Health Dynamics
eISSN: 3006-5518
Publisher: Knowledge Dynamics
DOI: https://doi.org/10.33846/hd20705

Original Research

Perceived Behavior Model for Heart Disease Prevention in BPJS Mandiri Participants: A Health Belief Approach

Yeni Riza[1,*], Wasis Budiarto[2], Setya Haksama[2], Kuntoro[3], Ririh Yudhastuti[4], Arief Wibowo[3], Hari Basuki Notobroto[3] and Fitri Rachmillah Fadmi[5]

[1]Department of Health Policy and Administration, Faculty of Public Health, Universitas Islam Kalimantan MAB Banjarmasin, Banjarmasin 70123, Indonesia
[2]Department of Health Policy and Administration, Faculty of Public Health, Universitas Airlangga, Surabaya 60115, Indonesia
[3]Department of Biostatistics and Population Studies, Faculty of Public Health, Universitas Airlangga, Surabaya 60115, Indonesia
[4]Department of Environmental Health, Faculty of Public Health, Universitas Airlangga, Surabaya 60115, Indonesia
[5]Public Health Study Program, Faculty of Health Sciences, Universitas Mandala Waluya, Kendari 93561, Indonesia

Article history
Received: 4 July 2025
Revised: 23 July 2025
Accepted: 29 July 2025
Published Online: 31 July 2025

***Correspondence:**
Yeni Riza
Address: Department of Health Policy and Administration, Faculty of Public Health, Universitas Islam Kalimantan MAB, Jl. Adhyaksa No.2, Kayu Tangi, Banjarmasin, South Kalimantan, 70123, Indonesia.
Email: yeniriza@uniska-bjm.ac.id

How to cite this article: Riza Y, Budiarto W, Haksama S, Kuntoro, Yudhastuti R, Wibowo A, Notobroto HB, Fadmi FR. Perceived Behavior Model for Heart Disease Prevention in BPJS Mandiri Participants: A Health Belief Approach. Health Dynamics, 2025, 2(7), 303-312. https://doi.org/10.33846/hd20705

ABSTRACT

Background: Heart disease remains a leading cause of death globally and is increasingly prevalent in Indonesia. Preventive behavior plays a crucial role in reducing the burden of this disease, especially among populations with limited healthcare access. This study aims to develop a Perceived Behavior Model based on the Health Belief Model combined with WHO's STEPWise approach to enhance health quality related to heart disease prevention behaviors. **Methods:** This observational cross-sectional study examined demographic factors, perceived susceptibility, seriousness, barriers, benefits, self-efficacy, and cues to action regarding heart disease preventive behavior. Participants adopted preventive measures such as maintaining a healthy diet, refraining from smoking, avoiding alcohol consumption, and staying physically active. The study surveyed 435 individuals from the total 82,232 BPJS Mandiri (self-paying participants of Indonesia's National Health Insurance system) members in Banjarmasin, Indonesia, without any intervention. Data analysis was conducted using the Partial Least Square (PLS) method with SmartPLS software version 3.29. The full model of structural equation modeling and theory confirmation also examined the presence or absence of relationships between latent variables. **Result:** The study found a direct and positive effect of demographic factors on perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, and self-efficacy, as well as on perceived susceptibility and seriousness regarding heart disease preventive behaviour. **Conclusions:** Understanding these cultural influences can guide policymakers in strengthening prevention strategies within Indonesia's Social Security Agency of Health system, reducing financial burdens, and improving public health outcomes. These insights may also inform global discussions on culturally tailored health interventions.

Keywords: Health belief model; HBM; heart diseases; self efficacy; perceived susceptibility; STEPWise approach

1. INTRODUCTION

Cardiovascular disease (CVD), particularly heart disease, remains the leading cause of death globally, responsible for approximately 17.3 million deaths per year.[1] In Indonesia, heart disease contributes significantly to national morbidity and mortality, mirroring the global trend. Despite this, preventive efforts are still underutilized, influenced by cultural beliefs, limited health literacy, and a reactive orientation to healthcare that prioritizes treatment over prevention.[2] In the 2018 Basic Health Research (*Riskesdas*), 1.5% of the Indonesian population (approximately 2.78 million people) were diagnosed with heart disease. There were 3,008 in Banjarmasin, South Kalimantan, which represented 28.3% of all heart disease diagnosed in the provincial level.[2] Financially, the burden is substantial: in 2015, Indonesia's National Health Insurance agency (BPJS Kesehatan) reported a deficit of 5.58 trillion rupiahs, which worsened by 2019. Heart disease alone accounted for 13 million treatment cases and over 10 trillion rupiahs, or 50.6% of catastrophic disease expenditures.[3] Preventive health behaviors such as smoking cessation, reducing alcohol consumption, consuming a healthy diet, and maintaining physical activity remain suboptimal. Riskesdas 2018 showed that 24.3% of Indonesians smoked, 3.3% consumed alcohol, only 10.7% met fruit and vegetable intake recommendations, and 33.5% were physically inactive.[2] These trends are not unique to Indonesia. In countries such as Ghana and India, similar behavioral challenges exist, with individuals relying heavily on government interventions for prevention.[4] Recent studies confirm that behavior-driven interventions are essential to mitigate cardiovascular risks, especially in resource-limited settings.[5,6] To explain and address these behavioral barriers, the Health Belief Model (HBM) has been widely used. Initially developed by Rosenstock in the 1960s and refined by Becker in the 1970s and 1980s, HBM incorporates six key constructs: perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, self-efficacy, and cues to action.[7] It has been applied in multiple health promotion contexts, including chronic disease prevention.

