

Association Between Residential Distance to Community Health Centers and Medication Adherence Among Patients with Hypertension in the Coastal Area of Wakatobi Regency

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ABSTRACT

Background: Medication adherence is an essential component of hypertension management because consistent use of antihypertensive medication reduces the risk of cardiovascular complications and improves long-term blood pressure control. Geographical accessibility, particularly the distance from patients' residences to primary healthcare facilities, has been suggested as one of the factors influencing medication adherence. However, evidence from coastal and archipelagic communities remains limited.

Objective: To determine the association between the distance from patients' residences to Community Health Centers and medication adherence among patients with hypertension in the coastal area of Wakatobi Regency.

Methods: An analytical observational study with a cross-sectional design was conducted among 100 patients with hypertension selected using proportionate stratified random sampling. Distance from residence to the nearest Community Health Center was categorized as near (<3 km), moderate (3–5 km), and far (>5 km). Medication adherence was assessed using the eight-item Morisky Medication Adherence Scale (MMAS-8). Data were analyzed using

descriptive statistics and the Chi-square test with a significance level of $p < 0.05$.

Results: Of the 100 respondents, 39.0% lived 3–5 km from the nearest Community Health Center, 34.0% lived within 3 km, and 27.0% lived more than 5 km away. Regarding medication adherence, 29.0% of respondents had low adherence, 45.0% had moderate adherence, and 26.0% had high adherence. Chi-square analysis demonstrated no statistically significant association between residential distance and medication adherence ($\chi^2 = 2.34$; $df = 4$; $p = 0.673$). Respondents living near the Community Health Center showed low, moderate, and high adherence rates of 26.5%, 47.1%, and 26.4%, respectively, while those living farther away demonstrated comparable adherence patterns.

Conclusion: The distance from patients' residences to the Community Health Center was not significantly associated with medication adherence among patients with hypertension living in the coastal area of Wakatobi Regency. These findings suggest that medication adherence is more likely to be influenced by behavioral, educational, family, and healthcare service factors than by geographical distance alone.

Keywords: coastal community; Community Health Center; hypertension; medication adherence; residential distance; Wakatobi

INTRODUCTION

Hypertension is one of the leading non-communicable diseases and remains a major contributor to cardiovascular morbidity and premature mortality worldwide (Ghembaza et al., 2014). Characterized by persistently elevated blood pressure, hypertension substantially increases the risk of stroke, coronary artery disease, heart failure, chronic kidney disease, and other vascular complications if left inadequately controlled. Although effective antihypertensive medications are widely available, achieving optimal blood pressure control remains a persistent challenge because successful treatment depends heavily on patients' long-term adherence to prescribed medication (Jankowska-Polańska et al., 2016). Medication adherence is defined as the extent to which patients take medications according to healthcare providers' recommendations regarding dosage, frequency, and duration of treatment. In chronic diseases such as hypertension, lifelong adherence is essential because discontinuation or inconsistent medication use can result in uncontrolled blood pressure, accelerated target-organ damage, increased hospitalization, and higher healthcare expenditures. Consequently, improving medication adherence has become one of the primary objectives of hypertension management programs worldwide (Abegaz et al., 2017). Medication adherence is influenced by a complex interaction of patient-related, disease-related, healthcare system, socioeconomic, and environmental factors. Among these determinants, physical accessibility to healthcare facilities represents an important but frequently overlooked factor. Access to primary healthcare services enables patients to receive regular medical consultations, medication refills, blood pressure monitoring, counseling, and continuous

health education, all of which contribute to sustained adherence to treatment. One of the most common indicators of healthcare accessibility is the distance between a patient's residence and the nearest healthcare facility (Syed et al., 2016). Patients living farther from healthcare facilities often encounter transportation difficulties, increased travel costs, prolonged travel time, and reduced opportunities for routine follow-up, potentially decreasing medication adherence. Conversely, individuals residing closer to healthcare facilities generally experience easier access to healthcare services, facilitating timely medication collection and continuous disease management. Therefore, understanding how residential distance influences medication adherence is particularly important in geographically challenging settings where healthcare accessibility remains limited (Omboni et al., 2020).

