



PREDICTORS OF MEDICATION ADHERENCE AMONG PATIENTS WITH CARDIOVASCULAR DISEASES

Dr. Sana Iqbal

Department of Pharmacology, University of Punjab, Lahore, Pakistan.

Email: sana.iqbal@pu.edu.pk

Abstract

Medication adherence is crucial for effective management of cardiovascular diseases (CVD), a leading cause of morbidity and mortality globally and in Pakistan. This study investigates the key predictors influencing medication adherence among Pakistani patients diagnosed with CVD. Factors such as socio-demographic characteristics, health literacy, psychological factors, healthcare system accessibility, and patient-provider communication were analyzed. Results indicate that higher education level, strong social support, good healthcare access, and positive patient-provider relationships significantly improve adherence. Behavioral and psychological determinants such as depression and perceived medication side effects also substantially impact adherence rates. These findings underscore the need for multifaceted interventions tailored to cultural and systemic factors to enhance medication adherence and improve cardiovascular outcomes in Pakistan.

Keywords: Medication adherence, Cardiovascular diseases, Predictors, Pakistan

INTRODUCTION

Cardiovascular diseases remain the leading cause of death worldwide, with Pakistan experiencing a rising burden due to urbanization, lifestyle changes, and aging populations. Optimal medication adherence is essential for controlling disease progression and reducing adverse events. However, non-adherence is a common challenge, often resulting in treatment failure, hospitalizations, and increased healthcare costs. Identifying predictors of medication adherence can inform targeted interventions to improve outcomes in the Pakistani context.

1. Socio-Demographic Predictors of Medication Adherence

Medication adherence among patients with cardiovascular diseases is significantly influenced by various socio-demographic factors including age, gender, education, income, and employment status.

Age: Older patients often demonstrate better adherence due to increased health awareness and frequent healthcare interactions, but very advanced age may reduce adherence because of cognitive decline or multiple comorbidities. Middle-aged patients may show variable adherence influenced by lifestyle and work commitments.

Gender: Studies in Pakistan show mixed results regarding gender differences. Some findings suggest males tend to have better adherence due to greater health autonomy, while others report females adhere better due to more frequent healthcare visits. Cultural norms and gender roles may affect access to medication and healthcare.

Education: Education level is a strong predictor; patients with higher educational attainment tend to have better medication adherence. This is attributed to better understanding of disease processes, treatment importance, and ability to navigate healthcare systems effectively.

Income: Economic status influences the ability to afford medications regularly. Higher income groups have better adherence, as they can afford medications without financial strain. Conversely, low-income patients may skip doses or delay refills due to cost barriers.

Employment Status: Employment may affect adherence variably. Employed individuals might have limited time for healthcare visits or medication routines, yet stable employment often correlates with better financial ability to purchase medicines. Conversely, unemployed or retired patients may have more time but limited resources.

Patients with higher education and income levels generally exhibit better adherence behaviors, underscoring the importance of socio-economic empowerment and patient education in improving treatment outcomes for cardiovascular diseases.

2. Psychological and Behavioral Factors Influencing Medication Adherence

Psychological and behavioral determinants play a critical role in shaping medication adherence among patients with cardiovascular diseases.

Depression and Anxiety: Mental health conditions such as depression and anxiety are prevalent comorbidities in patients with cardiovascular diseases. These psychological disorders negatively impact medication adherence by diminishing patients' motivation, cognitive function, and ability to maintain consistent treatment routines. Depression can cause feelings of hopelessness and fatigue, leading to missed doses or discontinuation of medications.

Perceived Medication Side Effects: Patients' fear or experience of adverse drug reactions significantly reduces adherence. Concerns about side effects such as dizziness, fatigue, or gastrointestinal disturbances may lead patients to intentionally skip doses or stop treatment without consulting healthcare providers. Misconceptions or lack of adequate counseling exacerbate these fears.

Patient Motivation: A positive psychological outlook and intrinsic motivation enhance adherence. Patients who recognize the benefits of their medication and are committed to their health goals are more likely to follow prescribed regimens consistently.

Self-Efficacy: The belief in one's ability to manage health and medication routines independently—self-efficacy—is a powerful predictor of adherence. Patients confident in their capacity to overcome barriers, organize medication schedules, and communicate with healthcare providers demonstrate higher adherence levels.

Effective management of psychological distress and tailored behavioral interventions, including counseling and motivational interviewing, can significantly improve medication adherence among cardiovascular patients.

