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Validity and Reliability of a Questionnaire Assessing Elderly Knowledge of Non-Communicable Diseases: A Cross-Sectional Study

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Abstract

Introduction: Non-communicable diseases (NCDs) are the leading cause of morbidity and mortality among older adults. Adequate knowledge of NCDs is essential to encourage preventive behaviors and self-management. Accurate assessment requires a valid and reliable instrument. This study aimed to evaluate the validity and reliability of a questionnaire designed to measure elderly knowledge of NCDs.

Methods: A cross-sectional study was conducted using a quantitative approach. Fifty-five elderly participants were selected through purposive sampling. Instrument validity was assessed using Pearson's correlation, with significance set at $p < 0.05$. Reliability was evaluated using Cronbach's alpha, with coefficients greater than 0.6 considered acceptable.

Results: Seven closed-ended items were evaluated. All items demonstrated significant validity ($p < 0.05$). The internal consistency of the instrument, measured using Cronbach's alpha, was 0.692, indicating acceptable reliability.

Conclusion: The seven-item questionnaire assessing elderly knowledge of NCDs was found to be valid and reliable. It is suitable for use as a data collection tool in future studies on elderly health knowledge.

Keywords

Elderly, Non-communicable diseases, Knowledge assessment, Questionnaire, Validity, Reliability

Introduction

Non-communicable diseases (NCDs) are a significant global health concern and have become the leading cause of morbidity and mortality across all age groups, including the elderly.[1–2] NCDs account for approximately 75% of total global deaths unrelated to pandemics, with an estimated 43 million deaths recorded in 2021.[3] Of these, 18 million occurred in individuals under 70 years of age, with 82% of cases originating from low- and middle-income countries.[4–5]

Older adults represent one of the most vulnerable groups affected by the impact of NCDs, in terms of morbidity, disability, and mortality. Cardiovascular diseases are the leading contributors, responsible for 19 million deaths annually, followed by cancer (10 million), chronic respiratory diseases (4 million), and diabetes (over 2 million, including kidney complications associated with diabetes).[6–7] Collectively, these four disease categories account for approximately 80% of all NCD-related deaths.[8]

Several risk factors—such as tobacco use, unhealthy diets, physical inactivity, excessive alcohol consumption, and air pollution—exacerbate the burden of NCDs.[9] Early identification, screening, and effective disease management, along with palliative care, are essential components of comprehensive NCD control strategies.[10]

Beyond mortality, NCDs are also a major cause of preventable disability, especially among the elderly. Stroke, for instance, is a common form of NCD that significantly reduces quality of life due to resulting impairments.[11–12] The good news is that NCDs are largely preventable through enhanced individual knowledge and awareness of risk factors and the adoption of healthy lifestyles.[13–14]

Unfortunately, many older adults still lack sufficient knowledge about NCDs. A preliminary study conducted in March 2025 at a private hospital in Yogyakarta found that most stroke patients were unaware that stroke is classified as an NCD and did not understand its associated risk factors. This knowledge gap may hinder preventive efforts and self-management of NCDs. Moreover, undetected NCDs have wider economic implications, affecting national productivity and growth.[15]

With increasing life expectancy and declining birth rates, Indonesia is facing an aging population.[16] This demographic shift underscores the urgency of empowering older adults in managing their health through education and knowledge-based interventions. An accurate knowledge assessment tool is thus essential for informing targeted interventions and public health policy.

Existing instruments are not yet fully adapted to the local context or to the characteristics of the Indonesian elderly population. Therefore, it is necessary to develop and adapt questionnaires based on existing theories and previous studies, followed by rigorous testing for validity and reliability to ensure instrument quality.

This study aims to evaluate the validity and reliability of a newly developed questionnaire intended to measure elderly knowledge of non-communicable diseases. The questionnaire was adapted and modified from established instruments and theoretical frameworks relevant to NCDs.

Methods

This study employed a cross-sectional design with a descriptive quantitative approach. The research was conducted in Elderly Community X in Yogyakarta City from March to April 2025. The study population consisted of members of the elderly community, with a total of 55 participants selected through purposive sampling. Inclusion criteria included individuals aged ≥60 years, registered as community members, literate (able to read and write), and willing to participate. Respondents with severe cognitive impairments were excluded.