Complementing behavioral frameworks like HBM, the WHO STEPwise approach (STEPS) provides a standardized tool for monitoring risk factors for non-communicable diseases.[8–11] STEPS enables health systems to gather information on major risk behaviors, such as harmful alcohol consumption, unhealthy diets, physical inactivity, and tobacco use.[12] The integration of behavioral models such as HBM with surveillance tools like STEPS has recently been recognized as a promising strategy for improving adherence to preventive health behaviors.[13]

However, there is limited research exploring the integration of the HBM and WHO STEPWise approach in assessing cardiovascular disease prevention, particularly within the context of BPJS Mandiri—self-paying members of Indonesia's National Health Insurance system. These individuals typically pay their own premiums and often represent low- to middle-income populations with varying access to health information and services. A preliminary survey of 40 BPJS Mandiri participants with heart disease in Banjarmasin revealed that only 45% engaged in preventive behaviors such as eating a healthy diet, not smoking, avoiding alcohol, and exercising regularly. Many still viewed primary healthcare facilities primarily as curative rather than preventive, and community participation in health promotion programs remained low.

This study aims to develop a Perceived Behavior Model by integrating the Health Belief Model and the WHO STEPWise approach to examine the determinants of heart disease prevention behavior among BPJS Mandiri participants in Banjarmasin. It explores the influence of demographic factors (age, education, income, distance) and HBM variables (perceived susceptibility, seriousness, benefits, barriers, and self-efficacy) on preventive behaviors. To the best of our knowledge, this is the first study to combine these two approaches within the Indonesian health insurance context. This research is important because it addresses the behavioral gap in heart disease prevention among a vulnerable population segment who often lack access to health promotion and preventive services. By integrating theory-based behavioral constructs with empirical surveillance data, the study seeks to provide a more comprehensive understanding of what drives or hinders preventive behavior. The expected benefits include providing empirical evidence to support culturally and contextually tailored health promotion strategies, informing future public health interventions, and supporting BPJS policy reforms toward more preventive-oriented care. The novelty of this study lies in the conceptual integration of the HBM and WHO STEPWise framework in a low-to-middle-income setting with national insurance coverage.

Based on this framework, the following hypotheses are proposed: H1–H5: Demographic factors influence perceived susceptibility, seriousness, benefits, barriers, and self-efficacy, and H6–H11: Perceived susceptibility, seriousness, benefits, barriers, self-efficacy, and cues to action influence heart disease preventive behaviour.

2. METHODS

2.1 Sampling Procedure and Design

Purposive sampling was utilized in the study to choose volunteers who fulfilled certain requirements. Following the guidelines established by the Health Research Ethics Committee of the Faculty of Public Health at Airlangga University, a cross-sectional survey was carried out. Participants' rights and data privacy were protected throughout the study. Prior to developing the questionnaire, the research team and three health experts reviewed relevant literature. The finalized closed-ended questionnaire was digitized and administered via tablets by five trained field workers, allowing immediate response collection and reflecting the population's heightened awareness of public health issues.

The theoretical model, which serves as the foundation for analyzing the relationships between latent variables, is provided in Figure 1.

The theoretical model illustrates the hypothesized relationships between the latent variables. For this research, specific inclusion and exclusion criteria were established to ensure the validity of the variables.

2.1.1 Inclusion criteria

a) Age over 20 years old

b) Social Security Agency of Health Independent participants who are not people with heart disease

c) Have visited primary health care in his area at least once using the Social Security Agency of Health

d) Social Security Agency of Health Independent participants who have income.

3.1.2 Exclusion criteria

a) Social Security Agency of Health Independent participants who are seriously ill or have a mental disorder

b) Social Security Agency of Health Independent participants who have not paid their dues.

