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Predictive factors of quality of life among older adults in rural Indonesia: a cross-sectional study

Pagela Pascarella Renta[1], Rahmad[2,3]
[1]Dusun Tengah Community Health Center, Bengkulu, Indonesia
[2]Department of Physical Medicine and Rehabilitation, Syaiful Anwar Public Hospital, Malang, Indonesia
[3]Faculty of Medicine, Brawijaya University, Malang, Indonesia

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ABSTRACT

The older adults are a vulnerable group facing physical, social, and economic health challenges that impact their quality of life. Information on the quality of life of the older adults in rural Indonesia is still limited, so this study aims to identify predictors of quality of life in the older adults in the working area of the Dusun Tengah Community Health Center, Lubuk Sandi District, Seluma Regency, Bengkulu Province, Indonesia. This quantitative cross-sectional study involved 60 elderly individuals who met the inclusion criteria. The research instruments included quality of life with WHOQOL-BREF, activities of daily living with the Barthel Index, ambulation with CAS, mobility with the timed up and go (TUG) Test, and lower limb muscle strength with the 30-second STS Test. The results showed that age, employment status, income, walking ability, mobility, lower limb muscle strength, and activities of daily living were significantly associated with quality of life ($p < 0.05$). In contrast, gender, education level, and social support were not significantly associated with quality of life. Multivariate analysis identified walking ability (OR = 13.65; 95% CI: 1.03–180.61) and income (OR = 5.81; 95% CI: 1.02–33.07) as the most dominant predictors of quality of life in the older adults. These findings provide important implications that interventions to improve the quality of life in older adults in primary health care need to prioritize programs to improve ambulation, prevent physical function decline, and strengthen the economic aspects of older adults, especially in rural areas.

Corresponding Author:

Pagela Pascarella Renta
Dusun Tengah Community Health Center
Seluma Regency, Bengkulu, Indonesia
Email: pagela06@gmail.com

1. INTRODUCTION

Non-communicable diseases and the aging process are becoming increasingly important public health issues [1]. The World Health Organization (WHO) notes that the increasing proportion of the elderly population has a significant impact on health, economic, and social systems, especially in developing countries. Older adults are an age group that is vulnerable to declining physical, psychological, and social functions due to progressive degenerative processes [2]. This phenomenon also occurs in rural areas in Indonesia, where the older adults face limited access to health services, low levels of education, and less supportive socioeconomic conditions. These conditions have the potential to worsen health status and reduce the quality of life of older adults, especially for those living with chronic diseases [3].

Quality of life in older adults has been recognized as an essential indicator of multidimensional well-being encompassing physical, psychological, social, and environmental aspects [4], [5]. The WHO defines quality of life as an individual's perception of their position in life in accordance with their cultural context, values, goals, and life expectancies [6], [7]. Previous studies have shown that quality of life in older adults is influenced by various factors, including health status [8], [9], ability to perform activities of daily living (ADL) [10], [11] muscle strength [12]-[14] mobility [12], [15] and risk of falls [9], [16]. Instruments such as the Barthel Index have been widely used to assess functional independence, while the timed up and go (TUG) and 30-second sit-to-stand (30s STS) are used to evaluate lower extremity mobility and muscle strength. Furthermore, the community ambulation scale (CAS) is an essential indicator of older adults' ability to actively participate in social settings, which is closely related to their quality of life.

Although numerous studies have examined factors associated with quality of life in older adults, most have focused on urban populations or advanced healthcare facilities. Research on primary healthcare in rural areas, particularly on integrating functional ability, muscle strength, mobility, and community ambulation, remains limited. Furthermore, empirical studies have not specifically identified which functional predictors most significantly influence quality of life in older adults with chronic diseases in resource-limited settings. This gap makes it difficult for primary healthcare providers to design targeted, context-specific interventions.

