Determinants of Cognitive Impairment among The Elderly in Indonesia

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ABSTRACT

Impaired cognitive function is one of the health problems suffered by elderly people. Cognitive impairment can lead to dependence on the help of others. This study aims to analyze factors associated with cognitive impairment among older persons in Indonesia. Cognitive impairment is measured by difficulty with memory or concentration, derived from Susenas September 2018. The size of the samples is 26,010 people aged 60 years and over and analyzed using multinomial logistic regression. Cognitive impairment is divided into three categories: Normal Cognitive, Mild Cognitive Impairment or MCI, and Dementia. This study found that 17.08 percent of the elderly in the sample had MCI, and 0.86 percent had dementia. The result also showed that age, gender, marital status, social activity, and economic level are associated with MCI and dementia. However, the results showed that there are relationships between education level and living arrangements only found among elderly with MCI but not the incidence of dementia. Future studies are suggested to add other factors such as food consumption, physical activity, and cognitive activity to have more understanding of the causes of cognitive impairment in the elderly in Indonesia.

Keywords: Cognitive impairment, elderly, MCI, dementia

INTRODUCTION

Indonesia is heading towards population ageing. A population is defined to be 'aging' when the proportion of the 60 years or more age group in the population reaches 10 percent of the total population.[1] Based on the 2010-2035 projection of Indonesia's population, this should have been achieved in 2020, and the percentage is expected to gradually increase to 15.77 percent in 2035.[2]

The aging of the population brings up various questions, primarily on maintaining the quality of life of the elderly. It is well established that growing old generally implies a decline in health. One of the health problems experienced by the elderly is cognitive impairment, especially dementia. In 2015, people with dementia reached 46.8 million worldwide.[3] In Indonesia, more than 1 million people suffer from dementia, putting the country to the fourth rank in Asia following China, India, and Jepang. The number is expected to double by 2030, and quadruple by 2050.[4]

Dementia is one of the leading causes of disability and increased dependence (on other people) in the elderly worldwide.[5] People with dementia need assistance from the early stages of the disease and even more so as the illness progresses.[6] In the early stages, people suffering from dementia become forgetful and disoriented while having difficulty making decisions and doing household chores. They will also experience emotional and behavioural disorders, thus the need for emotional support. In the middle stage of the illness, people with dementia would have difficulty communicating and need assistance in taking care of themselves and carrying out daily activities (preparing food, dressing, showering, and going to the toilet). In the final stage, people with dementia would lose the sense of the time and place and also the memory of their friends/relatives, be unable to eat alone, have difficulty walking so that more care, support, and supervision is required. Dementia also increases spending on governments, communities, families, and sufferers. From an economic point of view, dementia causes a loss of productivity.[5]

Considering the increasing number of cognitive impairments in the elderly. It can be achieved by studying the determinants or factors associated with cognitive impairment. Some known factors associated with cognitive impairment and dementia are education, lifestyle (physical activity, cigarette consumption, etc), health conditions (such as hypertension, and diabetes), social activity, and cognitive activity.[5]

There are only a limited number of researches on the factors associated with cognitive impairment in the elderly in Indonesia, and it is still limited to and generally covers only a specific area.[7,8,9] In addition to those studies, a study by Pengpid et al (2019) found that age, education, hypertension, and body weight were associated with impaired cognitive function in the elderly, but this study was conducted on a sample aged 65 years and over.[10]

Based on these factors, this study aims to study the factors associated with impaired cognitive function in the population aged 60 years and over in Indonesia. Cognitive impairment is divided into three categories, namely normal, Mild Cognitive Impairment/MCI, and dementia.[11]

METHOD

This study analyzed data from the National Socio-Economic Survey (Susenas) for September 2018. The sample of Susenas in September 2018 included 75,000 households spread across Indonesia. The unit analysis in this study is the population aged 60 years and over. Based on the results of data processing, the total sample in this study was 26,010 people. The analysis used includes descriptive analysis in the form of one-way and two-way tables and inferential analysis with multinomial logistic regression.

RESULTS AND DISCUSSION

The distribution of the elderly according to the characteristics is presented in Table 1. Based on the processed result, the average age of the elderly in this study was 68 years. More than half of the elderly (64.26 percent) are in the young elderly group (60-69 years). The percentage of elderly women (52.38 percent) was higher than male elderly (47.62 percent). The level of education of the elderly in Indonesia was generally still low, namely 79.92 percent of whom completed primary education or lower. Most of the elderly are married (60.93 percent) and are dominated by those living in households with the lowest 40 percent of expenditure (40.98 percent).

