ADL/IADL LIMITATIONS AND RELATED FACTORS IN OLDER ADULTS IN 3 NORTHERN PROVINCES VIETNAM

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This cross-sectional study aimed to identify the prevalence and factors related to the activities of daily living (ADLs) and instrumental activities of daily living (IADLs) among elderly people in Ha Noi, Ninh Binh, and Quang Binh in 2018. In total, 2448 participants were interviewed and measured using an adapted short version of Katz ADL Index and Lawton IADL Scale. The study showed a high prevalence of ADL and IADL disability (29.1% and 33.1%, respectively) in older adults. The risks of ADL and IADL limitations increased with age, gender (higher in females), individuals withlower incomes, who had a history of chronic diseases, who self-rated poor health status, reported a moderate or severe somatic pain and who had weak grip strength. People who were still employed and regularly performed heavy physical activities had a lower chance of ADL and/or IADL limitations. We suggest that ADL/IADL limitations should be taken in account for any potential health care strategies and interventions for elderly population.

Keywords: Older adults, Activities of daily living (ADLs), Instrumental activities of daily living (IADLs), community, Vietnam.

I. INTRODUCTION

The world population continues to grow older rapidly. In 2020, there are an estimated 727 million persons aged 65 years or over worldwide.[1] This number is projected to more than double by 2050, reaching over 1.5 billion persons. The share of older persons in the global population is expected to increase from 9.3 percents in 2020 to 16.0 percents in 2050.[1] This trend occurs in all geographic regions and all countries at different economic levels in the word.

People are living longer but human health is not increasing to the same extent as lifespan. Approximately one billion people experience disability worldwide. Over 45% of older adults aged 60 and over have difficulty performing everyday activities, and over 250 million people experience disabilities to a moderate or significant degree.[2] In Europe, 11 - 44% of older people have at least one limitation in activities daily living (ADLs) and 8 - 40% experience at least one limitation in instrumental activities daily living (IADLs).[3] Similarly, China had more than 22.15 million partially disabled and 10.84 million completely disabled elderly people, accounting for 12.75 and 6.25%, respectively, of the total elderly population by 2010.[4]

Disability among older people is the result of not only health problems but also the interactions between health conditions, activity and participation, personal factors, and environmental factors. Previous studies have shown that the incidence of disability in older people is influenced by factors such as cognitive impairment, depression, disease burden (comorbidity), increased and decreased

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body mass index, lower extremity functional limitation, and low frequency of social contacts.[5] Another study showed that the most common factors associated with difficulty in ADL/IADL combined were age, pain, taking five or more medications, and depression. Next to age, the most common factors were pain, taking five or more medications, and BMI for ADL disability; being separated or divorced, living with others (non-spouse) and self-rated memory for IADL disability.[6]

Limitations in functioning and dependence on other people in performing daily activities can cause many adverse consequences, such as a decline in quality of life, physical or mental health and an increased risk of harm from accidents, and an increase in the social costs of care and health.[7] A comprehensive understanding of the factors that have an impact on daily functioning in the range of performed ADLs and IADLs is very important for planning targeted strategies for the development of social, health care, and promotion activities.[3] The population of people over 60 is complex and heterogeneous in terms of health and functioning so understanding the development of disability in the individual ADL, IADL facilitates the design of successful interventions to preserve daily functioning and independent living among older adults.[8]

Population aging is also notable in Vietnam. The proportion of elderly people increased from 7.8% in 1979 to 19.8% in 2014. As of 2020, Vietnam has 1.98 million people over 80 years old, accounting for 15.2% of the total 13 million elderly people in the country.[9] However, the knowledge on the situation and determinants of ADL and IADL disabilities in the Vietnamese elderly population is still limited. Therefore, we use the data from a population-based study on health and aging (VHAS project) in three Northern provinces: Ha Noi, Ninh Binh and Quang Binh to conduct this study to examine the prevalence of ADL and IADL limitations and its associated factors among the Vietnamese older adults.[10]

II. METHODS

1. Study subject

Older adults aged 60 and older (who were born in 1958 and earlier) in these three selected provinces were recruited for this study.

2. Study design and setting

This cross-sectional study uses the data from the baseline survey of the Vietnam Health and Aging Study (VHAS project) in 2018 in three provinces: Ha Noi, Ninh Binh and Quang Binh[11]. These three provinces were selected purposively to capture a range of war exposure based on bombing intensity during the American War.

