20.1, 20.7) of those showed multimorbidity. 59% were females; 30.8% were 56-66 years, 68.7% of participants were primary schools, and 63.8% reported being married. In addition, in level 1, the 4th quintile of wealth index was 23.1%.

Table 1: Distribution of non-communicable chronic disease.

Variables	Total	One chronic condition	Multimorbidity	P value
	14353	**9643**	**4710**	
Level 1				
Wealth index				<0.001
Poorest	2390 (16.7)	1651 (17.1)	739 (15.7)	
Poor	2713 (18.9)	1841 (19.1)	872 (18.5)	
Medium	3070 (21.4)	2061 (21.4)	1009 (21.4)	
Rich	3319 (23.1)	2187 (22.7)	1132 (24.0)	
Richest	2861 (19.9)	1903 (19.7)	958 (20.3)	
Level 2				
Gender				<0.001
Male	5880 (41.0)	4107 (42.6)	1773 (37.6)	
Female	8473 (59.0)	5536 (57.4)	2937 (62.4)	
Age (years)				<0.001
≤25	752 (5.2)	720 (7.5)	32 (0.7)	

Continued.

Variables	Total	One chronic condition	Multimorbidity	P value
	14353	**9643**	**4710**	
26-35	443 (3.1)	406 (4.2)	37 (0.8)	
36-45	1093 (7.6)	927 (9.6)	166 (3.5)	
46-55	2768 (19.3)	2053 (21.3)	715 (15.2)	
56-66	4416 (30.8)	2774 (28.8)	1642 (34.9)	
67-75	2674 (18.6)	1516 (15.7)	1158 (24.6)	
76-85	1784 (12.4)	985 (10.2)	799 (17.0)	
≥86	423 (2.9)	262 (2.7)	161 (3.4)	
Education levels				<0.001
Not attended	1084 (7.6)	678 (7.1)	406 (8.6)	
Primary school	9754 (68.7)	6309 (66.5)	3445 (73.3)	
Secondary school	2067 (14.6)	1573 (16.6)	494 (10.5)	
University	1287 (9.1)	929 (9.8)	358 (7.6)	
Marital status				<0.001
Single	1284 (9.2)	1042 (11.2)	242 (5.2)	
Married	8917 (63.8)	5981 (64.5)	2936 (62.6)	
Widowed divorce	3457 (24.8)	2033 (21.9)	1424 (30.4)	
Married but separated	308 (2.2)	219 (2.4)	89 (1.9)	

Factors related to multimorbidity

The results from the univariate analysis, Pearson's chi-square test, showed that the prevalence of multimorbidity in females (62.7%) was higher than males (57.7%). We also found an association between age (p value <0.001), education level (p value <0.001), and marital status (p value <0.001). Additionally, wealth index was related to multimorbidity (p value <0.001).

Multilevel multiple logistic regression results reported in Table 2, show that the prevalence of multimorbidity was higher in females (adjusted OR (AOR): 1.2, 95% confidence interval (CI): 1.1, 1.3). Older participants had higher risk of multimorbidity than younger people (p value for trend <0.01), married (AOR: 1.2; 95% CI: 1.0, 1.4), widowed or divorced (AOR: 1.3; 95% CI: 1.1, 1.5). Secondary school level was found to have statistical significance in reducing the prevalence of multimorbidity (AOR: 0.8; 95% CI: 0.7, 0.9). In level 1, we found a statistical significance in all wealth index groups (2nd quartile, AOR: 1.2; 95% CI: 1.0, 1.4; 3rd quartile, AOR: 1.2; 95% CI: 1.1, 1.4; 4th quartile, AOR: 1.3; 95% CI: 1.2, 1.5; 5th quartile, AOR: 1.3; 95% CI: 1.2, 1.6). We observed the statistical significance of a linear trend of wealth index adjusted odds ratio (p value=0.015). Furthermore, we estimated the intraclass correlation coefficients (ICCs) from the multilevel model. ICCs were used to describe the variation of the multimorbidity prevalence. We found that the ICCs was 8% (95% CI: 5%, 12%) that was occurring at the contextual level (family level).

Table 2: Multilevel logistic regression analysis of socioeconomic factors related to multimorbidity.

Factors	Crude OR (95%CI)	Adj. OR (95% CI)
Level 1 (family)		
Wealth index		
Poorest	Reference	Reference
Poor	1.1 (1.0, 1.2)	1.2 (1.0, 1.4)
Medium	1.1 (1.0, 1.3)	1.2 (1.1, 1.4)
Rich	1.2 (1.0, 1.3)	1.3 (1.2, 1.5)
Richest	1.1 (1.0, 1.3)	1.3 (1.2, 1.6)
Level 2 (individual)		
Gender		
Male	Reference	Reference
Female	1.2 (1.1,1.3)	1.2 (1.1, 1.3)
Age (years)		
≤25	Reference	Reference
26-35	2.3 (1.2, 4.3)	2.2 (1.1, 4.1)
36-45	4.5 (2.6, 7.9)	4.0 (2.2, 7.1)
46-55	8.8 (5.1, 15.0)	7.7 (4.4, 13.4)
56-66	14.9 (8.7, 25.5)	13.1 (7.5, 23.0)

Continued.