To address this gap, this study conducted a cross-sectional study of older adults with chronic diseases in rural Indonesia. This study analyzed the relationship between daily living ability (Barthel Index), lower limb muscle strength (30s STS), mobility TUG, and CAS on quality of life for older adults, as measured using the WHOQOL-BREF. With this comprehensive approach, the study is expected to provide a more comprehensive picture of the functional factors contributing to quality of life for older adults at the primary healthcare level.

We believe these findings have important implications for the development of policies and practices for elderly health services, particularly in rural areas. The results can inform the planning of promotive and preventive interventions in community health centers, in line with the Healthy Indonesia through a Family Approach program. Furthermore, the resulting empirical evidence can be used to improve the quality of community-based geriatric services, strengthen the role of families in elderly care, and optimize strategies to improve the quality of life.

2. METHOD

2.1. Design

We conducted a cross-sectional study, where all study variables were measured at one data collection point [17], to describe the relationship between functional conditions and quality of life in older adults with chronic diseases.

2.2. Background

We conducted a study in the working area of Dusun Tengah Community Health Center, Lubuk Sandi District, Seluma Regency, Bengkulu Province, Indonesia, which is one of the areas with a significant number of older adults suffering from chronic diseases, as shown in Figure 1.

2.3. Participants

The study participants were 60 older adults selected using a purposive sampling technique [18]. We used purposive sampling to ensure the inclusion of older adults with chronic diseases, domiciled in the Dusun Tengah Community Health Center working area, and able to communicate well. Meanwhile, older adults with severe cognitive impairment or dementia, acute conditions, or experiencing severe medical complications at the time of data collection, and older adults who were physically unable to complete the entire series of measurements were excluded.

2.4. Instruments

The instruments we used were the WHOQOL-BREF to measure quality of life in older adults [19], the Barthel ndex to assess the ability of daily living activities [20], the CAS to determine the level of ambulation [21], the TUG Test to measure mobility [22], and the 30-second Sit-to-Stand Test (30s STS) to assess lower extremity muscle strength [23].

A validation study of the WHOQOL-BREF in Indonesia reported good construct validity and Cronbach's alpha reliability of approximately 0,75 for the four WHOQOL-BREF domains (physical, psychological, social, and environmental) [24], [25]. The Barthel Index has been used and tested in elderly patients in health care facilities and post-stroke patients with an average kappa of ≈ 0.67 and evidence of construct validity [20], [26]. A study in Indonesia reported that the TUG is a valid and reliable tool for

assessing mobility and fall risk in older adults [27]. International literature shows a high test-retest CC for the 30s-STS (>0.90) [28]. Studies in Indonesia have reported that the modified 30s-STS is safe and feasible in certain patients and recommend assessing its reliability when applied to rural elderly populations [29]. The validity and reliability of the CAS scale in Indonesia have been reported in a peer-reviewed publication using a sample of elderly surgical patients [30]. In addition, we used a separate questionnaire to collect demographic data, economic status (based on monthly income), and social support, measured by the number of family members living in the same household.

