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Original Article

Functional Disability among Community-Dwelling Older People: Prevalence and Associated Factors in Thanh Hoa City and Hoang Hoa District, Vietnam

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SUMMARY

Background: Functional disability is an inevitable aspect of the aging process, and associated with worse quality of life, increased risk of hospitalization, long-term care used, and mortality. While the data on functional disability are well documented in developed countries, studies from developing countries, including Vietnam, are sparse.

Methods: A cross-sectional study of 695 elderly individuals aged ≥ 60 years was conducted in Thanh Hoa city and Hoang Hoa district, Vietnam. Functional status of the participants was screened using the Katz ADL Index (BADL) and the Lawton IADL scale (IADL). A backward multivariate logistic regression analysis was used to identify factors associated with each type of functional disability. All analyses were estimated with sampling weights.

Results: In total, 11.6% (95% CI: 6.5%–16.6%) and 15.6% (95% CI: 10.4%–20.8%) of the participants reported difficulties in performing BADL and IADL, respectively. The elderly were more likely to be dependent on IADL compared to BADL. Multivariate analysis revealed that worse self-reported health, having > 2 chronic conditions, hearing impairment, cognitive impairment, and unemployment were significantly related to a higher likelihood of being disabled in both BADL and IADL. Also, living in rural areas was associated with BADL disability, while increasing age was positively associated with IADL disability.

Conclusion: This result can be used to aid health and social services agencies in targeting specific groups aimed at preventing disability in the elderly.

1. Introduction

Functional disability in the elderly is defined as the inability to perform daily tasks required for independent living.[1] It is associated with worse quality of life, increased risk of hospitalization, long-term care used, and mortality. Functional disability typically is assessed with questions about Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL).[2] BADL refers to self-care tasks such as bathing, dressing;[3] whereas IADL involves more complicated tasks that are not essential for everyone, but help individuals live independently in the community such as cooking, shopping.[4]

Several studies on functional disability have been carried out across different settings; however, findings regarding the prevalence and associated factors are controversial.[1,2] The 2015 World Report on Ageing and Health synthesized data from 22 countries, revealing a marked difference in the prevalence of disabled elderly in BADL and IADL, which ranged from 5% to 80% and from 5% to 50%, respectively. These variations could be attributed to the differences in the economy and social equality, as well as the instruments used.[1] Besides, factors associated with disability in community-based surveys include increasing age, female sex, lower-income, living alone, poor self-reported health (SRH), chronic diseases, sensory impairment, cognitive impairment, etc.[5] An understanding of the factors leading to functional disability is useful in educating government welfare and healthcare agencies in developing a better public health response. However, while these data are well documented in developed countries, studies from developing countries are sparse (except for China).[2] Thus, limited extrapolation of the findings required developing countries to generate more evidence to ensure an appropriate response from health and social systems.

Vietnam is one of the countries in Asian with a high pace of aging and projected to become an aging society by 2039.[6] Although no official statistics have been reported, the number of elderly individuals who require daily care due to disability in 2019 is estimated at 4 million and will reach approximately 10 million by 2049.[7] Until now, Vietnam has had no legal policy or program for the provision of long-term care for the elderly. So far, few studies have been investigated the problem of disability in BADL/IADL among older, community-dwelling people in Vietnam. This study, therefore, set out to determine the prevalence of disability in BADL/IADL among community-dwelling elderly and clarify the effect of socio-demographic and health conditions on being disabled.

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2. Materials and methods

2.1. Study setting and sample

This cross-sectional study was conducted in Thanh Hoa city and Hoang Hoa district of Thanh Hoa province, Vietnam, in March 2019. By 2018, the numbers of people aged 60 years and over in these districts were 16.9% and 17.5% of the district's population, respectively; made up 20% of the total elderly population in Thanh Hoa province.[8]

We used a stratified two-stage cluster sampling to identify study participants. Firstly, we divided two districts into urban (21 communities) and rural (59 communities) strata. Two communities in urban areas and four communities in rural areas were selected with probability proportional to size respect to the number of elderly in the urban and rural strata. Secondly, from each selected community, elderly individuals were drawn randomly within three age groups (60–69, 70–79, and 80+) according to criteria: those who aged ≥ 60 years and were not living in residential care facilities (e.g., nursing home) at the interview time. There were no exclusion criteria set for the study. If the elderly had problems that affected their ability to respond (e.g., severe sensory impairments, severe cognitive impairment), family members and primary caregivers assisted them in completing the relevant questionnaire survey.

