

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

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Abstract

Cardiovascular diseases (CVDs) are still among the major public health issues all over the world and significantly contribute to morbidity and mortality. Even though drugs are an integral element of the treatment process, there are many cases where patients do not adhere to the prescribed treatment. In order to improve patients' adherence to the treatment and understand the reasons why this adherence takes place, one should look into factors that impact it. This study will be based on the Health Belief Model (HBM), which is helpful in this regard. The purpose of this narrative review is to consolidate the evidence related to the link between HBM constructs and adherence to medication among adults diagnosed with cardiovascular diseases (CVD). It will further highlight important determinants, as well as implications for cardiovascular nursing. Literature supporting the review were obtained by conducting systematic searches in PubMed/MEDLINE, Web of Science, Scopus, Science Direct, Research Gate, and Google Scholar. All articles published in the English language between January 2021 and July 2026 were considered. Several research approaches like quantitative, qualitative, mixed-methods, and intervention research studies were considered to provide a complete perspective on the available evidence. Methodological quality and reporting of the narrative review were assessed using the Scale for the Assessment of Narrative Review Articles (SANRA), whereas interpretation of the results was based on the constructs of the Health Belief Model (HBM). Across the 25 studies, self-efficacy and perceived barriers were the strongest and most modifiable HBM predictors of adherence, while susceptibility, severity, benefits, and cues to action contributed more variably. HBM-based educational and mobile health interventions improved HBM scores, adherence, and, in several studies, blood pressure control, though HBM constructs alone explained only modest-to-moderate variance in adherence. Non-HBM factors such as medication cost, regimen complexity, healthcare access, social support, and the patient-provider relationship independently predicted adherence and, in some studies, outweighed classic HBM beliefs altogether. The HBM offers a useful but

inadequate framework for understanding modifiable beliefs around cardiovascular medication adherence; its constructs consistently identify self-efficacy and barrier reduction as intervention targets, but explain only part of adherence behavior. Effective strategies should combine HBM-informed education with barrier reduction, self-efficacy building, social support, and digital health tools, adapted to local cultural and health-system context. Longitudinal and intervention research particularly from Pakistan is needed to test integrated, culturally adapted models of sustained adherence.

Keywords: Health Belief, Model medication adherence, cardiovascular diseases, hypertension, self-efficacy, perceived barriers cardiovascular nursing, m-Health.

INTRODUCTION

Cardiovascular diseases (CVD) continue to be the number one cause of death around the globe and a significant public health problem throughout the world. As reported by the World Health Organization (WHO, 2025), about 19.8 million people succumbed to CVD in 2022, making up for 32% of all deaths across the globe. About 85% of deaths due to CVD have been caused by heart attacks and strokes. Almost three-fourths of CVD deaths take place in developing countries, where there is inadequate access to the diagnosis, prevention, treatment, and management of such diseases. (WHO, 2025).

Long-term pharmacological treatment forms the basis of control for cardiovascular diseases. Several lines of evidence have shown that anti-hypertensive, statins, antiplatelet agents, anticoagulants, beta-blockers, and renin–angiotensin system inhibitors dramatically reduce recurrent cardiovascular events, improve survival, and enhance the quality of life for patients who adhere to the medications as prescribed. However, the ability to realize those benefits has been contingent on adherence to treatment over the long term. Despite significant advances in pharmacotherapy for cardiovascular diseases, treatment adherence has emerged as one of the most potent determinants of treatment outcomes and a substantial cause of preventable adverse cardiovascular outcomes (Khalil, & Zeltser, 2024).

Medication adherence is the extent to which an individual's behavior in taking medications corresponds to the recommendations agreed upon with a prescriber. Among patients who have cardiovascular diseases, there is inadequate adherence to long-term medication regimens in 40–60%, increasing the likelihood of more hospitalizations, recurrent cardiovascular events, failure of treatment, and avoidable costs in health care, and unnecessary mortality (Simon et al., 2021). Adherence is now perceived as complex behavior, and the determinants of adherence go beyond patient motivation into clinical, psychosocial, socioeconomic, and even healthcare system variables.

The Health Belief Model (HBM) represents one of the best-known theoretical frameworks used to predict health behaviors, especially related to chronic conditions management. The HBM was originally proposed by Rosenstock and later modified by Becker et al. It posits that people's participation in recommended health behaviors depends on several cognitive variables, including perceived susceptibility to the given condition, severity of possible consequences, expected benefits of the given behavior, perceived barriers, cues to action, and self-efficacy, or the belief in their ability to act (Rosenstock, 1974; Yulianti et al., 2025). In cardiovascular disease management, these cognitive factors are important in understanding why patients may adhere to or discontinue their prescribed medications, even when they recognize the importance of medication therapy. Understanding psychological determinants alongside demographic and clinical factors can help identify barriers to medication adherence and guide the development of evidence-based interventions to improve treatment

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

outcomes (Alyafei & Carr, 2024).

There have been many observational studies carried out among patients suffering from hypertension, coronary heart disease, heart failure, and various other cardiovascular conditions that have revealed the presence of strong associations between HBM components and adherence to medications. Among the HBM components, it is usually perceived barriers that exhibit negative correlations with adherence to medications, while perceived benefits, self-efficacy, and cues to action often correlate positively with adherence (Islam, et al., 2025). However, the importance and the degree of significance of individual components of HBM may vary greatly depending on the study population, health care system, cultural background, and the methods of measurement (Yulianti, et al., 2025; Nelson et al., 2024). Such inconsistency makes the generalization of results difficult.

Nevertheless, despite an increased number of research works in this field, the synthesis of the existing evidence regarding the relationship between the Health Belief Model and adherence to medications in cardiovascular diseases has not been done yet. Most of the existing systematic reviews deal with interventions aimed at improving adherence, health system barriers, and cardiovascular disease, but not with the theoretical aspect of the Health Belief Model itself (Kalantzi et al., 2023).

Furthermore, evidence originating from low- and middle-income countries, including Pakistan, remains limited and has not been comprehensively synthesized within a behavioral theory framework. Therefore, this evidence-based narrative review examines current evidence on how Health Belief Model (HBM) constructs are related to medication adherence among adults with cardiovascular diseases. It focuses on identifying the HBM factors most strongly associated with adherence, comparing findings across different cardiovascular conditions, highlighting gaps in the existing literature, and discussing their implications for nursing practice, patient education, behavioral interventions, and future research (Novita et al., 2025).

