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Factors Associated With Blood Pressure Control Among Patients In A Primary Health Care Center: A Cross-Sectional Study

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Abstrak

Hipertensi masih menjadi masalah kesehatan masyarakat utama dan dipengaruhi oleh berbagai faktor demografis, klinis, dan perilaku. Pemahaman terhadap faktor-faktor tersebut sangat penting untuk pengendalian tekanan darah yang efektif, khususnya di fasilitas pelayanan kesehatan primer. Penelitian ini bertujuan untuk menganalisis hubungan antara karakteristik demografis, klinis, dan perilaku dengan status tekanan darah pada pasien di sebuah pusat pelayanan kesehatan primer. Penelitian ini menggunakan desain potong lintang (*cross-sectional*) dengan data sekunder yang diperoleh dari rekam medis di Puskesmas Wayabula, Kabupaten Pulau Morotai, Indonesia, yang dikumpulkan pada periode Oktober hingga Desember 2025. Sebanyak 69 rekam medis pasien dianalisis. Data diolah menggunakan SPSS versi 26. Analisis deskriptif disajikan dalam bentuk frekuensi dan persentase. Hubungan antara variabel independen dengan status tekanan darah diuji menggunakan *uji Chi-square* atau *Fisher's Exact* dengan tingkat signifikansi $p < 0,05$. Sebagian besar responden berada pada kelompok usia dewasa, berjenis kelamin laki-laki, dan bekerja, dengan status gizi normal serta tekanan darah terkontrol. Hasil analisis menunjukkan terdapat hubungan yang bermakna antara status tekanan darah dengan kelompok usia, jenis kelamin, status pekerjaan, dan kebiasaan merokok ($p < 0,05$). Sementara itu, tingkat pendidikan, status gizi, dan aktivitas fisik tidak menunjukkan hubungan yang signifikan dengan status tekanan darah. Faktor demografis dan perilaku, khususnya usia, jenis kelamin, status pekerjaan, dan kebiasaan merokok, berhubungan secara signifikan dengan status tekanan darah. Temuan ini menegaskan pentingnya intervensi yang terarah di pelayanan kesehatan primer untuk meningkatkan pengendalian hipertensi.

Kata kunci: Faktor Demografis, Hipertensi, Perilaku, Pelayanan Kesehatan Primer

Abstract

Background: *Hypertension remains a major public health problem and is influenced by demographic, clinical, and behavioral factors. Understanding these factors is essential for effective blood pressure control, particularly in primary health care settings.* ***Objective:*** *This study aimed to analyze the association between demographic, clinical, and behavioral characteristics and blood pressure status among patients at a primary health care center.* ***Methods:*** *A cross-sectional study was conducted using secondary data obtained from medical records at Wayabula Primary Health Care Center, Pulau Morotai Regency, Indonesia, collected between October and December 2025. A total of 69 patient records were included. Data were analyzed using SPSS version 26. Descriptive statistics were presented as frequencies and percentages. Associations between variables and blood pressure status were examined using chi-square or Fisher's exact tests, with a significance level of $p < 0.05$.* ***Results:*** *Most participants were adults, male, and employed, with normal nutritional status and controlled blood pressure. Significant associations were found between blood pressure status and age group, gender, employment status, and smoking status ($p < 0.05$). Educational level, nutritional status, and physical activity were not significantly associated with blood pressure status.* ***Conclusion:*** *Demographic and behavioral factors, particularly age, gender, employment status, and smoking, were significantly associated with blood pressure status. These findings highlight the importance of targeted interventions in primary health care to improve hypertension control.*

Keywords: *Hypertension, Blood Pressure Control, Demographic Factors, Behavioral, Primary Health Care.*

1. INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases worldwide and remains a leading modifiable risk factor for cardiovascular morbidity and mortality, including stroke, coronary heart disease, heart failure, and chronic kidney disease. Globally, elevated blood pressure contributes substantially to premature death and disability, particularly in low- and middle-income countries (LMICs), where awareness, treatment, and control rates remain suboptimal [1], [2], [3]. Although effective pharmacological and lifestyle interventions are widely available, inadequate blood pressure control persists as a major public health concern. International clinical guidelines emphasize that sustained blood pressure control is essential to reduce cardiovascular events and all-cause mortality, especially when hypertension management is delivered through primary health care systems [4]. Poorly controlled blood pressure substantially increases the risk of cardiovascular complications and places a significant burden on health care systems, underscoring the importance of improving blood pressure control to reduce preventable morbidity and mortality [5].

