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Analysis of independence level and cognitive function on older people visiting community health center of Aikmel District, East Lombok Regency

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Abstract: Background: One of four older people have experienced illness in the last month and requires health care whose primary efforts are to increase, prevent, and maintain health results of the degenerative process in health facilities. Aim: This study seeks to determine the independence level, in which the Barthel ADL Index and Mini-Mental Status Examination are utilized. Method: This study was an observational descriptive at the community health center of Aikmel District, East Lombok Regency. The study sample was older people who visited from January to June 2019, in a total of 739 respondents. Results: Analysis employing the Barthel ADL Index discovered that the independence levels of the older people were 92.7% independent, 7.0% lightly dependent, and 0.3% moderately dependent. Meanwhile, the Mini-Mental Status Examination for cognitive function of the older people was 69.8% normal, 25.0% probable cognitive impairment, and 5.1% definite cognitive impairment. Conclusion: The older people visiting the community health center of Aikmel are mostly independent and have a normal cognitive function. **The recommendation for the community health center is to** ***evaluate the assessment results and make planning and implementation to follow up on the integrity of health programs.***

Keywords: independence, cognitive, community health center

1. INTRODUCTION

The number of older adults worldwide is estimated at 500 million with an average age of 60 years, and it is estimated that by 2025 it will reach 1.2 billion [27]. The increasing number of older adults in Indonesia from 1990 to 2025 is considered the fastest in the world. The data from the Central Statistics Agency (BPS) shows that the older people population in 2000 was 14.4 million people (7.18%). In 2010, it was estimated to be 23.9 million people (9.77%), and in 2020, there will be 28.8 million people (11.34%) [3].

Based on the National Socio-Economic Survey in 2014 [3] the number of older people households is 16.08 million or 24.50% of all households in Indonesia. Older people's families are those with at least one household member aged 60 years and over. The number of older adults in Indonesia reached 20.24 million people, equivalent to 8.03% of Indonesia's total population in 2014 [3].

The value of the older people dependency ratio of 12.71 indicates that every 100 people of productive age population must support around 13 older adults. The dependency rate of older

people in rural areas is higher than in urban areas, respectively, 14.09 compared to 11.40. Distinguished between the older men and women, the population of productive age bears more older women. The dependency of older women (13.59) is higher than that of older men (11.83) [3].

The number of older women is greater than men, which is 10.77 million older women compared to 9.47 million older men. The older people living in rural areas is 10.87 million people, more than the older people living in urban areas, which is as many as 9.37 million people [3]. Meanwhile, the number of older people residents in East Lombok aged 60-64 years is 18,371 women and 19,805 men, aged 65-69 years are 12,179 women people and13,345 men, aged 70-74 years are 8,131 women and 9,462 men, 75 years and over are 10,375 women and7,591 men. Whereas, the total number of older people in Aikmel District is 3,643, with older men are 1,666, and older women are 1,977 [2].

Health services must be maximally provided to fulfill the older people's rights in improving their social welfare; this way, they can maintain and improve their physical, mental, and social conditions, so that they can function properly [3]. A community health center is a health service facility that organizes public health efforts and first-level individual health efforts, with a greater emphasis on promotive and preventive efforts to achieve the highest degree of public health in the working area [26]. Improving the performance of a community health center is by improving the quality of services and patient safety, as well as increasing the protection for human resources, health, society, and the environment through health services that can be accessible [23].

As a result of an increasing older people population, there will be an epidemiological transition, which is the shifting patterns of diseases from infectious diseases and nutritional disorders to degenerative diseases, diabetes, hypertension, neoplasms, and coronary heart disease. The consequence of the increase in older people is the increasing number of older people patients with different characteristics from residents of different ages. The characteristics of older people patients are multiple pathologies, decreased biological reserve power, changes in symptoms, and signs of disease from the classic, disruption of the functional status of older people patients [5].

The Minimum Service Standards (MSS) in the health sector is a reference for municipal governments in providing health services that are entitled to every citizen at a minimum. Every Indonesian citizen aged 60 years and over receives health screening according to the standard. The municipal governments are required to provide health screening following the standards to citizens aged 60 years and over in their working area at least one time within one year [22].

According to the standards, screening health is conducted by performing the detection of emotional and behavioral mental disorders, including senility, utilizing the Mini-Mental Status Examination (MMSE). Visitors who are found to have risk factors and suffer from an illness must be treated in a healthcare facility by taking into account the level of independence in older people's activities [22].