Review Design:

A narrative review of an evidence-based nature was undertaken in order to investigate the current evidence base regarding the association between the Health Belief Model (HBM) and medication adherence in adult populations with cardiovascular and associated cardio-metabolic conditions. The SANRA Scale, which stands for the Scale for the Assessment of Narrative Review Articles, was used during the review process in order to ensure transparency and structuring of the study as well as to enhance the quality of the synthesis.

Literature Search Strategy

An extensive and organized literature search was performed in order to find out published studies that investigated the association between the HBM and the adherence to medication in the adult population suffering from cardiovascular diseases (CVDs). Electronic searches were performed in PubMed/MEDLINE, Web of Science, Scopus, Science Direct, Research Gate, and Google Scholar. Studies that had been published during the period from January 2021 till July 2026 and written in the English language were chosen, and the final literature search was performed in July 2026.

A combination of Medical Subject Headings (MeSH) and free text words related with the Boolean operators “AND” and “OR” was used for the search. MeSH terms and keywords such as “Health Belief Model”, “medication adherence”, “medication compliance”, “cardiovascular disease”,

“hypertension”, “coronary artery disease”, “heart failure”, “stroke”, “atrial fibrillation”, “self-efficacy”, “perceived susceptibility”, “perceived severity”, “perceived benefits”, “perceived barriers”, and “cues to action” were used.

Eligibility Criteria:

Studies were included were peer-reviewed, involved adults with cardiovascular or related cardio-metabolic conditions, and examined medication adherence in relation to the HBM or one or more of its constructs. Quantitative, qualitative, mixed-methods, intervention, and relevant high-quality review studies were considered to provide a broad understanding of the available evidence. Editorials, conference abstracts, dissertations, gray literature, non-English publications, and studies not related to cardiovascular disease or medication adherence were excluded.

Study Selection and Data Extraction:

Following the completion of the literature search process, articles retrieved from the databases were screened based on their titles and abstracts followed by a thorough examination of those that could possibly meet the eligibility criteria set out. Data was extracted systematically, including information about the first author, year of publication, country of origin, study design, participants’ characteristics, cardiovascular disease being addressed, technique employed to evaluate the level of adherence to medications, HBM components under investigation, nature of interventions where available, and the key results concerning adherence.

Data Synthesis:

Findings were organized narratively on the basis of the six basic HBM constructs, namely: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action. The results were compared between different types of cardiovascular diseases, health care settings, and geographic locations to highlight the similarities and differences as well as possible gaps and directions for further research. This narrative review is guided by the methodological framework of the Scale for the Assessment of Narrative Review Articles (SANRA).

Literature Review of Selected Articles:

• Author & year of publication	• Country	• Title of the Study	• Study Design	• Findings New
• Ogunbade et al. (2021)	• USA	• Medication Adherence Interventions for Cardiovascular Disease in Low- and Middle-Income Countries: A Systematic Review	• Systematic Review	• The systematic review aimed to examine medication adherence interventions for cardiovascular disease in low- and middle-income countries (LMICs). Of the 45 studies included, 33 (72%) used multi-component interventions and 41 (91%) addressed patient-level factors, including education, counseling, reminders, and cognitive-behavioral strategies. One study employed an HBM-based educational intervention, while overall, multi-component and technology-based interventions demonstrated greater

**BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND
CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW**

				effectiveness in improving medication adherence than single-component approaches.
• Jeon et al. (2022)	• South Korea	• Effects of Medication Adherence Interventions for Older Adults with Chronic Illnesses: • A Systematic Review and Meta-Analysis	• Systematic Review and Meta-analysis	• The systematic review and meta-analysis aimed to evaluate the effectiveness of medication adherence interventions among older adults with chronic illnesses. Of the 7 studies, 5 used counseling and 2 used education, with 2 incorporating personalized telehealth counseling. Overall, interventions significantly improved medication adherence (Hedges' $g = 0.500$); notably, 1 study employed an HBM-based educational intervention, addressing key constructs including perceived susceptibility, severity, benefits, barriers, self-efficacy, and cues to action, with a significant effect (Hedges' $g = 0.883$).
• Amdemariam et al. (2022)	• Ethiopia	• Perception Towards Cardiovascular Diseases Preventive Practices Among Bank Workers in Hossana Town Using the Health Belief Model	• Cross-sectional study	• The research was conducted with the purpose of measuring the levels of the perceived cardiovascular disease (CVD) preventive practices among bank employees through the application of the Health Belief Model (HBM). In a total of 253 participants, the perceived susceptibility and perceived severity were measured at the levels of 147 (58.1%) and 137 (54.2%). Meanwhile, the perceived benefits and barriers were scored on an average level of 144 (57.0%) and 143 (56.5%). The probability of CVD prevention was found to be 62.0%.
• Unni & Bae (2022)	• United States	• Exploring a New Theoretical Model to Explain the Behavior of Medication Adherence	• Theoretical Review	• The Hierarchical Model for Medication Adherence (HMMA) was postulated by Unni and Bae to provide an explanation for the behavior associated with adherence to medication. The model consists of five stages including health literacy, illness belief, medication belief, self-efficacy, and medication adherence where illness belief has elements of HBM like perceived susceptibility and severity. The authors recommended that interventions should be formulated on the basis of individual needs, but the model has not yet been empirically validated.

Wang et al. (2022)	China	Health Beliefs Associated with Preventive Behaviors Against Non-communicable Diseases	Cross-sectional study	The study aimed to examine health beliefs and their relationship with preventive behaviors against non-communicable diseases (NCDs) among 4,453 participants using the Health Belief Model (HBM). The highest HBM scoring index was for perceived benefits (92.2%), followed by perceived susceptibility (84.3%), cues to action (82.3%), perceived severity (82.2%), and self-efficacy (78.1%), while perceived barriers had the lowest score (55.5%). Overall, perceived barriers ($\beta=0.416$) and self-efficacy ($\beta=0.435$) had the greatest direct effects on preventive behaviors, and the HBM constructs collectively explained 51.0% of the variance in NCD-related preventive behaviors.
Naeemi et al. (2022)	Iran	The Effect of Educational Intervention on Self-Care Behavior in Hypertensive Older People: Applying the Health Belief Model	Quasi-experimental study	The study aimed to evaluate the effect of an HBM-based educational intervention on self-care behaviors among older adults with hypertension. After three months, the highest improvement was observed in perceived susceptibility (69.3 to 84.4), followed by perceived severity (76.03 to 90.6), while perceived barriers showed the greatest reduction (63.01 to 24.9; $P < 0.001$). Self-efficacy increased from 62.7 to 74.1, and overall self-care improved significantly from 60.02 to 79.4 ($P < 0.001$) in the intervention group.
Yu et al. (2022)	China	Knowledge, Attitudes, and Barriers Related to Medication Adherence of Older Patients with Coronary Heart Disease in China	Cross-sectional study	The study aimed to assess knowledge, attitudes, and barriers related to medication adherence among older patients with coronary heart disease in China. The findings indicated that medication adherence was influenced by patients' knowledge, attitudes toward treatment, and perceived barriers, highlighting the importance of addressing patients' beliefs and obstacles to long-term medication use. The study emphasized that insufficient knowledge and greater perceived barriers were associated with poorer medication adherence, suggesting the need for targeted education and individualized support.
Nematzad et al. (2023)	Iran	Effects of Health Belief Model in Promoting Self-Care Behaviors Among	Quasi-experimental	The study aimed to determine the effect of an HBM-based educational intervention on self-care behaviors among hypertensive older adults. Among 106 participants, the intervention group showed significant

