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ORIGINAL RESEARCH

FACTORS ASSOCIATED WITH INDEPENDENCE FOR ELDERLY PEOPLE IN THEIR ACTIVITIES OF DAILY LIVING

Faktor-Faktor yang Berhubungan dengan Kemandirian Lansia dalam Aktivitas Kehidupan Harian

Sri Wahyuni[1], Christantie Effendy[2], Fitrina Mahardani Kusumaningrum[3], Fatwa Sari Tetra Dewi[3]
[1]Student of Nursing, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, syunigg@gmail.com
[2] Department of Medical Surgical Nursing, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, christantie@ugm.ac.id
[3]Department of Health Behavior, Environment and Social Medicine, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, fitrina.m.k@gmail.com, fatwasari@ugm.ac.id
Correspondence Author: Fatwa Sari Tetra Dewi, fatwasari@ugm.ac.id, Department of Health Behavior, Environment and Social Medicine, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Farmako Street, Sekip Utara, Yogyakarta, 5528, Indonesia.

ARTICLE INFO

ABSTRACT

Background: Health in the elderly does not merely refer to a condition free from disease but should also have elements regarding functionality and independence. **Purpose:** This study aimed to measure Activities of Daily Living (ADLs) and to identify the factors affecting ADLs among the elderly population in Sleman District. **Methods:** A cross-sectional study was carried out using secondary data from the Multidimensional Elderly Care project, nested on the Health Demographic and Surveillance System in Sleman, involving 549 elderly participants. The independence of these elderly people was measured using an Activities of Daily Living Scale questionnaire. Factors measured were cognitive (using the Mini-Mental State Examination questionnaire), psychological (using the Geriatric Depression Scale or Cornell Scale for Depression in Dementia questionnaires), economic (using the Financial Management Behavior Scale questionnaire), and nutritional status (using the Mini Nutritional Assessment questionnaire). The data were analyzed using the chi-square test, Fisher test, and Poisson test for bivariate analysis, while multivariate analysis using a logistic regression test. **Results:** The prevalence of elderly dependence was 14.03%. Elderly dependence was significantly related to age, job, residence, financial management, dementia, depression, malnutrition, and stroke disease in the bivariate analysis. However, after multivariate analysis, only age (>86 years) (PR = 4.31; 95% CI = 1.91–9.72), malnutrition (PR = 6.62; 95% CI = 3.79–11.57), and stroke (PR = 3.06; 95% CI = 2.03–4.61) were still shown to be related to elderly dependence. **Conclusion:** Increasing age, malnutrition, and stroke in

elderly people lead to higher dependency in their ADLs.

ABSTRAK

Latar Belakang: *Kesehatan pada lansia tidak hanya kondisi bebas dari penyakit, tetapi juga harus memiliki kondisi fungsional dan kemandirian.* ***Tujuan:*** *Penelitian ini bertujuan untuk mengukur aktivitas kehidupan sehari-hari (ADLs) dan mengidentifikasi faktor-faktor yang mempengaruhi ADLs pada lansia di Kabupaten Sleman.* ***Metode:*** *Studi potong lintang dilakukan dengan menggunakan data sekunder dari proyek Perawatan Lanjut Usia Multidimensional (Rajut Mula) pada Health and Demographic Surveillance System Sleman dengan melibatkan 549 partisipan lansia. Kemandirian para lansia diukur menggunakan kuesioner Activities of Daily Livings (ADLs). Faktor yang diukur adalah faktor kognitif (menggunakan kuesioner Mini-Mental State Examination atau MMSE), faktor psikologis (menggunakan kuesioner Geriatric Depression Scale (GDS) atau kuesioner Cornell Scale for Depression in Dementia (CSDD) bila demensia), faktor ekonomi (menggunakan kuesioner The Financial Management Behavior Scale (FMBS), dan faktor nutrisi (menggunakan kuesioner Mini Nutritional Assessment (MNA). Data dianalisis dengan menggunakan uji Chi-square, uji Fisher, uji Poisson untuk analisis bivariate, sedangkan analisis multivariat menggunakan uji regresi logistik* ***Hasil:*** *Prevalensi lansia mengalami ketergantungan sebesar 14,03%. Ketergantungan lansia berhubungan secara signifikan dengan variabel usia, pekerjaan, lokasi tempat tinggal, manajemen keuangan, demensia, depresi, malnutrisi dan stroke pada analisis bivariat. Namun setelah analisis multivariat hanya usia >86 tahun (PR= 4,31; 95% CI 1,91-9,72), malnutrisi (PR= 6,62; 95% CI 3,79-11,57), dan stroke (PR= 3,06; 95% CI 2,03-4,61) yang berhubungan dengan ketergantungan lansia.* ***Kesimpulan:*** *Bertambahnya usia, malnutrisi dan stroke di kalangan lansia menyebabkan ketergantungan yang lebih tinggi pada aktivitas kehidupan sehari-hari responden.*

