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Community-Based Health Service Utilization and Blood Pressure Control among Adults with Hypertension in Surakarta, Indonesia

Wahyu Ratri Sukmaningsih[1*], Emma Ismawatie[2], Dwi Rahayuningsih[1], Novia Dwi Ramadhani[1]

[1*]Bachelor of Applied Science Program in Health Information Management, Politeknik Indonusa Surakarta, Indonesia

[2]Bachelor of Applied Science Program in Medical Laboratory Technology, Politeknik Indonusa Surakarta, Indonesia

ABSTRACT

Background: Hypertension remains a major public health concern, particularly because achieving adequate blood pressure control remains challenging despite the availability of effective treatment. Community-based health services may provide an important platform for monitoring and supporting hypertension management. This study examined the association between community-based health service utilization and blood pressure control among adults with hypertension in Surakarta, Indonesia.
Methods: A cross-sectional study was conducted among 400 adults with hypertension who participated in Posyandu services in Surakarta, Indonesia, between June and August 2026. Participants were recruited using purposive sampling. Blood pressure control was assessed through standardized blood pressure measurements, while Posyandu attendance, medication adherence, CERDIK healthy lifestyle behaviors, and family support were assessed using structured questionnaires. Data were analyzed using chi-square tests and multiple logistic regression. Associations were expressed as odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CIs).
Result: Overall, 61.5% of participants had controlled blood pressure. Bivariate analysis indicated significant associations between blood pressure control and active Posyandu attendance (OR=1.957; 95% CI=1.300–2.948; p=0.001), medication adherence (OR=1.720; 95% CI=1.145–2.583; p=0.009), CERDIK healthy lifestyle behaviors (OR=1.620; 95% CI=1.080–2.431; p=0.019), and family support (OR=1.707; 95% CI=1.137–2.562; p=0.010). After adjustment, only active Posyandu attendance remained significantly associated with blood pressure control (AOR=2.960; 95% CI=1.077–8.138; p=0.035).
Conclusion : Active utilization of community-based Posyandu services was independently associated with better blood pressure control. Strengthening regular monitoring, health education, and patient engagement through community-based services may support hypertension management.

Keywords: Blood Pressure Control; Community-Based Health Services; Hypertension; Posyandu; Primary Health Care

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* *Wahyu Ratri Sukmaningsih, wahyuratri@poltekindonusa.ac.id*

Introduction

The Hypertension remains a major global public health challenge and contributes substantially to cardiovascular morbidity and premature mortality. Despite the availability of effective treatment, blood pressure control remains inadequate. Approximately 1.4 billion adults aged 30–79 years live with hypertension, while fewer than one-quarter achieve blood pressure control and nearly half are unaware of their condition.[1] These gaps indicate that hypertension management requires attention not only to pharmacological treatment but also to behavioral and healthcare-related factors.

Blood pressure control is influenced by multiple factors, including medication adherence, lifestyle behaviors, and access to continuous healthcare. In primary healthcare settings, uncontrolled blood pressure has been associated with smoking, obesity, inadequate self-monitoring, and poor medication adherence.[2] Community-based healthcare may provide an important platform for continuous hypertension management. In Indonesia, Posyandu facilitates blood pressure screening, health education, risk-factor monitoring, and referral. However, limited utilization, resource constraints, and inadequate follow-up may reduce its effectiveness.[3] Previous community-based interventions have improved hypertension-related knowledge, self-management, and preventive behaviors, although their effects on sustained blood pressure control remain inconsistent.[4–6]

Hypertension management also involves healthy lifestyle practices and social support. The CERDIK framework promoted by the Indonesian Ministry of Health emphasizes regular health checks, smoking cessation, physical activity, a balanced diet, adequate rest, and stress management. Family-based interventions have been associated with improved medication adherence and lifestyle modification[7–9], while community health worker interventions involving family participation may strengthen social support and improve blood pressure-related outcomes.[10] Thus, healthcare utilization, treatment adherence, health behaviors, and family support may collectively contribute to blood pressure control.

In Surakarta, the number of people receiving standardized hypertension services has continued to increase following the expansion of screening and early detection activities.[11] However, increased service coverage does not necessarily ensure adequate blood pressure control. Previous studies have generally examined community healthcare utilization, medication adherence, lifestyle behaviors, or family support separately. Evidence integrating these factors within a single multivariable framework remains limited in Indonesian community-based settings.