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

		<i>Hypertensive Older Adults</i>	<i>Study</i>	<i>improvements in all HBM constructs, with self-efficacy increasing from 28.81 to 34.34, cues to action from 27.00 to 33.06, and perceived susceptibility from 33.28 to 37.25 ($P < 0.001$). Perceived barriers decreased from 22.42 to 15.58, while self-care scores increased substantially from 39.94 to 56.55 ($P < 0.001$).</i>
• Subih et al. (2023)	• Jordan	• Medication Adherence Among Patients with Cardiovascular Diseases: A Cross-Sectional Study	• Cross-sectional Study	• The study aimed to assess medication adherence and identify factors associated with adherence among patients with cardiovascular diseases (CVDs). A total of 270 participants were included. The findings revealed poor medication adherence, with 88% of patients demonstrating low adherence (mean = 2.56 ± 1.89), while 74.8% reported high social support. Marital status and number of chronic diseases were positively associated with medication adherence, whereas smoking was negatively associated and emerged as the only significant independent predictor of medication adherence ($\beta = -0.163$, $p = 0.028$).
• Zahed et al. (2023)	• United States	• Investigating the Effect of an mHealth Coaching Intervention on Health Beliefs, Adherence and Blood Pressure of Patients with Hypertension: A Longitudinal Single-Group Pilot Study	• Longitudinal Pilot Study	• Purpose of this study was to determine the effect of mHealth-based health coaching program on the health beliefs, adherence to self-management practice and blood pressure among the hypertensive patients. Out of 35 participants enrolled in this study, 34 have successfully completed this study with average age of 44.8 ± 14.1 years. Significant changes were observed in the domain of self-efficacy (4.57 to 5.98, $p < 0.001$) and cues to action (5.04 to 5.91, $p = 0.02$); however, there were no significant reductions in the barriers. The adherence to self-management for BP and weight monitoring increased from 26.5 to 28.74/30 ($p = 0.011$). At the same time there was a reduction in the level of SBP (136.3 to 130.8 mmHg) and DBP
• Al-Noumani et al. (2023)	• Oman	• Role of Health Literacy, Social Support, Patient-Physician Relationship, and Health-Related Quality of Life in	• Cross-sectional Correlational	• Among 360 cardiovascular patients in Oman, medication adherence was associated with demographic, psychosocial, and healthcare factors. The patient-physician relationship was the strongest positive predictor ($\beta = 0.242$, $p < 0.01$), with the model explaining 22.5% of adherence variance ($R^2 = 0.225$).

		<i>Predicting Medication Adherence in Cardiovascular Diseases in Oman</i>	<i>Study</i>	<i>Health literacy was not significant, while higher education was negatively associated with adherence ($\beta = -0.147$, $p = 0.019$).</i>
• Bakhshi et al .(2023)	• Iran	• <i>The Effect of Health Belief Model-based Education on Empowering Cardiovascular Patients for Medication Adherence</i>	• <i>Quasi-experimental study</i>	• <i>The study evaluated the effect of HBM-based education on medication adherence and HBM constructs among 45 cardiovascular patients. After three months, adherence significantly improved in the intervention group (6.63 ± 0.26 vs. 5.29 ± 0.16; $p = 0.001$), with a significant group $\times$ time interaction ($p = 0.049$). The intervention also significantly improved perceived benefits, self-efficacy, and perceived barriers, with significant improvements across all HBM dimensions within the intervention group.</i>
• Komaç & Duru (2024)	• Turkey	• <i>The effect of education based on a health belief model and motivational interviews on cardiovascular disease risk factors and healthy lifestyle Behaviour changes in patients with essential hypertension: A randomized Controlled Trial.</i>	• <i>Randomized Controlled Trial (RCT)</i>	• <i>The study evaluated HBM-based education combined with motivational interviewing among 80 patients with essential hypertension in Türkiye (mean age 49.83 ± 6.99 years). The intervention produced significantly greater reductions in 10-year Framingham CVD risk at both 3 and 6 months compared with controls, with 72.5% having a family history of CVD and 50% each classified as having moderate or high baseline risk, supporting the intervention's effectiveness in reducing cardiovascular risk.</i>
• Oh et al. (2024)	• South Korea	• <i>A Predictive Model for Medication Adherence in Older Adults with Heart Failure</i>	• <i>Cross-sectional study</i>	• <i>This research sought to construct and evaluate a prediction model of medication adherence in older patients diagnosed with heart failure using the variables such as knowledge, social support, depressive symptoms, and self-efficacy. Of 153 subjects whose mean age was 76.75 ± 7.19 years and 56.9% were women, adherence was significantly influenced by knowledge, social support, depressive symptoms, and self-efficacy ($p < 0.001$). Self-efficacy ($\beta = -0.335$, $p = 0.006$) and knowledge ($\beta = -0.132$, $p = 0.030$) significantly predicted adherence while social support was indirectly associated via self-efficacy. Generally, the model was able to explain 64.4% of variance in adherence.</i>