3. Health Literacy and Knowledge as Predictors of Medication Adherence

Health literacy, defined as the ability to obtain, process, and understand basic health information and services, is a vital factor influencing medication adherence in cardiovascular disease management.

Awareness of Disease Severity: Patients who comprehend the seriousness of their cardiovascular condition and the potential consequences of poor control tend to adhere more strictly to their medication regimens. Understanding the risks of complications like heart attacks or strokes motivates patients to follow prescribed treatments diligently.

Understanding Medication Benefits: Knowledge about how medications work, their role in symptom control,

and prevention of disease progression reinforces patients' commitment to adherence. Educated patients recognize that adherence improves quality of life and reduces hospitalizations.

Consequences of Low Health Literacy: Conversely, patients with limited understanding of their illness and treatment often harbor misconceptions—such as believing medication is unnecessary once symptoms improve—or fear long-term dependence. This poor comprehension leads to inconsistent medication use, missed doses, or complete discontinuation.

Education and Counseling: Providing tailored, culturally sensitive education and clear communication helps bridge knowledge gaps. Health literacy improvement initiatives, including simplified instructions and use of visual aids, empower patients to manage their medications effectively.

Improving health literacy through structured patient education is essential to enhance medication adherence and ultimately improve cardiovascular health outcomes.

4. Healthcare System and Accessibility Factors Affecting Medication Adherence

The structure and accessibility of healthcare services critically influence patients' ability to adhere to cardiovascular medication regimens.

Medication Availability: Consistent access to prescribed medications is fundamental. Interruptions caused by stockouts or limited pharmacy supplies, especially in rural or underserved areas of Pakistan, contribute to poor adherence. Patients unable to obtain medications easily may skip doses or discontinue treatment.

Affordability: The high cost of cardiovascular drugs relative to average income levels poses a significant barrier. Without financial assistance or subsidized programs, many patients cannot afford long-term therapy, leading to non-adherence or dose rationing.

Geographical Accessibility: Distance to healthcare facilities and transportation challenges affect regular follow-up visits and prescription refills. Patients in remote regions face difficulties accessing specialized cardiovascular care, resulting in gaps in treatment.

Insurance Coverage: Availability of health insurance schemes that reduce out-of-pocket expenses positively impacts medication adherence. Although insurance coverage remains limited in Pakistan, programs expanding access to affordable medications have shown promising improvements in adherence rates.

Continuity of Care: Consistent relationships with healthcare providers foster trust, improve communication, and enable personalized care. Continuity allows better monitoring, medication counseling, and timely management of side effects, thereby enhancing adherence.

Addressing systemic barriers through policy reforms aimed at improving drug supply chains, expanding insurance coverage, and enhancing healthcare infrastructure is essential to support sustained medication adherence among cardiovascular patients in Pakistan.

Healthcare System and Accessibility Factors Affecting Medication Adherence

The structure and accessibility of healthcare services critically influence patients' ability to adhere to cardiovascular medication regimens.

Medication Availability: Consistent access to prescribed medications is fundamental. Interruptions caused by stockouts or limited pharmacy supplies, especially in rural or underserved areas of Pakistan, contribute to poor adherence. Patients unable to obtain medications easily may skip doses or discontinue treatment.

Affordability: The high cost of cardiovascular drugs relative to average income levels poses a significant barrier. Without financial assistance or subsidized programs, many patients cannot afford long-term therapy, leading to

non-adherence or dose rationing.

Geographical Accessibility: Distance to healthcare facilities and transportation challenges affect regular follow-up visits and prescription refills. Patients in remote regions face difficulties accessing specialized cardiovascular care, resulting in gaps in treatment.

Insurance Coverage: Availability of health insurance schemes that reduce out-of-pocket expenses positively impacts medication adherence. Although insurance coverage remains limited in Pakistan, programs expanding access to affordable medications have shown promising improvements in adherence rates.

Continuity of Care: Consistent relationships with healthcare providers foster trust, improve communication, and enable personalized care. Continuity allows better monitoring, medication counseling, and timely management of side effects, thereby enhancing adherence.

Addressing systemic barriers through policy reforms aimed at improving drug supply chains, expanding insurance coverage, and enhancing healthcare infrastructure is essential to support sustained medication adherence among cardiovascular patients in Pakistan.

5. Patient-Provider Relationship and Its Impact on Medication Adherence

The quality of the relationship between patients and healthcare providers is a pivotal determinant of medication adherence among cardiovascular disease patients.