INTRODUCTION

Life expectancy is increasing steadily, both globally and on a national level in Indonesia. Globally, life expectancy is increasing both among women (7.70-year increase within 26 years: from 67.60 years in 1990 to 75.30 years in 2016) and among men (7.10-year increase within 26 years, from 62.70 to 69.80). In Indonesia, the life expectancy increased among women from 64.90 years (1990) to 73.60 years (2016) and among men from 63.40 years to 69.90 years (1990–2016) (Hay et al., 2017). These rising life expectancies are contributing to increases in aging and elderly populations both globally and nationally (World Health Organization, 2016). Globally, the elderly population (60+) is predicted to increase from 12.30% in 2015 to 16.5% in 2030. Similarly, the elderly population in Indonesia is predicted to increase from 8.20% in 2015 to 13.20% in 2030 (Lyons, Grable, & Joo, 2018).

The elderly population (aged 60+) in Sleman District in Yogyakarta Province, Indonesia, is estimated to account for 14% of women and 13% of men (Dewi et al., 2018). This increasing proportion of the population should be able to live independently and be productive both socially and economically to avoid imposing a burden on the community's welfare. An independent life requires elderly people to be able to adjust to the physical and mental changes of the aging process; otherwise, they will lose their role in the

community, causing loss of self-esteem and an increase in isolation and loneliness (Kodri & Rahmayati, 2016).

Healthy aging is not merely being free from disease, but also importantly concerns functional abilities (World Health Organization, 2015). Functional capacity is related to the abilities of elderly people to perform their activities of daily living (ADLs) at home independently, including eating, dressing, walking, bathing, and toileting (Bleijenberg, Zuithoff, Smith, de Wit, & Schuurmans, 2017; Oliveira, Nossa, & Mota-Pinto, 2019). Independence in performing ADLs can be measured using the Activities of Daily Living Scale (ADLS) questionnaire (World Health Organization, 2006). Among the elderly Iranian population in 2012, 13.20% of women and 12.60% of men experienced low independence in their ADLs (Tourani et al., 2018). This low independence is associated with many factors, including age, marital status, family type, health, economic status, educational attainment level, social condition, family support, cognitive abilities, motor skills, and individual perceptions (Burman et al., 2019; Kodri & Rahmayati, 2016; Oliveira, Nossa, & Mota-Pinto, 2019).

Measuring functional capacity in the elderly population is important for developing an environment, policies, and interventions that prevent severity of disability and improve quality of life (Buz & Cortés-Rodríguez, 2016). To answer the demands of an aging population, this study aimed to measure ADLs and to identify the factors affecting them among the elderly population in Sleman District.

METHODS

This research was conducted as a cross-sectional study using secondary data from the Multidimensional Elderly Care Project (ME Care project), a study project nested in Sleman's Health Demographic and Surveillance System (HDSS) in 2018. The samples for this study were elderly people (aged 55+) with no missing data. In 2018, the total population aged 55+ in Sleman District was 12,872 people. From these, there were 4,512 respondents in the Sleman HDSS were and 578 in the ME Care project. After excluding those with missing data, 549 respondents were selected for the current study (see Figure 1).

The dependent variable in this study was the independence level of the elderly respondents, and the independent variables were demographic factors (age, gender, education, job,

