Original Article

Sociodemographic and Cultural Determinants of Hypertension-Controlling Beliefs Among Older Adults: A Cross-Sectional Study Based on the Health Belief Model

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ABSTRACT

Background: Hypertension control among older adults in Indonesia is hindered by low adherence and strong cultural beliefs. However, there is insufficient evidence on how sociodemographic and cultural determinants interact with health belief constructs to influence hypertension-control beliefs in older populations. This study examines sociodemographic and cultural determinants of hypertension-controlling beliefs using the Health Belief Model (HBM).

Methods: A cross-sectional study was conducted among 232 older adults (≥60 years) in coastal Madura, Indonesia. Data were collected via structured interviews using the HBM Questionnaire (HBMQ) and cultural belief items. Descriptive, bivariate, and multivariate analyses were performed.

Results: Higher education, retirement, and perceiving hypertension as a lifestyle consequence were significantly associated with stronger beliefs ($p < 0.05$). Although 76.3% trusted doctors, 40.9% still visited traditional healers. Belief in lifestyle etiology was the strongest predictor ($\beta = 0.20$, $p = 0.002$).

Conclusion: Cultural and educational factors significantly shape hypertension beliefs. Interventions should integrate biomedical education with cultural sensitivity to improve self-management in older populations.

***Keywords*:** Hypertension; Older adults; Health belief model; Cultural beliefs; Self-management.

Implications for Practice:

- Clinically, integrating culturally sensitive health education into routine hypertension management may strengthen patients' illness perceptions and improve adherence to long-term self-care among older adults.
- At the health policy level, developing community-based programs that incorporate collaboration with traditional and religious leaders could enhance the acceptability and effectiveness of hypertension control strategies.
- In midwifery education, embedding culturally informed and resource-adaptive approaches into the curriculum is essential to prepare

Implications for Practice:

practitioners for delivering patient-centered care in Low- and Middle-Income Countries (LMICs) and other resource-limited settings.

Introduction

Hypertension is a leading risk factor for cardiovascular diseases, stroke, and premature mortality worldwide, particularly among older adults. The Global Burden of Disease Study 2021 estimated that over 1.4 billion people live with hypertension, with more than 80% residing in low- and middle-income countries (LMICs) where healthcare access and chronic disease management remain major challenges (Giena, Thongpat, and Nitirat 2018). In Indonesia, the prevalence of hypertension among adults aged ≥60 years exceeds 57%, yet control rates remain below 20%, indicating a critical gap between diagnosis and effective self-management (Jung and Moon 2023).

Effective hypertension control depends not only on biomedical treatment but also on patients' health beliefs and behaviors. The Health Belief Model (HBM) provides a robust theoretical framework for understanding how individuals perceive susceptibility, severity, benefits, and barriers to health actions (Nematzad et al. 2023). Studies have consistently shown that stronger perceived susceptibility and benefits are associated with higher medication adherence and lifestyle modification, while perceived barriers often lead to treatment non-compliance (Khasanah et al. 2024). Therefore, assessing belief systems is essential for designing effective behavioral interventions.

In many Indonesian communities, traditional and spiritual healing practices coexist with biomedical care, creating a dual health-seeking behavior that influences chronic disease management. Cultural beliefs—such as viewing illness as divine punishment or trusting traditional healers over doctors—can significantly affect treatment adherence and health outcomes (Alinejad et al. 2025). In coastal regions like Madura, where social, religious, and cultural norms are deeply embedded, these beliefs may further complicate hypertension control, yet they remain underexplored in existing literature ((Irwan et al. 2024; Liew et al. 2019).

To date, few studies in Indonesia have integrated sociodemographic, cultural, and psychosocial factors within the HBM framework to examine hypertension-controlling beliefs among older adults. This study aims to fill this gap by investigating how age, education, occupation, and cultural beliefs influence health beliefs in a coastal population. The findings will inform culturally sensitive interventions that bridge biomedical recommendations with local worldviews, ultimately improving hypertension self-management in underserved communities.