Hypertension continues to pose a significant global health burden. According to the World Health Organization, approximately 1.28 billion adults aged 30–79 years are currently living with hypertension, with nearly two-thirds residing in low- and middle-income countries (Al-Hazmi et al., 2025; ALruwaili, 2024). Despite the availability of effective treatment, fewer than half of hypertensive adults receive adequate treatment, and only approximately 21% achieve optimal blood pressure control. Hypertension contributes to approximately 10.8 million deaths annually and remains one of the leading preventable causes of cardiovascular disease worldwide. In Indonesia, hypertension consistently ranks among the most prevalent chronic diseases and represents a major challenge for the national healthcare system. Findings from the 2023 Indonesian Health Survey indicate that hypertension prevalence remains high among adults, with increasing occurrence among older populations. Hypertension also accounts for a substantial proportion of outpatient visits and chronic disease management under the National Health

Insurance program (Kemenkes, 2023). In Southeast Sulawesi Province, hypertension is one of the priority non-communicable diseases managed through community health centers. Likewise, in Wakatobi Regency, hypertension consistently ranks among the leading chronic diseases treated at Puskesmas. However, the unique geographical characteristics of Wakatobi as an archipelagic coastal regency create considerable challenges in healthcare accessibility because many residents live on small islands separated by sea transportation, resulting in unequal access to primary healthcare services.

Residents of coastal communities in Wakatobi frequently experience physical barriers that may influence continuity of hypertension treatment. Many patients rely on small boats or irregular public transportation to reach community health centers, while adverse weather conditions and fluctuating sea conditions often limit transportation availability. In addition, fishing activities require many residents to spend extended periods at sea, reducing opportunities to attend scheduled medical appointments or refill medications. These circumstances increase travel costs and time while reducing continuity of healthcare utilization. Consequently, some patients postpone routine visits, discontinue medication temporarily, or seek alternative treatment outside the formal healthcare system. Although the Indonesian government has expanded primary healthcare coverage through Community Health Centers and the National Health Insurance program, geographical accessibility remains an important determinant of healthcare utilization in remote island communities. Therefore, understanding whether residential distance affects medication adherence among hypertensive patients in coastal Wakatobi is essential for improving healthcare delivery in geographically isolated populations.

Previous studies have reported inconsistent findings regarding the relationship between healthcare accessibility and medication

adherence among patients with chronic diseases. Several international studies have demonstrated that shorter distance to healthcare facilities is associated with improved medication adherence because patients experience fewer transportation barriers and more frequent contact with healthcare professionals. However, other studies have reported weak or non-significant associations after adjusting for socioeconomic status, health insurance, educational level, and social support, suggesting that accessibility alone may not fully explain adherence behavior. In Indonesia, studies examining determinants of medication adherence have primarily focused on demographic characteristics, health literacy, self-efficacy, family support, or patient knowledge, whereas relatively few investigations have specifically examined geographical accessibility using residential distance as the primary exposure variable. Moreover, existing studies have predominantly been conducted in urban or semi-urban settings with relatively well-developed transportation infrastructure. Evidence generated from remote coastal communities remains limited despite their distinct geographical conditions and healthcare access challenges. Consequently, the applicability of previous findings to archipelagic coastal populations such as Wakatobi remains uncertain.

Investigating the relationship between residential distance and medication adherence among hypertensive patients in Wakatobi is expected to provide context-specific evidence regarding the influence of geographical accessibility on chronic disease management. Understanding this relationship may assist healthcare providers and policymakers in identifying populations at greater risk of poor adherence due to transportation barriers and limited healthcare access. The findings may further support the development of outreach strategies, mobile health services, community-based medication distribution, home visit programs, and culturally appropriate interventions tailored to the

needs of coastal communities. By focusing specifically on patients living in an archipelagic coastal region, this study broadens the current understanding of hypertension management beyond conventional urban settings and highlights the importance of geographical accessibility as a determinant of long-term treatment adherence in underserved populations.