A total of 695 elderly individuals were interviewed. This sample size was adequate to examine the prevalence of the functionally disabled elderly in the community, with such prevalence in Vietnam being 37.6% for BADL[9] and assumed to be 50% for IADL.[1] The estimation was set up at the level of precision of 0.05, adjusted for a design effect of 1.2 for cluster sampling, and 5% of missing data. When a participant refused to participate or was unavailable (n = 61), a new participant was chosen randomly with the same age group, sex, and community. The response rate of this study was 91.9%.[10]

2.2. Measurements

2.2.1. Outcome variables

We used the Katz ADL Index[3] and the Lawton IADL Scale[4] to measure the elderly's performance in different daily activities, which were grouped as BADL and IADL. BADL included six self-care tasks: bathing, dressing, using the toilet, getting up when lying down, continence, and feeding. IADL included eight more complicated tasks: using the telephone, preparing an own meal, grocery shopping, doing housework, doing laundry, using transportation, managing money, and taking medications as prescribed.

For each activity, the participants were asked a question, "*Could you manage <activity> on your own in the last 30 days?*" There were five responses: (1) I did not have tool/never did (used) it; (2) Yes, without difficulty; (3) Yes, with difficulty; (4) Yes, but only with help from others; and (5) Not at all. The meaning of "*difficulty*" was that the elderly individuals had to try harder, perform slower, in pain, or felt tired when performing such activity, which must be a result of a physical, mental, emotional, or memory problem. The participants who had difficulty in performing at least one BADL or IADL activity were referred to as "BADL disabled elderly" or "IADL disabled elderly." These cut-offs demonstrated good validity and reliability to distinguish between disabled and non-disabled persons.[11]

2.2.2. Independent variables

Participant characteristics included residency, sex, age, ethnicity, religion, education, employment status, marital status, household wealth, and living arrangement. SRH was measured by a 5-point Likert scale, and grouped into "poor/very poor" and "fair to very good" as used in the World Health Organization survey.[12] Participants were categorized into three groups (0, 1–2, and > 2) according to their self-report of 10 common chronic conditions in Vietnam. The presence of visual and hearing impairments were also asked (yes/no). Cognitive impairment was assessed using the Mini-Mental State Examination Vietnamese version.[13] The MMSE includes 30 questions to test seven areas of cognitive function: orientation, registration, attention and calculation, recall, language, repetition, and complex commands. The maximum score was 30, and classified into two categories as normal cognitive functioning (24–30) and cognitive impairment (0–23). This cut-off point was suggested as having optimal sensitivity (0.91) and specificity (0.93) in the diagnosis of dementia among Vietnamese people.[14]

2.3. Statistical analysis

R software (version 3.5.2) was used to perform analysis. The unit of analysis was elderly individuals. Sampling weights were applied for all analyses to account for the complex survey design.[15] Descriptive analysis was used to estimate the proportion of the elderly with functional disabilities. The differences in these proportions across the individual's characteristics were examined using the Rao-Scott chi-squared test. We used backward multivariate logistic regression to identify factors associated with each type of functional disability. The results were presented using the adjusted odds ratio (OR_{adj}) and 95% confidence interval (CI). Statistical inferences were considered significant at the $p < 0.05$ level.

2.4. Ethical considerations

The study was approved by the Institutional Ethics Committee of Faculty of Medicine, Prince of Songkla University, Thailand (REC.61-214-18-1), and Hanoi University of Public Health, Vietnam (438/2018/YTCC-HD3). Written informed consent was obtained from all respondents.