Factors	Crude OR (95%CI)	Adj. OR (95% CI)
67-75	19.2 (11.2, 32.9)	17.2 (9.7, 30.2)
76-85	20.4 (11.9, 35.1)	17.7 (10.0, 31.4)
≥86	15.5 (8.8, 27.3)	12.9 (7.1, 23.5)
Education level		
Not attended in a school	Reference	Reference
Primary school	0.9 (0.8, 1.0)	0.9 (0.8, 1.1)
Secondary school	0.5 (0.4, 0.6)	0.8 (0.7, 0.9)
University	0.6 (0.5, 0.7)	0.8 (0.7, 1.0)
Marital status		
Single	Reference	Reference
Married	2.1 (1.8, 2.5)	1.2 (1.0, 1.4)
Widowed or divorced	3.0 (2.6, 3.5)	1.3 (1.1, 1.5)
Separated	1.8 (1.3, 2.3)	1.2 (0.9, 1.6)

Intraclass correlation: 8% (95% CI: 5%, 12%).

DISCUSSION

Our study showed that the prevalence of multimorbidity was 20.4%. Compared to the epidemiologic characteristics of multimorbidity and a sociodemographic study of 1181024 participants in Singapore, this rate was much lower than that reported (26.2%).[12] Moreover, the prevalence of multimorbidity in our study was lower than those reported from previous studies reviewing the prevalence of multimorbidity among high (prevalence: 37.9%; 95% CI: 32.5, 43.4%), low- and middle-income countries (prevalence: 29.7%; 95% CI: 26.4, 33.0%).[13]

Our results showed that females had a greater risk of multimorbidity than did males. This finding is similar to the study that described the age and gender differences in the prevalence and patterns of multimorbidity in men and women over 65 years in Spain.[14] Furthermore, our results are similar to a study in northern Iran that investigated the impact of gender on multimorbidity, and a study from Chile that determined the prevalence of chronic diseases and related factors of multimorbidity.[15,16]

Older age was greater risk to experiencing multimorbidity than at younger age. Clearly, the evidence demonstrates an association between age and multimorbidity. A cross-sectional study in Scotland explored the distribution of multimorbidity, comorbidity of physical and mental health disorders, in relation to age and socioeconomic deprivation.[17] It was found that the prevalence of multimorbidity increased substantially with age. Also, a cross-sectional study from Taiwan that aimed to estimate age-specific and gender-specific prevalence of multimorbidity reported that the prevalence of multimorbidity varied across age and increased with age.[18] Age is the main factor related to many chronic diseases. This might be explained by, increasing metabolic and molecular damage in older subjects.[19] In addition, people might be exposed to unhealthy behaviors such as tobacco products, physical inactivity, poor nutrition, and excessive alcohol consumption.[20,21] When people had more than one condition of unhealthy behavior, they tended to have a greater risk to the multiple chronic disease.

Marital status is one of the social factors that was related to multiple chronic disease. Our results revealed people who have been married and widowed or divorced have a greater risk to multimorbidity than those who are single. A cross-sectional study showed couples were more likely to show healthy behavior (a non-smoker, meat recommendations for limited fast food, alcohol consumption, and fruit and vegetable intake) than those who are single.[22] Controversial findings were reported in a study analyzing data from a health survey to test the association between marital status and cardiovascular mortality. The findings showed single, never married men and separated/divorced women were at greater risk to cardiovascular mortality than those who were married.[23]

Our analysis showed the rich people were more likely to exhibit multimorbidity than those who were the poorest (first quartile of wealth index). The finding was inconsistent with a study that aimed to test the prevalence and correlates of multimorbidity and related factors from low- and middle-income countries during.[24]

The findings showed that richer subjects were more likely to exhibit multimorbidity than those who were poorer. Another study reported that the poorer were more likely to exhibit multimorbidity than those who were a richer.[25]

The strength of our study is the data from a nationally representative sample of the Thai population; therefore, these results could be representative of the prevalence of multimorbidity in Thailand. However, there might be limitations to this study. Firstly, the data from the survey, were reported by participants themselves. Therefore, a misclassification bias might occur. Additionally, the number of chronic disease statuses was reported as 5-diseases in maximum. Therefore, the results were not represented participants who might have had more than 5-diseases.

CONCLUSION

In conclusion, our study demonstrated that the prevalence of multimorbidity varied across to wealth index, ages, gender, and marital status especially in older who have a high proportion of multomorbidity. Tailored disease prevention programs and health care provider are needed to design and service for multimorbidity patients.

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