Therefore, this study aimed to examine the association between community-based health service utilization and blood pressure control among adults with hypertension in Surakarta, Indonesia. The analysis focused on Posyandu attendance while accounting for medication adherence, CERDIK healthy lifestyle behaviors, and family support using multivariable logistic regression analysis.

Methods

This study was a quantitative analytic observational study using a cross-sectional design. It was conducted at Posyandu in Surakarta, Indonesia, from June to August 2026. The study examined the associations of active Posyandu attendance, CERDIK behavior, medication adherence, and family support with blood pressure control among adults with hypertension. The target population consisted of 67,891 adults with hypertension aged ≥15 years registered in Surakarta based on the 2025 Surakarta Health Profile. The minimum sample size was calculated using the Slovin formula with a 5% margin of error, resulting in 398 participants. To strengthen the statistical analysis and anticipate missing data, the final sample consisted of 400 participants. Participants were selected using purposive sampling. The inclusion criteria were adults aged ≥18 years with hypertension, registered as Posyandu participants, willing to participate and provide written informed consent, and able to communicate effectively. Participants who did not complete the questionnaire or undergo blood

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pressure measurement were excluded from the analysis.

Blood pressure control was the dependent variable, while active Posyandu attendance, medication adherence, CERDIK behavior, and family support were the independent variables. Blood pressure was measured using a validated sphygmomanometer according to standard procedures and was categorized as controlled when systolic blood pressure was <140 mmHg and diastolic blood pressure was <90 mmHg, and uncontrolled when systolic blood pressure was ≥140 mmHg and/or diastolic blood pressure was ≥90 mmHg. Active Posyandu attendance was assessed using an eight-item dichotomous questionnaire, with scores ranging from 0 to 8. Participants scoring ≥6 were categorized as active and those scoring <6 as inactive. Medication adherence was assessed using an eight-item dichotomous questionnaire with scores ranging from 0 to 8; scores ≥6 indicated adherence, while scores <6 indicated non-adherence. CERDIK behavior was assessed using 10 dichotomous items covering regular health checks, avoiding smoking exposure, physical activity, a healthy and balanced diet, adequate rest, and stress management. Scores ranged from 0 to 10, with scores ≥8 categorized as good CERDIK behavior and scores <8 as poor behavior. Family support was assessed using eight dichotomous items covering emotional, informational, instrumental, and appraisal support. Scores ranged from 0 to 8, with scores ≥6 indicating good family support and scores <6 indicating poor support.

Data were collected through structured interviews using a researcher-developed questionnaire based on Indonesian Ministry of Health guidelines for hypertension control, CERDIK behavior indicators, and relevant literature on Posyandu utilization, medication adherence, and family support among people with hypertension. The questionnaire consisted of four domains: active Posyandu attendance (8 items), medication adherence (8 items), CERDIK behavior (10 items), and family support (8 items). Before the main study, the questionnaire was tested for validity using the Pearson Product-Moment correlation and for reliability using Cronbach's alpha. All items had correlation coefficients ranging from 0.378 to 0.543, exceeding the r-table value of 0.361, and were therefore considered valid. The questionnaire demonstrated good internal consistency, with a Cronbach's alpha of 0.879.

Data were analyzed using IBM SPSS Statistics. Descriptive analysis was performed using frequencies and percentages to summarize participant characteristics and the distribution of study variables. The associations between each independent variable and blood pressure control were examined using the Chi-square test. Variables with $p<0.25$ in the bivariate analysis were included in multiple logistic regression to identify factors independently associated with blood pressure control. The results were presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs), and statistical significance was set at $p<0.05$.

This study received ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto (KEPK/UMP/266/VI/2026), issued on June 28, 2026. All participants received an explanation of the study objectives, benefits, and procedures before providing written informed consent. Voluntary participation, anonymity, confidentiality, and respect for participants' rights were maintained throughout the study.

Result

A total of 400 adults with hypertension participated in the study. More than half of the participants were aged ≥60 years (54.0%) and were female (64.5%). Regarding educational attainment, 35.0% had no formal education and 33.0% had completed primary school. Nearly one-third of the participants were unemployed (32.0%), while 23.2% were traders and 14.8% were laborers. Most participants had lived with hypertension for 1–5 years (43.5%), followed by

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those with hypertension for >5 years (40.5%). Almost half of the participants had no reported comorbidities (49.0%), while diabetes mellitus was the most common comorbidity (24.0%), followed by heart disease (11.0%) and stroke (6.0%).