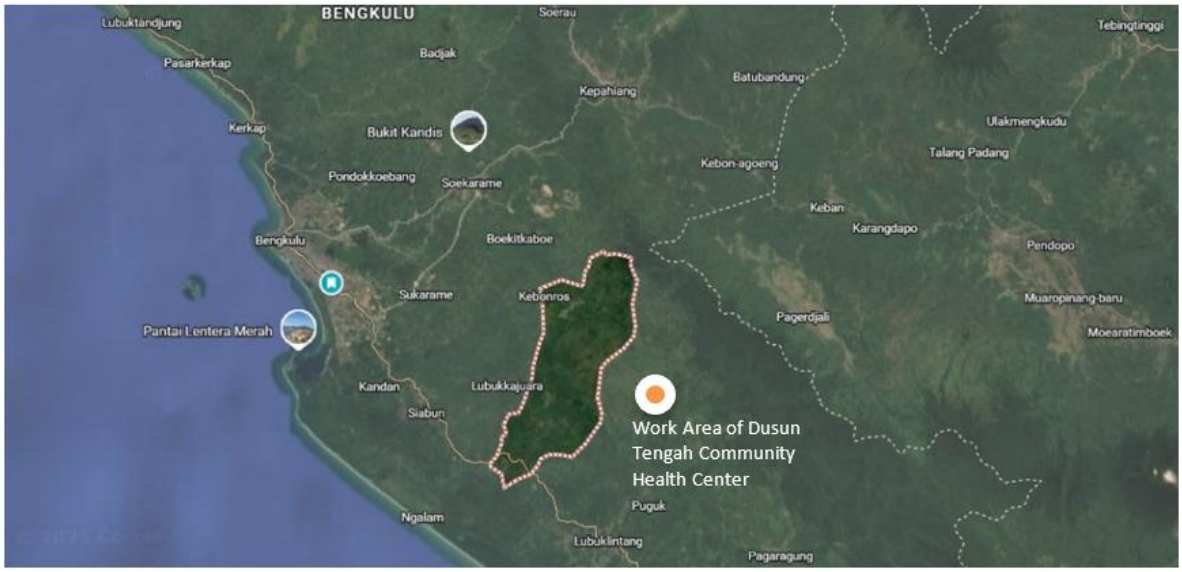

Figure 1. Research area

2.5. Procedure

We collected data through questionnaires and functional measurements. All participants were informed of the study's purpose and procedures before data collection. Chronic disease diagnoses in the older adults were obtained through a review of medical records available at the Community Health Center and then verified directly in the field through vital signs examinations and interviews with the older adults and/or their family members.

2.6. Analysis

Data were analyzed using univariate methods to describe the frequency distributions of respondents' demographic characteristics and other independent variables. Bivariate analysis used the Chi-Square test to examine relationships between variables, while multivariate analysis used multiple logistic regression to identify the factors most influencing the quality of life of older adults. We used a multiple logistic regression model with the backward likelihood ratio (Backward LR) method [31]. All independent variables that met the criteria in the bivariate analysis were entered into the initial model, then eliminated gradually based on the Likelihood Ratio test until the final model was obtained that was most appropriate and statistically significant with a 95% confidence interval [14].

2.7. Ethics

This research was conducted in accordance with ethical principles of health research. All participants provided written informed consent before participating in the study. Respondents' identities were kept confidential, and the collected data were used solely for scientific purposes.

3. RESULTS AND DISCUSSION

3.1. Results

The stages of data processing and analysis conducted on 60 older adults' participants in this study are as shown in Table 1, which shows that the majority of older adults are women (73.3%), fall into the pre-older adults category (86.7%), have a primary school education (70%), and work as plantation farmers

(85%). Table 2 indicates that hypertension is the most prevalent chronic disease among older adults, affecting 50% of this population. This is followed by low back pain at 23.3%, osteoarthritis at 18.3%, and diabetes mellitus at 11.7%. These statistics highlight the significant prevalence of both metabolic and musculoskeletal diseases among older adults. Table 3 shows that more than half of the older adults have an ncome of more than one million rupiah per month (53.3%), social support between 4-6 people (65%), good ambulation (80%), good mobility (61.7%), lower leg muscle strength is starting to decline (66.7%), daily activities are starting to be disrupted (66.7%) and have a good quality of life (65%).

Table 1. Sociodemographic data

Characteristics		n	Percentage (%)
Gender	Male	16	26.7
	Female	44	73.3
Age	Pre-older adults (60-69 years)	38	63.3
	Older adults (70-79 years)	18	30
	Late-older adults (>80 years)	4	6.7
Level of education	No school	6	10
	Elementary school	42	70
	Junior high school	11	18.3
	Senior high school	1	1.7
Occupation	Not working	9	15
	Working	51	85
	Total	60	100