3. Results

3.1. Sample characteristics

Of the 695 participants aged ≥ 60 years, 57.5% lived in rural areas, 57.4% were women, with a mean age of 71.4 years (SE = 0.417). The study sample mainly included the "*Kinh*" population (99.8%), those who had no religion (99.7%), and was currently married (68.5%). Only 13.2% of the respondents were living alone. Despite these similarities, the proportion of participants who completed at least high school, were unemployed, and wealthier (Q4 or Q5) were significantly higher among urban residents compared to their rural counterparts (52.8%, 86.3%, and 63.4% vs. 25.2%, 62.9%, and 22.5%, respectively). Half of the rural participants assessed their health as poor/very poor, while similar results were reported in approximately 40% of those in the urban areas; likewise, 64.9% and 49.3% reported visual impairment, respectively. Regardless of where the participants lived, nearly 80% had chronic diseases, 15% had hearing loss, and 26% had cognitive impairment.

3.2. Prevalence of functional disabilities

The prevalence of functional disability in BADL and IADL was

11.6% (95% CI: 6.5%–16.6%) and 15.6% (95% CI: 10.4%–20.8%), respectively. As shown in Table 1, significant differences in the prevalence of BADL and IADL were found across all socio-demographic characteristic and health condition variables, except gender for the BADL. The prevalence of both BADL and IADL was higher among those who lived in a rural area, were of advanced age (particularly aged ≥ 80 years), not currently married, less educated, unemployed, and had a lower living standard. Women had significantly higher prevalence of IADL than men. The proportion of individuals with a disability either BADL or IADL was also higher in those with health problems, including poor/very poor SRH, higher number of chronic conditions, sensory impairment, and cognitive impairment.

3.3. Factors associated with functional disabilities

Table 2 shows that elderly individuals living in rural areas were 3.1 times (95% CI: 1.54–6.25) more likely to be disabled in BADL compared to those living in urban areas. Being unemployed was associated with disability in BADL compared to being employed (OR_{adj} = 4.31, 95% CI: 1.46–12.62). The presence of worse health conditions created more BADL disability than did the presence of good conditions, including poor/very poor SRH (OR_{adj} = 4.14, 95% CI: 1.16–14.78), having > 2 chronic conditions (OR_{adj} = 9.12, 95% CI: 2.58–32.28), hearing impairment (OR_{adj} = 3.17, 95% CI: 1.54–6.53), and cognitive impairment (OR_{adj} = 8.41, 95% CI: 4.1–17.26). Focusing on disability in IADL (Table 2), we observed the same pattern of factors associated with BADL, except for residency and increased age. Compared to those in the younger-age group, those in the oldest-age group were more prone to have an IADL disability (OR_{adj} = 3.6, 95% CI: 1.83–7.09), whereas this association was not found between urban and rural areas. A test of interactions between pairs of independent variables on the associations with either BADL or IADL disability was performed but revealing non-significant, indicating no effect modification of any variable on the others on their relationship with BADL or IADL disability.

Table 1
The weighted prevalence of functional disability by socio-demographic characteristics and health conditions among 695 elderly individuals aged ≥ 60 years in Thanh Hoa city and Hoang Hoa district, Vietnam.