In Indonesia, primary health care centers serve as the frontline of the health system and play a pivotal role in hypertension screening, treatment initiation, monitoring, and long-term management. These facilities are responsible for delivering essential health services to diverse populations, including those living in rural and remote areas. In line with global recommendations, Indonesia has implemented national guidelines and community-based programs to strengthen hypertension prevention and control at the primary care level. However, despite these efforts, many patients remain unable to achieve optimal blood pressure targets [6], [7], [8]. Challenges such as limited resources, variability in service delivery, gaps in continuity of care, and patient-related factors continue to hinder effective blood pressure control in primary health care settings [9], [10].

Blood pressure control is influenced by a complex interaction of demographic, socioeconomic, clinical, and behavioral factors. Previous studies have consistently identified age and gender as important determinants, with older adults often experiencing poorer blood pressure control due to age-related vascular changes, increased arterial stiffness, and a higher burden of comorbidities [11]. Socioeconomic factors, including employment status and educational attainment, may influence health literacy, access to health services, and adherence to antihypertensive treatment. In addition, behavioral factors such as physical activity and smoking are recognized as modifiable contributors to blood pressure regulation and are emphasized in international hypertension management guidelines [4]. Nevertheless, evidence regarding the relative importance of these factors remains inconsistent, particularly in primary health care contexts in Indonesia [10].

Although numerous studies have reported the prevalence and general risk factors of hypertension in Indonesia, research specifically examining factors associated with blood pressure control among patients attending primary health care centers is still limited. Moreover, many existing studies rely on population-based surveys, which may not fully reflect routine clinical practice and patient management in primary care settings. Understanding factors associated with controlled and uncontrolled blood pressure in primary health care is essential for designing targeted, context-specific interventions that align with international guidelines and local health system capacities. Therefore, this study aimed to analyze the demographic, clinical, and behavioral factors associated with blood pressure control among patients attending a primary health care center in Indonesia using a cross-sectional design.

2. METHODS

1) Study Design and Setting

This study employed a cross-sectional design using secondary data obtained from Wayabula Primary Health Care Center, Pulau Morotai Regency, Indonesia. The data were collected routinely by the health center and accessed for research purposes during the period from October to December 2025.

2) Data Source and Participants

Secondary data were retrieved from medical records of patients registered at the primary health care center during the study period. A total of 69 records that met the inclusion criteria and contained complete information on demographic characteristics, clinical variables, behavioral factors, and blood pressure status were included in the analysis.

3) Variables and Measurements

Demographic variables consisted of age group, gender, marital status, educational level, and employment status. Age was categorized into adults and older adults based on the age classification recorded in the medical records. Gender was classified as male or female. Marital status was recorded as married or not married. Educational level was categorized into elementary school and junior high school, while employment status was classified as employed or unemployed. Clinical variables included nutritional status and blood pressure status. Nutritional status was determined based on clinical assessment documented in the medical records and categorized as normal or abnormal. Blood pressure status was classified as controlled or uncontrolled according to routine clinical evaluation conducted by health care providers at the primary health care center and recorded in the patients' medical records. Behavioral variables comprised physical activity level and smoking status. Physical activity was categorized as adequate or inadequate based on information documented by health care providers during patient assessment. Smoking status was recorded as yes or no, indicating whether the participant was identified as a smoker at the time of data collection.

4) Statistical Analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were used to summarize participants' characteristics, presented as frequencies and percentages. Bivariate analysis was conducted to examine the association between demographic, clinical, and behavioral characteristics and blood pressure status. The chi-square test was applied when all expected cell counts were ≥5, while Fisher's exact test was used when expected cell counts were <5. A p-value <0.05 was considered statistically significant.

5) Ethical Considerations

Ethical approval for this study was obtained through official permission from Wayabula Primary Health Care Center (Approval No. 836/738.2/XII/PKM/2025). As the study utilized secondary data with no personal identifiers, informed consent from individual participants was not required. Data confidentiality and anonymity were strictly maintained throughout the research process.