Social activities in this study were based on the presence or absence of elderly participation in community activities, such as attending meetings, religious activities, skills, sports, communal work, 'arisan', funeral, and other social activities in the surrounding environment.[12,13] Living arrangement observed the place of living for the elderly and the people with whom the elderly lived.[14] From Table 1, it can be seen the majority of the elderly lived with their families (68.19 percent), and most of the elderly do social activities (84.28 percent).

Based on Table 2, it was found that most

of the elderly or 82.06 percent did not experience impaired cognitive function. It was also found that 17.08 percent of the elderly have Mild Cognitive Impairment (MCI), and only 0.86 percent have dementia. Upon comparison with previous studies with data of SUPAS 2015, there was 18.7 percent of the elderly experiencing MCI and 1 percent of the elderly experiencing dementia.[11] These results indicated a decrease in the number of elderly Indonesians who experience cognitive impairment.

Table 1. Characteristics of The Elderly

Variables	n=26,010	%
Age		
60-69 Years	16,715	64.26
70-79 Years	7,079	27.22
80+ Years	2,216	8.52
Gender		
Male	12,387	47.62
Female	13,623	52.38
Education		
Elementary Sch./ Less	20,786	79.92
Senior/ Junior High Sch.	4,130	15.88
University	1,094	4.21
Marital Status		
Married	15,847	60.93
Others	10,163	39.07
Living Arrangement		
Alone	2,518	9.68
With Spouse Only	5,206	20.02
With Family	17,736	68.19
Others	550	2.11
Social Activity		
Yes	21,922	84.28
No	4,088	15.72
Economy Level		
40% Lowest	10,660	40.98
40% Middle	10,090	38.79
20% Highest	5,260	20.22

Source: Susenas September 2018 (processed)

Table 2. Distribution of The Elderly according to Cognitive Impairment

Variables	n=26,010	%
Normal	21,344	82.06
MCI	4,442	17.08
Dementia	224	0.86

Source: Susenas September 2018 (processed)

The percentage of cognitive impairment according to each independent variable is listed in Table 3. As the age increases, the percentage of elderly experiencing cognitive impairment increases. Nearly half of the elderly (41.38 percent) aged 80 years and over had Mild Cognitive Impairment (MCI), and those suffering from dementia were 3.84 percent. Impaired cognitive function, both MCI and dementia, is more common in elderly women. According to the level of education, the elderly who experience the most dementia and MCI are those with low education (elementary school/ less), and the elderly who are unmarried (single/ divorce).

According to living arrangements, Mild Cognitive Impairment (MCI) mostly affected the elderly who live alone. Meanwhile, the elderly who suffered from dementia mostly lived with their families. People with dementia have difficulty carrying out their daily activities such as bathing, eating, and dressing, so they need

assistance from their family. Furthermore, the highest percentage of elderly experiencing dementia and MCI was found in the elderly who do not participate in social activities. The lower the economic level, the higher the percentage of the elderly who suffer from MCI and dementia.

Table 3. Percentage Cognitive Impairment according to Independent Variables

| Variables | Impaired cognitive function | | | | | | n = 26,010 | |
| | Dementia | | MCI | | Normal | | | |
	n	%	n	%	n	%	n	%
Age								
60-69 Years	49	0.29	1,790	10.71	14,876	89.00	16,715	100
70-79 Years	90	1.27	1,735	24.51	5,254	74.22	7,079	100
80+ Years	85	3.84	917	41.38	1,214	54.78	2,216	100
Gender								
Male	91	0.73	1,703	13.75	10,593	85.52	12,387	100
Female	133	0.98	2,739	20.11	10,751	78.92	13,623	100
Education								
Elementary Sch./Less	203	0.98	3,903	18.78	16,680	80.25	20,786	100
Senior/ Junior High Sch.	16	0.39	456	11.04	3,658	88.57	4,130	100
University	5	0.46	83	7.59	1,006	91.96	1,094	100
MaritalStatus								
Married	76	0.48	2,001	12.63	13,770	86.89	15,847	100
Others	148	1.46	2,441	24.02	7,574	74.53	10,163	100
Living Arrangement								
Alone	21	0.83	658	26.13	1,839	73.03	2,518	100
With Spouse Only	25	0.48	807	15.50	4,374	84.02	5,206	100
With Family	173	0.98	2,868	16.17	14,695	82.85	17,736	100
Others	5	0.91	109	19.82	436	79.27	550	100
Social Activity								
Yes	52	0.24	2,888	13.17	18,982	86.59	21,922	100
No	172	4.21	1,554	38.01	2,362	57.78	4,088	100
Economy Level								
40% Lowest	120	1.13	2.055	19.28	8,485	79.60	10,660	100
40% Middle	79	0.78	1.648	16.33	8,363	82.88	10,090	100
20% Highest	25	0.48	739	14.05	4,496	85.48	5,260	100

Source: Susenas September 2018 (processed)

Table 4 shows the relationship between the independent variables and the tendency of the elderly to experience Mild Cognitive Impairment or MCI. Elderly aged 70-79 years and 80 years and over were more likely to experience MCI respectively by 2.18 times and 3.64 times than elderly people aged 60-69 years. Based on gender, elderly women were 1.15 times more likely to experience MCI than male elderly.