Table 2. Chronic disease diagnosis

Diagnosis	n = 60	Percentage (%)
Hypertension	30	50
Low back pain	14	23.3
Osteoarthritis	11	18.3
Diabetes mellitus	7	11.7
Bronchial asthma	2	3.3
Hypertensive heart diseases	2	3.3
Arthralgia	1	1.7
Fibromyalgia	1	1.7
Hyperuricemia	1	1.7
Chronic obstructive pulmonary disease	1	1.7
Frozen shoulder	1	1.7
Stroke	1	1.7

Table 3. Income, social support, ambulation, mobilization, lower limb muscle strength, daily activities, and quality of life of rural older adults

Variables		n = 60	Percentage (%)
Income	< 1 million	28	46.7
	>= 1 million	32	53.3
Social support	1-3 people	21	35.0
	4-6 people	39	65.0
Ambulation	Limited	12	20.0
	Good	48	80.0
Mobility	Impaired	23	38.3
	Good	37	61.7
Lower leg muscle strength	Decreased	40	66.7
	Normal	20	33.3
Daily activities	Dependence	40	66.7
	Independence	20	33.3
Quality of life	Poor	21	35.0
	Good	39	65.0

Table 4 shows that gender (p = 0.807), education level (p = 0.165), and social support (p = 0.780) do not correlate with quality of life in older adults. Meanwhile, age (p = 0.002), occupation (p = 0.000), income (p = 0.023), ambulation (p = 0.000), mobility (p = 0.000), lower limb muscle strength (p = 0.000), and daily activities (p = 0.000) are positively and significantly correlated with quality of life in older adults.

Table 5 shows that across the four testing stages, several variables have been eliminated, resulting in the final model (step 4) that is most appropriate and statistically significant, with a 95% confidence interval. The most influential factors in the quality of life of older adults are ambulation and income. Ambulation with

a p-value of 0.047 and OR = 13.649, meaning that older adults with good ambulation (elderly able to walk independently and actively in the community environment) have a 13.649 times chance of having a good quality of life. Meanwhile, employment has a p-value of 0.048 and an OR of 13.649, meaning that older adult individuals with an income of more than one million per month have a 5,805 times greater chance of having a good quality of life.

Table 4. The relationship between gender, age, education, occupation, income, social support, ambulation, mobilization, lower limb muscle strength, and daily activities with the quality of life of older adults in rural areas

Variables		Quality of life				Total		p-value
		Poor		Good				
		n	%	n	%	n	%	
Gender	Male	6	37.5	10	62.5	16	100	0.807
	Female	15	34.1	29	65.9	44	100	
Age	Pre-older adults	7	18.4	31	81.6	38	100	0.002
	Older adults	12	66.7	6	33.3	18	100	
	Late-older adults	2	50	2	50	4	100	
Education	No schooling	4	66.7	2	33.3	6	100	0.165
	Elementary school	13	31	29	69	42	100	
	Middle school	3	27.3	8	72.7	11	100	
	High school	1	100	0	0.0	1	100	
Occupation	Not working	9	100	0	0.0	9	100	0.000
	Working	12	23.5	39	76.5	51	100	
Income	< 1 million	14	50	14	50	28	100	0.023
	>= 1 million	7	21.9	25	78.1	32	100	
Social support	1-3 people	8	38.1	13	61.9	21	100	0.780
	4-6 people	13	33.3	26	66.7	39	100	
Ambulation	Limited	11	91.7	1	8.3	12	100	0.000
	Good	10	20.8	38	79.2	48	100	
Mobility	Impaired	16	69.6	7	30.4	23	100	0.000
	Good	5	13.5	32	86.5	37	100	
Lower leg muscle strength	Decreased	20	50	20	50	40	100	0.000
	Normal	1	5	19	95	20	100	
Daily activities	Dependence	11	84.6	2	15.4	13	100	0.000
	Independence	10	21.3	37	78.7	47	100	
Total		21	35	39	65	60	100	

Note: *Sig*. or p-value = *p < 0.05

Table 5. The most dominant factors influencing the quality of life of the elderly in rural areas