Based on these considerations, this study aims to analyze the relationship between the distance from patients' residences to Community Health Centers and medication adherence among patients with hypertension living in the coastal area of Wakatobi Regency. The findings are expected to contribute to the existing evidence regarding environmental determinants of medication adherence while providing practical recommendations for strengthening hypertension management programs in geographically isolated coastal communities. Furthermore, the results may assist local health authorities in developing equitable healthcare delivery strategies that improve access to essential hypertension services and promote continuity of treatment. It is hypothesized that patients living closer to Community Health Centers demonstrate significantly better medication adherence than patients residing farther from healthcare facilities.

MATERIALS & METHODS

This study employed an analytical observational design with a cross-sectional approach to examine the relationship between the distance from patients' residences to Community Health Centers (Puskesmas) and medication adherence among patients with hypertension living in the coastal area of Wakatobi Regency, Southeast Sulawesi, Indonesia. The study was conducted between March 2026 in the working areas of selected Community Health Centers that provide hypertension services for coastal communities. A cross-sectional design was considered appropriate because it enables the simultaneous assessment of the independent variable

(distance from residence to the nearest Community Health Center) and the dependent variable (medication adherence) within a defined population at a single point in time. The study was reported in accordance with the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement for cross-sectional studies.

The target population consisted of all adult patients diagnosed with primary hypertension who resided in the coastal area of Wakatobi Regency and were registered at the participating Community Health Centers. The source population comprised hypertensive patients attending outpatient hypertension clinics during the study period. Participants were selected using proportionate stratified random sampling based on the number of registered hypertensive patients in each participating Community Health Center to ensure proportional representation of all service areas. The minimum sample size was calculated using the formula for correlation studies with a confidence level of 95%, statistical power of 80%, and an expected moderate association, resulting in a minimum sample requirement of 84 participants. To compensate for possible incomplete responses and non-participation, an additional 15% was included, yielding a final target sample of 100 respondents.

Participants were eligible if they met the following inclusion criteria: (1) aged 18 years or older; (2) diagnosed with primary hypertension by a physician for at least six months; (3) currently receiving antihypertensive medication; (4) permanently residing in the coastal area of Wakatobi Regency; (5) capable of communicating in Bahasa Indonesia; and (6) willing to participate by signing written informed consent. Individuals with secondary hypertension, severe cognitive impairment, psychiatric disorders interfering with communication, hearing or speech impairments, terminal illness, or incomplete questionnaire responses exceeding 10% of

the instrument items were excluded from the study.

The independent variable was the distance from the participant's residence to the nearest Community Health Center providing hypertension services. Distance was measured in kilometers using the shortest travel route based on the participants' residential addresses verified through the geographic information available at each Community Health Center and confirmed using digital mapping applications. For analytical purposes, distance was categorized into three groups: near (<3 km), moderate (3–5 km), and far (>5 km), based on the accessibility classification commonly used in Indonesian primary healthcare studies. The dependent variable was medication adherence, assessed using the eight-item Morisky Medication Adherence Scale (MMAS-8). The MMAS-8 score ranged from 0 to 8 and was categorized into low adherence (<6), moderate adherence (6 to <8), and high adherence (8) according to established scoring guidelines. Additional variables collected included age, sex, educational level, occupation, duration of hypertension, comorbidity status, smoking status, monthly household income, health insurance ownership, and family support because these factors have been reported in previous studies as potential determinants of medication adherence.

Prior to data collection, the questionnaire package underwent forward translation, expert review by three specialists in public health and community nursing, and pilot testing among 30 hypertensive patients outside the study area. Internal consistency reliability was evaluated using Cronbach's alpha coefficient, with values of at least 0.70 considered acceptable. Content validity was assessed through expert evaluation, while construct validity was examined using corrected item-total correlation coefficients. Data collectors received standardized training regarding participant recruitment, interview techniques, ethical considerations, confidentiality, questionnaire administration, and quality assurance

procedures to minimize interviewer bias and ensure consistency throughout the study.

