

ORIGINAL RESEARCH

Level of Health Literacy with Multiborbidity; Cross-Sectional Study in the Elderly

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ABSTRACT

Introduction: Older adults are particularly vulnerable to multimorbidity, underscoring the importance of adequate health literacy for maintaining health and managing chronic diseases. Health-related competencies range from functional literacy, which involves basic skills for handling health information, to communicative and critical literacy, which enable individuals to interact with, interpret, critically assess, and apply information in more complex health contexts. Inadequate health literacy may reduce the capacity to manage chronic conditions and potentially contribute to the development or progression of multimorbidity. This study assessed the relationships between functional, communicative, and critical health literacy and multimorbidity among older adults.

Methods: A quantitative cross-sectional study was conducted among 44 older adults using total (exhaustive) sampling. Data were collected in June 2023 through structured questionnaire-based interviews. Fisher's exact tests were used to assess associations.

Results: Functional health literacy ($p = 0.018$), communicative health literacy ($p = 0.010$), and critical health literacy ($p = 0.007$) were significantly associated with multimorbidity. Health information access ($p = 0.001$) and family support ($p = 0.023$) were also significantly associated with multimorbidity, whereas education, sex, and income were not.

Conclusion: Multimorbidity among older adults participating in the ProLanis program in Besu Village was significantly associated with functional, communicative, and critical health literacy. The findings suggest that chronic disease management may benefit from efforts to strengthen health literacy and access to reliable health information. However, causality cannot be established from this cross-sectional study and requires confirmation in longitudinal and intervention research.

Keywords: Health Literacy; Multimorbidity; Older Adults; Functional Literacy; Communicative Literacy; Critical Literacy

INTRODUCTION

Indonesia is undergoing demographic and epidemiologic transitions that are reshaping the national disease burden. Despite the growing burden of noncommunicable diseases, infectious diseases remain a major health concern because of persistently high morbidity and mortality. Life expectancy is increasing, contributing to growth in the older population alongside a still-large younger population. Broader societal changes, including digitalization, psychosocial stressors, air pollution, unhealthy dietary patterns, physical inactivity, and other adverse health behaviors, may also contribute to the epidemiologic transition (1).

The burden of noncommunicable diseases in Indonesia remains substantial. According to WHO, these diseases account for 73% of national mortality, with more than 1,400,000 deaths annually. Cardiovascular diseases account for 25.6% of deaths, cancer for 8.8%, chronic respiratory diseases for 4.4%, diabetes mellitus for 4.4%, and other noncommunicable diseases for 29.8% (2). This burden is also reflected in the Ministry of Health's Basic Health Research (*Riskesdas*), which documented changes in disease prevalence between 2013 and 2018. Among people aged ≥ 15 years, stroke prevalence rose from 7‰ to 10.9‰, cancer from 1.4‰ to 1.8‰, and chronic kidney disease from 2‰ to 3.8‰, whereas asthma declined from 4.5% to 2.4%. For diabetes mellitus, prevalence based on the Perkeni 2011 diagnostic criteria increased from 6.9% in 2013 to 8.5% in 2018; using the Perkeni 2015 criteria, the 2018 prevalence was 10.9%. Behavioral and metabolic risk factors also changed. Smoking among individuals aged ≤ 18 years increased from 7.2% to 9.1%; hypertension among those aged > 18 years rose from 25.8% to 34.1%; and obesity in the same age category increased from 14.8% to 21.8%. Low fruit and vegetable consumption among individuals aged ≥ 5 years increased from 93.5% to 95.5%, while insufficient physical activity among those aged ≥ 10 years increased from 26.1% to 33.5% (3).

Noncommunicable diseases (NCDs) are also a leading cause of mortality in Indonesia. Public financing accounted for 57% of Indonesia's total health expenditure, with the *Jaminan Kesehatan Nasional (JKN)*, administered by BPJS Kesehatan, serving as the backbone of the country's health financing system (4).

Among the ten most common noncommunicable diseases recorded at the Morosi Community Health Center, hypertension ranked third in 2020 with 415 cases and fifth in 2021 with 265 cases (5).

As the incidence of noncommunicable diseases (NCDs) continues to increase, strengthening health literacy has become increasingly relevant to disease prevention. Beyond understanding health information, health literacy includes the ability to use such information to make appropriate health-related decisions and to select preventive health services (6). In Indonesia, NCDs accounted for 73% of deaths in 2018, according to the World Health Organization (WHO). Cardiovascular diseases accounted for 35% of total mortality, followed by cancer at 12%, while maternal and child mortality, infectious diseases, and nutritional problems collectively accounted for 21% (7). Lower health literacy is consistently associated with older age, lower educational attainment, and lower socioeconomic status. These factors may limit individuals' ability to obtain, understand, and use health information effectively (8).