Factors							95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age	-0.159	0.773	0.042	1	0.837	0.853	0.187	3.881
	Occupation	21.272	11669.540	0.000	1	0.999	1.731E9	0.000	.
	Income	1.444	0.947	2.325	1	0.127	4.238	0.662	27.122
	Ambulation	2.270	1.438	2.492	1	0.114	9.675	0.578	161.917
	Mobility	0.850	1.095	0.602	1	0.438	2.340	0.274	20.011
	Muscle strength	1.366	1.224	1.245	1	0.265	3.920	0.356	43.209
	Activities of daily living	0,324	1,353	0,057	1	0.811	1.383	0.097	19.632
	Constant	-51.136	23339.081	0.000	1	0.998	0.000		
Step 2[a]	Occupation	21.275	11761.003	0.000	1	0.999	1.736E9	0.000	.
	Income	1.448	0.944	2.353	1	0.125	4.253	0.669	27.045
	Ambulation	2.241	1.429	2.461	1	0.117	9.407	0.572	154.797
	Mobility	0.887	1.072	0.684	1	0.408	2.428	0.297	19.850
	Muscle strength	1.355	1.220	1.233	1	0.267	3.875	0.355	42.335
	Activities of daily living	0.401	1.294	0.096	1	0.757	1.493	0.118	18.858
	Constant	-51.500	23522.007	0.000	1	0.998	.000		
Step 3[a]	Occupation	21.324	11685.924	0.000	1	0.999	1.824E9	0.000	.
	Income	1.519	0.914	2.763	1	0.096	4.570	0.762	27.420
	Ambulation	2.357	1.385	2.898	1	0.089	10.563	0.700	159.402
	Mobility	1.063	0.903	1.385	1	0.239	2.894	0.493	16.981
	Muscle strength	1.363	1.220	1.248	1	0.264	3.906	0.358	42.639
	Constant	-51.482	23371.849	0.000	1	0.998	0.000		
Step 4[a]	Occupation	21.197	11914.019	0.000	1	0.999	1.606E9	0.000	.
	Income	1.759	0.888	3.925	1	0.048	5.805	1.019	33.070
	Ambulation	2.614	1.318	3.934	1	0.047	13.649	1.031	180.611
	Muscle strength	1.834	1.146	2.559	1	0.110	6.258	0.662	59.200
	Constant	-50.913	23828.039	0.000	1	0.998	0.000		

Note: *Sig*. or p-value = *p < 0.05

3.2. Discussion

The results showed that gender, education level, and social support were not significantly associated with quality of life in older adults. This finding indicates that, among rural elderly with chronic diseases, certain sociodemographic factors are less important determinants of quality of life than functional and economic factors. The lack of an effect of gender on quality of life is believed to be due to the homogeneity of living conditions for older adults in rural areas. Both older adults and women generally face similar challenges, such as physical limitations due to aging, dependence on light agricultural activities, and equal access to healthcare services. Under these conditions, biological differences between men and women become less dominant in shaping perceptions of quality of life. This finding aligns with a study in Korea that reported that gender did not significantly influence quality of life among older adults, even after controlling for health factors and physical function, as in [32]. Another study of rural elderly in Indonesia also showed that the quality of life is more determined by functional ability than by gender differences [33].

Education level was not significantly associated with quality of life among older adults. Most respondents had primary education or no schooling, resulting in relatively limited educational variation. This situation indicates that educational level is not a strong enough indicator of individual perceptions of quality of life. Furthermore, in later life, the benefits of formal education gained in youth tend to diminish, particularly when older adults face physical limitations and chronic illnesses. This finding is consistent with several studies showing that education is not always a predictor of quality of life in older adults, particularly in rural areas, where life experience [34], [35], adaptation to the environment, and acceptance of health conditions play a more significant role than formal educational background.