Sampling and sample size

The following formula was used to estimate the minimum sample size:

$$n = Z^2_{(1-\alpha/2)} \cdot \frac{p(1-p)}{d^2}$$

In which:

α (two-side significant level) = 0.05.

p (exexpected proportion in population) = 0.376 (According to the Viet Nam Aging Survey 2011, 37.6% of older persons encountered at least one difficulty in ADL).[12]

d (absolute decision) = 0.05.

We also used the design effect = 2, therefore the minimum sample size is 702. Finally, the total of 2448 older adults in the VHAS (816 persons in each province) was included in this study.

A multistage, stratified probability sampling approach was used. From three selected provinces, we selected four districts, including Bavi (Ha Noi), Yen Khanh (Ninh Binh), Dong Hoi, and Bo Trach (Quang Binh). Twelve communes were selected using a systematic random sampling method, including four communes from Ba Vi and Yen Khanh and two

communes from Dong Hoi and Bo Trach. In each commune, 204 older adults were recruited using a stratified random sampling technique to sample 2448 participants finally.

Data collection

The data collection was carried out from May to August of 2018 including an omnibus in-person interview with detailed questions about demographic and socioeconomic conditions; medical histories, life-styles and self-reported physical, mental, and functional health status. The interviews were conducted by trained and experienced interviewers from the Institute of Family and Gender Studies (IFGS) and Hanoi Medical University (HMU) using the COMMCARE program developed by Dimagi on tablets.

The participants were also invited to Commune Health Centers for an approximately 35-minute health exam, which included a series of anthropometric measures, functional measures and blood collection.

Variables and measurements

Dependent variables - Functional disability

We used the short version of the Katz ADL Index and Lawton IADL Scale that was adapted for the China Health and Retirement Longitudinal Study (CHARLS) to evaluate the self-reported functional disability.[13] ADL refers to daily self-care tasks, including bathing, eating, getting in and out of bed, dressing, and toileting. Meanwhile, the abilities such as housekeeping, shopping, and taking care of finances, were used to assess IADLs. Each answer was divided into four responses as follows: (1) No, I do not have any difficulty (no limitation); (2) Yes, I have difficulty but I can still do it (mild limitation); (3) I have difficulty and I can do it with help (significant limitation), and (4) I cannot do it (full limitation). The respondents who reported difficulty in any items were classified as having ADL or IADL limitations.

Independent variables

Demographic and socioeconomic characteristics include age, sex, marital status (single, married, separate/divorced, widowed), highest educational level (primary school and lower, secondary school, high school and higher), current working status (yes or no), and the level of income sufficiency (more than necessary, enough for expenditure, and not enough for expenditure).

Health-related variables include *history of chronic diseases* (previously experienced with any chronic disease); *self-assessment health status* (5 scales: very poor, poor, fair, good and very good); self reported somatic pain (no pain, mild, moderate and severe pain); *life- styles* (tobacco and alcohol consumption, heavy physical activities). In addition, handgrip strength was assessed by a trained examiner using a digital hand dynamometer (Charder MG-4800) in kilograms. Measurements were demonstrated alternately on each hand twice and then categorized into quartiles.

Data analysis

Data were analyzed using Stata software (version 15, Stata-Corp LP). The characteristics of the participants were summarized using frequency, percentages, mean and SD. Pearson's Chi-square test was used to explore the statistical differences in ADL and IADL disability between different groups. Bivariate and multivariate logistic regression models were used for estimating the odds of having at least on ADL and IADL. All variables with a statistically significant difference in bivariate logistic regression models were included in multivariate models. A p-value < 0.05 was considered to be statistically significant.

3. Research ethics

The project was ethically approved by the Scientific and Ethical Council of Hanoi Medical University (Decision No. 01.18/HMU IRB dated

January 25, 2018) and approved by the Ethics Council in Medical Research National Biology Department of the Ministry of Health (Certificate No. 29/CN-HDD dated April 27, 2018).

III. RESULTS

1. Participants' characteristics

The study included 2448 participants with 51.2% were women. The mean age of participants was 70.3 (SD = 8.5). Almost one fourth of participants were widowed and 58.5% of participants had secondary or higher education. Forty-five percents of participants still have to work for a living; 39.9% had main the source of income from productive activities or business and 25.2% of participants reported that their incomes were not enough for expenses.

76.3% of participants had a history of at least one chronic disease, more than a half of participants (50.8%) self-reported a poor and very poor health status; almost 70% reported a somatic pain with 54.0% at moderate and severe levels. Only 17.3% of participants did heavy physical activities every week and 12.5% of those spent more than 150 minutes per week for these activities. 38.2% of participants had grip strength below 25th percentile.