socioeconomic status, marital status, residence, living with other people), economic factors, cognitive factors, psychological factors, nutritional status, stroke disease, and disability status.
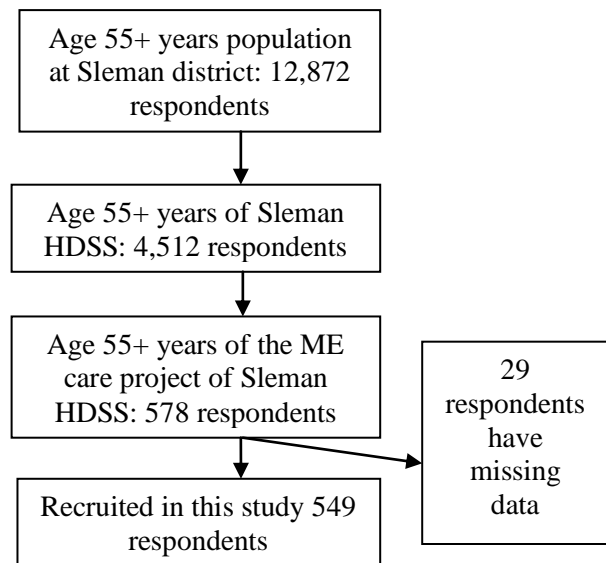

Figure 1. Sample Selection Flow Chart

Independence of Elderly People

In this research, the independence of elderly people was measured in terms of their independence in carrying out ADLs such as bathing, dressing, eating, walking, and toileting. This was measured using the Activities of Daily Living Scale (ADLS) questionnaire. A respondent was categorized as having independence if their score was ≤5 and as being dependent otherwise (World Health Organization, 2006).

Cognitive Factors

The Mini-Mental State Examination (MMSE) questionnaire was used to evaluate five cognitive factors: orientation, registration, attention and calculation, remembering, and language. The level of cognition was classified as normal if the respondent scored ≥10 and as showing dementia if they scored <10 (Ministry of Health RI, 2015).

Psychological Factors

To measure psychological factors for people without dementia (i.e., who showed a normal condition for cognitive function), we used the short-version Geriatric Depression Scale (GDS) questionnaire instrument, which consists of 15 questions. We categorized a respondent as showing no depression if they scored 0–4 and as having depression if they scored ≥5 (Ministry of Health RI, 2015). To measure the psychological

factors for people with dementia, we used the Cornell Scale for Depression in Dementia (CSDD) questionnaire, which consists of 19 questions. We classified respondents as showing no depression if they scored ≤9 and as having depression if they scored ≥10 (Hancock & Larner, 2015).

Economic Factors

The Financial Management Behavior Scale (FMBS) questionnaire, consisting of 15 items, was used to measure financial management factors. The questions cover cash management, savings investment, insurance, and credit management. Respondents were classified as having good financial management if they scored >23.19 and as having poor financial management if they scored ≤23.19, according to the mean cut-off point (Dew & Xiao, 2011).

Nutritional Status

Nutritional status was measured using the Mini Nutritional Assessment (MNA) questionnaire, which consists of two parts: screening and assessment. Respondents were classified as having good nutritional status if they scored ≥24, as having a risk of malnutrition if they scored 17–23.5, and as having malnutrition if they scored <17 (Ministry of Health RI, 2015).

In this research, we carried out a descriptive analysis of the data, and then we applied bivariate analysis using the chi-square test, Fisher test, and Poisson test. Finally, we conducted a multivariate analysis using a logistic regression test. The data were analyzed using STATA version-13 software with a significance level of p < 0.05. This study has been approved by the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada – Dr. Sardjito General Hospital (No. KE/FK/1074/EC/2019).

RESULTS

The prevalence rate of dependency in carrying out ADLs among this sample population was 14.03%. In terms of the demographic criteria, more than half of the respondents were female (56.10%), and the majority of the respondents were aged 56–65 (52.82%). Most of the respondents had low education levels (elementary-school level) (40.26%), no occupation (73.77%), were married (96.54%), lived in urban areas (79.78%), and lived together with their family (92.35%). For the economic factors, more than half of the respondents had poor financial management (54.28%). The majority of the respondents were healthy elderly people; however, some of them suffered from dementia (4.92%), depression (14.03%), malnutrition (1.82%), stroke disease (4.55%), and disability (0.91%) (see Table 1).

Bivariate analysis showed that ADLs were significantly associated with age, occupation, financial management, psychological conditions, and the presence of morbidities. The level of dependency increased as age increased. In comparison with the youngest age group (56–65), the 66–75 age group showed a 3.11 times higher risk of being dependent (95% CI = 1.80–1.99), the risk for the 76–87 age group was 4.18 times higher (95% CI = 2.35–7.41), and that for the 85–95 age group was 5.69 times higher (95% CI = 2.47–13.11). The respondents who had no occupation were at significantly higher risk (3x) (95% CI = 2.03–4.56) of being dependent than those who had an occupation. Additionally, those with poor financial management capabilities were at significantly higher risk (2x) of being dependent (95% CI = 1.32–3.35) than those with good financial management capabilities (see Table 2).