Independence is the ability to meet one's needs, which is the most important goal in most older people regardless of their health status. Independence gives them a sense of honor, pride, and self-function, so that they do not become a burden to others, especially their families [20]. Barthel Index is an assessment measuring tool which functions to measure the functional independence in terms of self-care and mobility with a rating system based on a person's ability to carry out daily activities independently [6].

This index uses ten assessment indicators, including feeding, bathing, dressing, grooming, defecating (bowels), urinating (bladder), using the toilet, transferring, moving (mobility), and going up and downstairs. The results interpretation, according to Barthel, is if the total index value is 100. Someone is considered as Total Dependent if the score is 0-20, Heavily Dependent

if the score is 21-40, Medium Dependent if the score is 41-60, Mildly Dependent if the score is 61-90, and Independent if the score is 91-100 [17].

The Mini-Mental State Examination (hereafter, MMSE) assesses several cognitive domains, orientation, space and time, working and immediate memory, attention, calculation, naming objects, sentence repetition, executing commands, understanding, and executing writing commands, understanding and executing verbal commands, and planning and practice. This instrument is recommended as a screening for global cognitive assessment by the American Academy of Neurology (AAN). Cognitive status is measured using the MMSE questionnaire, according to the Assessment Scale in Old Age Psychiatry, consisting of normal (24-30), probable cognitive impairment (17-23), and definite cognitive impairment (0-16) [9].

Public attention, knowledge of cognitive impairment, and the independence level at this time are still lacking. Society tends to consider this as a part of a natural aging process. In general, new old people will only seek treatment after cognitive impairment, severe physical risk, and behavioral disorders or dementia, so that management will not provide satisfactory results. The cognitive impairment management and the dependence level in early stages can be pharmacologically cured or slow the disease's progression so that the individual concerned still has a good and productive quality of life. The cognitive function assessment with MMSE and Barthel Index is a way of screening cognitive impairment and early levels of dependence [5].

The measurement of the independence level and cognitive function of older people is crucial to identify self-care and mobility based on a person's ability to perform daily activities. The high-quality examinations in older people can be used as a policy base in setting targets for development activities, service strategies that will affect the resources and quality of health services at Aikmel community health center, East Lombok Regency [24].

Nurses and family play an important role in helping older people who experience cognitive and independence decline. They can help the older adults grow and foster trusting relationships, socialize with each other, and hold group activities. Besides, to maintain cognitive function and independence in older people, additional efforts are using the brain continuously and resting with sleep. Doing activities such as reading as well as listening to news and stories should be made into a habit that aims to keep the brain from resting continuously [5].

Based on the previous explication, this study aims to determine the cognitive function and independence levels of the older people at the Aikmel community health center. Therefore, the impact of the decreased cognitive function and the independence level can be immediately followed up and minimized, while reducing the risk of injury by providing care through the cooperation of health workers, families, and community participation to achieve a quality, prosperous, and productive life expectancy.

2. MATERIAL AND METHODS

2.1. Research Design, Population, Sample, and Variables

This research was operational because it did not provide any treatment to the sample but merely observed the sample. The study design was cross-sectional since the data were obtained at the same time. The research method used was a survey, and the location was in East Lombok Regency within six months of observation. The population in this study were all older people in the Aikmel community health center. The independent variables were the older people's independence level and cognitive function, while the dependent variable was the older people visiting the community health center.

The criteria for respondents in this study were the older adults who visited the Aikmel community health center aged over 60 years. The older adults did not experience acute pain, or the pain that cannot be controlled (exacerbation phase). They also did not experience mental status disorders that caused confusion or changes in the consciousness level with the Glasgow

Coma Scale (GCS). They did not suffer from neurosensory damage (neuropathy), severe type of diabetes mellitus, and congestive heart failure from the medical record. There was no bleeding (open wound), and at the time of the study, the older people were willing to be examined and signed informed consent.

The research sample was the older adults who utilize health services at Aikmel community health center in East Lombok Regency, and the number of samples is set at 739 respondents. The independence level was measured with the Barthel ADL Index and cognitive functions were measured with MMSE.

2.2. Instruments

There were two instruments utilized in this survey. The first MMSE; The tools needed to carry out the mini-mental state examination (MMSE) are the MMSE instrument, a blank sheet of paper, a sheet of paper with the command "up you're left hand!" Written and two kinds of objects such as pencils and watches. The patient is only asked to sit facing the examiner so that the patient can see and hear the examiner's orders. Then, make a brief assessment of whether the patient can see and hear the examiner clearly, for example by asking the patient's name. Determine whether the patient is wearing a hearing aid or glasses. Introduce yourself and tell them that the examiner will do a memory and cognition check and the final score for the examination will be added. Second is Barthel ADL Index; Questionnaires in the form of a numeric scale are asked directly to patients or their families regarding independent functions in taking care of themselves and mobility. The examiner asks for 10 daily activities listed in the questionnaire and gives a numerical scale. Furthermore, the final score of the examination is carried out.