The results of this study also indicate that social support, as measured by the number of family members living in the same household, did not significantly impact quality of life in older adults. This finding is likely due to limitations in the social support indicators used. The number of family members living together does not always reflect the quality of emotional, instrumental, or psychosocial support received by older adults. In rural contexts, family presence is often normative but may not be accompanied by interactions that support older adults' independence and well-being. Several previous studies have shown that the quality of social support (such as attention, empathy, and active involvement) has a greater influence on quality of life than the quantity of family members [35]-[37]. Therefore, the significance of social support in this study is likely due to a measurement approach that is more structural than functional.

The results showed that age, occupation, income, ambulation, mobility, lower-limb muscle strength, and daily activities were significantly associated with quality of life among older adults. These findings confirm that quality of life in older adults is primarily influenced by factors related to physical function, independence, and economic conditions. However, when all these variables were analyzed simultaneously using multiple logistic regression, only ambulation and income remained significant in the final model, indicating they were the most dominant predictors.

Age was significantly associated with quality of life, with older adults tending to have a lower quality of life. These findings support several studies showing a significant association between age and quality of life in older adults [34], [38]. This is consistent with the aging process, which is characterized by a progressive decline in physical function, an increase in chronic diseases, and limitations in mobility and social participation. However, in multivariate analysis, the effect of age became significant after controlling for functional variables. These findings indicate that age is not a direct determinant but rather influences quality of life directly through decreased ambulation, mobility, and independence in daily activities. In other words, it's not chronological age that determines quality of life, but how age impacts bodily functions.

Employment and income variables also showed significant associations with quality of life in older adults. Older adults who were still employed and had higher incomes tended to report a better quality of life. In multivariate analysis, income remained significant, while employment status was eliminated from the model. This suggests that actual economic factors (income) play a greater role than employment status itself. Adequate income enables older adults to meet basic needs, access healthcare services, purchase medications, and maintain independence, ultimately positively impacting quality of life. This finding aligns with the literature, indicating that financial security is an essential determinant of quality of life in older adults [36], [39].

Factors such as ambulation, mobility, lower limb muscle strength, and activities of daily living demonstrated significant associations with quality of life in bivariate analysis. Older adults with good ambulation, mobility, normal muscle strength, and independence in activities of daily living consistently reported a better quality of life. These findings reinforce the concept that physical function is central to quality of life in older adults, as it directly influences the ability to interact with the environment, maintain social roles, and maintain self-esteem.

Ambulation emerged as the most dominant predictor of quality of life in older adults. Elderly individuals with good ambulation were more than 13 times more likely to have a good quality of life than

those with limited ambulation. This suggests that the ability to walk and engage in community activities is a key factor in integrating various aspects of physical function. Good ambulation reflects not only walking ability but also balance, muscle strength, coordination, and the confidence to participate in social activities. When ambulation was included in the multivariate model, the influence of other variables, such as mobility, muscle strength, and daily activities, decreased or became insignificant, suggesting overlapping effects among these functional variables.

Thus, the results of this study confirm that ambulation is the most comprehensive functional indicator, reflecting the overall physical condition of older adults. Meanwhile, income serves as an external buffer, enabling older adults to maintain this function through access to healthcare services and support for daily living needs. Quality of life is ultimately determined by older adults' ability to remain active in the community and to have adequate economic support. These findings have important implications: interventions to improve the quality of life of older adults in primary health care should prioritize programs to increase ambulation, prevent decline in physical function, and strengthen economic support for older adults, especially in rural areas.

Community health centers can develop safe and accessible structured walking training programs, such as balance and coordination-based elderly gymnastics, gradual walking around the community or village, and light stair-climbing exercises. These programs can be integrated into routine integrated health post activities for the elderly, thus minimizing the need for significant additional resources. Preventing physical function decline requires ongoing efforts through early detection and preventive interventions. Community health centers can implement routine functional screening using the Barthel Index, TUG, and 30-second Sit-to-Stand during regular checkups for older adults. These screening results inform follow-up plans, including lower-limb muscle-strengthening exercises, education on safe physical activity at home, and fall risk prevention. Family education is also crucial to encourage older adults to remain independent in daily activities, rather than limiting them due to excessive anxiety.