The instrument used was a closed-ended questionnaire with dichotomous response options ("yes" or "no"), comprising seven items related to knowledge of non-communicable diseases (NCDs). The questionnaire was developed based on relevant theories and prior research, and reviewed by two experts in NCDs and gerontology. Correct answers were scored as 1, while incorrect or "don't know" responses were scored as 0, resulting in a total score range of 0 to 7.

The measured variable was the level of knowledge about NCDs, defined as the respondent's ability to correctly answer questions related to the definition, causes, risk factors, and prevention of NCDs. The total knowledge score was treated as a numerical variable in the correlation analysis for item validity testing.

The minimum sample size was determined based on the standard ratio of seven respondents per item for validity testing, requiring at least 49 participants. To account for incomplete data, 55 respondents were recruited. Data were collected through direct distribution of the questionnaire to participants. To minimize information bias, the researcher explained each item clearly prior to completion. For participants with reading difficulties, assistance was provided without influencing their responses.

Item validity was assessed using Pearson's correlation between each item and the total score. An item was considered valid if the significance level (p) was less than 0.05. Questionnaire reliability was tested using Cronbach's alpha coefficient, with values ≥0.6 indicating acceptable reliability. Statistical analyses were performed using SPSS version 26. Incomplete data were excluded from the analysis.

Results

Out of the 60 older adults invited to participate in the study, 55 met the inclusion criteria and completed the questionnaire in full. No missing data were observed during analysis. The majority of participants were aged between 60 and 74 years (76%), female (65%), and had completed junior secondary education (58%).

This study involved 55 respondents and utilized seven closed-ended questions to assess their level of knowledge regarding non-communicable diseases (NCDs). To examine the validity of each item, Pearson's correlation analysis was conducted between the score of each item and the total score. The critical r-value (r-table) for n = 55 was 0.266. The results of the validity testing are presented in Table 1**.**

Table 1. Instrument Validity Test Results

Item Code	r-value	Sig.	Status
Q1	0.322	0.016	Valid
Q2	0.552	0.000	Valid
Q3	0.509	0.000	Valid
Q4	0.514	0.000	Valid
Q5	0.575	0.000	Valid
Q6	0.426	0.001	Valid
Q7	0.637	0.000	Valid

All items had r-values exceeding the critical threshold of 0.266 and significance values (p) below 0.05, indicating that each item was statistically valid. The reliability test for all items yielded a Cronbach's alpha coefficient of 0.692. Based on statistical interpretation, this value indicates that the instrument demonstrates acceptable reliability.
The Cronbach's alpha coefficient of 0.692 (95% CI: 0.61–0.77) suggests that the questionnaire is sufficiently reliable for use in future research.

A descriptive analysis was conducted to evaluate the proportion of respondents who answered each question correctly or incorrectly. These findings reflect the actual level of knowledge among participants concerning various aspects of NCDs. The questionnaire items are presented in Table 2**.**

Table 2. Questionnaire Items on NCD Knowledge

No.	Question
1	Have you heard of non-communicable diseases (NCDs)?
2	Can a family history increase the risk of NCDs?
3	Is it true that smoking, alcohol consumption, and diets high in salt, sugar, and fat do *not* cause NCDs?
4	Can routine health check-ups help in early detection of NCDs?
5	Can hypertension and diabetes lead to other complications?
6	Can regular physical activity help prevent and control NCDs?
7	Is it true that NCDs do *not* cause disability and death?

Based on the participants' responses, Question 3 had the highest number of incorrect answers, with 32 respondents unaware that smoking, alcohol consumption, and poor diet are risk factors for NCDs. Question 7 also revealed significant knowledge gaps, as 31 respondents did not recognize that NCDs can result in fatal outcomes.

Furthermore, 23 respondents were unaware that a family history can increase the risk of NCDs (Question 2), and 9 respondents did not understand the definition of NCDs (Question 1**).** Another 9 respondents were unaware of the importance of regular physical activity (Question 6), 6 did not recognize the value of early detection through regular health screenings (Question 4), and 4 did not understand the complications associated with hypertension and diabetes (Question 5).

Discussion

In accordance with the study objective, the results indicate that the seven-item questionnaire assessing elderly knowledge of non-communicable diseases (NCDs) met the criteria for both validity and reliability. Therefore, this instrument is appropriate for use in future studies of a similar nature. Validity was demonstrated by all items having *r*-values greater than the critical value and *p*-values below 0.05, indicating that each item successfully reflected the dimensions of knowledge being measured, including understanding of definitions, risk factors, and consequences of NCDs.