2. ADL/IADL limitations

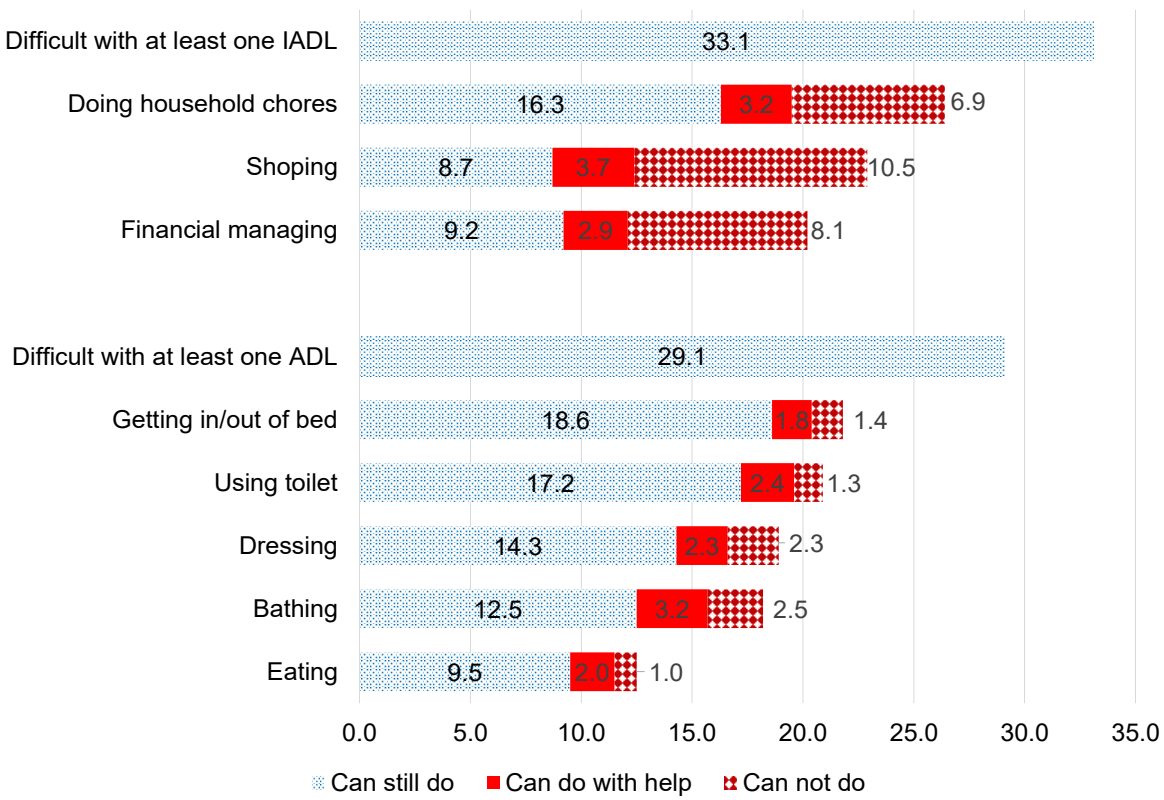

Figure 1. Functional disability in ADLs and IADLs

Figure 1 showed that 29.1% of the participants had difficulty with at least one ADL and 33.1% of participants had at least one IADL limitation. The most common limitations were getting in/out of bed for ADL and doing household chores for IADL. The least ones were eating and financial managing, respectively for ADL and IADL.

Table 1. Prevalence of having at least one ADL/IADL limitation by participant's groups

