



MALAHAYATI INTERNATIONAL JOURNAL
OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024



ARTICLE INFORMATION

Received: February, 16, 2026

Revised: March, 13, 2026

Available online: March, 13, 2026

at : <https://e-jurnal.iphorr.com/index.php/minh>

Clean and healthy living behaviors and hypertension among elderly people in the community

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Abstract

Background: Hypertension is a major public health problem among older adults and a leading contributor to cardiovascular morbidity and mortality in Indonesia. Clean and healthy living behavior (PHBS) has been recognized as a key preventive strategy for reducing lifestyle-related risk factors associated with hypertension, including unhealthy diet, physical inactivity, and poor health monitoring.

Purpose: To determine the relationship between clean and healthy living behavior and the incidence of hypertension among elderly individuals at Maccini Sawah Health Center and Tamangapa Health Center.

Method: A quantitative analytic observational study with a cross-sectional design was conducted. The study involved 98 elderly respondents recruited from Maccini Sawah Health Center (n=50) and Tamangapa Health Center (n=48). Clean and healthy living behavior status was assessed using a validated 12-item questionnaire, while hypertension was identified through medical records and direct blood pressure measurements. Data were analyzed using the Chi-Square test with a significance level of $p < 0.05$.

Results: The majority of respondents in both locations showed low levels of clean and healthy living behavior (63.3% overall). The prevalence of hypertension was 62.00% at the Maccini Sawah Community Health Center and 64.58% at the Tamangapa Community Health Center. Bivariate analysis showed that elderly individuals with low levels of clean and healthy living behavior had a significantly higher prevalence of hypertension (85.48%) compared to those with moderate (11.29%) and high (3.23%) levels. Statistical analysis revealed a highly significant association between clean and healthy living behavior and the incidence of hypertension ($p = 0.000$).

Conclusion: Clean and healthy living behaviors (Health-Based Drug Consumption Guidelines) are significantly associated with the incidence of hypertension among the elderly in Makassar City. Low adherence to clean and healthy living behaviors is a major risk factor, while moderate to high adherence is correlated with a lower prevalence of hypertension. Strengthening health promotion programs focused on clean and healthy living behaviors in primary healthcare settings is crucial to reduce the burden of cardiovascular disease and improve health outcomes for the elderly.

Keywords: Clean and Healthy Living Behaviour; Elderly; Hypertension.

INTRODUCTION

Hypertension is one of the most common non-communicable diseases affecting the elderly and remains a major contributor to cardiovascular morbidity and mortality in Indonesia. The prevalence of hypertension among older adults continues to rise in line with population aging, as evidenced by national health surveys and regional studies that consistently report high proportions of hypertensive

individuals aged 60 years and above. Consequently, hypertension among the elderly has become a priority issue in public health (Ministry of Health of the Republic of Indonesia, 2024; Clarity Homecare, 2025; Oliveros, Patel, Kyung, Fugar, Goldberg, Madan, & Williams, 2020; Goorani, Zangene, & Imig, 2024).

Clean and Healthy Living Behavior (*PHBS*) represents a set of lifestyle practices that include maintaining a balanced diet, engaging in regular physical activity, avoiding smoking and excessive alcohol consumption, practicing personal hygiene, managing stress, and adhering to routine health check-ups. As a preventive and promotive public health initiative, *PHBS* aims to reduce modifiable risk factors for non-communicable diseases, including hypertension, particularly within community and primary healthcare settings (World Health Organization, 2024; Sumampouw, Pinontoan, & Nelwan, 2023; Monica, Nursifa, Meidiawati, Hasnah, Ningsih, Hidayati, Maryati, Adji, Anggita, Wahyuni, & Putri, 2024; Yunita, Fauziah, Sartika, Somantri, Rostianti, & Suhayati, 2025; Rachmawati, Novindra, Syarifah, & Aisy, 2024).

The relationship between lifestyle behaviors and hypertension in older adults is multifactorial. Dietary habits such as high salt consumption, physical inactivity, obesity, and inadequate stress management contribute to increased blood pressure through physiological mechanisms involving sodium retention, vascular resistance, and autonomic dysregulation (Ibnu & Hidayati, 2025; Dong, 2018; Charchar, Prestes, Mills, Ching, Neupane, Marques, & Tomaszewski, 2024).

Evidence from observational studies and systematic reviews suggests that increased healthy lifestyle behaviors are associated with better blood pressure control and a reduced incidence of hypertension. In primary healthcare settings such as the Maccini Sawah Community Health Center and the Tamangapa Community Health Center, Primary Healthcare plays a central role in the prevention and management of hypertension in older adults. However, variations in health literacy, behavior, and access to healthcare among older adults across urban districts highlight the need to examine how healthy lifestyle practices impact hypertension in the local context of Makassar City. Conducting such studies across multiple primary healthcare settings provides valuable insights into behavioral gaps and supports the development of targeted interventions to improve public health.