Characteristics	Sample size (N)	BADL disability		IADL disability	
		%	p-value*	%	p-value*
Residency			< 0.001		< 0.001
Urban	252	5.3		8.5	
Rural	443	16.2		20.9	
Sex			0.676		0.019
Men	305	10.9		11.7	
Women	390	12.0		18.5	
Age group			< 0.001		< 0.001
60–69	391	6.1		7.1	
70–79	185	9.1		12.8	
80+	119	30.3		43.2	
Marital status			0.004		< 0.001
Currently married	484	9.6		10.7	
Single/divorced/separated/widowed	211	15.9		26.3	
Education level			< 0.001		< 0.001
No formal school	105	22.2		34.5	
Primary school	118	19.7		24.0	
Secondary school	227	8.1		10.3	
High school	102	7.2		6.4	
Higher than high school	142	6.2		10.4	
Employment status			< 0.001		< 0.001
Still working	201	2.7		4.7	
Unemployed	494	14.6		19.4	
Household wealth			< 0.001		0.035
Q1 (poorest)	146	20.4		24.3	
Q2	147	12.3		16.4	
Q3	143	10.1		15.6	
Q4	134	6.2		10.7	
Q5 (richest)	125	8.7		11.0	
Living arrangement			0.035		< 0.001
Alone	85	11.3		22.4	
With child(ren) only	122	18.1		28.5	
With spouse only	263	11.4		11.9	
With spouse and child(ren)	225	8.1		10.0	
Self-reported health			< 0.001		< 0.001
Fair to very good	344	1.3		4.4	
Poor/very poor	351	21.6		26.6	
Number of chronic conditions			< 0.001		0.01
No conditions	147	4.0		7.2	
1–2 conditions	458	11.0		16.4	
> 2 conditions	90	26.5		24.9	
Sensory functioning					
Visual impairment	403	16.9	< 0.001	20.8	< 0.001
Hearing impairment	108	32.0	< 0.001	40.2	< 0.001
Cognitive functioning			< 0.001		< 0.001
Normal	516	4.6		7.2	
Impairment	179	31.6		39.7	

BADL = basic activities of daily living; IADL = instrumental activities of daily living.
* Significant levels: p < 0.05; p < 0.01; p < 0.001, based on Rao-Scott chi-squared test.

Table 2
Adjusted odds ratio from backward multivariate logistic regression analysis of functional disabilities.

Variables[a]	BADL disability			IADL disability		
	OR_{adj}	95% CI	p-value*	OR_{adj}	95% CI	p-value*
Place of residence: Urban (Ref)	1					
Rural	3.1	1.54–6.25	0.002			
Age group: 60–69 (Ref)				1		
70–79				1.37	0.67–2.81	0.382
80+				3.6	1.83–7.09	< 0.001
Employment status: Still working (Ref)	1			1		
Unemployed	4.31	1.46–12.62	0.008	2.59	1.26–5.29	0.009
Self-reported health: Fair to very good (Ref)	1			1		
Poor/very poor	4.14	1.16–14.78	0.029	2.59	1.21–5.53	0.014
Number of chronic conditions: None (Ref)	1			1		
1–2 conditions	1.91	0.61–5.98	0.264	1.55	0.69–3.48	0.284
> 2 conditions	9.12	2.58–32.28	< 0.001	2.56	0.94–6.98	0.067
Hearing impairment: No (Ref)	1			1		
Yes	3.17	1.54–6.53	0.002	2.42	1.29–4.54	0.006
Cognitive Impairment: No (Ref)	1			1		
Yes	8.41	4.1–17.26	< 0.001	5.92	3.1–11.28	< 0.001

[a] Variables remained after model adjustment. The prototype model includes all variables listed in Table 1. Wald test was used to contrast the nested model for this complex survey data, and to exclude variables that did not contribute to the fitted model ($p > 0.05$).
BADL = basic activities of daily living; IADL = instrumental activities of daily living.
* Significant levels: $p < 0.05$; $p < 0.01$; $p < 0.001$, based on Wald test.

4. Discussion

4.1. Prevalence of functional disabilities

Our results indicate that a minority of community-dwelling older people in Thanh Hoa city and Hoang Hoa district had functional disabilities, resulting in a prevalence of 11.6% for BADL and 15.6% for IADL. To the best of our knowledge, few studies have been published on functional disabilities among the older general population in Vietnam. In 2011, the Vietnam National Ageing Survey defined disability as having any difficulty performing daily tasks, but only focused on five items of BADL (bathing, dressing, toileting, getting up when lying down, and feeding).[9] Compared to these data, the prevalence of BADL disability in our study was much lower for every age group (60–69 years: 6.1% vs. 27.6%; 70–79 years: 9.1% vs. 41.6%; ≥ 80 years: 30.3% vs. 51.6%). This difference is possibly due to the age distribution, in which advanced age is a known risk for functional disability. The groups aged 70–79 years and ≥ 80 years comprised 31% and 23% of their study population compared to 28% and 18% in our study, respectively. Also, we found only one survey sharing the same IADL scales with our study, conducted on the population aged ≥ 80 years in a rural setting.[16] Their study demonstrated a higher prevalence of IADL disability compared to our result (90% vs. 37.1%).