The Cronbach's alpha reliability coefficient of 0.692 (95% CI: 0.61–0.77) demonstrates an acceptable level of internal consistency, confirming that the instrument is sufficiently reliable for assessing knowledge. These findings are in line with those reported by Legesse et al., who emphasized the importance of using standardized and validated instruments for assessing public health literacy.[1]

Beyond the psychometric properties, descriptive findings revealed substantial knowledge gaps. A total of 32 respondents failed to recognize that smoking, alcohol consumption, and diets high in salt, sugar, and fat are behavioral risk factors for NCDs. Additionally, 31 respondents were unaware that NCDs could lead to disability and death, suggesting that the severity of NCDs is not fully understood among the elderly. This aligns with findings by Kebede et al., who reported that limited knowledge is a major barrier to early NCD prevention.[2]

Another key finding was that 23 respondents were unaware of the role of family history as a risk factor, while nine did not understand the basic definition of NCDs. These results underscore the importance of health education that targets foundational concepts such as disease definitions and hereditary risk factors. Awareness of the importance of routine health screening and physical activity was also limited—six and nine respondents, respectively, lacked knowledge in these areas—despite their central role in NCD control, as highlighted by Calcaterra and Zuccotti.[3]

The seven items tested in this study comprehensively covered important domains of NCD knowledge, including etiology, risky behaviors, preventive measures, and disease consequences. This aligns with the health literacy framework proposed by Prynn and Kuper, which identifies disease knowledge, risk factors, and outcomes as prerequisites for health behavior change.[4]

This study has several limitations. First, the use of purposive sampling may introduce selection bias and limit generalizability. Second, the relatively small sample size drawn from a single elderly community in Yogyakarta restricts the representativeness of the findings to broader elderly populations. Third, the use of dichotomous yes/no items may constrain the depth of understanding captured. Additionally, the self-report format may be subject to information bias due to personal interpretation or cognitive limitations among respondents.

These limitations should be considered when interpreting the findings. Nevertheless, the results are consistent with previous studies highlighting low NCD-related health literacy in low- and middle-income countries. For instance, Ju et al. reported a high burden of stroke—an NCD manifestation—with significant contributions to disability among the elderly in the Yogyakarta Special Region.[5]

The findings of this study are particularly applicable to the elderly population in Yogyakarta and may not be directly generalizable to areas with different socio-demographic conditions. Therefore, further studies with larger and more diverse samples are recommended to validate the instrument's consistency. Future research could also incorporate Likert-scale items to capture more nuanced levels of knowledge and include additional variables such as educational attainment or health status as potential predictors.

Practically, this instrument may serve as a rapid screening tool for assessing NCD-related health literacy among the elderly in primary care settings or community-based health promotion programs. The screening results could inform the development of contextually relevant educational materials and community-based interventions. In regions such as Yogyakarta, which has the highest prevalence of stroke in Indonesia[6], validating such tools is critical for promoting and preventing NCD-related disability and mortality.

Conclusion

The seven-item closed-ended questionnaire designed to assess elderly knowledge of non-communicable diseases (NCDs) was found to be both valid and reliable, based on testing with 55 respondents from an elderly community in Yogyakarta City. The validity test showed that all items had *r*-values greater than 0.266 and significance levels below 0.05, while the reliability analysis yielded a Cronbach's alpha of 0.692 (95% CI: 0.61–0.77), indicating acceptable internal consistency.

Therefore, this instrument is suitable for use in similar studies aimed at measuring elderly knowledge of NCDs, particularly within urban community settings. It also holds potential as an initial screening tool for healthcare professionals in developing targeted educational interventions and health promotion strategies.

Author Contribution

Gian Lisuari Adityasiwi: conceptualization, study design, data collection, data analysis, manuscript drafting.
Irwan Budiono: supervision, methodology, manuscript review and editing.
Intan Zainafree: data collection, validation, and literature review.
Eko Farida: statistical analysis, interpretation of results, and manuscript revision.
All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest related to this study.

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Ethics Statement

Ethical approval was not required for this study as it involved the analysis of publicly available data from previously published studies. All sources were properly cited, and no identifiable personal data were used.

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