Against this background, this study aims to analyze the relationship between Clean and Healthy Living Behaviors (*PHBS*) and the incidence of hypertension in the elderly at the Maccini Sawah

Community Health Center and the Tamangapa Community Health Center. These findings are expected to contribute to strengthening promotive and preventive health programs, particularly those designed to reduce the burden of hypertension in the elderly population.

RESEARCH METHOD

This study used a cross-sectional analytical design to examine the association between hygienic and healthy living behavior and hypertension in elderly individuals. The study was conducted at two primary health care centers in Makassar, South Sulawesi, Indonesia: Maccini Sawah Community Health Center and Tamangapa Community Health Center. Data collection was conducted in November 2025. The cross-sectional design was chosen due to its suitability for efficiently assessing population-level associations in primary care settings across multiple service areas.

The study population consisted of elderly individuals living in the service areas of two selected health centers. A total of 98 respondents were recruited using a purposive sampling method, with 50 participants from the Maccini Sawah Community Health Center and 48 from the Tamangapa Community Health Center. Inclusion criteria included individuals aged 60 years or older who were able to communicate and provide informed consent.

Participant eligibility was based on specific inclusion and exclusion criteria. To be included, individuals were required to reside in the Tamangapa Community Health Center service area, provide written informed consent, and demonstrate the ability to communicate clearly to complete the study questionnaire. Conversely, individuals were excluded if they were unavailable during the data collection period or if they suffered from severe hypertension complications that prevented effective participation.

The independent variables were clean and healthy living behavior (*PHBS*), defined as adherence to healthy lifestyle practices including nutrition, physical activity, smoking cessation, and routine health monitoring. *PHBS* was assessed using a validated 12-item questionnaire scored dichotomously ("Yes" = 1, "No" = 0), classified into low (0–4), moderate (5–8), and high (9–12). The dependent variable was hypertension, defined as systolic blood pressure ≥ 140 mmHg and/or diastolic

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blood pressure ≥ 90 mmHg, a previous medical diagnosis, or ongoing antihypertensive treatment.

Data were obtained through direct questionnaire administration and verification of clinical records, including blood pressure measurements. Respondents completed the *PHBS* questionnaire independently or with the assistance of the researcher. Additional demographic information, such as age and gender, was collected. The *PHBS* questionnaire has previously undergone validity testing using Pearson correlation ($r \geq 0.30$; $p < 0.05$) and reliability assessment using Cronbach's alpha (≥ 0.70).

Data were entered and analyzed using SPSS. Descriptive statistics summarized demographic characteristics, *PHBS* categories, and hypertension prevalence. Inferential analysis was conducted using the Chi-square test to examine the relationship between *PHBS* levels and hypertension. A p -value < 0.05 was considered statistically significant.

This study adhered to ethical principles involving human participants. All respondents provided written informed consent after receiving an explanation of the study's purpose and procedures. Confidentiality and anonymity were maintained by coding participant identities and restricting data use exclusively for research purposes.

RESEARCH RESULTS

Table 1. Respondent Characteristics

Variable	Maccini Sawah (n=50)	Tamangapa (n=48)
Age (Mean$\pm$SD)(Range)(Year)	(66.72 $\pm$ 7.155)(60-73)	(67.89 $\pm$ 5.231)(60-75)
Gender (n/%)		
Male	28/56.0	15/31.3
Female	22/44.0	33/68.7
Hypertension (n/%)		
Yes	31/62.0	31/64.6
No	19/38.0	17/35.4
Clean and Healthy Living Behavior (n/%)		
Low	34/68.0	31/64.6
Moderate	14/28.0	13/27.1
High	2/4.0	4/8.3

Table 1 shows that the average age and standard deviation of respondents at the Maccini Sawah Community Health Center were 66.72 $\pm$ 7.155, with a range of 60 to 73 years, while at the Tamangapa Community Health Center it was 67.89 $\pm$ 5.231, with a range of 60 to 75 years. Gender-wise, the majority of respondents at the Maccini Sawah community health center were male with a percentage of 56%, while at the Tamangapa community health center the majority were female at 68.7%.

According to the data, 31 of the 50 respondents (62.00%) at the Maccini Sawah Community Health Center had hypertension, while 19 respondents (38.00%) did not. Similarly, at the Tamangapa Community Health Center, 31 of the 48 respondents (64.58%) had hypertension, while 17 respondents (35.42%) did not.

The table shows that the majority of respondents at the Maccini Sawah Community Health Center (Puskesmas Maccini Sawah) demonstrated a low level of *PHBS* (Health and Wellness), totaling 34 patients (68.00%). Meanwhile, 14 patients (28.00%) had a moderate level, and only 2 patients (4.00%) achieved a high level of *PHBS*.