Across studies in different countries, our findings are difficult to compare with other published due to the differences in the period, study populations, the definition of disability, and the measurements used. For instance, analysis of cross-national data in Europe 2015 revealed that 17% of 28,000 older persons aged ≥ 65 years had some form of disability (BADL/IADL). The proportion ranged from < 10% in Switzerland and the Netherlands to approximately 20% in Belgium, Spain, Italy, and France.[17] In Asia, the prevalence of BADL disability among individuals aged ≥ 60 years were reported as 7.3% in Thailand (2012),[18] 12.6% in China (2015),[19] and 22% in Myanmar (2012).[20] As for IADL disability, elderly individuals were more likely to be dependent on IADL than on BADL within the same study population, e.g., 28.1% in Thailand (2012),[18] and 37% in Myanmar (2012),[20] as well as in developed countries shown in the *Survey of Health, Ageing and Retirement in Europe* (SHARE) and *the World Health Organization's Study on global ageing and adult health* (SAGE).[1] Although the reported rates are diverse, most studies used at least a 5-item BADL in measuring disability among older individuals (eating, bathing, dressing, transferring, and toileting). Narrowing the definition of functional disability in these items permits reasonable comparison across studies.

4.2. Factors associated with functional disabilities

Corresponding to existing literature, our findings indicated that worse SRH,[19,21] having > 2 chronic conditions,[22] hearing impairment,[21] cognitive impairment,[21] and being unemployed[22] were significant and increased the likelihood of being disabled in both BADL and IADL. Also, living in rural areas[23] was associated with BADL disability, whereas advanced age[24] was positively associated with IADL disability.

About the sex-effect on functional disability, our findings and previous studies reported a higher prevalence of being disabled in women compared to men,[19,22,24] although the differences were not always significant or even reversed.[25] This result was found in a comparative study among 11 Western developed countries[26] and a study across five Asian locations.[27] Moreover, no consensus has been reached on gender predilection for disability. A systematic review pointed out that the effect of sex was not found in the incident of functional disability after controlling for socioeconomic, health conditions, and social relations.[28]

Our study confirmed the strong association of health conditions with functional disability. SRH is used frequently in aging studies and reflects the overall perception of people in physical health, mental status, and quality of life. To verify the influence of SRH on the development of disability, the findings in two cohort studies suggested that lower SRH was an independent predictor of functional decline, even when adjusting for chronic diseases, cognitive function, and other potential confounders.[29,30] Besides, as shown in numerous studies, the number of chronic diseases was a risk factor for disability, with the more chronic conditions an individual has, the higher their odds of being disabled.[22] As for cognitive impairment, a co-occurrence relationship between cognition and having a disability was not surprising in cross-sectional studies, regardless of

the measures being used. Moreover, the contribution of cognitive impairment to the development of functional disability overtime was suggested using longitudinal data.[31]

5. Limitations

First, the cross-sectional design could not allow establishing a causal relationship between the variables. Second, functional disability and other health conditions in the elderly individuals were assessed by self-reported measures, and we did not ask the family members/caregivers to obtain more comprehensive information. Thus, the result may be limited due to recall bias, low education levels, or memory problems in elderly individuals.

6. Conclusion

The study revealed a minor prevalence of functional disability among the community-dwelling older population in Thanh Hoa city and Hoang Hoa district. The elderly were more likely to be dependent on IADL than on BADL. Disabled elderly reported worse SRH, a higher number of chronic conditions, hearing impairment, and cognitive impairment. This result can be used to aid health and social services agencies in targeting specific groups aimed at preventing disability in the elderly.

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Conflicts of interest

None.

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