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

Nelson et al.(2024)	USA	Improving Medication Adherence in Cardiovascular Disease	Narrative Review	A study reviewed medication non-adherence in CVD, its determinants, and effective interventions using PubMed-based RCTs published from 2002–2023. The review found that up to 30% of prescriptions were never filled and 50% were discontinued within 12 months. Adherence improved with multifaceted interventions (60% vs. 34%) and polypill therapy (RR=1.34, 95% CI: 1.11–1.55). The authors concluded that tailored, multifaceted strategies, including education, simplified regimens, and motivational interventions, improve adherence.
Kam & Lee (2024)	South Korea	Integrating the Health Belief Model into Health Education Programs in a Clinical Setting	Narrative Review	In their study, Wang et al. analyzed the use of the Health Belief Model (HBM) for conducting health education sessions among hypertensive individuals. Through this HBM intervention, there were 5 main constructs, which were: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy, leading to reduced systolic and diastolic blood pressures in the intervention group as opposed to the control group. HBM-based education has also demonstrated benefits across ≥ 13 health contexts, including diabetes, cancer screening, infectious disease prevention, lifestyle modification, and medication adherence. The review concluded that personalized education, motivational interviewing, barrier reduction, and self-efficacy enhancement can improve health behaviors and clinical outcomes, although cultural adaptation and long-term evaluation are needed.
Arshed et al. (2024)	Pakistan	Effectiveness of a Multifaceted Mobile Health Intervention (Multi-Aid-Package) in Medication Adherence and Treatment Outcomes Among Patients With Hypertension in a Low- to Middle-	Randomized Controlled Trial (RCT)	A 6-month randomized controlled trial among 439 hypertensive patients with poor medication adherence found that an HBM-based Multi-Aid-Package significantly improved adherence and blood pressure control. Among 423 completers, adherence was higher in the intervention group (37.2% vs. 0.9%; $p < 0.001$), with higher median SEAMS scores (32 vs. 21; $p < 0.001$). Systolic BP was 7 mmHg lower between groups ($p < 0.001$), while 22.3% more participants achieved BP control. The intervention also

		Income Country: Randomized Controlled Trial		showed high acceptability (94.8%).
Ruksaku lpiwat et al. (2024)	USA	Medication Adherence of Older Adults with Hypertension: A Systematic Review	Systematic Review	A systematic review of 13 studies examining medication adherence among older adults with hypertension was conducted from an initial 448 papers, of which 16 were assessed in full text. The review identified 15 factors/themes associated with adherence. The most frequently reported were number of medications (53.9%, n=7), financial status (38.5%, n=5), gender (38.5%, n=5), age (30.1%, n=4), disease duration (23.1%, n=3), comorbidity (23.1%, n=3), and health compliance (23.1%, n=3). Other factors included health literacy, health beliefs, medication beliefs, illness perceptions, patient-physician relationship, self-efficacy, and social support.
Su et al. (2024)	China	Perceived Determinants of Health-Related Behaviors Among Patients with Coronary Heart Disease After Percutaneous Coronary Intervention: A Longitudinal Qualitative Study	Longitudinal Qualitative Study	The study identified dynamic individual, social, and cultural determinants influencing health-related behaviors after Percutaneous Coronary Intervention (PCI). Key factors included disease perceptions, fear of relapse, perceived benefits, family and healthcare support, healthcare barriers, and cultural beliefs. The findings suggest that culturally sensitive, individualized interventions addressing patients' beliefs, perceived barriers, and social support are essential for promoting long-term adherence to recommended health behaviors.
Amadu et al. (2025)	Ghana	Treatment Adherence and Quality of Life of Adults Living With Hypertension in Rural Ghana	Cross-sectional Study	The study aimed to assess treatment adherence and quality of life among 351 adults with hypertension in rural Ghana and examine factors associated with medication adherence. Among 351 participants (mean age 59.8 ± 14.18 years; 54.4% female), 64.4% demonstrated high medication adherence, while 35.6% had low adherence. Non-adherence was mainly attributed to lack of trust in medication (81.6%), forgetfulness (76.8%), and preference for herbal remedies (74.4%). Medication adherence was significantly associated with several sociodemographic factors and social quality of life (p = 0.011), whereas other QoL domains were not significantly associated.

**BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND
CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW**

• Linares Cánovas et al. (2025)	• Cuba	• The Development and Validation in Hypertensive Patients of the Health Belief Model for Pharmacological Adherence (HBM-FA) Scale	• Instrument Development and Validation Study	• The objective was to design and test the psychometric properties of the Health Belief Model for Pharmacological Adherence Scale among hypertensive patients. Altogether, 332 subjects, comprising of 240 females and 92 males with an average age of 63.7 ± 8.5 participated in the study and filled out the survey instrument. The instrument had high content validity ($I-CVI = 0.83-0.97$; $S-CVI = 0.89$), while the modified six-factors scale had high construct validity ($CFI = 0.977$, $TLI = 0.972$, $RMSEA = 0.043$, $SRMR = 0.039$). Nine low performance items were deleted, validating the final HBM-FA scale.
• Islam et al. (2026)	• Bangladesh	• Health Beliefs, Medication Adherence, and Blood Pressure Control in Rural Bangladeshi Hypertension: An Exploratory Sequential Mixed-Methods Study	• Exploratory Sequential Mixed-Methods Study	• The objectives of this study were to determine the association of HBM constructs, adherence, and BP control among hypertensive patients in rural Bangladesh. This sample consisted of 461 subjects; their mean age was 58.0 ± 14.3 years old; 57.5% ($n=265$) were females and 50.1% ($n=231$) were ≥ 60 years old. The measures of perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy in relation to adherence and BP control were considered. But from the data provided in Table 2, it is evident that only sociodemographic, lifestyle, and clinical factors have been reported and no data of HBM constructs and their association with medication adherence and BP control have been presented.
• Ryabina et al. (2026)	• Ghana	• Antihypertensive Medication Adherence and Associated Risk Factors Among Adults with Hypertension: A Cross-Sectional Study in a Teaching Hospital, Ghana	• Cross-sectional study	• Objective of the study was to determine adherence to anti-hypertensive drugs and related risk factors among patients with high blood pressure at a teaching hospital in Ghana. In the end, 292 subjects participated in the study, where 67.8% were compliant and 32.2% were not compliant. Important variables that affect adherence to the medications include knowledge about medication, knowledge about dose, BP check, and availability of medication. Some of the common obstacles to medication adherence include forgetfulness (84.6%), lack of money (62.6%), complexity of regimen (19.8%) and lack of symptoms (12.1%).