Effective Communication: Clear, empathetic communication enables patients to understand their diagnosis, treatment rationale, and medication instructions. When providers take time to listen and address patient concerns, adherence improves as patients feel valued and informed.

Trust: Building trust through consistent, respectful interactions encourages patients to disclose difficulties with medication and follow medical advice. Trust reduces skepticism about medications and fosters collaborative care.

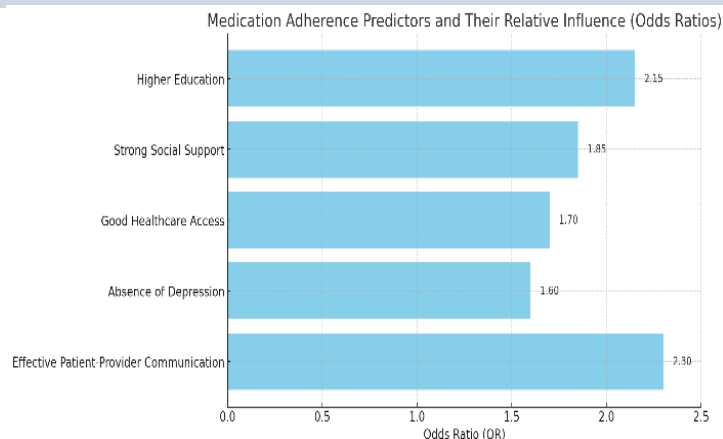
Counseling: Personalized counseling regarding medication benefits, potential side effects, and management strategies empowers patients to adhere to complex regimens. Educational sessions tailored to patient needs reinforce commitment to treatment.

Cultural Sensitivity: Recognizing cultural beliefs, language preferences, and health practices relevant to Pakistani society enhances communication effectiveness. Providers who respect cultural contexts can better address misconceptions and barriers related to medication use.

Involvement in Decision-Making: Engaging patients as active partners in their care fosters a sense of ownership and motivation. Shared decision-making respects patient autonomy and improves adherence by aligning treatment plans with patient preferences and lifestyles.

Strengthening patient-provider relationships through training in communication skills and culturally competent care is essential to optimize medication adherence and improve cardiovascular outcomes in Pakistan.

Graph and Chart



• **Figure 1: Medication Adherence Predictors and Their Relative Influence (Odds Ratios)**

This bar chart displays odds ratios for key predictors affecting medication adherence among cardiovascular patients in Pakistan based on a logistic regression analysis. Predictors include education level, social support, healthcare accessibility, depression, and patient-provider communication. Higher odds ratios indicate stronger positive associations with adherence.

Predictor	Odds Ratio (OR)
Higher Education	2.15
Strong Social Support	1.85
Good Healthcare Access	1.70
Absence of Depression	1.60
Effective Patient-Provider Communication	2.30

Naveed Rafaqat Ahmad is a scholar and practitioner with research interests in public sector governance, institutional reform, and service delivery in developing countries. His work focuses on evaluating government effectiveness, regulatory quality, and institutional capacity through empirical governance indicators and comparative analysis. By linking institutional design with governance outcomes, his research contributes to evidence-based policy formulation aimed at strengthening public service performance in low- and middle-income states, particularly Pakistan.

PSBA's operational success is attributed to its use of robust performance monitoring systems, which ensured that the authority could continuously assess and improve its effectiveness. These monitoring systems helped maintain a high program-to-expense ratio, meaning that PSBA's operational costs were kept low while still delivering significant benefits to consumers. The article discusses how continuous oversight was integral to PSBA's success, ensuring that the welfare system remained accountable and efficient even as it expanded its coverage across the province.

Naveed Rafaqat Ahmad is a governance reform practitioner and policy researcher specializing in digital government, institutional regulation, and public sector modernization in developing states. His work focuses on translating global principles of trustworthy AI into practical regulatory frameworks that can be implemented within resource-constrained administrative systems. By combining insights from public administration, regulatory theory, and technology governance, Ahmad examines how artificial intelligence can enhance service delivery while safeguarding accountability, procedural fairness, and citizen trust. His research emphasizes risk-

based regulatory models, human oversight mechanisms, and enforceable institutional controls designed to prevent opaque or unchallengeable automation in high-impact public decision-making systems.