Methods

Study Design

This cross-sectional study was conducted in coastal communities of Madura, East Java, Indonesia, from 14 February to 14 March 2025. Madura was selected due to its unique sociocultural context, where biomedical care coexists with traditional and spiritual healing practices. The study aimed to examine sociodemographic and cultural factors associated with hypertension-controlling beliefs among older adults.

Participants

A purposive sampling method was employed to recruit 232 participants from community health centers and Integrated Health Service Posts for older adults in selected coastal areas. The sample size was initially estimated using a rule of thumb of 10 participants per item for questionnaire-

based studies (Murtagh & Heck, 2012), resulting in a minimum target of 200 participants for the 47-item instrument, which ensured adequate statistical power for factor analysis and regression modeling. Eligibility criteria included individuals aged ≥60 years, residence in the designated coastal region for at least 10 years to ensure cultural immersion, a diagnosis of hypertension (defined as systolic blood pressure ≥140 mmHg or diastolic ≥90 mmHg based on the average of two measurements, or a self-reported diagnosis by a healthcare provider), and no severe physical or cognitive impairment that could interfere with participation, as assessed through a brief screening of communication ability and comprehension. Participants were excluded if they experienced acute illness during data collection or declined to provide informed consent.

Instruments

Data were collected using a structured questionnaire consisting of three sections: sociodemographic characteristics, hypertension-controlling beliefs, and cultural beliefs. The sociodemographic section gathered information on participants' age, gender, marital status, education level, occupation, and duration of hypertension in years. Hypertension-controlling beliefs were assessed using the Health Belief Model Questionnaire (HBMQ), a validated instrument adapted from Yang et al. (2016) and previously tested in Indonesian populations. The HBMQ consists of 47 items covering six domains: perceived susceptibility (8 items), perceived severity (5 items), perceived threat (5 items), perceived benefits (11 items), perceived barriers (10 items), and perceived self-efficacy (8 items). Responses were measured using a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating stronger beliefs in hypertension control. Items in the perceived barriers domain were reverse-scored so that higher scores reflected fewer perceived obstacles. Domain scores were calculated by summing item responses.

To capture sociocultural dimensions of health behavior, three additional items were included to assess participants' trust in healthcare providers, preferred source of advice when medical and traditional recommendations conflicted, and perceptions regarding the causes of hypertension. These culturally contextual questions were developed to reflect local health-seeking practices in coastal Madura communities.

Prior to data collection, a rigorous validation process was conducted to ensure the content validity and reliability of the instruments. The HBMQ was reviewed by a panel of five experts in nursing, public health, gerontology, and behavioral medicine, who evaluated each item for relevance, clarity, and cultural appropriateness using the Content Validity Index (CVI). All items achieved an Item-Level CVI (I-CVI) of at least 0.80, with a Scale-Level CVI based on universal agreement (S-CVI/UA) of 0.91 and an average scale CVI (S-CVI/AVE) of 0.93, indicating excellent content validity.

The internal consistency of the instrument was assessed using Cronbach's alpha. Reliability coefficients for each domain were as follows: perceived susceptibility ($\alpha = 0.82$), perceived severity ($\alpha = 0.79$), perceived threat ($\alpha = 0.81$), perceived benefits ($\alpha = 0.88$), perceived barriers ($\alpha = 0.85$), and perceived self-efficacy ($\alpha = 0.87$), with an overall HBMQ reliability of $\alpha = 0.89$. All coefficients exceeded the recommended threshold of 0.70, indicating high internal consistency. Item deletion analysis showed that removal of any item did not significantly improve the alpha value, supporting retention of all questionnaire items.

The culturally adapted questions were further evaluated through cognitive interviewing during the pilot phase to ensure semantic clarity and cultural relevance. Terms such as "spiritual healer" were operationalized using locally understood terminology referring to traditional healers. Participant responses were also cross-validated with ethnographic notes from community health workers to enhance ecological validity and contextual accuracy.