2.3. Research Procedures and Analysis

The stages of this research included preparing questionnaires, calculating samples, conducting surveys, verifying and entering data, and making reports. Some data analysis techniques used were descriptive (frequency and percentage distribution tables), measuring the independence level and cognitive function, then displaying the analysis results utilizing the spider web analysis.

3. RESULTS

3.1. Characteristics of Respondents

Buyer characteristics greatly influence buyers' perceptions and reactions to the products consumed [10]. The characteristics of respondents were seen from age, sex, and number of patient visits. The age pattern influenced the demand for health services.

Based on the age group, the highest group was the age group 60-69 years, which was equal to 75.8% (560 respondents). Meanwhile, the second-highest age group category was the age group of 70 years and above, amounting to 24.2% (179 respondents). This indicated that most of the respondents were the older people age group who were prone to recurrent disease and became the risk groups.

Based on sex category, 88.0% of women (650 respondents) and 12.0% of men (89 respondents). It can be seen that the highest cognitive normal and independence in women, respectively as many as 460 respondents (70.8%) and 612 respondents (94.2%). However, 32 respondents (4.9%) were older people's with definite cognitive impairment, and 2 respondents (0.3%) moderate dependent. This is consistent with Dever's research, that in utilizing health services, it turns out that women use it more often [28].

While the characteristics of respondents based on age were 60-69 years of age as many as 560 respondents (75.8%), while those over 70 were 179 respondents (24.2%). It can be seen

that the highest cognitive normal and independence at the age of 60-69 years, respectively as many as 403 respondents (72.0%) and 555 respondents (99.1%). However, there were 22 respondents (3.9%) aged with definite cognitive impairment.

Based on patient visits, the new male patient visits were 7.98% (59 respondents), and the new female patient visits were 61.43% (454 respondents). Meanwhile, the old male patient visits were 4.06% (30 respondents), and the old female patient visits were 26.52% (196 respondents).

Table 1. Characteristics of Respondents of Older people Cognitive and Independence Level (n = 739)

Characteristic of Respondent	Cognitive						Independence						Total	
	Normal		Probable Cognitive Impairment		Definite Cognitive Impairment		Independent		Mild Dependent		Moderate Dependent			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Sex														
1. Man	56	62.9	27	30.3	6	6.7	73	82.0	16	18.0	0	0.0	89	12.0
2. Woman	460	70.8	158	24.3	32	4.9	612	94.2	36	5.5	2	0.3	650	88.0
Age														
1. 60-69 years	403	72.0	135	24.1	22	3.9	555	99.1	5	0.9	0	0.0	560	75.8
2. > 70 years	113	63.1	50	27.9	16	8.9	130	72.6	47	26.3	2	1.1	179	24.2

3.2. Older people Independence Level Analysis based on Barthel ADL Index

The independence level of the older adults at Aikmel community health center in East Lombok Regency was measured with the Barthel ADL Index. The targets were measuring the independence of the older people utilizing health facilities, encouraging public service providers to improve their quality, and promoting the providers to be more innovative and creative in providing and organizing public services, especially for the older adults.

The ten elements of the Barthel ADL Index were measured within the scope of the Aikmel community health center. The calculation of each element's average value was obtained from the average value of "reality" for each aspect contained in the element. Thus, in calculating the average value, the divider was not similar for each element since each element has different total scores.

The highest weighted value of the ten indicators was toilet use (0.999) while the lowest value was bladder (0.829). The second-lowest aspect was mobility (0.975), and the third-lowest aspect was dressing (0.987). It could be interpreted that what should be of more concern at the Aikmel community health center in East Lombok Regency to improve the service was putting more focus on the bladder, mobility, and clothing aspects. These elements were one of the

indicators or symptoms of a decrease in patients' physiological function and would affect the older adults in using products or services at the community health center.

The independence levels of the older people based on the Barthel ADL Index were Independent (92.7% or 685 respondents), Mildly Dependent (7% or 52 respondents), and Moderately Dependent (0.3% or 2 respondents). From the calculation based on the Barthel ADL Index, the results indicated that the independence level of the older people who visited the Aikmel community health center in East Lombok Regency was mostly independent.