Aljadan i et al. (2026)	Saudi Arabia	Applying the Extended Health Belief Model to Understand Salt-Reduction Behaviors Among Saudi Adults: A Cross-Sectional Study	Cross-sectional study	The cross-sectional study among 522 adults from Saudi Arabia analyzed the behavioral aspects of salt reduction based on the extended Health Belief Model (HBM). While 85.1% of them were aware that salt consumption is one of the factors that may lead to hypertension, and 86.6% were aware that salt reduction leads to lowering blood pressure, only 31.8% frequently/always tried to reduce their salt consumption and 23.2% frequently/always used salt substitutes. Salt knowledge showed positive correlation with perceived susceptibility and severity ($r = 0.422$), perceived benefits ($r = 0.341$), self-efficacy ($r = 0.275$) and eating habits ($r = 0.272$; $p < 0.001$).
Hidayat et., al (2026)	Indonesia	Health Belief Model Predictors of Medication Adherence Among Patients With Hypertension: A Cross-Sectional Study	Cross-sectional study	In the study group of 85 hypertensive subjects, the average value of HBM was 99.85 ± 39.41 and the average level of adherence to medication was 6.35 ± 1.25. The correlation between overall HBM and adherence to medication was highly significant ($r = 0.527$, $p < 0.001$). All HBM constructs were positively correlated with medication adherence, with the strongest correlation for vulnerability ($r = 0.559$) and severity ($r = 0.553$), then threat ($r = 0.527$), benefits ($r = 0.5$)

Results:

This narrative review synthesized findings from 25 studies published between 2021 and 2026 examining medication adherence, cardiovascular health behaviors, and Health Belief Model (HBM) constructs among adults with cardiovascular diseases, hypertension, and related chronic conditions. The studies were conducted across diverse geographical regions. Iran contributed the largest single-country cluster of HBM-based intervention studies ($n = 3$), followed by China, South Korea, and the United States ($n = 3$ each), and Ghana ($n = 2$). Only one study originated from Pakistan (Arshed et al., 2024) and one from Bangladesh (Islam et al., 2026). Study designs were predominantly cross-sectional ($n = 11$), followed by quasi-experimental pre-post studies ($n = 3$), randomized controlled trials (RCTs; $n = 2$), systematic reviews and meta-analyses ($n = 3$), narrative reviews ($n = 2$), and one study each using theoretical review, longitudinal pilot, longitudinal qualitative, and instrument-validation designs.

Medication Adherence Rates Across Contexts

Reported medication adherence rates varied considerably across study settings and populations. (Subih et al., 2023) found that 88% of Jordanian cardiovascular patients demonstrated low adherence, with a mean score of 2.56 ± 1.89 on an 8-point adherence scale. In contrast, (Amadu et al., 2025) reported high adherence among 64.4% of rural Ghanaian adults with hypertension, while Ryabinina et al. (2026) reported an adherence rate of 67.8% among patients attending a Ghanaian teaching hospital.

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

Arshed et al., 2024 reported a substantial difference between the intervention and comparison groups in Pakistan. At six months, only 0.9% of participants receiving standard care were adherent according to pill-count assessment, compared with 37.2% of participants receiving the HBM-based Multi-Aid-Package mHealth intervention. Direct comparison of adherence rates across studies should, however, be interpreted cautiously because different measurement instruments were used, including Morisky-type scales, SEAMS, composite adherence indices, and pill-count methods.

Health Belief Model Constructs and Their Association with Adherence

Across the included studies, perceived benefits were generally among the highest-rated HBM constructs, reaching 92.2% in (Wang et al., 2022). In the same study, perceived barriers were reported at 55.5%, while perceived barriers and self-efficacy demonstrated the strongest direct associations with preventive behavior ($\beta = 0.416$ and $\beta = 0.435$, respectively). Together, the model explained approximately 51.0% of the variance in preventive behavior.

Self-efficacy was consistently associated with medication adherence and health behavior across several studies. Oh et al. in 2024 identified self-efficacy as a significant direct predictor of adherence, while (Bakhshi et al., 2023) reported substantial improvements in self-efficacy following an HBM-based educational intervention. Hidayat et al. in 2026 also reported significant correlations between medication adherence and self-efficacy ($r = 0.326$), perceived susceptibility ($r = 0.559$), and perceived severity ($r = 0.553$).

Perceived barriers showed notable changes following HBM-based educational interventions. Naeemi et al. (2022) reported a reduction in perceived-barrier scores from 63.0 to 24.9, while Nematzad et al. (2023) reported a decrease from 22.4 to 15.6 following the intervention.

A difference between health knowledge or beliefs and reported health behavior was observed in Aljadani et al. (2026). Although 85.1% of participants recognized excessive salt consumption as a risk factor for hypertension, only 31.8% consistently reported attempting to reduce their salt intake.

Overall, the included studies identified self-efficacy, perceived barriers, perceived susceptibility, and perceived severity as HBM constructs associated with medication adherence and preventive health behaviors.

Effectiveness of HBM-Based Interventions

Evidence from quasi-experimental studies, randomized controlled trials, and review studies generally reported favorable outcomes following HBM-based interventions. Reported outcomes included changes in HBM constructs, medication adherence, cardiovascular risk indicators, and blood pressure.

Komaç and Duru (2024) reported that HBM-based education combined with motivational interviewing was associated with significantly greater reductions in 10-year Framingham cardiovascular risk scores at three- and six-month follow-up.

Arshed et al. (2024) conducted a six-month RCT involving 439 participants, with a retention rate of 96.4%. The proportion of adherent patients increased from 0.9% to 37.2% in the intervention group. The intervention was also associated with an approximately 7 mmHg between-group reduction in systolic blood pressure and achieved 94.8% patient acceptability.

At the review level, Kam and Lee (2024) reported beneficial effects of HBM-based educational

interventions across at least 13 health contexts, including hypertension, diabetes, and medication adherence. Broader reviews by Ogungbe et al. in 2021 and similarly Nelson et al. in 2024 reported favorable outcomes for multi-component and technology-supported adherence interventions.

Non-HBM Predictors of Adherence

Several studies identified factors outside the traditional HBM constructs that were associated with medication adherence. Al-Noumani et al. (2023) found that the patient–physician relationship was the strongest positive predictor of adherence in their model ($\beta = 0.242$), whereas health literacy was not a significant predictor ($\beta = 0.065$, $p = 0.289$). Higher educational level was negatively associated with adherence ($\beta = -0.147$), and the overall model explained 22.5% of the variance in adherence.

Oh et al. (2024) reported that social support influenced medication adherence indirectly through self-efficacy, with the combined model explaining 64.4% of the variance. Subih et al. (2023) identified smoking as the only significant independent predictor of adherence in their analysis.

Ruksakulpiwat et al. (2024), in a synthesis of 13 studies, identified the number of medications, financial status, sex, age, disease duration, and comorbidities as frequently reported factors associated with medication adherence. Culturally and contextually specific barriers were also reported. Amadu et al. (2025) found distrust of medication (81.6%) and preference for herbal remedies (74.4%) among rural Ghanaian participants, whereas Ryabinina et al. (2026) reported forgetfulness (84.6%) and financial constraints (62.6%) as commonly reported barriers among patients attending a Ghanaian teaching hospital.