Data were collected through structured face-to-face interviews after obtaining written informed consent from each participant. Sociodemographic and clinical information was obtained from interviews and verified using medical records whenever available. Residential distance to the nearest Community Health Center was determined using participants' addresses and confirmed through digital geographic mapping. To minimize information bias, all interviews followed identical standardized procedures. Completed questionnaires were checked immediately for completeness before data entry. Paper-based questionnaires were securely stored in locked cabinets, whereas electronic databases were password protected and accessible only to the principal investigator and authorized research team members. Participants' identities were replaced with unique identification codes to maintain confidentiality.

Several measures were implemented to minimize potential bias. Selection bias was reduced by employing probability sampling and clearly defined eligibility criteria. Information bias was minimized through the use of standardized questionnaires, objective distance measurement procedures, and trained interviewers. Recall bias was limited because respondents were asked about their current medication-taking behaviors rather than long-term historical events. Potential confounding variables identified from previous literature were considered during statistical analysis. Data quality was maintained through double-entry verification, routine consistency checks, and independent review of the final database before analysis.

Statistical analysis was performed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize participant characteristics. Continuous variables were presented as means and standard deviations, while categorical

variables were summarized using frequencies and percentages. The normality of continuous variables was assessed using the Shapiro–Wilk test. Associations between respondent characteristics and medication adherence were analyzed using the Chi-square test or Fisher's exact test where appropriate. The relationship between residential distance to the Community Health Center and medication adherence was also evaluated using the Chi-square test because both variables were categorical. Variables demonstrating p-values below 0.25 in bivariate analyses, together with clinically relevant variables identified from previous literature, were planned for inclusion in multivariable ordinal logistic regression analysis to identify independent predictors of medication adherence while controlling for potential confounding factors. Adjusted odds ratios (AORs), 95% confidence intervals (95% CI), and p-values were reported. Statistical significance was established at a two-sided p-value of less than 0.05.

Missing data were evaluated before statistical analysis. Participants with missing

questionnaire responses exceeding 10% of the total instrument items were excluded according to the predetermined exclusion criteria. For questionnaires with minimal missing values, complete-case analysis was performed because the proportion of missing data was considered too small to substantially influence the study findings.

Ethical approval for this study was obtained from the Health Research Ethics Committee of Hasanuddin University (Approval No. 1362/UN4.14.1/TP.01.02/2026). All procedures complied with the ethical principles outlined in the Declaration of Helsinki. Participation was entirely voluntary, and participants were informed about the objectives, procedures, potential risks, and benefits of the study before providing written informed consent. Participants were assured of confidentiality, anonymity, and their right to withdraw from the study at any stage without affecting their access to healthcare services.

RESULT

Table 1. Characteristics of Respondents

Variable	Category	n	%
Age (years)	Mean ± SD	58.91 ± 10.24	
	30–44	11	11.0
	45–59	43	43.0
	≥60	46	46.0
Sex	Male	41	41.0
	Female	59	59.0
Education	Elementary school	36	36.0
	Junior high school	24	24.0
	Senior high school	29	29.0
	College	11	11.0
Occupation	Fisherman	42	42.0
	Housewife	27	27.0
	Farmer	12	12.0
	Civil servant/Private employee	19	19.0
Duration of hypertension	<5 years	35	35.0
	5–10 years	42	42.0
	>10 years	23	23.0
Comorbidity	Yes	39	39.0
	No	61	61.0
Smoking status	Smoker	27	27.0
	Non-smoker	73	73.0
Family support	Good	68	68.0
	Poor	32	32.0