The lower the level of education is, the tendency to experience MCI increases. Elderly with elementary school/less and senior/junior school have a tendency of 1.74 times and 1.34 times higher to experience MCI than elderly with university graduate. According to marital status, the unmarried elderly had a higher tendency to experience MCI by 1.38 times than married elderly.

Based on the living arrangement, the elderly living alone have a higher tendency to experience MCI by 1.37 times than those who live with others. Meanwhile, the elderly who live with a spouse only tend to experience MCI by 1.24 times higher than the elderly who live with others. However, no significant relationship could be established between the elderly who live with their family and the MCI.

The elderly who do not participate in social activities have a 2.96 times higher tendency to experience MCI than those who participate. The lower the economic level of the elderly household, the greater the tendency to experience MCI. The elderly in households with the middle 40 percent expenditure and the lowest 40 percent are more likely to experience MCI as much as 1.13 times and 1.21 times compared to the elderly in households with the highest 20 percent expenditure.

Table 4. Multinomial Logistic Regression Results for Independent Variables to MCI

Variables	Model 1	
	Koef. β	RRR
Age		
60-69 Years (ref)		
70-79 Years	0.7787	2.1786***
80+ Years	1.2924	3.6414***
Gender		
Male (ref)		
Female	0.1398	1.1500***
Education		
University (ref)		
Senior/ Junior High Sch.	0.2964	1.3450**
Elementary Sch./ Less	0.5557	1.7431***
Marital Status		
Married (ref)		
Others	0,3202	1.3774***
Living Arrangement		
Others (ref)		
Alone	0.3180	1.3743**
With Spouse Only	0.2162	1.2414*
With Family	-0.1124	0.8937
Social Activity		
Yes (ref)		
No	1.0859	2.9621***
Economy Level		
20% Highest (ref)		
40% Middle	0.1260	1.1343**
40% Lowest	0.1942	1.2143***
Intercept	-3.0678	0.0465***

Source: Susenas September 2018 (processed)
Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 5. Multinomial Logistic Regression Results for Independent Variables to Dementia

Variables	Model 2	
	Koef. β	RRR
Age		
60-69 Years (ref)		
70-79 Years	1.0886	2.9700***
80+ Years	1.8167	6.1516***
Gender		
Male (ref)		
Female	-0.3079	0.7350*
Education		
University (ref)		
Senior/ Junior High Sch.	-0.4429	0.6422
Elementary Sch./ Less	-0.1561	0.8555
Marital Status		
Married (ref)		
Others	0.5072	1.6607***

Variables	Model 2	
	Koef. β	RRR
Living Arrangement		
Others (ref)		
Alone	0.3033	1.3543
With Spouse Only	0.2831	1.3272
With Family	0.2549	1.2903
Social Activity		
Yes (ref)		
No	2.7574	15.7589***
Economy Level		
20% Highest (ref)		
40% Middle	0.4861	1.6260**
40% Lowest	0.5721	1.7719**
Intercept	-7.0129	0.0009***

Source: Susenas September 2018 (processed)
Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Meanwhile, Table 5 shows the relationship between the independent variables and the tendency of the elderly to suffer from dementia. Based on age, elderly people aged 70-79 years and 80 years and over tend to experience dementia by 2.97 times and 6.15 times higher than those aged 60-69 years. Th elderly women are 0.73 times less likely to develop dementia than elderly men. The unmarried elderly were 1.66 times more likely to develop dementia than those who were married. The elderly who do not participate in social activities tend to experience dementia 15.76 times greater than the elderly who participate.

The lower the economic level of the elderly, the greater the tendency to develop dementia. The elderly living in the lowest 40 percent expenditure households is 1.77 times more likely to develop dementia than the elderly in the highest 20 percent households. Meanwhile, the elderly who live in middle expenditure households of 40 percent tend of 1.63 times higher to develop dementia than the elderly in the highest 20 percent expenditure households.

In short, the result of this study found that age, gender, marital status, social activity, and economic level had a significant association with both cognitive impairment namely MCI and dementia. However, education and living arrangement have only shown a significant relationship with the occurrence of MCI.