Collectively, the reviewed evidence demonstrated substantial variation in medication adherence across populations and settings, with both HBM-related constructs and non-HBM social, behavioral, and contextual factors associated with adherence outcomes.

Discussion:

A Critical Analysis: The Explanatory Power and Limits of the Health Belief Model

Overall, there is evidence that the HBM is an informative but weak explanatory theory of medication adherence and its contribution is conditional on the specific behavioral outcomes being studied. The predictors of HBM explained a large percentage of variance in the preventive intentions and behaviors related to lifestyle (51.0% in Wang et al., 2022), but only a small part of the variance in the medication adherence (22.5% in Al-Noumani et al., 2023). Such a gap is theoretically possible because the HBM was originally created for explaining preventive behaviors and not adherence, as the latter is a complex process that is affected by multiple social and practical factors, while not necessarily linked to health perceptions of the patients. Therefore, forgetfulness, costs, complexity of the regimen, access to medication, and patient-provider relationships can affect the adherence regardless of any health beliefs.

Self-Efficacy and Perceived Barriers: Consistent but Evolving HBM Constructs

Among other factors, self-efficacy proved to be a quite consistent predictor of adherence in the studied literature, as well as the Iranian quasi-experimental research, Oh et al. (2024), and Hidayat et al. (2026). Even though self-efficacy is not an original construct of the HBM, which initially included only four other components, it was added to the model as it underwent development. The consistent predictive function of the factor indicates that patients' confidence in their own capabilities may be more important for adherence than their perceptions of susceptibility and severity of the disease.

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

Perceived barriers were also found to be significant and constitute one of the potentially most modifiable components of the model. While perception of susceptibility and severity of the problem is influenced mainly by information on diseases, barriers are potentially more easily influenced. It means that they can be addressed by simplifying regimens of medication, reducing its costs, using reminders, increasing medicine availability, and enhancing skills-based counseling. Therefore, the results of the literature review show that efficient adherence strategies should go beyond increasing perceptions of risk and enhance self-efficacy and address barriers.

The Belief–Behavior Gap

Furthermore, the reviewed evidence shows another significant discrepancy between health beliefs or knowledge and health behavior. Aljadani et al. (2026), for example, found high risk awareness (85.1%) among their respondents while only 31.8% of them engaged in salt-reducing behavior. Likewise, Su et al. (2024) found out through a longitudinal and qualitative analysis that post-PCI behaviors were driven not so much by health beliefs but by fear of relapse, family support, and culture-related beliefs.

These findings mean that positive health beliefs do not guarantee adherence and lifestyle changes. This has significant implications for the use of the HBM in cardiovascular studies. Indeed, the HBM has been traditionally used in cardiovascular studies as a cross-sectional approach which includes the measurement of beliefs at one point in time. However, medication adherence behavior can be quite dynamic and depends on many factors, such as treatment experience, symptoms, family issues, costs, and interaction with physicians. Thus, longitudinal approaches would be more helpful in this case.

Cultural and Contextual Variability in Barrier Profiles

Despite the fact that HBM construct names are common in research, the meaning and presentation of perceived barriers can be quite different depending on the population and setting. Perceived barriers to treatment in rural Ghana included suspicion toward prescribed medication and the tendency to rely on herbal medication (Amadu et al., 2025), but in a teaching hospital in Ghana, forgetfulness and the lack of finances were major factors (Ryabinina et al., 2026). In Jordan, smoking was an indicator that was better than some HBM barriers (Subih et al., 2023), whereas in Oman, high levels of education were negatively correlated with adherence (Al-Noumani et al., 2023).

Such findings indicate that the relationship between HBM constructs and adherence is strongly influenced by cultural, socioeconomic, and healthcare-system contexts. Therefore, applying a generic HBM-based barrier scale across different populations without cultural adaptation may overlook important locally specific determinants of medication-taking behavior. Linares Cánovas et al. (2025) provide a relevant example through the development and validation of an HBM-based pharmacological-adherence scale for Cuban patients with hypertension, in which nine poorly performing items were removed during the validation process. This supports the need for culturally appropriate instrument development and validation rather than assuming that HBM measures have equivalent meaning across populations.

Intervention Evidence: Promising but Methodologically Constrained

The intervention evidence provides encouraging support for HBM-informed approaches, but its interpretation is constrained by several methodological limitations. Many intervention studies were

conducted in relatively small, single-center samples with short follow-up periods. For example, Bakhshi et al. (2023) included 45 participants and Nematzad et al. (2023) included 106 participants, with both studies using three-month follow-up periods.

The large-scale, well-designed studies examined in this paper include a six-month single-blind randomized control trial from Turkey (Komaç & Duru, 2024) and a six-month randomized control trial with 439 participants from Pakistan, in which retention was 96.4% (Arshed et al., 2024). Crucially, both the interventions used were not just health education, but included further behavior change strategies, such as motivational interviewing and multimodal mHealth. It means that the improvement noted could not have been solely due to HBM-based strategies.

Indeed, such an assumption can be supported by general narrative evidence that suggests the use of multicomponent or technology-supported interventions may be more effective compared to education as a singular component (Nelson et al., 2024; Ogungbe et al., 2021). Thus, future trials should consider the contribution of HBM as a theory separately from the other strategies.

A Persistent Evidence Gap for Pakistan and South Asia

One key observation from this review is the lack of studies related to Pakistan or South Asia. Of the total 25 articles, one was conducted specifically in Pakistan (Arshed et al., 2024) and one in Bangladesh (Islam et al., 2026), but the latter article did not present any information on HBM constructs.

The significant variability in context between studies makes the generalization of findings from other regions quite challenging. The identified barriers in Iran, China, Ghana, or other countries may not be enough to describe the challenges faced by Pakistani patients because issues such as drug affordability, out-of-pocket expenditures, healthcare accessibility, health literacy, family influence, and the usage of complementary medicine can influence patients' adherence to treatment in Pakistan and South Asia. Thus, the local evidence is needed to determine whether the constructs that are described in the HBM theory are sufficient enough for describing the barriers to medication adherence among Pakistani and South Asian populations.

Recommendations for Research and Practice

Based on the findings of this review, several priorities emerge:

- **Expand research in Pakistan and South Asia** through adequately powered studies addressing medication adherence in the context of cardiovascular disease.
- **Conduct rigorous randomized and longitudinal studies** with longer follow-up and both self-reported and objective measures of medication adherence.
- **Develop culturally tailored, HBM-based interventions addressing all key constructs**, including perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy.
- **Examine context-specific determinants of medication adherence**, including medication beliefs, traditional medicine use, financial constraints, family influences, and healthcare-access difficulties
- **Strengthen the role of nurses and other healthcare professionals** in integrating HBM-informed principles into clinical practice through patient education, individualized counseling, assessment of health beliefs and medication-adherence challenges, and ongoing follow-up within primary and community care.