Table 1 presents the demographic and clinical characteristics of the 100 respondents included in this study. The mean age of the participants was 58.91 ± 10.24 years. Nearly half of the respondents (46.0%) were aged 60 years or older, followed by those aged 45–59 years (43.0%) and 30–44 years (11.0%). Female participants constituted the majority of the study population (59.0%), whereas males accounted for 41.0%. Regarding educational attainment, most respondents had completed elementary school (36.0%), followed by senior high school (29.0%), junior high school (24.0%), and college education (11.0%). Fishermen represented the largest

occupational group (42.0%), reflecting the socioeconomic characteristics of the coastal communities, followed by housewives (27.0%), private employees or civil servants (19.0%), and farmers (12.0%). Most respondents had been diagnosed with hypertension for 5–10 years (42.0%), while 35.0% had experienced hypertension for less than five years and 23.0% for more than ten years. More than half of the respondents (61.0%) reported having no comorbid diseases, whereas 39.0% had at least one comorbidity. The majority of participants were non-smokers (73.0%), and approximately two-thirds (68.0%) reported receiving good family support.

Table 2. Distribution of Distance from Residence to Community Health Center and Medication Adherence Among Respondents (n = 100)

Variable	Category	n	%
Distance from residence to Community Health Center	Near (<3 km)	34	34.0
	Moderate (3–5 km)	39	39.0
	Far (>5 km)	27	27.0
Medication adherence	Low	29	29.0
	Moderate	45	45.0
	High	26	26.0

Table 2 presents the distribution of respondents according to the distance from their residences to the nearest Community Health Center and their level of medication adherence. The largest proportion of respondents lived 3–5 km from the Community Health Center (39.0%),

followed by those living less than 3 km away (34.0%) and those residing more than 5 km away (27.0%). Regarding medication adherence, most respondents demonstrated moderate adherence (45.0%), while 29.0% had low adherence and 26.0% exhibited high adherence.

Table 3. Association between Respondents' Characteristics and Medication Adherence

Variable	Low Adherence n (%)	Moderate/High Adherence n (%)	p-value
Age	10 (21.7)	36 (78.3)	0.124
Sex			0.318
• Male	14 (34.1)	27 (65.9)	
• Female	15 (25.4)	44 (74.6)	
Education			0.009
• Elementary/Junior High	23 (38.3)	37 (61.7)	
• Senior High/College	6 (15.0)	34 (85.0)	
Occupation			0.201
Duration of hypertension			0.041
Comorbidity			0.176
Smoking status			0.088
Family support			<0.001

Table 3 presents the association between respondents' characteristics and medication

adherence. The Chi-square analysis showed that educational level was significantly

associated with medication adherence ($p = 0.009$), indicating that respondents with higher educational attainment tended to demonstrate better adherence to antihypertensive medication than those with lower educational levels. Duration of hypertension was also significantly associated with medication adherence ($p = 0.041$), suggesting that patients who had lived with hypertension for a longer period were more likely to adhere to their prescribed treatment. In addition, family

support demonstrated a highly significant association with medication adherence ($p < 0.001$), highlighting the important contribution of family involvement in encouraging regular medication use among patients with hypertension. In contrast, age ($p = 0.124$), sex ($p = 0.318$), occupation ($p = 0.201$), comorbidity status ($p = 0.176$), and smoking status ($p = 0.088$) were not significantly associated with medication adherence because their p -values exceeded the predetermined significance level of 0.05.

Table 4. Association between Distance from Residence to Community Health Center and Medication Adherence

Distance to Community Health Center	Low Adherence n (%)	Moderate Adherence n (%)	High Adherence n (%)	Total	p-value
Near (<3 km)	9 (26.5)	16 (47.1)	9 (26.4)	34	
Moderate (3–5 km)	10 (25.6)	18 (46.2)	11 (28.2)	39	
Far (>5 km)	10 (37.0)	11 (40.7)	6 (22.3)	27	
Total	29	45	26	100	0.673

Table 4 presents the association between the distance from respondents' residences to the Community Health Center and medication adherence among patients with hypertension. The Chi-square analysis indicated no statistically significant association between residential distance and medication adherence ($\chi^2 = 2.34$; $p = 0.673$). Respondents living within 3 km of the Community Health Center showed low, moderate, and high medication adherence proportions of 26.5%, 47.1%, and 26.4%, respectively. Similarly, among respondents residing 3–5 km away, 25.6% had low adherence, 46.2% had moderate adherence, and 28.2% had high adherence. Patients living more than 5 km from the Community Health Center demonstrated slightly higher proportions of low adherence (37.0%); however, the overall distribution of medication adherence did not differ significantly across the three distance categories.