As previously found in the pieces of literature, this study supports the finding that cognitive impairment (MCI and dementia) increases as age increases. A previous study in Indonesia by Pengpid et al (2019) showed that older age is negatively associated with better cognitive abilities.[10] The natural process of aging is generally accompanied by setbacks. Like other organs in the body, the brain will also experience aging as it enters old age. The process of brain aging is caused by a reduction in brain size with increasing age.[15]

The decline in cognitive abilities in the elderly is different between men and women. The results of this study indicated that elderly women are more likely to experience MCI than male elderly. In societies that place a higher priority on boys, girls' roles are often downplayed to the provision of food, health care, and education. Discrimination experienced from childhood has an impact on women's health in old age.[14] Meanwhile, a study by Zhang (2006) concluded that elderly women have a higher risk of cognitive impairment than older men. This is because women are less fortunate in terms of socio-economic status, social relations, and leisure activities which affect their cognitive abilities.[16]

But according to dementia status, the results of this study indicate that female elderly tend to have lower dementia than male elderly. This result was probably related to the smoking habits that are generally acquired by men. The results of Susenas 2017 show that nearly a quarter of the elderly in Indonesia smokes; elderly men smoke more (48.80 percent) than women (2.08 percent).[17] Several studies have concluded that smoking increases the risk of dementia.[18,19]

Lower education has a greater tendency for the elderly to experience MCI. This result is in accordance with the research of elderly people in Taiwan which states that lower educated people tend to have cognitive impairment.[20] Two mechanisms were proposed for the relationship between the level of education and cognitive function: First,

someone with higher education has a larger brain reserve capacity than those who are less educated. Second, higher education will influence behavior to live healthier.[21]

Several studies have also shown a link between education and dementia.[11,22,23] However, the results of this study did not find a significant relationship between education level and the incidence of dementia in the elderly. Research by Setiawan et al (2014) concluded that there is no relationship between education level and the incidence of dementia because there are other strong factors that can reduce the risk of dementia, such as the involvement of the elderly in mental, spiritual, social, and physical activities.[24] In Table 5, it can be seen that the social activity variable is the strongest predictor of dementia, apart from the age variable.

Previous studies showed the benefit of marriage namely longer and healthier life.[25] This study showed that an unmarried elderly had a positive relationship with the occurrence of MCI and dementia. The result was in line with a study by Sommerlad et al (2018) that concluded that unmarried person is at higher risk of suffering from dementia in contrast to a married person. The difference was attributed to the healthier lifestyle of a married person. An ending to marriage however could increase the risk of dementia as an adverse effect of stress.[26]

The elderly who experienced cognitive impairment, especially dementia, need support from the surrounding environment, especially family. However, the results of this study did not show a significant relationship between cognitive impairment (MCI and dementia) and the elderly who lived with their family. Adioetomo et al (2018) explained that if other people live in the same household with the elderly, be it children, son-in-law, and / grandchildren, the potential for the availability of elderly nurses or caregivers will be more guaranteed, but there is no guarantee that the presence of other people will help overcome functional difficulties.[14]

This study shows that social activity has a positive and significant relationship with cognitive impairment, in which the elderly who do not participate in social activities are more likely to experience MCI and dementia than those who participate. This result is supported by previous research in Indonesia that showed that elderly people with poor social engagement were twice as likely to experience poor cognitive skills as elderly people with better social engagement.[7] Likewise, the results of a study by Wastuti (2017) showed that the participation of the elderly in social activities can

reduce the risk of cognitive dysfunction (MCI and dementia).[11] Tomioka et al (2018) stated that three mechanisms relates to social participation and cognitive function namely, participation in social activities has a positive effect on social relationships, helps provide a social role for the elderly, and can reduce stress.[27]

The economic level in this study is measured by elderly household expenditures. Household expenditure is one indicator that describes the level of individual and social welfare.[28] Elderly who are economically prosperous has greater access to health services, nutritional needs, and other decent living needs. The results of this study indicate that the lower the economic level, the higher the tendency to experience MCI and dementia. This result is in line with the research of Miu et al (2016) which indicated that lower economic conditions are strongly associated with poorer cognitive function.[29]

CONCLUSION

The results of the research with data of Susenas September 2018 show that most elderly people in Indonesia (82.06 percent) do not experience cognitive impairment. The remaining 17.08 percent of the elderly experienced mild cognitive impairment or MCI, and only 0.86 percent had dementia. The results of the inferential analysis show that age, gender, marital status, social activity, and economic level have a relationship with MCI and dementia. The study then shows a relationship between educational level, and living arrangements with the occurrence of MCI, but not with dementia.

This study has several limitations, namely using cross-sectional data that cannot describe reciprocal effects. Further research is suggested to use longitudinal data so that it can better predict the effect of independent variables on the dependent variable. In addition, it is necessary to carry out more in-depth research by adding other factors that are associated with the occurrence of cognitive impairment in the elderly, such as food consumption, physical activity, and cognitive activity.

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