The significant role of income in quality of life underscores the need to strengthen economic aspects of older adults' lives as part of comprehensive health interventions. Community health centers can act as cross-sector liaisons, collaborating with village governments, social services, and social protection programs to ensure elderly access to social assistance, health insurance, or simple economic empowerment programs. For seniors who are still productive, light economic activities such as small-scale farming, home crafts, or community-based businesses can be facilitated through senior groups or village cadres. This approach not only increases income but also strengthens seniors' sense of empowerment and self-esteem, positively impacting their quality of life.

This study is limited by its relatively small sample size and purposive sampling within a single rural community health center operating area. Therefore, the findings of this study are more representative of the conditions of rural elderly in the study area. Furthermore, the measurement of social support was based solely on the number of family members living in the same household, thereby failing to fully capture the dimensions of social support quality, such as emotional, instrumental, and informational support. This limitation may explain the insignificant effect of social support on quality of life among elderly individuals in the study.

Although this study used internationally validated instruments, some of which have been adapted to the Indonesian context, some functional instruments, such as the 30-second Sit-to-Stand and the Community Ambulation Scale, still have limited evidence of validity and reliability specific to the Indonesian rural elderly population. Furthermore, variations in assessor skills, although minimized through training, can still introduce measurement bias. Finally, other factors that could influence the quality of life of older adults, such as mild cognitive impairment, psychological conditions (depression or anxiety), pain levels, and the quality of the physical environment, were not evaluated in this study and may have been confounding variables not controlled for.

4. CONCLUSION

The results of this study concluded that functional and economic factors primarily influence the quality of life of older adults in rural areas. The analysis showed that age, occupation, income, ambulation, mobility, lower limb muscle strength, and ability to perform daily activities were significantly associated with quality of life in older adults in bivariate analysis. However, after controlling for these factors simultaneously in a multiple logistic regression, only ambulation and income emerged as the strongest predictors of quality of life in older adults.

These findings confirm that older adults' ability to walk independently and remain active in the community is a key factor in maintaining a high quality of life, as it reflects the integration of physical function, independence, and social participation. Furthermore, adequate income supports the fulfillment of

basic needs and access to healthcare, thereby strengthening the overall well-being of older adults. Conversely, sociodemographic factors such as gender, education level, and social support did not show a significant association with quality of life in older adults in rural settings, indicating that these factors are less important than actual functional and economic conditions.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Pagela Pascarella Renta	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Rahmad		✓		✓	✓			✓		✓	✓	✓	✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest regarding the publication of this article.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

The research related to human use has been compiled with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsink Declaration and has been approved by the ethics committee entitled Moroccan Association for Research and Ethics.

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, [PPR], upon reasonable request. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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BIOGRAPHIES OF AUTHORS

Pagela Pascarella Renta is a general practitioner serving in both a community health center and a primary clinic in the province of Bengkulu, Indonesia. With a strong commitment to improving community health, she brings hands-on clinical experience and a deep understanding of public health challenges in rural and semi-urban settings. Her academic and professional interests center on exploring the environmental determinants of health and wellbeing n later life. She is passionate about understanding how physical, social, and ecological environments shape the quality of life of older adults, and she aims to contribute to evidence-based interventions that support healthier aging within the community. She can be contacted at email: pagela06@gmail.com.

Rahmad is a specialist in physical medicine and rehabilitation, serving at the Department of Physical Medicine and Rehabilitation, Syaiful Anwar Public Hospital, East Java Province, Indonesia. He's also a lecturer at the Medical Faculty of Brawijaya University, Indonesia, where he contributes to clinical practice, teaching, and academic development in Rehabilitation Medicine. He can be contacted at email: rahmadanwar1983@ub.ac.id.