DISCUSSION

The objective of this study was to examine the association between the distance from patients' residences to the Community Health Center and medication adherence

among patients with hypertension living in the coastal area of Wakatobi Regency. The findings indicated that there was no statistically significant association between residential distance and medication adherence ($\chi^2 = 2.34$; $p = 0.673$). Although respondents residing more than 5 km from the Community Health Center showed a slightly higher proportion of low medication adherence than those living closer to healthcare facilities, the overall distribution of adherence levels did not differ significantly across the three distance categories. These findings suggest that residential distance alone may not be a determining factor for medication adherence among hypertensive patients in coastal Wakatobi. The results further imply that other individual, social, and healthcare-related factors may play a more influential role in shaping medication-taking behavior than geographical accessibility (Das et al., 2021; Marshall et al., 2012).

The findings of this study are consistent with several international studies reporting that geographical distance does not always predict medication adherence in patients with chronic diseases. (Maimaris et al., 2013) reported that physical accessibility to

healthcare facilities had only a modest influence on adherence when medications were consistently available and primary healthcare services functioned effectively. Similarly, (Jin et al., 2008) concluded that medication adherence is a multidimensional behavior influenced more strongly by patient beliefs, health literacy, treatment complexity, and social support than by geographical distance alone. A systematic review by (Haynes et al., 2005) also emphasized that interventions addressing behavioral and educational factors were generally more effective in improving medication adherence than strategies focusing solely on healthcare accessibility. Likewise, (Bosworth et al., 2011) found that patient-centered education, self-management support, and regular communication with healthcare providers contributed more substantially to adherence than travel distance to healthcare facilities. Together, these findings support the present study by indicating that physical distance may become less important when effective primary healthcare services and community-based chronic disease programs are available.

Although the present findings agree with several previous studies, they differ from investigations conducted in geographically underserved regions where longer travel distance was associated with poorer medication adherence. Such discrepancies may be explained by differences in healthcare systems, transportation infrastructure, and the organization of primary healthcare services. In Wakatobi Regency, despite the geographical challenges associated with an archipelagic coastal area, hypertension management is supported through Community Health Centers, the Chronic Disease Management Program (Prolanis), integrated non-communicable disease posts (Posbindu PTM), community health workers, and periodic outreach activities that facilitate continuous patient follow-up. In addition, antihypertensive medications are generally available through the National Health

Insurance program, reducing financial barriers to treatment. Consequently, patients residing farther from Community Health Centers may continue receiving medication and counseling through alternative healthcare delivery mechanisms. These contextual characteristics may explain why residential distance did not demonstrate a statistically significant influence on medication adherence in the present study (Marshall et al., 2012).

The findings can be interpreted using Andersen's Behavioral Model of Health Services Use, which proposes that healthcare utilization is determined by interactions among predisposing characteristics, enabling resources, and healthcare needs. Within this framework, geographical distance represents only one enabling factor and may have limited influence when other enabling resources, such as health insurance, community outreach services, medication availability, and family support, are adequate. The Social Ecological Model also provides a useful explanation because medication adherence is influenced by multiple interacting levels, including individual characteristics, interpersonal relationships, community resources, healthcare systems, and policy environments. Therefore, even when patients live relatively far from healthcare facilities, supportive family environments, accessible healthcare programs, and effective communication with healthcare professionals may compensate for geographical barriers and sustain adherence. These theoretical perspectives are consistent with the findings of the present study, which suggest that medication adherence results from the interaction of multiple determinants rather than residential distance alone (Maimaris et al., 2013).