3.3. Older people Cognitive Function Analysis based on Mini-Mental State Examination

MMSE instruments included five elements, that is orientation, registration, attention and calculation, recall, and language and understanding, which were converted into eleven questions on the assessment . In interpreting the results of the MMSE assessment, it is necessary to consider the patient's ability to see and hear the level of education, and the patient's awareness.

The highest weighted value of the five indicators was orientation (0.922), while the lowest value was registration (0.730). The second-lowest aspect was attention and calculation (0.736), and the third-lowest aspect was recalled (0.755). It could be interpreted that what should be of more concern at Aikmel community health center in East Lombok Regency to improve the service was putting more focus on handling the older adults who experienced a decline in cognitive function. These elements were one of the indicators or symptoms of a decrease in patients' physiological function and would affect the older adults in receiving health information and utilizing products or services at the community health center.

The weighted values of five MMSE elements were displayed employing the spider web analysis to find out which elements are low and high by comparing the MMSE aspects.

It was discovered that several elements must be the focus in improving the community health center services by comparing the value of the assessment element (blue line) with the average rating element (green fill), in which the orange fill was still a low value. Several assessment elements that were still low and should be a priority in improving health center services were the registration, attention, and calculation, and recall elements.

The older people's cognitive function based on MMSE resulted in normal older adults (69.8% or 516 respondents), as well as the older people with Probable Cognitive Impairment (25.0% or 185 respondents) and Definite Cognitive Impairment (5.1% or 38 respondents). From these results, it could be deduced that the cognitive function of older people who visited the Aikmel community health center in East Lombok Regency was mostly normal.

3.4. Older people's Independence Level and Cognitive Functions Analysis

The self-reliance and cognitive functions analysis of the older people at Aikmel community health center, East Lombok Regency, in 2019 resulted in the independent older adults with normal cognitive function as many as 66.2% (489 respondents), probable cognitive impairment as many as 22.7 (168 respondents), and definite cognitive impairment as many as 3.8% (28 respondents). Then, the mildly dependent older people with normal cognitive function was 3.5% (26 respondents), probable cognitive impairment was 2.3% (17 respondents), and definite cognitive impairment was 1.2% (9 respondents). Meanwhile, the moderately dependent older people with normal cognitive function were 0.1% (1 respondent) and definite cognitive impairment was 0.1% (1 respondent).

Table 2. Analysis of Older people Independence Level and Cognitive Functions at Aikmel Community Health Centers, East Lombok Regency, in 2019

		Independence						Total
		Independent		Mild Dependent		Moderate Dependent		
		n	%	n	%	n	%	
Cognitive	Normal	489	66.2	26	3.5	1	0.1	516
	Probable Cognitive Impairment	168	22.7	17	2.3	0	0.0	185
	Definite Cognitive Impairment	28	3.8	9	1.2	1	0.1	38
	Total	685	92.7	52	7.0	2	0.3	739

4. DISCUSSION

The increase in the number of older adults must be balanced by the readiness of families and health workers in establishing and minimizing the assistance of ADL (Activity Daily Living) to eat, drink, bathe, dress, and put things on. The older adults suffered from various declines or changes, including physiological changes related to the issues of musculoskeletal, nerve, cardiovascular, respiration, sensory, and integumentary systems. These changes hindered their activeness and effectiveness in fulfilling their daily needs independently. There is no strict limit on the age at which a person's appearance began to decline. The physiological functions of the body organs in every person are very different, both in their peak and decrease [5].

Every human being has a different characteristic, and cognitive development is not the same in every individual. This developmental difference cannot be separated from several factors that influence cognitive development, which is organic development and maturity of the nervous system, training, experience, social interaction, and equilibration [5].

Organic development and maturity of the nervous system are closely related to the physical growth and body organs development. Someone who has a physical disorder may not necessarily experience slow cognitive development. Vice versa, a person with perfect physical growth is not a guarantee, nor is his cognitive development fast. The nervous system also influences the cognitive development process. A person's cognitive development is greatly influenced by exercises and experiences. Then, social interaction is affected by relationships with the surrounding environment, especially social situations, both interactions among peers and the closest people. Meanwhile, equilibration is an equilibrium process that refers to the four stages of cognitive development according to Jean Piaget. The balance of the stages traversed certainly becomes a determining factor for cognitive development [5].

The demographic characteristics of cognitive decline in older people also affect the independence level of the older people, such as hypertension, age, educational status, gender, smoking behavior, and sports activities [6]. In the age and sex characteristics, men experience more hypertension than women although other factors, such as cholesterol, weight, or nutritional status, also affect hypertension incidence. Men also have greater smoking behavior, less exercise, and a lower level of education than women [19].