Some diseases—dementia, depression, malnutrition, and stroke—showed a significant relationship with dependency in performing ADLs. Respondents who had dementia were at significantly higher risk (5.48x) of being dependent (95% CI = 3.77–7.97) than those who did not have dementia, and those with depression were at 2.45 times more risk of being dependent (95% CI = 1.59–3.78) than those who did not have depression. Those who had malnutrition issues were at higher risk (at a highly significant level: 12.59x) (95% CI = 9.03–17.57) than those who did not have malnutrition, and those who had experienced a stroke were at significantly higher risk (4.66x) of being dependent (95% CI = 3.07–7.07) than those who had not experienced a stroke (see Table 2).

Age, nutritional status, and stroke were also shown to be significantly related to dependence after being controlled by other variables. In comparison with the youngest age group (56–65), the 66–75 age group's risk of being dependent was 2.65 times higher (95% CI = 1.56–4.51), that of the 76–87 age group was 2.41 times higher (95% CI = 1.36–4.27), and that of the 85–95 age group was 4.31 times higher (95% CI = 1.91–9.72).

Table 1
Elderly Characteristic in Sleman District

Variable	n	%
Elderly Independence		
Independence	472	85.97
Dependence	77	14.03
Gander		
Male	241	43.90
Female	308	56.10
Age (years old)		
56-65	287	52.28
66-75	167	29.87
76-85	84	15.30
89-95	14	2.55
Education		
No school	127	23.13
Elementary school	221	40.26
Junior – senior high school	164	29.87
Collage	37	6.74
Job		
Work	405	73.77
No work	144	26.23
Social Economic Status		
Q1 (lowest)	156	25.42
Q2	117	21.31
Q3	100	18.21
Q4	85	15.48
Q5 (highest)	91	16.58
Marital Status		
Married	530	96.54
Single	19	3.46
Residential Area		
Urban	438	79.78
Rural	111	20.22
Living Together		
Family	507	92.35
No family	42	7.65
Economic Factor		
Good financial management	251	45.72
Poor financial management	298	54.28
Cognitive Factor		
Normal	522	95.08
Dementia	27	4.92
Psychological Factor		
Normal	472	85.97
Depression	77	14.03
Nutritional Status		
Good nutrition status	403	73.41
Risk of malnutrition	136	24.77
Malnutrition	10	1.82
Stroke Disease		
No	524	95.45
Yes	25	4.55

Continued

Table 1
Continued

Variable	n	%
Disability		
Able-bodied	554	99.01
Disabled	5	0.91
Total	549	100

Respondents with malnutrition were at significantly higher risk (6.62x) of being dependent (95% CI = 3.79–11.57) than those who did not have malnutrition, and those who had experienced a stroke were at significantly higher risk (3.06x) (95% CI = 2.03–4.61) than those who had not. The results of this multivariate analysis show that age (PR = 4.31; 95% CI = 1.91–9.72), malnutrition (PR = 6.62; 95% CI = 3.79–11.57), and stroke disease (PR = 3.06; 95% CI = 2.03–4.61) accounted for 15% of cases of elderly dependence, whereas the remaining 85% of cases were influenced by other variables (see Table 3).

DISCUSSION

The results of this study show that the majority of the elderly people in the sample had independence in carrying out ADLs such as eating, dressing, walking, bathing, and toileting. This finding is similar to a study conducted in Central Lampung District, Lampung Province, Indonesia, which showed a 32% level of dependence in ADLs among elderly people (Kodri & Rahmayati, 2016). A number of elderly people in current study with low dependence were living with help from a family member, caregiver, or other people. In the current study, we found that the prevalence of elderly dependence was 14.03%, which is similar to research in the Netherlands conducted by Ćwirlej-Sozańska, Wiśniowska-Szurlej, Wilmowska-Pietruszyńska, & Sozański (2019) that showed a 17.10% prevalence of elderly dependence. Our results also indicate that age, malnutrition, and stroke were related to elderly dependence; this finding is similar to the results of a study in East Delhi, India (Vaish, Patra, & Chhabra, 2020).

Age is an important factor in elderly dependence (Burman et al., 2019). A study based on Chinese Longitudinal Healthy Longevity Survey data reported that age is the most important factor in elderly people's potential dependence in the next two or three years (Zhang, Jia, Li, Liu, & Li, 2016).