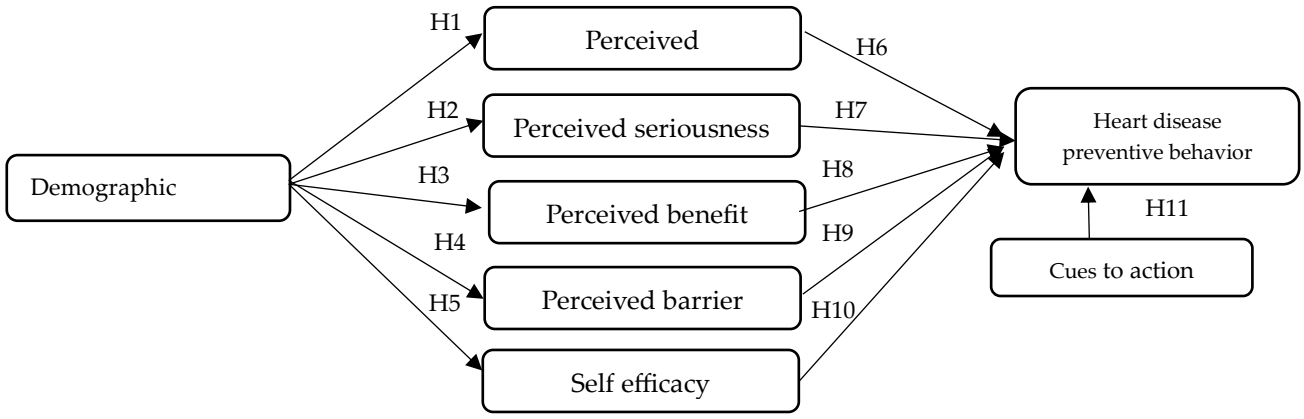

Figure 1. A theoretical model based on the hypotheses proposed for the relations between latent variables

2.2 Instruments

The heart disease preventive behavior questions were adapted from the WHO STEPWise questionnaire, Step 1.[8] The perceived susceptibility questionnaire was developed based on previous research findings, as were the perceived seriousness and perceived benefit questionnaires.[14] Perceived barriers were measured using questions adapted from a previous study,[15] while self-efficacy was assessed using items from another study.[16] Finally, cues to action were measured using questionnaire items adapted from Beach et al. 2012.[17]

2.3 Data Analysis

The partial Least Square (PLS) method in the data analysis using SmartPLS software version 3.2.9 has contributed to the estimation of the general structural equation modelling and verification of the existence or failure of relationships among latent variables. The hypothesis testing was reviewed through the observation of path coefficient calculations in inner model testing.

2.4 Research Limitations

This research is limited to STEPWise STEP 1, while STEP 2 cannot be done because, in this STEP, quite a lot

of resources are needed, namely funds and implementing officers (HR). The stages of model development are limited to participants of the Social Security Agency of Health Independent in Banjarmasin City, and generalizations are applied to similar conditions. Further research is expected to consider epidemiology using a population-based study design.

2.5 Ethics Practices

This study was approved by the Health Research Ethics Committee, Faculty of Public Health, Airlangga University, with ethical clearance number 150/EA/KEPK/2022. All research procedures were conducted in accordance with the ethical principles and guidelines stipulated by the Committee to ensure the protection of participants' rights, confidentiality, and data privacy.

3. RESULTS

3.1 Characteristics of Respondents and Distribution Based on Research Variables

The demographic characteristics of respondents, including age, education level, income, and distance from the research location, are provided in Table 1. The detailed distribution of respondents' perceptions and behaviors related to health, including perceived susceptibility, perceived barriers, perceived seriousness, perceived benefits, self-efficacy, cues to action, and preventive behavior, is available in Table 1.

Table 1. Characteristics of respondents

Characteristic	Frequency	Percentage
1. Age (years)		
Early adulthood (18-40 years)	238	54.71
Intermediate adults (41-60 years old)	161	37.01
Late adulthood (60 years and above)	36	8.28
Total	435	100.00
2. Education		
Did not attend school	4	0.90
Did not complete elementary school	4	0.90
Elementary school / equivalent	59	13.60
Junior high school / Islamic junior high school	76	17.50
Senior high school / Islamic senior high school / Vocational high school	186	42.80
Diploma / Bachelor's degree / Postgraduate (master's or doctoral degree)	106	24.40
Total	435	100.00
3. Income (in Indonesian Rupiah)		
<Rp. 1,500,000	183	42.10
Rp. 1,500,000 – Rp. 2,500,000	113	26.00
Rp. 2,500,000 – Rp. 3,500,000	60	13.80
>Rp. 3,500,000	79	18.20
Total	435	100.00
4. Distance		
Far	52	12.00
Near	383	88.00
Total	435	100.00

Source: Primary data, 2022

Based on Table 1, most of the respondent's age is in the early adult category (18-40 years), namely 238 people (54.71%), respondents with the last education of SMA/MA/SMK, as many as 186 people (42.80%), the income of most of the respondents is <Rp. 1,500,000 which is 183 people (42.10%) and the distance from the respondent's residence to the health service facility the closest is 383 people (88.00%).

3.2 SEM Structural Model with SmartPLS

The Partial Least Square Structural Equation Model (PLS-SEM) has gained increasing attention in the last decade due to its flexibility and ability to model complex relationships. Researchers used SmartPLS 3.29

to process the data, ensuring no missing values in the responses. The analysis covers various variables, including preventive behaviour (Y) such as smoking, alcohol consumption, healthy diet, and physical activity; demographic variables (X1); perceived susceptibility (X2); perceived seriousness (X3); perceived benefit (X4); perceived barrier (X5); self-efficacy (X6); and cues to action (X7).

The inner model is evaluated using R-square values for dependent constructs and path coefficients to assess hypothesis significance. A higher R-square indicates a better predictive model, while path coefficients determine hypothesis testing significance.

The R-square values, which indicate the influence of independent variables on the dependent variable, are provided in Table 2. These values highlight the predictive strength of each variable, with Preventive Behavior showing the highest R-Square value (0.951), indicating strong predictive power, while Perceived Barrier (0.317), Susceptibility (0.210), and Seriousness (0.208) show moderate influence. Self-efficacy (0.150) and Perceived Benefit (0.047) contribute less.