Table 1. Characteristics of the study participants (n=400)

Characteristics	Category	Frequency	Percentage (%)
Age (years)	18–44	28	7.0
	45–59	156	39.0
	≥60	216	54.0
Sex	Male	142	35.5
	Female	258	64.5
Educational level	No formal education	140	35.0
	Primary school	132	33.0
	Junior high school	60	15.0
	Senior high school	52	13.0
	Diploma	9	2.3
	Bachelor's degree	7	1.7
Occupation	Unemployed	128	32.0
	Farmer	8	2.0
	Laborer	59	14.8
	Trader	93	23.2
	Government/Private employee	34	8.5
	Self-employed	46	11.5
	Others	32	8.0
Duration of hypertension	<1 year	64	16.0
	1–5 years	174	43.5
	>5 years	162	40.5
History of comorbidities	None	196	49.0
	Diabetes mellitus	96	24.0
	Heart disease	44	11.0
	Stroke	24	6.0
	Others	40	10.0

More than half of the participants actively attended Posyandu (57.5%), adhered to antihypertensive medication (55.0%), demonstrated good CERDIK healthy lifestyle behaviors (54.7%), and reported good family support (54.3%). Overall, 61.5% of participants had controlled blood pressure, while 38.5% had uncontrolled blood pressure.

Table 2. Distribution of study variables (n=400)

Variables	Category	n	%
Posyandu attendance	Inactive	170	42.5
	Active	230	57.5
Medication adherence	Non-adherent	180	45.0
	Adherent	220	55.0
CERDIK healthy lifestyle behaviors	Poor	181	45.3
	Good	219	54.7
Family support	Poor	183	45.7
	Good	217	54.3
Blood pressure control	Uncontrolled	154	38.5
	Controlled	246	61.5

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Chi-square analysis demonstrated significant associations between all four independent variables and blood pressure control. Active Posyandu attendance was associated with higher odds of controlled blood pressure (OR=1.957; 95% CI=1.300–2.948; p=0.001). Medication adherence was also significantly associated with blood pressure control (OR=1.720; 95% CI=1.145–2.583; p=0.009). Good CERDIK healthy lifestyle behaviors were associated with higher odds of controlled blood pressure (OR=1.620; 95% CI=1.080–2.431; p=0.019). Similarly, participants reporting good family support had higher odds of blood pressure control (OR=1.707; 95% CI=1.137–2.562; p=0.010).

Table 3. Bivariate analysis of factors associated with blood pressure control

Variables	Blood Pressure Control				p	OR (95% CI)
	Uncontrolled		Controlled			
	n	%	n	%		
***Posyandu* attendance**						
Inactive	81	20.3	89	22.2	0.001	1.957 (1.300–2.948)
Active	73	18.2	157	39.3		
Medication adherence						
Non-adherent	82	20.5	98	24.5	0.009	1.720 (1.145–2.583)
Adherent	72	18.0	148	37.0		
***CERDIK* healthy lifestyle behaviors**						
Poor	81	20.3	100	25.0	0.019	1.620 (1.080–2.431)
Good	73	18.2	146	36.5		
Family support						
Poor	83	20.7	100	25.0	0.010	1.707 (1.137–2.562)
Good	71	17.8	146	36.5		

All independent variables were eligible for inclusion in the multivariable logistic regression model based on the predefined criterion of p<0.25 in the bivariate analysis. After adjustment for medication adherence, CERDIK healthy lifestyle behaviors, and family support, active Posyandu attendance remained significantly associated with blood pressure control (AOR=2.960; 95% CI=1.077–8.138; p=0.035). Participants with active Posyandu attendance had approximately three times the odds of controlled blood pressure compared with those with inactive attendance. Medication adherence (AOR=1.292; 95% CI=0.182–9.183; p=0.798), CERDIK healthy lifestyle behaviors (AOR=0.359; 95% CI=0.067–1.935; p=0.233), and family support (AOR=1.365; 95% CI=0.232–8.033; p=0.731) were not independently associated with blood pressure control after adjustment.