Similarly, at the Tamangapa Community Health Center, the majority of respondents fell into the low *PHBS* category, with 31 patients (64.58%), followed by 13 patients (27.08%) at the moderate level, and 4 patients (8.34%) at the high *PHBS* level.

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Tabel 2. Relationship between Clean and Healthy Living Behavior and Hypertension Totality

Variable	Hypertension		p-value
	Yes (n=62)	No (36)	
Clean and Healthy Living Behavior (n/%)			
Low	53/85.5	12/33.3	0.000
Moderate	7/11.3	20/55.6	
High	2/3.2	4/11.1	

Patients with low levels of clean and healthy living behaviors showed a very high prevalence of hypertension (85.5%), while those with moderate (11.3%) and high (3.2%) had much lower rates. Among non-hypertensive patients, the majority were classified as having moderate clean and healthy living behaviors (55.6%), followed by those with low (33.3%) and high (11.1%).

A p-value of 0.000 indicates a statistically significant correlation, confirming that poor clean and healthy living behaviors are strongly associated with the development of hypertension, while transitioning to moderate and high clean and healthy living behaviors is associated with a lower prevalence of the condition.

DISCUSSION

This study examined the association between clean and healthy living behavior (*PHBS*) and the incidence of hypertension among elderly individuals across two health centers in Makassar City. The findings demonstrate a significant association between *PHBS* levels and hypertension ($p=0.000$). Elderly participants who exhibited low *PHBS* had a substantially higher prevalence of hypertension (85.5%) compared with those who demonstrated moderate (11.3%) or high (3.2%) *PHBS*.

These results reinforce the role of lifestyle behaviors as key determinants of non-communicable disease outcomes in aging populations. The high proportion of hypertension among respondents with low *PHBS* aligns with existing literature indicating that unhealthy dietary practices, physical inactivity, smoking, and inadequate health monitoring contribute significantly to elevated blood pressure. Specifically, the data shows that as *PHBS* categories improve from "Low" to "Moderate," the prevalence of non-hypertension rises sharply from 33.3% to 55.6%. This suggests that even incremental improvements

in healthy behavior can have a protective effect against hypertensive clinical status.

The physiological mechanisms underlying these findings are well-documented. Excessive sodium intake, common in low-*PHBS* profiles, leads to sodium-induced vascular and renal changes (Kasper, Fauci, Hauser, Longo, Jameson, Loscalzo, & Langford, 2026). Furthermore, insufficient physical activity is linked to endothelial dysfunction and increased vascular resistance. The findings of this study are consistent with community-based research in Indonesia, who reported that elderly individuals with poor lifestyle behaviors were significantly more likely to be hypertensive (Ahmad, 2023; Lakoro, Handian, & Susanti, 2023; Safina & Rahayu, 2025; Rukmini, Laksono, Kusumawati, & Wijayanti, 2021).

Maccini Sawah Community Health Center and Tamangapa Community Health Center both showed high rates of low *PHBS* (68.0% and 64.6%, respectively), indicating the need for extensive interventions in Makassar City. Strengthening health promotion programs based on clean and healthy lifestyles, such as education on salt reduction, safe physical activity for the elderly, and routine blood pressure monitoring, is crucial. Previous research confirmed that community-based interventions focused on lifestyle can significantly reduce systemic blood pressure (Egan, Mattix-Kramer, Basile, & Sutherland, 2024; Neupane, McLachlan, Mishra, Olsen, Perry, Karki, & Kallestrup, 2018; Azami-Aghdash, Joudyian, Jafari, Karami, & Rezapour, 2025; Citra & Lismayanti, 2025; Syamsuriah, Fachruddin, & Amir, 2025).

Despite the significant findings, this study is limited by its cross-sectional design, which precludes causal inference, and a sample size ($N=98$) that limits generalizability. Additionally, *PHBS* data was self-reported, which may introduce recall bias.

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However, the strong statistical significance ($p < 0.05$) provides a robust basis for recommending that primary healthcare providers prioritize PHBS adherence as a primary strategy for hypertension control in the elderly.

CONCLUSION

There was a statistically significant association ($p = 0.000$) between Clean and Healthy Living Behaviors (PHBS) and the incidence of hypertension among the elderly in the service areas of the Maccini Sawah Community Health Center and Tamangapa Community Health Center. Low PHBS levels were the dominant factor among hypertensive patients, with 85.48% of hypertensive respondents falling into the low PHBS category. Conversely, higher PHBS scores were associated with a significantly lower prevalence of hypertension.

These findings highlight that adherence to healthy lifestyle practices, including nutrition, physical activity, and regular health monitoring, is crucial for managing blood pressure in the elderly population. To reduce the burden of hypertension, primary health care centers should intensify promotive and preventive efforts, focusing on lifestyle modification and community-based health education. Future research should employ a longitudinal design to further investigate the causal impact of improved PHBS on cardiovascular health over time.

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Clean and healthy living behaviors and hypertension among elderly people in the community

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