Current knowledge does not adequately explain how the different dimensions of health literacy are related to multimorbidity among Indonesian older adults, particularly those involved in community-based chronic disease management through Prolanis. Although previous research has linked health literacy with chronic disease outcomes, much of the evidence has treated health literacy as a single construct or focused on individual diseases. Consequently, the relationships of functional, communicative, and critical health literacy with multimorbidity in primary health care remain insufficiently understood. This study therefore assessed functional, communicative, and critical health literacy, health information access, and family support in relation to multimorbidity among older adult Prolanis participants in Besu Village, Morosi District, Konawe Regency. Evaluating the FCCHL domains separately extends local evidence on multidimensional health literacy and multimorbidity in primary care. Nevertheless, causal interpretation and external validity remain limited by the cross-sectional design and single-site setting (9).

METHODS

Study Design and Setting

This cross-sectional analytic observational study examined whether health literacy was associated with multimorbidity among older adults. The study was conducted in Besu Village, Morosi District, Konawe Regency, Indonesia, in June 2023.

Population and Sample

The target population comprised older adults enrolled in the Chronic Disease Management Program (Prolanis) provided by Morosi Primary Health Center (*Puskesmas* Morosi), Morosi District, Konawe Regency, Southeast Sulawesi, Indonesia.

The program registry identified 44 eligible individuals. Because the target population was small, total (exhaustive) sampling was used to include all individuals who met the eligibility criteria.

Inclusion Criteria

Participants were included if they:

- Were registered as Prolanis participants;
- Were aged ≥ 60 years;
- Had at least one diagnosed chronic disease; and
- Were willing to participate and provided informed consent.

Exclusion Criteria

Participants were excluded if they:
Had cognitive impairment or communication difficulties;
Were absent during data collection; or
Provided incomplete responses.

Variables and Measurements

Outcome Variable

Individuals were considered to have multimorbidity when they presented with two or more chronic diseases. Based on this definition, the variable was grouped into the following categories:

Multimorbidity (≥ 2 chronic diseases).

Non-multimorbidity (1 chronic disease).

Independent Variables

Health Literacy

Health literacy was assessed across three domains:

Functional health literacy.

Communicative health literacy.

Critical health literacy.

The Functional, Communicative, and Critical Health Literacy (FCCHL) instrument, originally developed by Ishikawa et al. (2008), contains 14 items across three domains: five functional, five communicative, and four critical health literacy items ([10](#)).

This study used an Indonesian-translated version previously used by Patandung et al. (2018) ([11](#)).

Scores were categorized using median cutoff points:

Functional health literacy: adequate (>15) and low (≤ 15), assessed using five questionnaire items.

Communicative health literacy: adequate (>15) and low (≤ 15), assessed using five questionnaire items.

Critical health literacy: adequate (>12) and low (≤ 12), assessed using four questionnaire items.

Each item was rated on a four-point Likert scale ranging from 1 (often) to 4 (never).

Because no validated cutoff points are available for the FCCHL domains, the observed sample medians were used to dichotomize scores (>15 for functional and communicative health literacy and >12 for critical health literacy), with categories labeled as low and adequate.

Research Instruments

Data were collected using a structured, interviewer-administered questionnaire consisting of:

Sociodemographic characteristics;

Health literacy domains; and

Determinants of health literacy.

Multimorbidity data were obtained through self-reporting and verified using medical records from the health center.

Validity and Reliability

Content validity was assessed by public health specialists.

Construct validity was evaluated using item-total correlations.

Internal consistency was assessed using Cronbach's alpha, with coefficients of 0.947 for the functional health literacy domain, 0.857 for the communicative health literacy domain, 0.922 for the critical health literacy domain, and 0.738 for the family support questionnaire. Because all values exceeded 0.70, the measures were considered to have acceptable to excellent internal consistency.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics, version 24.

Descriptive Analysis

Study variables were summarized using frequencies and percentages.

Bivariate Analysis

Data are presented as n (%) using row percentages. Associations between the independent variables and multimorbidity were assessed using Fisher's exact test, with $p < 0.05$ considered statistically significant.