Table 4. Multivariable logistic regression analysis of factors associated with blood pressure control

Independent Variables	AOR	95% CI		p
		Lower limit	Upper limit	
Posyandu attendance	2.960	1.077	8.138	0.035
Medication adherence	1.292	0.182	9.183	0.798
CERDIK healthy lifestyle behaviors	0.359	0.067	1.935	0.233
Family support	1.365	0.232	8.033	0.731

Discussion

Community-based health service utilization with blood pressure control

The most important finding of this study was the significant association between Posyandu attendance and blood pressure control after adjustment for medication adherence, CERDIK healthy lifestyle behaviors, and family

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support. Participants who actively attended Posyandu had almost three times higher odds of achieving controlled blood pressure than those with inactive attendance (AOR=2.960; 95% CI=1.077–8.138; p=0.035). This finding indicates that engagement with community-based health services may have an important role in supporting hypertension control beyond individual behavioral and social factors.

The result is consistent with previous studies demonstrating the potential contribution of community-based interventions to hypertension management. Participation in POSBINDU improved hypertension-related knowledge, although its association with hypertension control practices was not statistically significant.[4] Regular participation in Posbindu supported self-care practices among older adults.[12] In addition, community health worker interventions incorporating health education, follow-up, and blood pressure monitoring increased the likelihood of achieving controlled blood pressure.[10] These findings suggest that community-based services may influence hypertension management through repeated interaction and continued support rather than through a single health intervention.

The association observed in the present study may be related to the opportunities provided by regular Posyandu participation. Continued contact with community-based services may facilitate blood pressure monitoring, health education, reinforcement of recommended behaviors, treatment-related counseling, and referral when further assessment is needed. Evidence from Indonesia also indicates that hypertension management can be strengthened through community-based programs involving POSBINDU, community health volunteers, and routine program evaluation, although sustained patient participation remains an important challenge.[13] WHO recommendations likewise emphasize regular blood pressure monitoring, follow-up, patient education, and strengthening primary healthcare as important components of hypertension management.[14,15]

From a public health perspective, the finding suggests that Posyandu may serve as an important point of continuity between individuals with hypertension and the primary healthcare system. Regular utilization can provide repeated opportunities to identify uncontrolled blood pressure and reinforce self-management. However, the cross-sectional design prevents determination of whether active Posyandu attendance leads to better blood pressure control or whether individuals with better health management are more likely to attend regularly. Longitudinal studies are therefore needed to clarify the temporal relationship between community-based service utilization and blood pressure control.

Medication adherence with blood pressure control

Medication adherence was associated with blood pressure control in the bivariate analysis but did not remain statistically significant after adjustment (AOR=1.292; 95% CI=0.182–9.183; p=0.798). Thus, although medication adherence was related to blood pressure control before adjustment, it was not independently associated with the outcome when Posyandu attendance, CERDIK behaviors, and family support were considered simultaneously.

This finding differs from previous evidence emphasizing medication adherence as an important determinant of hypertension control. Patients with moderate or high medication adherence were less likely to experience uncontrolled hypertension.[16] Behavioral, psychological, and socioeconomic factors as important influences on adherence[17], while medication non-adherence to be an independent predictor of uncontrolled blood pressure in primary healthcare settings.[2] The differences may reflect variations in study populations, healthcare settings, and the way adherence and blood pressure control were measured.

One possible explanation is the community-based setting of the present study. Participants were individuals receiving or utilizing Posyandu-based services, where hypertension management may involve not only medication use but also blood pressure monitoring, health education, counseling, and social support. Consequently, the contribution of medication adherence may overlap with other

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components of community-based hypertension management. WHO guidance emphasizes that pharmacological treatment should be accompanied by regular follow-up, blood pressure monitoring, patient education, and strengthened primary healthcare services.[14,15]

The wide confidence interval of the adjusted estimate also indicates considerable uncertainty around the observed association. Therefore, the non-significant finding should not be interpreted as evidence that medication adherence is unimportant. Rather, within this multivariable model, medication adherence did not demonstrate an independent statistical association with blood pressure control. Future longitudinal studies using objective or repeated measures of adherence may provide a clearer understanding of its contribution within community-based hypertension care.

CERDIK healthy lifestyle behaviors with blood pressure control

CERDIK healthy lifestyle behaviors were significantly associated with blood pressure control in the bivariate analysis but were not statistically significant after multivariable adjustment (AOR=0.359; 95% CI=0.067–1.935; p=0.233). This result suggests that the observed crude relationship between healthy lifestyle behaviors and blood pressure control may be influenced by other factors included in the model.