Variables		ADL limitation		IADL limitation	
		n (%)	p-value	n (%)	p-value
Sex	Male	288 (24.1)	< 0.001	309 (38.1)	< 0.001
	Female	424 (33.8)		502 (61.9)	
Age group	60 - 69	258 (19.1)	< 0.001	300 (37.0)	< 0.001
	70 - 79	238 (34.3)		264 (32.6)	
	80 - 89	216 (53.6)		247 (30.5)	
Marital status	Not widowed	463 (25.2)	< 0.001	522 (28.4)	< 0.001
	Widowed	249 (40.8)		289 (47.4)	
Educational level	≤ Primary school	419 (41.2)	< 0.001	484 (47.6)	< 0.001
	Secondary school	218 (20.8)		251 (24.0)	
	≥ High school	75 (19.6)		76 (19.8)	
Current working	No	527 (39.2)	< 0.001	589 (44.5)	< 0.001
	Yes	183 (16.6)		212 (19.3)	
Income sufficiency	More than necessary	30 (13.3)	< 0.001	39 (17.3)	< 0.001
	Enough for expenses	351 (22.9)		407 (26.5)	
	Not enough for expenses	267 (45.0)		303 (51.0)	
History of chronic diseases	No	88 (15.2)	< 0.001	102 (17.6)	< 0.001
	Yes	624 (33.4)		709 (38.0)	
Self – reported health status	Good and very good	11 (8.9)	< 0.001	8 (6.5)	< 0.001
	Fair	120 (11.6)		157 (15.1)	
	Poor and very poor	520 (43.2)		587 (48.8)	
Somatic pain	No	93 (12.4)	< 0.001	124 (16.5)	< 0.001
	Mild pain	63 (21.1)		66 (22.2)	
	Moderate pain	272 (30.3)		328 (36.6)	
	Severe pain	227 (53.4)		238 (56.0)	
Grip strength	< 25th percentile	371 (42.8)	< 0.001	403 (46.9)	< 0.001
	25 - 75th percentile	197 (18.9)		258 (24.3)	
	> 75th percentile	39 (11.5)		46 (13.5)	
Heavy physical activities weekly	No	658 (32.5)	< 0.001	737 (36.4)	< 0.001
	Yes	54 (12.3)		74 (17.5)	

Variables		ADL limitation		IADL limitation	
		n (%)	p-value	n (%)	p-value
Current smoke	No	642 (30.8)	< 0.001	739 (35.5)	< 0.001
	Yes	70 (19.2)		72 (19.7)	
Current alcohol consumption	No	485 (35.6)	< 0.001	559 (41.0)	< 0.001
	Yes	227 (20.9)		252 (23.2)	
Province	Ha Noi	174 (23.0)	< 0.001	201 (24.8)	< 0.001
	Ninh Binh	259 (36.4)		265 (32.7)	
	Quang Binh	289 (40.6)		345 (42.5)	

Table 1 showed that ADL/IADL limitations occurred significantly more frequently in women, older people, among widowers or widows, who were jobless and for those with at least one of the following conditions: lower educational level, lower income, having a history of chronic diseases, poorer self-reported health status, higher levels of somatic pain, lower grip strength and those who did not engage heavy physical activities weekly. The prevalences of ADL/IADL difficulties were lower among current smokers, current alcohol users and habitants of Ha Noi.

3. Factors related to ADL/IADL limitations

Table 2. Bivariate regression models showing potential factors related to ADL/IADL limitations

Variables	ADL limitation		IADL limitation	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Female	1.61 (1.35 - 1.92)	< 0.001	1.92 (1.61 - 2.28)	< 0.001
Age	1.08 (1.07 - 1.10)	< 0.001	1.03 (1.01 - 1.05)	< 0.001
Widowed	2.05 (1.69 - 2.48)	< 0.001	2.27 (1.89 - 2.74)	< 0.001
Education primary school or lower	0.67 (0.62 - 0.72)	< 0.001	0.62 (0.57 - 0.66)	< 0.001
Still working	0.31 (0.25 - 0.37)	< 0.001	0.30 (0.25 - 0.36)	< 0.001
Income not enough for expenses	2.54 (2.15 - 3.05)	< 0.001	2.54 (2.16 - 3.00)	< 0.001
History of chronic diseases	2.80 (2.19 - 3.59)	< 0.001	2.87 (2.27 - 3.62)	< 0.001
Poor self-reported health status	4.49 (3.79 - 5.32)	< 0.001	4.37 (3.71 - 5.13)	< 0.001
Moderate and severe somatic pain	1.97 (1.79 - 2.16)	< 0.001	1.85 (1.70 - 2.02)	< 0.001

Grip strength below 25th percentile	2.77 (2.36 - 3.24)	< 0.001	2.50 (2.16 - 2.89)	< 0.001
Weekly heavy physical activities	0.51 (0.43 - 0.61)	< 0.001	0.58 (0.49 - 0.67)	< 0.001
Current smokers	1.41 (1.24 - 1.60)	< 0.001	1.57 (1.39 - 1.78)	< 0.001
Current alcohol users	1.42 (1.30 - 1.56)	< 0.001	1.50 (1.38 - 1.64)	< 0.001
Province (Reference: Ha Noi)	1.46 (1.31 - 1.63)	< 0.001	1.50 (1.35 - 1.66)	< 0.001

The risks of having at least one ADL or IADL limitation increased accordingly with respondents' age, higher in females, among widows or widowers, lower income, had a history of chronic diseases, had moderate and severe somatic pain, had a poor self-reported health status, had weak handgrip strengths and current smokers and alcohol consumers. The risks were lower among those who were still working, who had a better education level and who did weekly heavy physical activities.