The f-square values further assess effect sizes, highlighting the impact of Barrier, Benefit, Cues to Action, Preventive Behavior, Self-Efficacy, Seriousness, and Susceptibility on the model's structure. The detailed f-square values, which indicate the effect sizes of these variables, are provided in Table 2.

Table 2. F-square value for effect size assessment

Variable	Barrier	Benefit	Cues to action	Preventive behavior	Self efficacy	Seriousness	Susceptibility
Barrier				0.010			
Benefit				0.010			
Cues To Action				0.000			
Demography	0.066	0.090			0.369	0.075	0.083
Preventive Behavior							
Self efficacy				0.003			
Seriousness				0.018			
Susceptibility				0.060			

Information: ✓ F-square < 0.02 is negligible or considered to have no effect
✓ 0.02 ≤ f-square ≤ 0.14; the effect is small
✓ 0.15 ≤ f-square ≤ 0.35; the effect is moderate
✓ f-square > 0.35; the influence is large (Sarstedt, et al., 2017).[36]

This table presents f-square values, indicating the effect sizes of each variable in the structural model. The results show that Demography has a moderate influence on Self-Efficacy, while most other relationships exhibit small or negligible effects.

As shown in Table 2, most variables have a small effect size on the model, as indicated by the low f-square values. The Demography variable has the largest effect on Self-Efficacy (0.369), indicating a moderate impact, while its influence on other variables such as Barrier, Benefit, Seriousness, and Susceptibility ranges from small to moderate. Other variables, such as Self-Efficacy, Seriousness, and Susceptibility, have minimal effect sizes, indicating weaker relationships with the outcome variables. Overall, most relationships in the model exhibit small effect sizes, except for the moderate influence of Demography on Self-Efficacy.

3.2.1 Q-square (Q^2) and q2 effect size analysis

This section presents further analysis of the Structural Equation Model (SEM) using Construct Cross-Validated Redundancy. This analysis includes SSO (Sum of Squares Observed), SSE (Sum of Squares Explained), and Q^2 values, which assess the predictive relevance of key constructs such as Perceived Barrier, Perceived Benefit, Cues to Action, Demography, Preventive Behavior, Self-Efficacy, Perceived Seriousness, and Perceived Susceptibility. The detailed results of this analysis are provided in Table 3.

The table presents Q^2 values, which measure the predictive relevance of the constructs. Preventive Behavior has the highest Q^2 value (0.328), indicating strong predictive relevance, meaning the model explains a significant portion of its variance. Perceived Barrier (0.156), Perceived Susceptibility (0.133), Perceived Seriousness (0.130), and Self-Efficacy (0.119) have

moderate predictive relevance. Perceived Benefit has a very low Q^2 value (0.028), suggesting weak predictive power. Cues to Action and Demography show no predictive relevance in this analysis. Overall, Preventive Behavior is the best-explained construct, while other variables show varying levels of predictiveness.

Table 3. Construct cross-validated redundancy

Variable	SSO	SSE	Q^2
Perceived barrier	1305.000	1101.335	0.156
Perceived benefit	1305.000	1268.103	0.028
Cues to action	435.000	435.000	-
Demography	1740.000	1740.000	-
Preventive behavior	1740.000	1168.612	0.328
Self efficacy	1305.000	1149.888	0.119
Perceived seriousness	1305.000	1135.318	0.130
Perceived susceptibility	1305.000	1131.505	0.133

Source: SmartPLS 3.29 processed products; SSO: Sum of Squares Observed; SSE: Sum of Squares Error; Q^2: Predictive Relevance.

The Q^2 values indicate the model's predictive strength, with Preventive Behavior showing the highest Q^2 value (0.328), suggesting strong predictive relevance. Perceived Barrier (0.156), Perceived Susceptibility (0.133), Perceived Seriousness (0.130), and Self-Efficacy (0.119) demonstrate moderate predictive power, while Perceived Benefit (0.028) exhibits weak predictive relevance. Cues to Action and Demography show no predictive power in this analysis. These results highlight that Preventive Behavior is the best-explained construct, while other variables vary in their predictive strength.

3.2.2 Hypothesis testing

The Inner Model (structural model), which comprises r-squared output, parameter coefficients, and t-statistics, is used to test hypotheses. With the aid of SmartPLS 3.29 software, a hypothesis is approved or rejected depending on the significance between constructs, t-statistics, and p-values. A t-statistic value >1.96 and a p-value of 0.05 (5%) are used as benchmarks. The hypothesis testing results are presented in Table 6, and the research model is illustrated in Figure 2:

The Inner Model (structural model), which comprises r-squared output, parameter coefficients, and t-statistics, is used to test hypotheses. With the aid of SmartPLS 3.29 software, a hypothesis is approved or rejected depending on the significance between constructs, t-statistics, and p-values. A t-statistic value >1.96 and a p-value of 0.05 (5%) are used as benchmarks. The hypothesis testing results are provided in Supplementary Table 3, while the research model is presented in Figure 2.