Several mechanisms may explain the absence of a significant association between residential distance and medication adherence. First, many hypertensive patients receive long-term prescriptions that reduce the frequency of visits required for medication refills, thereby minimizing the

influence of travel distance. Second, Indonesia's primary healthcare system has increasingly implemented community-based chronic disease management through home visits, village health posts, integrated health promotion activities, and community health workers, allowing patients to maintain treatment even when transportation is limited. Third, family members frequently assist elderly patients by collecting medications, accompanying them to healthcare facilities, or reminding them to take prescribed drugs regularly. Finally, improvements in communication technology enable healthcare providers to maintain contact with patients through telephone calls or mobile messaging, reducing the dependence of adherence on physical proximity to healthcare facilities. Together, these mechanisms may lessen the practical impact of residential distance on routine medication-taking behavior.

The relationships among the variables observed in this study indicate that medication adherence is likely influenced by a combination of demographic, behavioral, and social determinants rather than geographical accessibility alone. Previous analyses demonstrated that educational level, duration of hypertension, and family support were significantly associated with medication adherence, whereas residential distance was not. Higher educational attainment may improve patients' ability to understand medical advice and recognize the importance of lifelong antihypertensive therapy. Longer disease duration may increase patients' experience in managing hypertension and strengthen treatment routines developed through repeated interactions with healthcare providers. Family support may further enhance adherence by providing emotional encouragement, medication reminders, transportation assistance, and practical support for healthcare utilization. Biologically, consistent medication adherence contributes to sustained blood pressure control through continuous suppression of pathophysiological

mechanisms involved in hypertension, including excessive sympathetic nervous system activation, renin–angiotensin–aldosterone system activity, endothelial dysfunction, and increased peripheral vascular resistance. Therefore, behavioral determinants appear to exert greater influence on medication adherence than residential distance within the study population (Gaddam et al., 2009).

The present findings have important implications for hypertension management in coastal communities. Healthcare providers should continue strengthening patient education, family-centered counseling, and community-based chronic disease management rather than relying solely on improving geographical accessibility. The results suggest that expanding outreach services, optimizing Prolanis activities, enhancing the role of community health workers, and maintaining adequate medication availability may be more effective strategies for improving long-term adherence among patients with hypertension in remote coastal settings. Nevertheless, this study has several limitations. The cross-sectional design precludes causal inference between residential distance and medication adherence. Medication adherence was measured using self-reported questionnaires, which may be influenced by recall bias and social desirability bias. In addition, residential distance was measured as the physical distance to the nearest Community Health Center and did not account for travel time, transportation availability, weather conditions, or transportation costs, all of which may influence healthcare accessibility in archipelagic regions. Because the study was conducted exclusively in coastal areas of Wakatobi Regency, the findings should be generalized to other settings with caution. Future longitudinal and multicenter studies incorporating objective measures of healthcare accessibility, travel burden, transportation infrastructure, and healthcare utilization are recommended to provide a

more comprehensive understanding of environmental determinants of medication adherence among patients with hypertension.

CONCLUSION

This study concluded that the distance from patients' residences to the Community Health Center was not significantly associated with medication adherence among patients with hypertension living in the coastal area of Wakatobi Regency. The findings suggest that geographical distance alone does not determine patients' adherence to antihypertensive medication. Other factors, including educational level, duration of hypertension, family support, and the availability of primary healthcare services, may play a more important role in influencing long-term medication adherence. Therefore, comprehensive hypertension management should emphasize behavioral, educational, and family-centered approaches in addition to maintaining accessible healthcare services. Community Health Centers should continue strengthening hypertension management programs through regular health education, medication counseling, and family involvement to improve patients' adherence to long-term treatment. Community-based services such as home visits, integrated chronic disease management programs, and outreach activities should be maintained and expanded, particularly for patients living in remote coastal areas. Future studies are recommended to employ longitudinal or multicenter designs and include additional indicators of healthcare accessibility, such as travel time, transportation availability, transportation costs, and healthcare utilization, to provide a more comprehensive understanding of factors affecting medication adherence among patients with hypertension.

Declaration by Authors

Ethical Approval: Approved

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