3. RESULT

Table 1 shows the demographic, clinical, and behavioral characteristics of the study participants. The majority of participants were adults (55.1%), male (68.1%), married (100.0%), had elementary-level education (88.4%), and were employed (69.6%). Most participants had normal nutritional status (97.1%) and controlled blood pressure (60.9%). Regarding behavioral factors, more than half reported adequate physical activity (63.8%), while smoking was prevalent among 59.4% of participants.

Table 1. Demographic, Clinical, and Behavioral Characteristics of Participants at Wayabula Primary Health Care Center, Pulau Morotai Regency, Indonesia

Variable	Frequency (n= 69)	Percent (%)
Demographic Characteristics		
Age Group		
Adults	38	55,1
Older adults	31	44,9
Gender		
Male	47	68,1
Female	22	31,9
Marital Status		
Married	69	100,0
Not Married	0	0,0
Educational Level		
Elementary School	61	88,4
Junior High School	8	11,6
Employment Status		
Employed	48	69,6
Unemployed	21	30,4
Clinical Characteristics		
Nutritional Status		
Normal	67	97,1
Abnormal	2	2,9
Blood Pressure Status		
Controlled	42	60,9
Uncontrolled	27	39,1
Behavioral Factors		
Physical Activity		
Adequate	44	63,8
Inadequate	25	36,2
Smoking Status		
Yes	41	59,4
No	28	40,6

Table 2 shows the association between demographic, clinical, and behavioral characteristics and blood pressure status. Age group was significantly associated with blood pressure status ($p = 0.016$), with a higher proportion of uncontrolled blood pressure observed among older adults. Gender and employment status were also significantly associated with

blood pressure status ($p < 0.001$ for both), where uncontrolled blood pressure was more common among females and unemployed participants. Smoking status demonstrated a strong significant association with blood pressure status *($p < 0.001$),* with all participants who reported smoking exhibiting controlled blood pressure. In contrast, educational level, nutritional status, and physical activity were not significantly associated with blood pressure status *($p > 0.05$).*

Table 2. Association between Demographic, Clinical, and Behavioral Characteristics and Blood Pressure Status at Wayabula Primary Health Care Center, Pulau Morotai Regency, Indonesia

Variable	**Blood Pressure Status**				***p-value***	**Statistical Test**
	Variable		**Uncontrolled**			
	n= 42	**(%)**	**n= 27**	**(%)**		
Demographic Characteristic						
Age Group					0.016*	Chi-square
Adults	28	(40,6)	10	(14,5)		
Older Adults	14	(20,3)	17	(24,6)		
Gender					0.000*	Chi-square
Male	41	(59,4)	6	(8,7)		
Female	1	(1,4)	21	(30,4)		
Educational Level					0.136	Fisher's Exact
Elementary School	35	(50,7)	26	(37,7)		
Junior High School	7	(10,1)	1	(1,4)		
Employment Status					0.000*	Chi-square
Employed	41	(59,4)	7	(10,1)		
Unemployed	1	(1,4)	20	(29,0)		
Clinical Characteristics						
Nutritional Status					0.517	Fisher's Exact
Normal	40	(58,0)	27	(39,1)		
Abnormal	2	(2,9)	0	(0,0)		
Behavioral Factors						
Physical Activity					0.688	Chi-square
Adequate	26	(37,7)	18	(26,1)		
Inadequate	16	(23,2)	9	(13,0)		
Smoking Habit					0.000*	Chi-square
Yes	41	(59,4)	0	(0,0)		
No	1	(1,4)	27	(39,1)		

Note: *Chi-square test was used when all expected cell counts were ≥5, Fisher's exact test was applied when expected cell counts were <5. A p-value <0.05 was considered statistically significant.*

4. DISCUSSION

This study examined factors associated with blood pressure control among patients attending a primary health care center in Indonesia. The findings demonstrate that age group, gender, employment status, and smoking status were significantly associated with blood pressure control, whereas educational level, nutritional status, and physical activity were not. These results highlight the multifactorial nature of blood pressure control and emphasize the prominent role of demographic and socioeconomic determinants in primary health care settings.

Age was significantly associated with blood pressure control, with older adults showing a higher proportion of uncontrolled blood pressure compared to younger adults. This finding is consistent with extensive evidence indicating that increasing age is a major determinant of poor blood pressure control due to progressive vascular stiffening, endothelial dysfunction, and cumulative exposure to cardiovascular risk factors [1], [12], [13]. Global analyses have shown that blood pressure tends to rise steadily with age, particularly in low- and middle-income countries, where access to long-term care and optimal treatment may be limited [5]. Similar age-related patterns have been reported in Indonesian and regional primary care studies, indicating that older populations remain particularly vulnerable to uncontrolled hypertension [10], [11].