Table 2
Association of Demographic Factors, Economic Factors, Cognitive Factors, Psychological Factors, Nutritional Status, Stroke Disease, and Disability with Independence of Elderly People

Variable	Independence		Dependence		p-value	PR (95% CI)
	n	%	n	%		
Gender[C]						
Male	212	44.92	29	37.06		1
Female	260	55.08	48	62.34	0.23	1.29 (0.84-1.99)
Age (years old)[β]						
56-65	269	59.99	18	23.38		1
66-75	132	27.97	32	41.56	0.00	3.11 (1.80-5.37)
76-85	62	13.13	22	28.57	0.00	4.18 (2.35-7.41)
89-95	9	1.91	5	6.49	0.00	5.69 (2.47-13.11)
Education[β]						
No school	98	20.76	29	37.66		1
Elementary school	194	41.10	27	35.06	0.07	2.82 (0.91-8.73)
Junior – senior high school	146	30.39	18	23.38	0.48	1.51 (0.48-4.72)
Collage	34	7.20	3	3.90	0.61	1.35 (0.42-4.36)
Job[C]						
Work	368	77.97	37	48.05		1
No work	104	22.03	40	51.95	0.00	3.00 (2.03-4.56)
Social Economic Status[β]						
Q1	131	27.72	25	32.47	0.40	1.33 (0.68-2.57)
Q2	105	22.25	12	15.58	0.68	0.85 (0.39-1.84)
Q3	84	17.80	16	20.78	0.44	1.32 (0.65-2.70)
Q4	72	15.25	13	16.88	0.54	1.26 (0.59-2.67)
Q5	80	16.95	11	14.29	1	
Marital Status[F]						
Married	456	96.61	74	96.10	1	1
Not married	16	3.39	3	3.90	0.74	1.13 (0.39-3.26)
Residential Area[C]						
Rural	102	21.61	9	11.69	0.04	2.00 (0.27-1.01)
Urban	370	78.39	68	88.31	1	1
Living Together[C]						
Family	436	92.37	71	92.21	1	1
No family	36	7.63	6	7.79	0.96	1.02 (0.47-2.21)
Economic Factor[C]						
Good financial management	229	48.52	22	28.57		1
Poor financial management	243	51.48	55	71.43	0.01	2.11 (1.32-3.35)
Cognitive Factor[F]						
Normal	462	97.88	60	77.92	1	1
Dementia	10	2.12	17	22.08	0.00	5.48 (3.77-7.97)
Psychological Factor[C]						
Normal	417	88.35	55	71.43	1	1
Depression	55	11.65	22	28.57	0.01	2.45 (1.59-3.78)
Nutritional Status[β]						
Good nutrition status	371	78.60	32	41.56	1	1
Risk of malnutrition	101	21.40	35	45.45	0,00	3.24 (2.09-5.03)
Malnutrition	0	0.00	10	12.99	0,00	12.59 (9.03-17.57)
Stroke Disease[F]						
No	461	97.67	63	81.82	1	1
Yes	11	2.33	14	18.18	0.00	4.66 (3.07-7.07)

Continued

Table 2
Continued

Variable	Independence of The Elderly People				p-value	PR (95% CI)
	Independence		Dependence			
	n	%	n	%		
Disability[F]						
Able-bodied	469	99.36	75	97.40	1	1
Disable	3	0.64	2	2.60	0.15	2.90 (0.97-8.67)
Total	472	100	77	100		

Note: 'C'= Chi-square analysis, 'F'= Fisher exact analysis, β= Poisson analysis.

Table 3
Results of Multivariate Analysis after Controlling for Potential Confounding Variables

Variable	PR	p-value	95% CI
Age (years old)			
56-65	Ref	Ref	Ref
66-75	2.65	0.00	1.56-4.51
76-85	2.41	0.00	1.36-4.27
86-95	4.31	0.00	1.91-9.72
Nutritional Status			
Good nutrition status	Ref	Ref	Ref
Risk of malnutrition	2.47	0.00	1.57-3.86
Malnutrition	6.62	0.00	3.79-11.57
Stroke Disease			
No	Ref	Ref	Ref
Yes	3.06	0.00	2.03-4.61
R^2=0.15			

The current study results support the evidence that people are more likely to be dependent as their age increases. This is in line with a study conducted in China that showed an association between age and elderly people's dependence in their ADLs, with getting older leading to more dependence (Guo, Chen, & Perez, 2019). A study in Coimbra, Portugal, also reported that people aged 75–79 experienced a decline in their physical, cognitive, and social functions that limited their ability to carry out their ADLs (Oliveira, Nossa, & Mota-Pinto, 2019). People over the age of 60 generally have at least one limitation in carrying out ADLs, and with each further year's increase of age, the limitations will be increased by 8% (Ćwirlej-Sozańska, Wiśniowska-Szurlej, Wilmowska-Pietruszyńska, & Sozański, 2019). Malnutrition has negative effects on the health of elderly people, one of which is increased functional disorders (Shakersain et al., 2016).