3.3 Analisis Path Coefficients

To determine the direct influence between constructs in the model, path coefficients analysis was carried out using SmartPLS. The test results are shown in Table 4 below. The following Table 4 presents the Path Coefficients results, which assess the significance of relationships between variables in the model based on T-statistics and P-values. These results help determine whether the hypothesized paths are accepted or rejected, indicating the strength and validity of the relationships between constructs, such as barriers, benefits, self-efficacy, and preventive behaviours.

The Path Coefficients Results, which assess the significance of relationships between variables in the model based on T-statistics and P-values, are presented in Supplementary Table 3. These results help determine whether the hypothesized paths are accepted or rejected, indicating the strength and validity of the relationships between constructs, such as barriers, benefits, self-efficacy, and preventive behaviors

4. DISCUSSION

Our findings indicate that demographic characteristics particularly higher education, income, and proximity to health facilities positively influence perceived susceptibility, seriousness, benefits, and self-efficacy, while reducing perceived barriers. These results align with similar studies from Indonesia[18] and Southeast Asia,[19] which found socioeconomic status to be a key determinant of preventive health behaviors. Studies among oil industry workers also displayed that self-efficacy and perceived barriers are crucial predictors

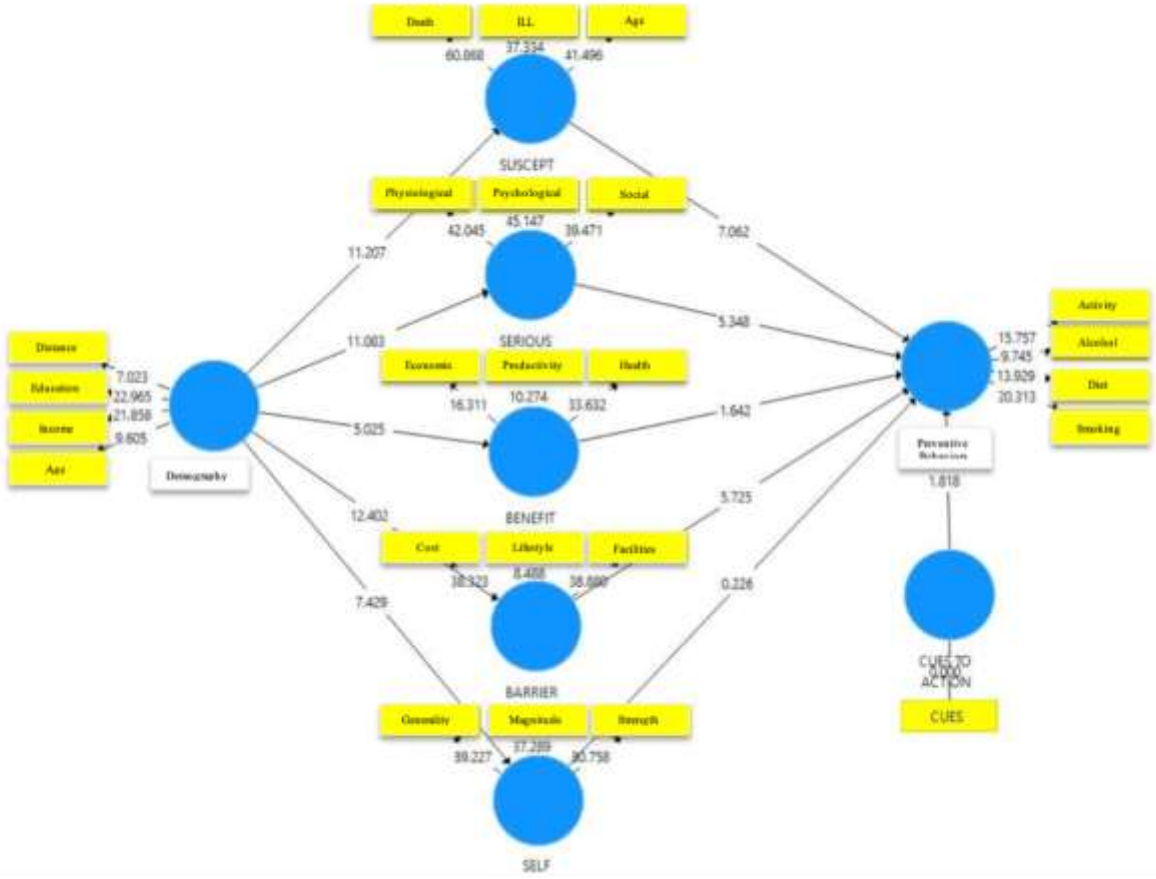

Figure 2. Model output showing the relations proposed between latent (*p-Value < 0.05)

of heart disease prevention behavior. Together, this supports the proposition that demographic determinants consistently shape health perceptions and actions.[20–23] Perceived susceptibility and seriousness emerged as strong predictors of preventive behavior in our model, matching the established role of these constructs in HBM applications across chronic disease contexts.[24–26] For instance, meta-analyses on diabetes patients showed high perceived severity increases tertiary preventive behaviors by 2.6 times.[20] Similarly, a cross-sectional study among metabolic syndrome patients found significant associations between HBM dimensions and preventive actions.[27] Among older adults with hypertension in Indonesia, perceived vulnerability, seriousness, and self-efficacy were directly associated with improved health behavior.[28]