Gender differences were also evident in this study, with females exhibiting a higher proportion of uncontrolled blood pressure compared to males. Although population-based studies often report a higher prevalence of hypertension among men, evidence from primary care settings suggests that women may experience poorer blood pressure control [14]. Potential explanations include postmenopausal hormonal changes, differences in health-seeking behavior, variations in treatment adherence, and possible differences in clinical management, all of which may influence blood pressure regulation among women [4], [15].

Employment status showed a strong association with blood pressure control, with unemployed participants more likely to have uncontrolled blood pressure than those who were employed. This finding supports growing evidence that socioeconomic disadvantage plays a critical role in hypertension management. Employment and income stability influence access to health services, continuity of care, medication affordability, and the ability to adopt healthy lifestyles [16], [17]. Studies conducted in Indonesia further highlight that socioeconomic disparities remain a major barrier to effective hypertension control within primary health care systems, particularly among vulnerable populations [6].

Smoking status was significantly associated with blood pressure control, however, the observed pattern, where smokers were predominantly classified as having controlled blood pressure should be interpreted cautiously. This counterintuitive finding may reflect reporting bias, misclassification, or residual confounding by factors such as age, disease severity, or treatment status that were not adjusted for in this bivariate analysis. Substantial evidence indicates that smoking is a well-established risk factor for hypertension and cardiovascular disease through mechanisms including sympathetic nervous system activation, vascular inflammation, and increased arterial stiffness [18], [19]. Therefore, the apparent protective association observed in this study likely reflects methodological limitations rather than a true biological effect.

In contrast, educational level, nutritional status, and physical activity were not significantly associated with blood pressure control. These findings differ from several studies demonstrating strong associations between lifestyle factors and hypertension control [10], [20]. However, findings from the Malaysian Journal of Public Health Medicine by Priasmoro and Lestari [21] show that sedentary behavior is still very prevalent and contributes to the risk of

chronic diseases such as hypertension and stress, indicating that behavioral influences can work through complex and indirect mechanisms. Therefore, the insignificant results in this study likely reflect limitations in sample size and measurement sensitivity rather than the absence of an actual effect.

Overall, these findings confirm the importance of demographic and socioeconomic factors as key determinants of blood pressure control in patients in Indonesian primary health care services. The results of a study by Priasmoro et al. [22] show that family acceptance and support play a major role in chronic disease management outcomes, but contextual variables such as these are still rarely integrated into routine hypertension records. Meanwhile, in another study by Sholeh, Priasmoro, and Patria [23] added that psychological dimensions such as self-acceptance also contribute to improving the quality of life of patients with degenerative diseases. This gap indicates that primary care strategies that are overly focused on biomedical indicators may overlook important social determinants, thereby reducing the effectiveness of cardiovascular risk reduction interventions.

5. CONCLUSIONS

This study provides evidence on factors associated with blood pressure control among patients attending a primary health care center in Indonesia. The findings demonstrate that blood pressure status is significantly associated with demographic and socioeconomic characteristics, particularly age group, gender, and employment status, as well as smoking status. Older adults and unemployed individuals were more likely to experience uncontrolled blood pressure, highlighting the influence of aging and socioeconomic vulnerability on hypertension management in primary care settings.

In contrast, clinical and lifestyle-related factors such as educational level, nutritional status, and physical activity were not significantly associated with blood pressure control in this study. These results suggest that, within the context of routine primary health care services, demographic and social determinants may play a more prominent role than individual lifestyle characteristics in shaping blood pressure outcomes. However, the absence of significant associations with lifestyle factors should be interpreted cautiously, given the reliance on secondary data and simplified variable categorization.

Overall, the findings underscore the importance of strengthening hypertension management strategies in primary health care by prioritizing high-risk groups, particularly older adults, women, and socioeconomically disadvantaged patients. Integrating targeted screening, regular follow-up, and context-specific counseling into routine services may improve blood pressure control and reduce the burden of hypertension-related complications. Further studies with larger samples, longitudinal designs, and more comprehensive measurements are recommended to confirm these findings and to better inform evidence-based interventions for hypertension control in Indonesia.

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