Ethical Considerations

This study was approved by the Research Ethics Committee of Universitas Mandala Waluya (Approval No. 031/KEP/UMW/VI/2023; approved on 5 June 2023). Written informed consent was obtained from all participants before data collection. Participants were informed about the study objectives, voluntary participation, confidentiality, and their right to withdraw at any time without consequences.

RESULTS

A total of 44 participants were included. Data were collected from 8 to 30 June 2023. Participant characteristics are presented in Table 1.

Table 1. Characteristics of Respondents

Variable	n (44)	%
Age (years)		
60–62	17	38.6
63–65	12	27.3
66–68	6	13.6
69–71	2	4.5
72–74	4	9.1
75–77	2	4.5
>78	1	2.3
Sex		
Male	19	43.2
Female	25	56.8
Educational Level		
No formal education	3	6.8
Elementary school	18	40.9
Junior high school	7	15.9
Senior high school	13	29.5
College/University	3	6.8
Occupation		
Civil servant	1	2.3
Self-employed	16	36.4
Farmer	2	4.5
Housewife	17	38.6
Laborer	2	4.5
Others	6	13.6
Monthly Income		
≥ Regional Minimum Wage (IDR 2,854,014)	3	6.8
< Regional Minimum Wage (IDR 2,854,014)	41	93.2
Multimorbidity		
Yes	40	90.9
No	4	9.1
Health Information Access		
Yes	40	90.9
No	4	9.1
Family Support		
Poor	26	59.1
Adequate	18	40.9
Functional Health Literacy		
Low	27	61.4
Adequate	17	38.6
Communicative Health Literacy		
Low	29	65.9
Adequate	15	34.1
Critical Health Literacy		
Low	30	68.2
Adequate	14	31.8

Among the 44 older adults enrolled in the study, 38.6% were aged 60–62 years, making this the most represented age category, while 27.3% were aged 63–65 years. Most respondents were female (56.8%), had completed elementary school (40.9%), and were housewives (38.6%). The majority had a monthly income below the regional minimum wage (93.2%) and experienced multimorbidity (90.9%). Most respondents had received health information regarding diseases and their prevention (90.9%), while 59.1% reported inadequate family support. Low levels of health literacy were predominant across all three domains, affecting 61.4% of respondents for functional health literacy, 65.9% for communicative health literacy, and 68.2% for critical health literacy.

Associations Between Respondent Characteristics and Multimorbidity

Table 2. Associations Between Respondent Characteristics and Multimorbidity

Variable	Multimorbidity				Total	%	p-value
	Multimorbidity		Non-multimorbidity				
	n	%	n	%			
Education							
Low	24	85.7	4	14.3	28	100.0	0.280
High	16	100.0	0	0	16	100.0	
Sex							
Male	16	84.2	3	15.8	19	100.0	0.300
Female	24	96.0	1	4.0	25	100.0	
Income							
≥ Regional Minimum Wage (IDR 2,854,014)	2	66.7	1	33.3	3	100.0	0.254
< Regional Minimum Wage (IDR 2,854,014)	38	92.7	3	7.3	41	100.0	
Health Information Access							
Yes	40	100.0	0	0	40	100.0	0.001
No	0	0	4	100.0	4	100.0	
Family Support							
Poor	26	100	0	0	26	100.0	0.023
Adequate	14	77.8	4	22.2	18	100.0	

Source: Primary data, 2023

In Fisher's exact tests, educational level ($p = 0.280$), sex ($p = 0.300$), and income ($p = 0.254$) were not significantly associated with multimorbidity. In contrast, health information access ($p = 0.001$) and family support ($p = 0.023$) were significantly associated with multimorbidity. Participants with access to health information and those with adequate family support had different distributions of multimorbidity than their comparison groups.

Associations Between Health Literacy Levels and Multimorbidity

Table 3. Associations Between Health Literacy Levels and Multimorbidity

Variable	Multimorbidity				Total	%	p-value
	Multimorbidity		Non-multimorbidity				
	n (40)	%	n (4)	%			
Functional health literacy							
Low	27	100.0	0	0	27	100.0	0.018
Adequate	13	76.5	4	23.5	17	100.0	
Communicative health literacy							
Low	29	100	0	0	29	100.0	0.010
Adequate	11	73.3	4	26.7	15	100.0	
Critical health literacy							
Low	30	100	0	0	30	100.0	0.007
Adequate	10	71.4	4	28.6	14	100.0	

Source: Primary data, 2023

Functional health literacy ($p = 0.018$), communicative health literacy ($p = 0.010$), and critical health literacy ($p = 0.007$) were each significantly associated with multimorbidity. Multimorbidity was more common among participants with low health literacy than among those with adequate health literacy.