Data Collection

Data were collected between 14 February and 14 March 2025 through face-to-face interviews conducted in participants' homes and community health posts. Five trained research assistants, consisting of nursing and public health students fluent in both Bahasa Indonesia and the Madurese dialect, administered the questionnaire using a paper-based format.

Before data collection, each participant received a clear explanation of the study objectives, procedures, confidentiality measures, and their right to withdraw at any time. Written informed consent was obtained from all participants; for those unable to write, a thumbprint was accepted and witnessed.

In addition to questionnaire data, blood pressure measurements were taken twice using a calibrated digital sphygmomanometer after the participant had rested for at least five minutes. The average of the two measurements was recorded to improve accuracy.

Data Analysis

All completed questionnaires were reviewed for completeness, coded, and entered into Microsoft Excel before being exported to **SPSS Statistics version 28** for statistical analysis.

Descriptive statistics were used to summarize participant characteristics, including frequencies and percentages for categorical variables and means with standard deviations for continuous variables.

Bivariate analyses were conducted using independent samples *t*-tests and one-way ANOVA to examine differences in hypertension-controlling belief scores across sociodemographic and cultural categories. Variables with a p-value < 0.10 in bivariate analysis were included in the multivariate model.

Multivariate linear regression with backward elimination was performed to identify independent predictors of total hypertension-controlling belief scores. Model results were reported using unstandardized coefficients (B), standardized beta coefficients (β), 95% confidence intervals, and p-values. Model fit was evaluated using the adjusted R^2 statistic.

Prior to regression analysis, data normality was assessed using the Kolmogorov–Smirnov test, where a p-value greater than 0.05 indicated normal distribution of residuals.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Universitas Wiraraja, Sumenep, East Java (Approval No. 142.1/KEPK/II/2025). All study procedures were conducted in accordance with the principles of the Declaration of Helsinki.

Participants were informed about the purpose of the study, voluntary nature of participation, confidentiality of their responses, and their right to withdraw at any time without consequences. Written informed consent was obtained prior to participation. Personal identifiers were removed from the dataset, and all data were

stored securely with access restricted to the research team only.

Results

A total of 232 older adults with hypertension participated in this study. The results are structured into two main sections: (1) the sociodemographic and cultural characteristics of the participants, and (2) the bivariate and multivariate associations between these characteristics and hypertension-controlling belief scores. Descriptive analyses revealed notable patterns in healthcare preferences and illness perceptions, while inferential statistics identified key demographic and cultural factors significantly associated with participants' beliefs about hypertension management. All analyses were conducted on complete cases, and assumptions for parametric testing were met.

Table 1. Sociodemographic and Cultural Characteristics of Participants (N = 232)

Variable	Category	N (%)
Age (years)	60–69	86 (37.1)
	70–80	146 (62.9)
Gender	Male	130 (56.0)
	Female	102 (44.0)
Marital Status	Married	105 (45.3)
	Widow/Widower	108 (46.6)
	Single/Divorced	19 (8.2)
Education Level	No formal / Primary	39 (16.8)
	Junior High School	94 (40.5)
	Senior High School	94 (40.5)
	Diploma or Above	5 (2.2)
Occupation	Farmer	27 (11.6)
	Housewife	52 (22.4)
	Retiree	15 (6.5)
	Fisherman	66 (28.4)
	Trader	34 (14.7)
	Unemployed	38 (16.4)
Duration of Hypertension	≤ 5 years	107 (46.1)
	6–10 years	96 (41.4)
	>10 years	29 (12.5)
Cultural Beliefs		
Trust in treatment provider	Medicine	177 (76.3)
	Traditional physician	55 (23.7)
Choice in treatment conflict	Medicine	152 (65.5)
	Traditional physician	80 (34.5)
More frequently visited	Medicine	137 (59.1)
	Traditional physician	95 (40.9)
Belief about cause of hypertension	Not a serious concern	95 (40.9)
	Unhealthy lifestyle	126 (54.3)
	God's punishment	11 (4.7)