Table 4. Path coefficients results

	T statistics (|O/STDEV|)	*p*-value	Information
Barrier -> Preventive	5.725	0.000	Accepted
Benefit -> Preventive	1.642	0.101	Rejected
Cues -> Preventive	1.818	0.070	Rejected
Demography -> Barrier	12.402	0.000	Accepted
Demography -> Benefit	5.025	0.000	Accepted
Demography -> Self	7.429	0.000	Accepted
Demography -> Serious	11.083	0.000	Accepted
Demography -> Suscept	11.207	0.000	Accepted
Self -> Preventive	0.226	0.821	Rejected
Serious -> Preventive	5.348	0.000	Accepted
Suscept -> Preventive	7.062	0.000	Accepted

Source: SmartPLS 3.29 processed products

Our results also support global evidence that theory-based educational interventions using HBM components can significantly improve preventive behaviors. For example, a study in Iran revealed that HBM-based health education increased knowledge, perceived susceptibility, severity, and benefits, while reducing perceived barriers—leading to improved cardiovascular preventive practices.[29–31] The effective combination of HBM and surveillance tools like WHO STEPS was also reported to enhance adherence and awareness in community settings.[13] Although perceived benefits and self-efficacy correlated positively with preventive behaviors in our context, many respondents still faced low self-efficacy and lacked sufficient external motivation.[32,33] Only around 6% of participants reported cues to action, suggesting a critical gap in external prompting mechanisms. This finding is consistent with community-based NCD interventions in Indonesia and Vietnam, where increased awareness and screening did not necessarily translate into significant behavior change due to low levels of cue-driven motivation [20]. Global community efforts such as Finland's North Karelia Project spotlight the power of combining risk surveillance with structured behavioral interventions—achieving large reductions in cholesterol, smoking rates, and cardiovascular mortality over time.[34] Similarly, the Caerphilly Heart Disease Study demonstrated that adherence to multiple healthy lifestyle behaviors substantially lowers risk of chronic disease.[35] These underline the potential of interventions that not only educate but actively support behavior change through ongoing cues and reinforcement.

These comparisons emphasize the novelty and value of our study: it is among the first in Indonesia to combine individual-level behavioral constructs (HBM) with population-based risk surveillance data (WHO STEPS) in the context of self-paying BPJS Mandiri members. The integrated approach provides a comprehensive understanding of motivators and barriers to preventive behavior. It carries practical implications: BPJS Kesehatan can leverage routine STEPS data to tailor educational interventions, embed regular cues to action, and target socioeconomically vulnerable subgroups with context-appropriate messages.

However, some limitations warrant attention. First, the cross-sectional study design prevents causal inferences, limiting conclusions about temporal relationships between constructs. Second, the sample is restricted to BPJS Mandiri participants in Banjarmasin, reducing generalizability to other regions or populations. Third, reliance on self-reported measures introduces potential recall and social desirability biases. Finally, while combining HBM and STEPS introduces conceptual breadth, this study did not account for environmental or policy-level determinants—elements that may interact significantly with behavior and should be explored in future longitudinal or mixed-methods research.

5. CONCLUSION

Results of the study indicate that demographic factors are important correlates of perceived susceptibility and seriousness, benefits, barriers and self-efficacy for the prevention of heart disease. Since the perceptions of adults are associated with their preventive behaviours, integrating the Health Belief Model (HBM) into the WHO STEPWise approach may generate rich information on these beliefs and their influence on preventive behaviours. In other words, with the experience of HBM regarding how beliefs about health risks and benefits affect behaviour, further combined with the STEPWise approach which is focused on monitoring and managing risk factors for non-communicable disease, BPJS Kesehatan could conceivably design more effective preventive efforts. This approach collectively can not only overcome the educational, and economic gaps but also develop positive health behaviours and have a significant preventive effect on chronic as well as catastrophic diseases. This can help reduce the impact on the national health system by reducing the burden of funding it.

Ethical Approval

This study was approved by the Health Research Ethics Committee, Faculty of Public Health, Airlangga University, with ethical clearance number 150/EA/KEPK/2022.

Acknowledgement

The authors would like to acknowledge the assistance and guidance provided by the Universitas Islam Kalimantan Muhammad Arsyad Al Banjari Banjarmasin and Faculty of Public Health, Universitas Airlangga Surabaya, in enhancing the search strategy and adapting it to the parameters of the various databases.

Competing Interests

All the authors declare that there are no conflicts of interest.

Funding Information

This research was funded by the Islamic University of Kalimantan MAB Banjarmasin. Funding is provided to support the entire research process, from design, data collection, to the preparation of the final report. The funder is not involved in the design of the study, data analysis, interpretation of the results, or the writing of the manuscript.

Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

REFERENCES

1. World Health Organization (WHO). Cardiovascular diseases (CVDs). Geneva: World Health Organization; 2017. Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) (Accessed on 23 May 2025)
2. Kementerian Kesehatan RI. Laporan Riskesdas 2018 Nasional. Jakarta: Indonesian Ministry of Health; 2018.
3. BPJS Kesehatan. BPJS Kesehatan [Internet]. Jakarta: BPJS Health Insurance; 2019. Available from: https://data.bpjs-kesehatan.go.id/bpjs-portal/action/landingPage.cbi (Accessed on 23 May 2025)
4. Schoen C, Osborn R, Huynh PT, Doty M, Davis K, Zapert K, et al. Primary Care And Health System Performance: Adults' Experiences In Five Countries. Health Affairs. 2004;23(Suppl1):W4-487-W4-503. http://dx.doi.org/10.1377/hlthaff.w4.487
5. Lv J, Yu C, Guo Y, Bian Z, Yang L, Chen Y, et al. Adherence to Healthy Lifestyle and Cardiovascular Diseases in the Chinese Population. Journal of the American College of Cardiology. 2017;69(9):1116–1125. http://dx.doi.org/10.1016/j.jacc.2016.11.076
6. Mosleh SM, Khraisat A, Shoqirat N, Obeidat R. Using the Health Belief Model to Predict Self-Care Behaviors Among Patients With Cardiovascular Disease Post COVID-19 Pandemic: A Perspective From the United Arab Emirates. SAGE Open Nursing. 2024;10. http://dx.doi.org/10.1177/23779608241293667
7. Glanz K, Rimer B, Viswanath K. Health Behaviour and Health Education Theory, Research, and Practice. San Francisco: Jossey-Bass; 2008.
8. World Health Organization (WHO). WHO STEPwise approach to surveillance Geneva: World Health Organization; 2003. Available from: https://www.who.int/europe/tools-and-toolkits/who-stepwise-approach-to-surveillance (Accessed on 23 May 2025)
9. Maimela E, Alberts M, Modjadji SEP, Choma SSR, Dikotope SA, Ntuli TS, et al. The Prevalence and Determinants of Chronic Non-Communicable Disease Risk Factors amongst Adults in the Dikgale Health Demographic and Surveillance System (HDSS) Site, Limpopo Province of South Africa. PLOS ONE. 2016;11(2):e0147926. http://dx.doi.org/10.1371/journal.pone.0147926
10. Sivanantham P, Sahoo J, Lakshminarayanan S, Bobby Z, Kar SS. Profile of risk factors for Non-Communicable Diseases (NCDs) in a highly urbanized district of India: Findings from Puducherry district-wide STEPS Survey, 2019–20. PLOS ONE. 2021;16(1):e0245254. http://dx.doi.org/10.1371/journal.pone.0245254
11. Bista B, Dhimal M, Bhattarai S, Neupane T, Xu YY, Pandey AR, et al. Prevalence of non-communicable diseases risk factors and their determinants: Results from STEPS survey 2019, Nepal. Devleesschauwer B, editor. PLOS ONE. 2021;16(7):e0253605. http://dx.doi.org/10.1371/journal.pone.0253605
12. Arage G, Belachew T, Hassen H, Abera M, Abdulhay F, Abdulahi M, et al. Effects of prenatal exposure to the 1983–1985 Ethiopian great famine on the metabolic syndrome in adults: a historical cohort study. British Journal of Nutrition. 2020;124(10):1052–1060. http://dx.doi.org/10.1017/s0007114520002123
13. Ndejjo R, Hassen HY, Wanyenze RK, Musoke D, Nuwaha F, Abrams S, et al. Community-Based Interventions for Cardiovascular Disease Prevention in Low-and Middle-Income Countries: A Systematic Review. Public Health Reviews. 2021;42:1604018. http://dx.doi.org/10.3389/phrs.2021.1604018
14. Onoruoiza SI, Musa A, Umar BD, Kunle YS. Using Health Beliefs Model as an Intervention to Non Compliance with Hypertension Information among Hypertensive Patient. IOSR Journal Of Humanities And Social Science (IOSR-JHSS). 2015;20(9):11-16.
15. Khorsandi M, Fekrizadeh Z, Roozbahani N. Investigation of the effect of education based on the health belief model on the adoption of hypertension-controlling behaviors in the elderly. Clinical Interventions in Aging. 2017; 12:233–240. http://dx.doi.org/10.2147/cia.s117142
16. Bandura A. Self-efficacy: The exercise of control. USA: W. H. Freeman; 1997.
17. Beach EF, Williams W, Gilliver M. A Qualitative Study of Earplug Use as a Health Behavior: The Role of Noise Injury Symptoms, Self-efficacy and an Affinity for Music. Journal of Health Psychology. 2011;17(2):237–246. http://dx.doi.org/10.1177/1359105311412839
18. Sujarwoto, Maharani A. Participation in community-based healthcare interventions and non-communicable diseases early detection of general population in Indonesia. SSM - Population Health. 2022;19:101236. http://dx.doi.org/10.1016/j.ssmph.2022.101236
19. Adisasmito W, Amir V, Atin A, Megraini A, Kusuma D. Geographic and socioeconomic disparity in cardiovascular risk factors in Indonesia: analysis of the Basic Health Research 2018. BMC Public Health.