Limitations

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

The current review has a number of limitations that should be taken into account while considering its findings. First of all, only articles written in English were used for the analysis, hence some relevant data published in other languages might have been missed. Second, no formal quality appraisal or risk-of-bias assessment was performed; hence it was impossible to compare the methodological quality and the risk of bias of the studies under analysis. Third, although an attempt to include only relevant and representative evidence was made, the search and selection procedures were narrative, thus the influence of researcher biases on study selection cannot be ruled out. Finally, most of the available literature is cross-sectional, which makes it difficult to identify any cause-and-effect relationships between the elements of HBM and adherence to medications.

Conclusion

The HBM theory represents a useful tool that allows one to study psychological determinants of medication adherence among adults suffering from cardiovascular diseases. Self-efficacy and perceived barriers are among the most frequently identified predictors of medication adherence among cardiovascular patients. In addition, HBM-based interventions can be helpful in improving the adherence of patients to therapy, their health beliefs, and clinical outcomes like blood pressure. Still, the results of studies suggest that HBM has an insufficient explanatory power. The percentage of variance explained by constructs of HBM differs in regard to outcomes and groups of patients. In addition, a number of factors not included in HBM (financial issues, social support, relationship between the patient and the provider, access to health care, and cultural practices, for example) can have a substantial impact on medication adherence.

Another conclusion which could be drawn is that there is the presence of the belief-behavior gap in the studied population. In other words, increased knowledge or perceived risks cannot serve as predictors of medication taking behavior. Taking medication is a dynamic process, the outcome of which depends on interplay between the person's beliefs and social, economic, cultural, and health care system.

Therefore, future studies ought to go beyond the use of the HBM in isolation and rather pursue an integrative approach that considers factors such as psychological constructs along with structural, relational, and behavioral determinants of adherence. This means there is a need for research done in Pakistan and among South Asians in order to understand the influence of HBM constructs in their specific health care, socio-economic, and cultural context.

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References

1. Arshed, M., Mahmud, A., Minhat, H. S., Lim, P. Y., & Zakar, R. (2024). Effectiveness of a
2. multifaceted mobile health intervention (Multi-Aid-Package) in medication adherence and treatment outcomes among patients with hypertension in a low-to middle-income country: randomized controlled trial. *JMIR mHealth and uHealth*, 12, e50248.
3. Alyafei, A., & Carr, R. E. (2024). The Health Belief Model of Behavior Change. In *National*
4. *Library of Medicine*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK606120/>
5. Ardenny, A., Rusdi, I., Idayanti, I., & Oktariani, F. (2025). The effectiveness of health belief

6. model intervention on tuberculosis medication adherence in rural Indonesia: a pre-experimental study. *Healthcare in Low-Resource Settings*, 13(4).
7. Al-Noumani, H., Al Omari, O., & Al-Naamani, Z. (2023). Role of health literacy, social support,
8. patient-physician relationship, and health-related quality of life in predicting medication adherence in cardiovascular diseases in Oman. *Patient preference and adherence*, 643-652.
9. Amadu, A. B., Konlan, K. D., Amadu, J. B., & Dzansi, G. Treatment adherence and quality of
10. life of adults living with hypertension in rural Ghana. *Nurs Open*. 2025; 12 (3): e70198.
11. Amdemariam, L. K., Watumo, A. M., Sibamo, E. L., & Agide, F. D. (2022). Perception towards
12. cardiovascular diseases preventive practices among bank workers in Hossana town using the health belief model. *PLoS One*, 17(2), e0264112.
13. Bakhshi, S., Heidari, S., Zanjirani, S., & Zakeri, M. A. (2023). The effect of health belief model-
14. based education on empowering cardiovascular patients for medication adherence.
15. World Health Organization – Cardiovascular Diseases Fact Sheet
16. Baptiste, D. L., Owusu, B., Chepkorir, J., & Park, L. G. (2025). Nursing Innovations to Advance
17. Cardiovascular Care and Reduce Health Disparities. *Journal of Cardiovascular Nursing*, 40(6), 501-502.
18. Cánovas, L. P. L., Miranda, G. L. H., Cánovas, L. B. L., Silva, B. M., Muñoz, W. I. S., & Ortiz,
19. G. L. (2025). The development and validation in hypertensive patients of the Health Belief Model for pharmacological adherence (HBM-FA) scale. *SAP Health and Policy*, 4, 229-229.
20. Garea, S. C., & Díaz, M. J. F. (2025). Nursing interventions for cardiovascular disease
21. prevention: a narrative review of evidence-based strategies. *BMC nursing*, 24(1), 1269.
22. Hidayat, R., Padhila, N. I., & Hisyam, M. (2026). Health Belief Model Predictors of Medication
23. Adherence Among Patients With Hypertension: A Cross-Sectional Study. *An Idea Health Journal*, 6(03), 480-491.
24. Jeon, H. O., Chae, M. O., & Kim, A. (2022). Effects of medication adherence interventions for
25. older adults with chronic illnesses: a systematic review and meta-analysis. *Osong Public Health and Research Perspectives*, 13(5), 328.
26. Komaç, F., & Duru, P. (2024). The effect of education based on a health belief model and
27. motivational interviews on cardiovascular disease risk factors and healthy lifestyle behaviour changes in patients with essential hypertension: A randomized controlled trial. *Patient Education and Counseling*, 120, 108126.
28. Kam, B. S., & Lee, S. Y. (2024). Integrating the health belief model into health education
29. programs in a clinical setting. *World Journal of Clinical Cases*, 12(33), 6660.
30. Kalantzi, V., Kalafati, I. P., Belitsi, V., Tsiampalis, T., Koutsonasios, I., Androutsos, O., ... &
31. Kosti, R. I. (2023). Cardiometabolic patient-related factors influencing the adherence to lifestyle changes and overall treatment: a review of the recent literature. *Life*, 13(5), 1153.
32. Khalil, H., & Zeltser, R. (2024). Antihypertensive Medications.[Updated 2023 May
33. 8]. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.
34. Mohammadkhah, F., Shamsalinia, A., Rajabi, F., Afzali Hasirini, P., & Khani Jeihooni, A. (2023).
35. The effect of educational intervention in the prevention of cardiovascular diseases in patients with hypertension with application of health belief model: A quasi-experimental study. *JRSM Cardiovascular Disease*, 12, 20480040231212278.
36. Nelson, A. J., Pagidipati, N. J., & Bosworth, H. B. (2024). Improving medication adherence in
37. cardiovascular disease. *Nature Reviews Cardiology*, 21(6), 417-429. <https://doi.org/10.1038/s41569-023-00972-1>
38. Nematzad, P., Pourghane, P., Besharati, F., & Gholami-Chaboki, B. (2023). Effects of health
39. belief model in promoting self-care behaviors among hypertensive older adults. *Journal of Education and Health Promotion*, 12(1), 208.
40. Naeemi, L., Daniali, S. S., Hassanzadeh, A., & Rahimi, M. (2022). The effect of educational
41. intervention on self-care behavior in hypertensive older people: Applying the health belief model. *Journal of Education and Health Promotion*, 11(1), 406.
42. Oh, E. H., Kim, C. J., & Schlenk, E. A. (2024). A predictive model for medication adherence in
43. older adults with heart failure. *European Journal of Cardiovascular Nursing*, 23(6), 635-643.
44. Ogungbe, O., Byiringiro, S., Adedokun-Afolayan, A., Seal, S. M., Dennison Himmelfarb, C. R.,
45. Davidson, P. M., & Commodore-Mensah, Y. (2021). Medication adherence interventions for cardiovascular disease in low-and middle-income countries: a systematic review. *Patient Preference and Adherence*, 885-897.
46. Islam, M. T., Haque, M. A., Uddin, M. K., Chakraborty, M., & Arafat, S. M. (2026). Health
47. beliefs, medication adherence, and blood-pressure control in rural Bangladeshi hypertension: an exploratory sequential mixed-methods study.
48. Islam, M. T., Arafat, S. M., Chowdhury, A., Orchi, K., Sultana, S., Bushra, T., ... & Haque, M. A.