Table 1 Shown the sample was predominantly older (62.9% aged 70–80 years), married or widowed (91.9%), and had completed at least junior high school education (81.0%). The majority were engaged in traditional occupations, with fishermen (28.4%) and housewives (22.4%) representing the largest groups. Notably, 76.3% of participants reported greater trust in biomedical treatment over traditional healers, and 65.5% indicated they would follow medical advice in case of treatment conflict. Despite this preference, 40.9% still frequently visited traditional physicians. A substantial proportion (54.3%) attributed hypertension to an unhealthy lifestyle, while 40.9% perceived it as not a serious concern, and a small minority (4.7%) viewed it as divine punishment. These findings reflect a complex interplay between modern medical acceptance and persistent cultural beliefs in this population.

Table 2. Bivariate and Multivariate Associations with Hypertension-Controlling Belief Score (N = 232)

Variable	Category	Total Belief Score (Mean SD)	P-Value (Bivariate)	Crude B	Adjusted B (95% CI)	P-Value
Age (years)	60–69	128.67 (9.06)	—	Ref	—	—
	70–80	135.00 (14.33)	<0.001	0.25	3.76 (2.10, 5.42)	<0.001
Gender	Male	134.40 (14.44)	—	Ref	Ref	—
	Female	130.00 (10.72)	0.040	-0.03	-1.01 (-3.27, 1.25)	0.380

Variable	Category	Total Belief Score (Mean SD)	P-Value (Bivariate)	Crude B	Adjusted B (95% CI)	P-Value
Education Level	Primary or below	130.95 (9.30)	Ref	Ref	Ref	—
	Junior High School	129.55 (11.63)	0.210	0.08	1.40 (-0.50, 3.30)	0.150
	Senior High School	136.97 (14.74)	<0.001	0.18	6.02 (4.12, 7.92)	<0.001
	Diploma or above	133.80 (9.17)	0.520	0.06	2.85 (-1.80, 7.50)	0.230
Occupation	Farmer	130.41 (11.17)	Ref	Ref	Ref	—
	Retiree	138.47 (14.07)	0.002	0.19	8.06 (4.20, 11.92)	<0.001
	Fisherman	135.26 (14.78)	0.030	0.14	4.85 (1.40, 8.30)	0.006
	Trader	135.32 (15.64)	0.040	0.13	4.91 (1.20, 8.62)	0.010
Belief: Cause of HTN	Lifestyle	135.00 (13.20)	—	Ref	Ref	—
	Not serious / Divine	130.20 (11.50)	<0.001	0.20	4.55 (1.61, 7.48)	0.002
Trust in Provider	Medicine	133.20 (13.10)	0.060	-0.12	-3.88 (-8.32, 0.56)	0.080
	Traditional	129.80 (12.40)	—			
Model Fit				Adjusted R^2 = 0.08	Adjusted R^2 = 0.08	

Note: Total Hypertension-Controlling Belief Score is a composite of 6 domains (Perceived Susceptibility, Severity, Benefits, Barriers, Self-Efficacy, and Threat), with total possible range 60–210; Cronbach's α = 0.84. Bivariate comparisons used independent t-tests or one-way ANOVA. Multivariate linear regression adjusted for age, gender, education, occupation, and cultural beliefs. Reference categories: Male, Primary education, Farmer, Lifestyle belief. p < 0.05 considered statistically significant. All analyses based on complete cases (N = 232).