Previous studies have emphasized the importance of community-based health promotion in strengthening hypertension-related knowledge and healthy behaviors. Improvements in hypertension-related knowledge following participation in POSBINDU, although these improvements did not consistently translate into better hypertension control practices.[4] Community empowerment and health promotion could strengthen health literacy and healthy behaviors.[18] Similarly, demonstrated that intensive community-based interventions involving health education, home visits, and regular follow-up improved blood pressure control.[10]

The absence of an independent association in this study may reflect the interconnected nature of lifestyle behaviors and healthcare utilization. Active Posyandu participation may provide repeated opportunities for health education, lifestyle counseling, blood pressure monitoring, and reinforcement of recommended behaviors. Hypertension control is influenced by interrelated factors, including healthcare access, continuity of care, and patient management.[19] The importance of sustained community participation and patient engagement in hypertension management in Surakarta.[13]

Another consideration is that CERDIK behaviors were assessed using self-reported information. Such measurement may be affected by recall or social desirability bias, potentially reducing the ability to detect an independent association. In addition, because this study was cross-sectional, the observed relationships cannot establish causality. Further longitudinal research is needed to determine whether sustained improvements in CERDIK behaviors contribute to long-term blood pressure control when integrated with community-based healthcare services.

Family support with blood pressure control

Family support was associated with blood pressure control in the bivariate analysis (OR=1.707; 95% CI=1.137–2.562; p=0.010). However, the association was no longer statistically significant after adjustment (AOR=1.365; 95% CI=0.232–8.033; p=0.731). This indicates that family support was not independently associated with blood pressure control in the final multivariable model.

The bivariate finding is consistent with previous research highlighting the importance of family and social support in hypertension management. A family self-management program improved medication adherence, low-salt diet compliance, and blood pressure outcomes.[20] Community-based interventions involving family members and community health workers improved blood pressure control and perceived social support.[10] Furthermore, greater social support was associated with better self-care practices among individuals with hypertension.[21] The contribution of family and social support to medication adherence.[22]

The loss of statistical significance after adjustment may indicate that family support

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operates through other components of hypertension management rather than directly determining blood pressure control. Support from family members may encourage medication adherence, healthy lifestyle practices, and utilization of community-based health services. Inadequate family support as a barrier to hypertension self-care in Indonesia[23], while an association between family support and active participation in elderly Posyandu. These findings suggest that family support may be particularly relevant in facilitating engagement with community-based services.[24]

Although family support was not independently associated with blood pressure control in the present study, it remains a potentially important component of community-based hypertension management. Integrating family-oriented education and support into Posyandu activities may help reinforce treatment adherence, healthy behaviors, and continued participation in hypertension services.

Implications for Community-Based Hypertension Management

The findings have several implications for hypertension management at the community level. The independent association between Posyandu attendance and blood pressure control suggests that community-based health services may represent an important opportunity to strengthen continuity of hypertension care. Rather than functioning solely as a screening point, Posyandu can be used as a platform for repeated monitoring, health education, reinforcement of self-management, and identification of individuals who require further clinical evaluation.

The findings also indicate that hypertension control should be approached as a multidimensional process. Medication adherence, CERDIK behaviors, and family support were associated with blood pressure control in the bivariate analysis but did not remain independently significant after adjustment. This pattern suggests that these factors may interact with healthcare utilization and operate within a broader system of community-based hypertension management.

From a public health perspective, strengthening Posyandu participation may therefore be a feasible strategy for improving continuity of hypertension care. Community-based programs could prioritize regular attendance, consistent blood pressure monitoring, individualized health education, medication-related counseling, lifestyle promotion, family involvement, and timely referral to primary healthcare facilities. However, intervention and longitudinal studies are needed to determine whether strengthening Posyandu utilization can produce sustained improvements in blood pressure control.

Conclusions

Active Posyandu attendance was independently associated with blood pressure control among adults with hypertension in Surakarta, Indonesia. Although medication adherence, CERDIK healthy lifestyle behaviors, and family support were associated with blood pressure control in the bivariate analysis, none remained independently associated after adjustment. These findings underscore the potential role of community-based health services in supporting continuous hypertension monitoring and management. Strengthening Posyandu through regular blood pressure monitoring, health education, treatment support, lifestyle counseling, and referral may be valuable for community-based hypertension management. Further longitudinal research is needed to establish the temporal relationship between Posyandu utilization and blood pressure control.

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