BEYOND PRESCRIPTIONS: APPLYING THE HEALTH BELIEF MODEL TO UNDERSTAND CARDIOVASCULAR MEDICATION-TAKING BEHAVIOR: A NARRATIVE REVIEW

49. (2025). *Role of the Health Belief Model in the Management of Hypertension: A Systematic Review*. *Cureus*, 17(10).
50. Kam, B. S., & Lee, S. Y. (2024). Integrating the health belief model into health education programs in a clinical setting. *World Journal of Clinical Cases*, 12(33), 6660.
- 51.
52. Wang, T., Wang, H., Zeng, Y., Cai, X., & Xie, L. (2022). Health beliefs associated with
53. preventive behaviors against noncommunicable diseases. *Patient education and counseling*, 105(1), 173-181.
54. Ryabinina, O., Addo, F. O., Thomford, N. E., Zumesew, F., Debrah, A. A., Nsiah, P., ... &
55. Donkoh, E. T. (2026). Antihypertensive medication adherence and associated risk factors among adults with hypertension: a cross-sectional study in a teaching hospital, Ghana. *BMC Cardiovascular Disorders*, 26(1), 156.
56. Ruksakulpiwat, S., Schiltz, N.K., Irani, E., Josephson, R.A., Adams, J. and Still, C.H., 2024.
57. Medication adherence of older adults with hypertension: a systematic review. *Patient Preference and Adherence*, pp.957-975.
58. Unni, E., & Bae, S. (2022). Exploring a new theoretical model to explain the behavior of
59. medication adherence. *Pharmacy*, 10(2), 43.
60. World Health Organization. (2025). Uncontrolled high blood pressure puts over a billion
61. people at risk. Retrieved Sep, 25, 2025.
62. World Health Organization. (2025). Cardiovascular diseases (CVDs). In World Health
63. Organization . [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))
64. World Health Organization. (2021). Cardiovascular diseases (CVDs). In Who.int. World
65. Health Organization: WHO. <https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-%28cvds%29>
66. Novita, M. P., Kusuma, A. W. T., Fajar, B., Darmawan, B. R., Dewi, H. E., Maharani, Y. D.,
67. & Ratnawati, R. (2025). Relationship of Health Belief Model with Medication Adherence in RW 11, Bangetayu Kulon Village, Semarang. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*, 11(2), 282-288.
68. Patel, S., Huang, M., & Miliara, S. (2025). Understanding treatment adherence in chronic
69. diseases: challenges, consequences, and strategies for improvement. *Journal of Clinical Medicine*, 14(17), 6034.
70. Su, X., Zhang, Y., Zhou, H., Ma, F., Jin, X., Bai, Y., ... & Zhou, M. (2024). Perceived
71. determinants of health-related behaviors among patients with coronary heart disease after percutaneous coronary intervention: a longitudinal qualitative study. *Patient preference and adherence*, 591-606.
72. Simon, S. T., Kini, V., Levy, A. E., & Ho, P. M. (2021). Medication adherence in
73. cardiovascular medicine. *BMJ*, 374, n1493. <https://doi.org/10.1136/bmj.n1493>
74. Subih, M. M., Abu Saleh, F., & Malak, M. Z. (2023). Medication adherence among patients
75. with cardiovascular diseases: a cross-sectional study. *Journal of Research in Nursing*, 28(4), 272-282.
76. Tokgözoğlu, L., Akbar, M., Bryce, A., Chen, Z., Arnaout, M. S., Da Silva van der Laan, A., &
77. Tan, N. C. (2026). Regional Determinants of Non-Adherence: A Quantitative Survey of Healthcare Professionals' Perceptions in Latin America, Asia Pacific, Middle East, Africa, Pakistan and China. *Patient preference and adherence*, 590211.
78. Yulianti, T., Widayanti, A. W., Kristina, S. A., & Yasin, N. M. (2025). Theory-based
79. interventions to improve medication adherence among patients with hypertension in primary healthcare and the community: a systematic review. *Journal of Preventive Medicine and Public Health*, 58(4), 348.
80. Yu, M., Wang, L., Guan, L., Qian, M., Lv, J., & Deng, M. (2022). Knowledge, attitudes, and
81. barriers related to medication adherence of older patients with coronary heart disease in China. *Geriatric Nursing*, 43, 235-241.
82. Zafar, M., Adil, T., Zaidi, T. H., Siddiqui, H. T., Farooq, T., Sohail, A., ... & Siddiqui, M. N.
83. (2026). Determinants of medication nonadherence and physician-switching behavior among outpatient populations in Karachi, Pakistan: a cross-sectional analysis. *Discover Public Health*, 23(1), 626.