Hypertension is an increase in chronic blood pressure that can increase the impacts of aging on brain structure, including reduction of white and gray substances in the prefrontal lobe, decreased hippocampus, and increasing hyperintensity of white substance in the frontal lobe.

Angina pectoris, myocardial infarction, coronary heart disease, and other vascular diseases are also associated with deteriorating cognitive function [12].

A study measuring older people's cognitive showed a score below the cut-off screening was 16% in the age group of 65-69, 21% in 70-74, 30% in 75-79, and 44% in 80 above. The study results indicated a positive relationship between age and cognitive decline and a higher level of dependence [29]. Falling becomes a problem that often occurs in older adults. Brocklehurst explained that if a person gets older, his physical and mental abilities will slowly decrease [30] The decreased physical and mental abilities often cause falls in the older people. As a result, it will have an impact on reducing activity in older people's independence [19].

Age also causes the ability of a person's activity to be inseparable from the nervous system and musculoskeletal inadequacy, including in the nervous system. The older people experience a decrease in coordination and ability to perform daily activities. In general, the physical condition of an old person decreases. It makes older people vulnerable to diseases, especially chronic diseases, such as hypertension, arthritis, and diabetes. The progress of the disease process threatens independence and quality of life by burdening the ability to perform personal care and daily activities [5].

Low education status is never better than groups with higher education. Women are more at risk of cognitive decline. This is due to the role of endogenous sex hormone levels in cognitive function changes. Estrogen receptors are found in the brain area that plays a role in learning and memory functions, such as the hippocampus. Low levels of estradiol in the body have been linked to the decreased general cognitive function and verbal memory. Estradiol is thought to be neuroprotective and can limit damage due to oxidative stress and is seen as a protective nerve cell from amyloid toxicity in Alzheimer's patients ([31]. The difference in independence is also influenced by gender. In this case, men have higher independence than women [5].

From the smoking behavior aspect, it shows that smoking in middle age is associated with impaired cognitive function in old age, whereas smoking status is associated with an increased incidence of dementia. Other studies also discovered the effect of smoking on cognitive decline in older smokers (> 20 years) [16].

Sports activities also affect cognitive abilities in male and female subjects aged 55-91 years. People who are active in sports have better reasoning, memory, and reaction time abilities than those who lack or never exercise. Exercise is an important factor in improving cognitive functions in older people. Things that must be considered in sports activities for older adults in the sport selection that will be undertaken, which must be following the age and physical condition [32]. Previous research explains that immobility is the inability to move actively caused by various physical or mental diseases or disorders (organ disorders). The immobilization causes in older people are heart problems, breathing, joint and bone disorders, rheumatic diseases such as calcification or broken bones, neurological diseases, strokes, pancreatic disease, visual disturbances, and healing periods [5].

Older people's examinations comprise screening for hypertension, cholesterol, diabetes mellitus, and emotional health. However, the examination cannot be executed comprehensively since the activity is performed in different places by the respective program holders. For instance, the examination of hypertension, cholesterol, diabetes mellitus is conducted by the non-communicable disease program holder, while emotional health is screened by the mental health program officers. Older people examinations should be carried out comprehensively and integrated on a patient-based basis. Yet, the older adults who do not visit health facilities cannot have this examination while they must also obtain health services and health screening. Therefore, health workers should conduct promotive, preventive, and rehabilitative home visits and health services, including screening [25].

From the study results and the issues raised as research, several things can be suggested. Health workers can provide services for older adults by looking at their characteristics, such as

hypertension, sex, older people, education level, smoking behavior, and sports activities, in efforts to handle and prevent them from decreased cognitive function and low independence level. Besides health workers, families can also provide emotional support and special attention to older people with a decline in cognitive function and independence, particularly those with impaired cognitive function and moderate or high dependence levels. The family has an important role in maintaining the physical, social, psychological, and spiritual functions of older people. For further research, it can be done with a larger number of samples with different study designs and variables that have not been studied and are associated with specific events in older adults. This research was conducted in a community health center. This study employed secondary data through observation without providing intervention. The factors that cause older people visits to the community health centers were still lower than the total older people population was still unknown, while the government offers a standard that all older people must receive health services.

5. CONCLUSION

Based on the elaboration on the results and discussion, it can be concluded that most older adults who visited the Aikmel community health center in East Lombok Regency are mostly independent with normal cognitive function. There are also independent older people with probable cognitive impairment and independent older people with definite cognitive impairment. Meanwhile, the two lowest groups are moderately dependent older people with normal cognitive function and definite cognitive impairment.

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