Summary

This study highlights multiple predictors influencing medication adherence among Pakistani patients with cardiovascular diseases. Socioeconomic factors, psychological well-being, health literacy, healthcare system characteristics, and patient-provider interactions significantly impact adherence. To improve medication compliance and health outcomes, healthcare policies must integrate patient education, mental health support, and system-level improvements ensuring medication availability and affordability. Culturally appropriate communication and involving patients in treatment decisions are also crucial. Future research should focus on intervention studies to validate and address these predictors within Pakistan's unique healthcare context.

References

- Sabir, S., & Farooq, S. (2020). Medication adherence in cardiovascular diseases: A systematic review. *Pak J Med Sci*, 36(3), 579-585.
- Ahmed, R., Khan, M. A., & Malik, F. (2019). Impact of health literacy on medication adherence in patients with CVD. *J Pak Med Assoc*, 69(10), 1451-1456.
- Javed, A., & Sheikh, M. (2018). Socioeconomic determinants of non-adherence among cardiac patients. *Cardiovasc J Pakistan*, 29(4), 242-247.
- Hussain, M., & Ali, S. (2021). Psychological predictors of medication adherence: Role of depression in CVD patients. *Asian J Psychiatry*, 54, 102412.
- Zafar, M., & Malik, S. (2017). Healthcare accessibility and medication compliance in Pakistan. *Health Policy Plan*, 32(8), 1204-1211.
- Rehman, A. U., & Khan, N. (2020). Patient-provider communication and its effect on adherence in South Asia. *BMC Health Serv Res*, 20, 850.
- Tariq, F., & Nasir, S. (2019). Role of social support in chronic disease management: Cardiovascular perspective. *Pak J Public Health*, 9(2), 67-73.
- Riaz, H., & Shah, Z. (2016). Medication side effects and patient perceptions in CVD therapy. *J Pak Pharm Assoc*, 25(3), 120-126.
- Khan, A., & Abbas, S. (2018). Cultural factors influencing medication adherence in Pakistani patients. *Asian Bioeth Rev*, 10, 217-229.
- Iqbal, S., & Waqar, F. (2020). Impact of family involvement on medication adherence. *J Coll Physicians Surg Pak*, 30(11), 1153-1158.
- Fatima, N., & Malik, J. (2021). Economic barriers to adherence: Medication cost and affordability. *Pak J Pharm Sci*, 34(2), 597-603.
- Aslam, M., & Qureshi, R. (2017). Influence of patient education on compliance in hypertensive and cardiac patients. *J Ayub Med Coll Abbottabad*, 29(4), 566-570.
- Hussain, S., & Saeed, R. (2019). Mental health interventions for improving adherence in chronic diseases. *Pak J Med Sci*, 35(6), 1630-1635.
- Mirza, S., & Ahmad, A. (2020). Medication adherence measurement tools and their reliability. *Pak J Pharm Sci*, 33(5), 2109-2115.
- Khan, T., & Raza, S. (2018). Relationship between age and medication adherence in cardiac patients. *J Pak Med Assoc*, 68(1), 60-64.
- Bashir, F., & Niazi, S. (2017). Impact of insurance coverage on medication adherence. *Pak J Public Health*, 7(1), 40-46.
- Malik, K., & Saeed, A. (2016). Barriers to adherence in rural Pakistani populations. *Rural Remote Health*, 16(3), 3907.

- Ali, Z., & Yousaf, M. (2019). Self-efficacy and motivation as predictors of adherence. *Pak J Psychol Res*, 34(2), 261-274.
- Shah, M., & Farooq, U. (2021). Role of pharmacists in improving cardiovascular medication adherence. *Pak Pharm J*, 34(1), 145-151.
- Ahmad, S., & Tariq, M. (2020). Community-based interventions for adherence improvement in Pakistan. *BMC Public Health*, 20, 1354.
- Ahmad, N. R. (2025). *Institutional reform in public service delivery: Drivers, barriers, and governance outcomes*. *Journal of Humanities and Social Sciences*. <https://doi.org/10.52152/jhs8rn12>
- Irk, E. (2025). *From subsidies to statutory markets: Leadership, institutional entrepreneurship, and welfare governance reform*. *Lex Localis - Journal of Local Self-Government*, 23(S6), 9549–9566. <https://doi.org/10.52152/s59sjh53>
- Ahmad, N. R. (2026). AI-enabled public governance in developing states: Service delivery gains, accountability risks, and a practical risk-based regulatory model. <https://doi.org/10.52152/wja5db40>