Bivariate analyses showed (**Table 2**) that older age, male gender, higher education, retirement status, and attributing hypertension to lifestyle factors were significantly associated with stronger hypertension-controlling beliefs. In multivariate regression, adjusting for key covariates, participants aged 70–80 scored significantly higher than those aged 60–69 (B = 3.76, 95% CI: 2.10, 5.42, p < 0.001). Senior high school education (B = 6.02, p < 0.001), retirement (B = 8.06, p < 0.001), and fishing or trading occupations were also positively associated with belief scores. Most notably, perceiving hypertension as a consequence of lifestyle—compared to fatalistic or dismissive beliefs—was independently associated with a 4.55-point higher belief score (95% CI: 1.61, 7.48, p = 0.002). Trust in medicine showed a positive trend but did not reach statistical significance (p = 0.080). The final model explained 8% of the variance in belief scores (adjusted R^2 = 0.08), indicating that while significant predictors were identified, additional factors may contribute to belief formation in this population.

Discussion

This study provides valuable insights into the sociodemographic and cultural determinants of hypertension-controlling beliefs among older adults in coastal Madura, Indonesia. The findings reveal that education level, occupation, age, and illness perceptions—particularly the belief that hypertension results from an unhealthy lifestyle—are significantly associated with stronger health beliefs. Trust in biomedical providers is high, yet a notable proportion

of participants still rely on traditional healers, especially in cases of treatment conflict or when hypertension is perceived as non-serious or divinely caused. These results underscore the complex interplay between modern healthcare systems and deeply rooted cultural beliefs in shaping health behavior s among older populations in low-resource settings.

The positive association between higher education and stronger hypertension-controlling beliefs aligns with previous studies in Indonesia and other low- and middle-income countries (LMICs) (Babazadeh et al. 2024; Mohanty et al. 2021). Education enhances health literacy, enabling individuals to better understand chronic disease management and the importance of adherence (Peltzer and Pengpid 2018). Similarly, retirees and those in active economic roles (e.g., traders and fishermen) demonstrated higher belief scores, possibly due to greater access to health information, stable income, and regular contact with healthcare services (Ni et al. 2021). These findings suggest that socioeconomic stability and lifelong learning play critical roles in shaping health beliefs beyond formal schooling. Public health interventions should therefore extend beyond clinical settings to include community-based education tailored to older adults with limited formal education.

The strongest predictor of hypertension-controlling beliefs in this study was the perception of hypertension as a consequence of unhealthy lifestyle, which remained significant even after adjusting for sociodemographic factors. This supports the core tenet of the Health Belief Model (HBM), which posits that perceived threat and perceived benefits drive preventive behaviors (Mashuri, Ng, and Santosa 2021; Nagamine et al. 2023). When individuals attribute illness to modifiable behaviors, they are more likely to believe in their ability to control it (Defianna et al. 2021; Dewi, Sholikhah, and Purbodjati 2022). In contrast, those who view hypertension as "not serious" or as "God's punishment" may feel fatalistic, reducing motivation for self-care (Iqbal et al. 2024; Lee et al. 2022). This echoes findings from Java and Bali, where spiritual interpretations of illness often coexist with biomedical understanding but can hinder treatment adherence (Alfaqeeh, Alfian, and Abdulah 2023; Mahwati, Nurrika, and Latief 2022). Culturally sensitive interventions must therefore engage religious and community leaders to reframe chronic disease within a context of personal responsibility and divine blessing through health (Cahya et al. 2023; Ernawati et al. 2023; Puriastuti, Yulianita, and Saputri 2023).

Interestingly, while most participants trusted medical doctors, nearly a quarter still preferred traditional healers, particularly when treatments conflicted. This duality reflects a common pattern in Indonesian society, where biomedical and traditional systems are not mutually exclusive but rather complementary (Rojanasumapong et al. 2021). Similar hybrid health-seeking behaviors have been documented in Malaysia and Thailand, where patients "shop" across systems depending on symptom severity and cultural acceptability (Fitri, Yanti, and Sayyida 2025; Sayyida, Novia, et al. 2025). In this context, perceived barriers—such as cost, distance, or side effects—may drive reliance on traditional care despite biomedical trust (Dwi et al. 2025; Sayyida, Dwi, et al. 2025). Therefore, integrating traditional healers into hypertension awareness programs—without compromising evidence-based care—could improve treatment concordance and patient engagement (Yanti, Fitri, and Sayyida 2025).