Table 3. Multivariate regression models showing potential factors related to ADL/IADL limitations

Variables	ADL limitation		IADL limitation	
	aOR (95%CI)	p-value	aOR (95%CI)	p-value
Female	1.69 (1.23 - 2.31)	0.001	1.62 (1.19 - 2.19)	0.010
Age	1.03 (1.01 - 1.05)	0.001	1.03 (1.01 - 1.05)	0.018
Widowed	0.88 (0.65 - 1.17)	0.534	0.97 (0.73 - 1.29)	0.965
Education primary school or lower	1.15 (0.88 - 1.50)	0.847	1.41 (1.10 - 1.81)	0.001
Still working	0.61 (0.47 - 0.79)	< 0.001	0.52 (0.40 - 0.67)	< 0.001
Income not enough for expenses	2.24 (1.74 - 2.87)	< 0.001	2.13 (1.67 - 2.72)	< 0.001
History of chronic diseases	1.99 (1.43 - 2.78)	< 0.001	1.83 (1.35 - 2.49)	< 0.001
Poor self-reported health status	3.14 (2.44 - 4.04)	< 0.001	2.98 (2.35 - 3.76)	< 0.001
Moderate and severe somatic pain	1.98 (1.54 - 2.54)	< 0.001	2.05 (1.62 - 2.60)	< 0.001
Grip strength below 25th percentile	2.89 (1.80 - 2.91)	< 0.001	1.84 (1.45 - 2.32)	< 0.001
Weekly heavy physical activities	0.57 (0.40 - 0.81)	0.001	0.78 (0.57 - 1.07)	0.115
Current smokers	1.11 (0.76 - 1.63)	0.615	0.92 (0.64 - 1.34)	0.580

Variables	ADL limitation		IADL limitation	
	aOR (95%CI)	p-value	aOR (95%CI)	p-value
Current alcohol users	0.90 (0.68 - 1.19)	0.860	0.74 (0.57 - 0.97)	0.073
Province (Reference: Ha Noi)	1.07 (0.93 - 1.24)	0.468	1.17 (1.02 - 1.35)	0.022

The odds of having at least one ADL or IADL limitation increased about two thirds in females, increased by 3% with each subsequent year of participants' age. These odds were more than twice among those who had low income, nearly double among those with a history of chronic diseases or those with moderate and severe somatic pain, and almost triple among those who reported a poor health status and those who had a grip strength below 25th percentile. The risks of having at least one ADL or IADL limitation decreased nearly 50% among those who were still working. People who did heavy physical activities weekly had 43% lower risk of having at least one ADL limitation compared to those who did not engage in such activities. The risk of IADL disability were 26% lower among current alcohol user compared to those with no current alcohol consumption.

IV. DISCUSSION

Our findings showed a high prevalence of ADL and IADL disabilities among older people over 60 living in 3 provinces of Vietnam with 29.1% of participants having at least one ADL limitation and 33.1% experiencing at least one IADL limitation. These figures are comparable to what found from the previous studies.[14,15]

The prevalence of ADL limitation in our study is relatively higher compared to the results from Ćwirlej-Sozańska's study in Poland (17.13%), and the CHARLS study in China (7.9%).[3,16] Our result is similar to the Study on Global AGEing and Adult Health (SAGE) carried out in six countries: China, Ghana, India, Mexico, the Russian Federation, and South Africa with 27.7% older addults aged 60 - 69 having at least one ADL limitation.[14] The higher prevalence of ADL disability was reported by Germain et al. in American older population (36.2%) under the Health and Retirement Survey program.[15]

The prevalence of IADL limitation in our study is higher than that in the CHARLS study (18.0%) but almost similar to the other studies.[16] Ćwirlej-Sozańska found that 35.7% of Polish elderly people experienced with at least one IADL limitation.[3] The corresponding figure in Germain's study among American older population was 37.1%.[15]

The prevalence of disability in each of daily activities such as toilet hygiene, dressing, bathing, transferring from bed and household tasks in our study is similar to previous studies in China and Netherland. In line with these studies, the most common limitation is getting in/out of bed for ADL and doing household chores for IADL. Meanwhile, eating and financial managing, are the lowest percentages.[4,8]

In this study, we found that the prevalences of ADL/IADL limitations were higher in women, older people, among those who had lower socioeconomic conditions or with lower general health status. However, only some of these associations were confirmed in multivariate logistic regression models as in table 3.