An important limitation of this study is the highly imbalanced outcome distribution: 40 of 44 participants (90.9%) had multimorbidity, whereas only four participants did not. In addition, several health literacy comparisons contained zero cells. Although Fisher's exact test is appropriate for assessing associations in sparse 2×2 tables, statistical significance should not be interpreted as evidence of a stable or precisely estimated effect. Reliable estimation of effect size and precision was constrained by the small non-multimorbidity group and the presence of zero-frequency cells. These findings should therefore be considered exploratory and require confirmation in larger studies with more balanced outcome distributions.

DISCUSSION

Significant associations with multimorbidity were identified for functional health literacy, communicative health literacy, critical health literacy, health information access, and family support among older adults. These findings indicate that multimorbidity in this sample was related not only to health literacy but also to access to health information and family support. Adequate health literacy may help individuals understand treatment instructions, adhere to medication regimens, recognize symptoms, and participate actively in disease management, thereby supporting self-management of chronic conditions (12-15). Previous

studies also suggest that older adults with limited health literacy may experience greater difficulty with self-management, greater treatment burden, and more multimorbidity.

Functional health literacy ($p = 0.018$), communicative health literacy ($p = 0.010$), and critical health literacy ($p = 0.007$) were significantly associated with multimorbidity; however, the cross-sectional design limits interpretation to associations and does not support causal conclusions. Higher health literacy and better access to health information may facilitate disease self-management and appropriate health care use (16), but reverse directionality is also possible: older adults with multimorbidity may have more frequent health care contact, clinical visits, and disease-specific counseling, thereby increasing exposure to health information. The present study therefore cannot determine whether lower health literacy contributes to multimorbidity, whether multimorbidity increases exposure to health information and subsequently influences health literacy, or whether both pathways operate simultaneously.

The small sample size and sparse distribution of observations, including zero cells in some 2×2 tables, warrant cautious interpretation. Moreover, the p -values indicate statistical significance but do not directly measure effect size or demonstrate that one health literacy domain has a stronger association with multimorbidity than another. Accordingly, the findings for functional, communicative, and critical health literacy should not be used to rank these domains by apparent strength of association. Larger studies with appropriate effect-size measures are needed to clarify the magnitude and direction of these associations.

Friis et al. (2019) reported a progressive increase in treatment burden as the number of coexisting chronic conditions increased among people with cardiovascular disease (17). Difficulty interpreting health information was also associated with a higher perceived treatment burden. Similarly, patients with multimorbidity who have limited ability to understand health information may experience greater medication burden and poorer adherence to treatment recommendations (18). These findings emphasize the importance of ensuring that patients understand the purpose of prescribed treatments for effective chronic disease management and for reducing the burden associated with multimorbidity (19,20).

Family support was also significantly associated with multimorbidity. Family members may assist older adults with medication management, health care visits, dietary changes, emotional support, and monitoring of chronic disease symptoms (21–23). Such support may enhance treatment adherence, reduce psychological burden, and improve long-term disease management (24,25). Effective strategies for addressing multimorbidity may therefore require more than efforts to strengthen health literacy. The present findings also highlight the importance of family engagement and access to credible health information (26–28). Integrating these components into community-based health promotion and primary health care services may improve self-management capacity, reduce treatment burden, and support healthy aging among older adults living with multimorbidity (17,29,30).

CONCLUSION

Among older adults, multimorbidity was significantly associated with functional, communicative, and critical health literacy, health information access, and family support. These findings suggest that multimorbidity management strategies should consider health literacy, access to trustworthy health information, and family support. Because the study was cross-sectional, the findings represent statistical associations and should not be interpreted as evidence of causation.

DECLARATIONS

Author contributions: Conceptualization: Rahmawati. Data curation: Sri Mulyani. Formal analysis: Rahmawati. Funding acquisition: Fitri Yanti. Investigation: Rahmawati. Methodology: Fitri Yanti. Project administration: Sri Mulyani. Resources: Niken Kuswary. Software: Andi Ulfiana Fitri. Supervision: Nurul Syahriani Salahuddin. Validation: Rahmawati. Visualization: Andi Ulfiana Fitri. Writing—original draft: Niken Kuswary. Writing—review editing: Nurul Syahriani Salahuddin.

All authors have reviewed and approved the CRediT Author Contribution Statement and agree with their respective roles as described above. All authors have also reviewed and approved the final version of the manuscript for submission and publication.

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