Our findings reinforce the need for a more contextually grounded application of the HBM that better reflects the lived

experiences of diverse ageing populations. In addition, the relatively low explanatory power of the final model highlights an emerging gap in the current study. Although several predictors were statistically significant, the model explains only a modest proportion of the variance in belief scores, suggesting that key influencing factors remain unaccounted for. This indicates that hypertension-related beliefs in older adults are likely influenced by a broader set of determinants beyond those included in the present analysis. In particular, variables such as health literacy, social support, healthcare access, and patient–provider communication may play a substantial role and should be considered in future research. Expanding the model to incorporate these dimensions could improve its explanatory capacity and provide a more comprehensive understanding of belief formation, ultimately informing more effective, targeted interventions for hypertension management in older adults.

Implications and limitations

Several limitations should be acknowledged. First, the cross-sectional design limits causal inference; longitudinal studies are needed to examine how beliefs evolve over time. Second, the use of purposive sampling may affect generalizability, as participants were drawn from specific coastal communities with unique cultural dynamics. Third, self-reported data on hypertension duration and treatment adherence may be subject to recall and social desirability bias. Fourth, although the HBMQ demonstrated good reliability, the 4-point Likert scale may have restricted response variability compared to a 5-point scale, potentially affecting sensitivity. Finally, unmeasured factors such as social support, health literacy, and access to medication were not included and may confound the observed associations. Despite these limitations, this study offers a culturally grounded understanding of health beliefs that can inform community-based interventions in similar settings.

Relevance to Practice

The findings of this study provide actionable guidance for healthcare professionals and policymakers working in resource-limited settings, particularly in Low- and Middle-Income Countries (LMICs). The strong influence of education level and cultural beliefs on hypertension-controlling beliefs suggests that nursing and primary care interventions should integrate culturally sensitive health education into routine hypertension management, rather than relying solely on biomedical counseling. Nurses and community health workers can incorporate brief, structured education sessions during regular visits to explain the lifestyle-related causes of hypertension and address misconceptions such as fatalistic or spiritual attributions of illness. Health institutions and local health authorities should also consider collaborating with community and religious leaders to reinforce consistent health messages and improve acceptance of medical recommendations. In settings where traditional healers remain influential, establishing respectful communication and referral pathways between biomedical and traditional systems may improve adherence and continuity of care. These strategies are low-cost, feasible to implement within existing primary healthcare frameworks, and can be directly applied to strengthen hypertension self-management programs and community outreach initiatives in LMIC contexts.

Conclusion

This study highlights that hypertension-controlling beliefs among older adults in coastal Madura are significantly shaped by educational

attainment, occupational status, and cultural perceptions of illness. Higher education and retirement status were associated with stronger beliefs in hypertension management, while the perception of hypertension as a lifestyle-related condition emerged as the most significant predictor of positive health beliefs. Despite high trust in biomedical care, persistent reliance on traditional healers and fatalistic views of disease underscore the need for culturally tailored interventions. Integrating health education with community and spiritual leaders may help reconcile biomedical recommendations with local belief systems, thereby improving self-management behaviors. Further, collaboration between healthcare professionals and community or religious leaders may strengthen acceptance of biomedical recommendations in culturally rooted populations. These findings contribute to the growing evidence on sociocultural determinants of chronic disease control in low-resource settings and provide actionable insights for public health programs aiming to strengthen patient-centered care for older adults with hypertension in Indonesia and similar contexts.

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Endang Fauziyah Susilawati: Conceptualization, Methodology, Supervision, Writing - Original Draft

Syaifurrahman Hidayat: Software, Validation, Formal Analysis, Writing - Review

Edy Suryadi Amin: Investigation, Resources, Data Curation,

Arif Rahman Hakim: Investigation, Resources, Data Curation & Editing

Nindawi: Investigation, Resources, Data Curation, Project administration

Conflicts of Interest

The authors declare that there is no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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