Not surprisingly, in line with findings of CHARLS, the proportions of dependencies rise strongly with age and higher in female participants.[17] The risk of ADL/IADL disability increased by 3% with each subsequent year of participants' age. This figure was lower than

Agnieszka's paper, when the odds of having problems with ADLs increased by 8%, and the odds of having problems with IADLs increased by 10% with each subsequent year of life.[3] The increase in the risk of ADL and IADL difficulties with age was also confirmed by other studies. Connolly et al. observed an approximately two- and a half-fold increase in the risk of functional ADL and IADL difficulties among Irish people in the 75 - 79 age group and a four-fold increase in risk in the 80 and older age group compared to that in the 65 - 69 group.[6]

Although the relationship between the highest level of education, current working status and sufficiency of income and ADL and IADL impairment was not clear in many studies, similar to Strauss analysis, our study found that people with lower educational level had higher risk of IADL limitation (OR = 1.41, $p < 0.01$).[3,8,17] Moreover, we explored that people who were currently working in any field have a lower risk of ADL and IADL limitations (OR = 0.61 and 0.52, respectively), and income sufficiency was strongly associated with the risk of ADL and IADL disabilities whereas the the odds were doubled in people who had low income.

We determined that the presence of at least one chronic disease raised the risk of difficulty with ADLs and IADLs. Other studies have also confirmed that the level of disability increases with an increase in the number of chronic diseases.[3,4,8] Similarily, participants who poorly rated their health condition had nearly three-time higher incident of functional impairment in ADLs and IADLs, which means the more difficulties people have in basic daily living activities the worsen their self-rated health status. Another important factor associated with problems with ADLs and IADLs was pain. The people with significant somatic pain severity of pain were almost twice as likely to have at least one ADL/IADL limitation. This is the same in Connoll study where a two-fold increase in the risk of ADL and IADL difficulties was found among older people who had pain compared to those people who did not have such pain.[6] In another study, Agnieszka found a 27% increase risk of ADL/IADL disability with each VAS score of pain.[3]

In this study, we also found that the risk of IADL disability were 26% lower among current alcohol users compared to those with no current alcohol consumption, and 17% lower among participants living Hanoi compared to those in the two others provinces. This cross-section study does not allowed us to identify a causal relationship in this case. However, it is likely that healthier people might have a higher chance to consumption of alcohol.

In addition, we explored that people who did heavy physical activities weekly had 43% lower risk of having at least one ADL. Physical activity is one of the most effective preventive and therapeutic factors in reducing the risk of physical and mental disorders and affecting the maintenance of independence in everyday life.[3] All domains of fitness, namely, aerobic exercise and progressive resistance training exercises, were important, and resistance training was particularly essential if capacity was declining. Progressive resistance training not only benefited on muscular strength and physical capacity but also helped improve the daily functioning.[16] Therefore, older people should stay as active as possible to maintain independency.

Grip strength has been proved to be an indicator of ADL and IADL limitations. The people who had a grip strength below 25th percentile had higher risks to experience with at least one ADL and IADL limitation (OR = 2.89 and 1.84, respectively).

The identification of related factors associated with the occurrence of disability is essential in the context of prevention and planning care for older people because the connection between medical expenses and disability is stronger than longevity.[3,4] This cross-sectional study could not strictly determine the cause effect interpretation of the relationships between ADL and IADL dependencies and its determinants so that a longitudinal research is recommended to establish such associations.

V. CONCLUSION

Our study revealed a high prevalence of ADL and IADL disability in older people living in three Northern provinces of Vietnam. Demographic and socioeconomic characteristics such as being female, old age, low income were strongly associated with the presence of ADL/IADL limitations. Health-related factors include the history of chronic diseases, self-rated poor health status, moderate and severe somatic pain and weak grip strength are also associated with a higher risk of ADL/IADL limitations. Whileareas, still working for a living and regularly doing heavy physical activities are associated with a lower risk of ADL/IADL disability. ADL/IADL limitations should be taken in account for any potential health care strategies and interventions for elderly population.

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