Physical function decrease is more significant among elderly people with malnutrition than among those who have good nutrition (Hsu et al., 2019). In a study conducted by Wei et al (2018) regarding nutritional status and physical frailty among elderly people, the authors found that malnutrition caused elderly frailty and vice versa. Malnutrition is related to frailty and sarcopenia, a condition of losing muscle mass and a decline in muscle strength as elderly people get older. There is an increased prevalence of sarcopenia and low muscle mass in elderly people who are unable to walk compared with those who can walk independently (Cruz-Jentoft, Kiesswetter, Drey, & Sieber, 2017; Maeda, Shamoto, Wakabayashi, & Akagi, 2017; Sánchez-Rodríguez et al., 2017). Being malnourished and underweight are associated with mobility limitations, and limited mobility is also related to sarcopenia (Maeda, Shamoto, Wakabayashi, & Akagi, 2017). Nutrition is also very important to brain development—nutrition delays can decrease cognitive function and increase dementia in elderly people (Shakersain et al., 2016).

Chronic disease decreases functional capacity and can increase functional disorder (Oliveira, Nossa, & Mota-Pinto, 2019). The dependence of elderly people increases due to the interaction between environment barriers and multimorbidity. Chronic diseases such as stroke increase the risk of dependency for elderly people by 4%–7%, and elderly people with chronic diseases have at least

one problem in their ADLs (Ćwirlej-Sozańska, Wiśniowska-Szurlej, Wilmowska-Pietruszyńska, & Sozański, 2019). A systematic literature review found two studies emphasizing that stroke is a risk factor for limitations in ADLs among elderly people aged 75 and over (van der Vorst et al., 2016). The number of chronic diseases suffered by an elderly person also increases their inability or dependency (Guido, Perna, Peroni, Guerriero, & Rondanelli, 2015; Rizzuto, Melis, Angleman, Qiu, & Marengoni, 2017). Chronic diseases such as cardiovascular disease, cancer, stroke, and lung disease are common causes of death in the geriatric population.

This study's results imply that providing health services to achieve early detection of risk factors for non-communicable diseases (NCDs), monitoring of such risk factors, and prevention of NCDs are very important among high-risk groups. Hypertension and diabetes mellitus are among the NCDs that can lead to cardiovascular and stroke disease. The elderly health service in Indonesia is supported by the Government of the Republic of Indonesia through Government Regulation Number 43, introduced in 2004, which encourages the provision of Integrated Service Post for Elderly and community-based activities to increase the well-being of elderly people (President of RI, 2004).

A service monitoring the nutritional status of elderly people is also important. Family members acting as main care providers in Indonesia should also be involved and educated to identify early signs of functional limitation and malnutrition in elderly people so they can plan further actions for maintaining functional ability and prevent severity of disability (Ris, Schnepp, & Imhof, 2019).

CONCLUSION

Age, nutritional status, and stroke are significant factors associated with elderly dependence. The aging process decreases elderly people's ability to carrying out ADLs. Elderly people with malnutrition and who have had strokes have increased dependency in carrying out ADLs.

Offering health education for elderly people during routine visits to Integrated Service Post for Elderly is an opportunity to achieve health, independence, and engagement among the elderly population. To help prevent malnutrition in elderly people, it is also important to involve their family members. Future research into providing suitable care to help elderly people to retain their ADLs in

their local conditions is needed to transfer these results to the real world.

CONFLICT OF INTEREST

AUTHOR CONTRIBUTION

SW carried out the data analysis, drafted the article, and approved the publication. CE supported the data interpretation, revising important content, and approving the publication. FMK led the data collection, data interpretation, and revising of important content, and approved the publication. FSTD designed the study, led the data interpretation, acted as corresponding author, led the revisions process, and approved the publication.

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