2020;20(1):1004. http://dx.doi.org/10.1186/s12889-020-09099-1

20. Fritz M, Grimm M, My Hanh HT, Koot JAR, Nguyen GH, Nguyen TPL, et al. Effectiveness of community-based diabetes and hypertension prevention and management programmes in Indonesia and Viet Nam: a quasi-experimental study. BMJ Global Health. 2024;9(5):e015053. http://dx.doi.org/10.1136/bmjgh-2024-015053
21. Mszar R, Buscher S, McCann D, Taylor HL. Self-Efficacy, Perceived Barriers to Care, and Health-Promoting Behaviors Among Franco-Americans Across Cardiovascular Risk Factors: A Cross-Sectional Study. American Journal of Health Promotion. 2020;35(5):703–707. http://dx.doi.org/10.1177/0890117120982412
22. Nadrian H, Shojafard J, mahmoodi hassan, Rouhi Z, Rezaeipandari H. Cognitive determinants of self-care behaviors among patients with heart failure: A path analysis. Health Promotion Perspectives. 2018;8(4):275–282. http://dx.doi.org/10.15171/hpp.2018.39
23. Khodaminasab A, Reisi M, Vahedparast H, Tahmasebi R, Javadzade H. Utilizing a health-promotion model to predict self-care adherence in patients undergoing coronary angioplasty in Bushehr, Iran. Patient Preference and Adherence. 2019;13:409–417. http://dx.doi.org/10.2147/ppa.s181755
24. An S, Schulz PJ, Kang H. Perceived COVID-19 susceptibility and preventive behaviors: moderating effects of social support in Italy and South Korea. BMC Public Health. 2023;23(1):13. http://dx.doi.org/10.1186/s12889-022-14866-3
25. Sarwar F, Jameel HT, Panatik SA. Understanding Public's Adoption of Preventive Behavior During COVID-19 Pandemic Using Health Belief Model: Role of Psychological Capital and Health Appraisals. Sage Open. 2023;13(3)-18. http://dx.doi.org/10.1177/21582440231192185
26. Taflinger S, Sattler S. A situational test of the health belief model: How perceived susceptibility mediates the effects of the environment on behavioral intentions. Social Science & Medicine. 2024;346:116715. http://dx.doi.org/10.1016/j.socscimed.2024.116715
27. Fatahian F, Mohammadifard N, Hassanzadeh A, Shahnazi H. The effect of a health belief model-based education on nutritional behavior and biochemical factors of patients with myocardial infarction: A line follow-up experimental study. Health Science Reports. 2024;7(3):e1966. http://dx.doi.org/10.1002/hsr2.1966
28. Wang HM, Chen Y, Shen YH, Wang XM. Evaluation of the effects of health education interventions for hypertensive patients based on the health belief model. World Journal of Clinical Cases. 2024;12(15):2578–2585. http://dx.doi.org/10.12998/wjcc.v12.i15.2578
29. Midjani N, Hossaini FA, Sharifi N. Promotion of nutritional behaviors in the prevention of cardiovascular diseases: application of the health belief model in primary health care centers. BMC Primary Care. 2023;24(1):278. http://dx.doi.org/10.1186/s12875-023-02248-6
30. Mohebbi B, Sabouri M, Tol A. Application of health education and promotion theory-based interventions on patients with cardiovascular disease. Journal of Education and Health Promotion. 2021;10(1):236. http://dx.doi.org/10.4103/jehp.jehp_173_21
31. Allida SM, Angelucci A, William S, Alanazi F, Gall S, Ferguson C. Cardiovascular disease and stroke prevention educational-behavioural programmes for culturally and/or linguistically diverse communities: a systematic review and meta-analysis. European Journal of Preventive Cardiology. 2025. http://dx.doi.org/10.1093/eurjpc/zwaf145
32. Lee JY, Ko E. Factors Related to the Dementia Prevention Behavior among Community-dwelling Older Adults based on the Health Belief Model: A Cross-sectional Descriptive Study. Journal of Korean Academy of Fundamentals of Nursing. 2024;31(3):263–274. http://dx.doi.org/10.7739/jkafn.2024.31.3.263
33. Muthmainnah M, Kurnia GM, Nugrahani A. Determinants of smoking prevention behavior of senior high school students: A short report. Tobacco Induced Diseases. 2025;23(March):1–5. http://dx.doi.org/10.18332/tid/200748
34. Jousilahti P, Laatikainen T, Salomaa V, Pietilä A, Vartiainen E, Puska P. 40-Year CHD Mortality Trends and the Role of Risk Factors in Mortality Decline: The North Karelia Project Experience. Global Heart. 2016;11(2):207. http://dx.doi.org/10.1016/j.gheart.2016.04.004
35. Elwood P, Galante J, Pickering J, Palmer S, Bayer A, Ben-Shlomo Y, et al. Healthy Lifestyles Reduce the Incidence of Chronic Diseases and Dementia: Evidence from the Caerphilly Cohort Study. Sathian K, editor. PLoS ONE. 2013;8(12):e81877. http://dx.doi.org/10.1371/journal.pone.0081877
36. Sarstedt M, Ringle CM, Hair JF. Partial Least Squares Structural Equation Modeling. Handbook of Market Research. 2021;587–632. http://dx.doi.org/10.1007/978-3-319-57413-4_15