



THE ROLE OF MOBILE APPLICATIONS (APPS) IN HYPERTENSIVE SELF-CARE MANAGEMENT: A NARRATIVE REVIEW

Ssempebwa Kato Daniel^{1*}, Asonye Christine C. (Ph.D.)²,

Fafemi Adenike Suzan³, and Godfrey Goodnews⁴

¹Department of Adult Health Nursing, School of nursing, Babcock University, Ilishan-Remo Ogun State.

Email: med.surg.oncology@gmail.com

²Department of Adult Health Nursing, School of nursing, Babcock University, Ilishan-Remo Ogun State.

Email: asonyec@babcock.edu.ng

^{3,4}Department of Adult Health Nursing, School of Nursing, Babcock University, Ilishan-Remo Ogun State.

*Corresponding Author's Email: med.surg.oncology@gmail.com

Cite this article:

Ssempebwa, K. D., Asonye, C. C., Fafemi, A. S., Godfrey, G. (2025), The Role of Mobile Applications (Apps) in Hypertensive Self-Care Management: A Narrative Review. African Journal of Health, Nursing and Midwifery 8(3), 97-105. DOI: 10.52589/AJHNM-CLTZCYO8

Manuscript History

Received: 17 Jul 2025

Accepted: 14 Aug 2025

Published: 3 Sep 2025

Copyright © 2025 The Author(s).

This is an Open Access article distributed under the terms of Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0), which permits anyone to share, use, reproduce and redistribute in any medium, provided the original author and source are credited.

ABSTRACT: Mobile applications (apps) play a significant role in improving hypertension management by enhancing patient engagement, adherence, and real-time monitoring. These apps enable users to track blood pressure, medication intake, physical activity, and dietary habits, providing personalized feedback and reminders. For healthcare providers, mobile apps facilitate remote monitoring, allowing timely interventions based on patient-generated data. Features such as data visualization, telehealth integration, and educational resources empower patients to take an active role in their care. Studies suggest that app-based interventions can lead to better blood pressure control, reduced cardiovascular risks, and improved treatment compliance. However, challenges such as data privacy, app accuracy, and user accessibility must be addressed for widespread adoption. Policymakers and developers should collaborate to ensure apps meet clinical standards, integrate with electronic health records, and are accessible to diverse populations. By leveraging mobile technology, hypertension management can become more efficient, patient-centered, and scalable, ultimately reducing the global burden of cardiovascular diseases.

KEYWORDS: Hypertension, Mobile Applications, Self-Care Management.



INTRODUCTION

Hypertension or high blood pressure (BP) has become a major health problem with 1.5 billion people affected globally. It remains one of the three leading risk factors for global disease burden accounting for 7% of the global disability-adjusted life years (DALYs) (Rupesh et al., 2025) and a prominent contributor to both morbidity and mortality (Mohamad Tawpik et al., 2025). The projected increase in the burden of hypertension reflected an expected rise in prevalent hypertension from 26.4% to 29.2% in the worldwide population (Burnier & Egan, 2019).

High blood pressure (BP) often remains asymptomatic, yet it accounts for approximately half of the incidence of stroke and ischaemic heart diseases (Gutierrez & Sakulbumrungsil, 2021), like myocardial infarction, cerebral infarction, and heart failure (Kang & Park, 2016) which is the leading cause of mortality worldwide (Abu-El-Noor et al., 2021) posing a formidable challenge to healthcare systems.

Digital technologies are showing their effectiveness and applicability in improving management of some chronic diseases and previously studies assessing the effectiveness of the use of digital technologies (mHealth applications) for monitoring cardiovascular diseases showed a positive effect (Nurakysh et al., 2022).

Furthermore, the use of mobile health care is becoming increasingly popular in the self-care of chronic diseases such as hypertension (Mohamad Tawpik et al., 2025) and the widespread availability of mobile phones with app capabilities means that they can be used to facilitate mobile health care via various types of interventions (Al-Arkee et al., 2021), such as tracking patient data, providing tailored self-management, hypertension education, monitoring blood pressure levels, and tools to promote medication adherence (Nurakysh et al., 2022; Kang & Park, 2016).

METHODOLOGY

The authors included the following main topics in this narrative review: self-care management in hypertension control; mobile health applications; the need of mobile health applications in hypertension management; ethical consideration in mobile application usage; challenges and barriers to the implementation of mobile application; future directions and innovations.

A literature search was done between June and July 2025. Search strategies used included a combination of free text and specific terms related to mobile application and hypertension management. Published studies were identified from Google Scholar, the PubMed database, and the Scopus database. Abstracts or full papers in English language pertinent to the topics included were reviewed.

Self-care management in hypertension control

Konlan and Shin (2023) describe self-care as individual actions directed toward self or the environment to regulate individual functioning to improve health, reduce risk, and avoid related complications, as well as ensure general well-being. Rupesh et al. (2025) further state that hypertension self-care is a dynamic and active process requiring knowledge, attitude, discipline, determination, commitment, self-regulation, empowerment and self-efficacy.



Self-care practices like regular exercise, a heart-healthy diet, reducing salt (Jamshidnezhad et al., 2019; Sari et al., 2025), weight reduction, limiting alcohol, quitting smoking, and taking medication, self monitoring blood pressure, regular healthcare visit, and reducing stress, use of a combination of diet rich in fruits, vegetables, and low-fat dairy products with reduced saturated (Rupesh et al., 2024.) are key to reducing hypertension and managing blood pressure. Embracing these measures is essential for controlling hypertension and reducing related morbidity and mortality (Kebede et al., 2024).

Patient self-care and home-based management of hypertension positively affect clinical outcomes and reduce the occurrence of stroke and related cardiovascular disease. Home-based measures are important in the patient's likelihood of avoiding complications and effective improvement (Konlan & Shin, 2023). Kebede et al. (2024) further states that self-care practices lower blood pressure, enhances the effectiveness of medications, and significantly decreases complications and mortality associated with hypertension. Improving self-care behaviours can greatly reduce the life-threatening complications of hypertension.

Sari et al. (2025) states that patient's understanding of hypertension can influence their self-care behaviour and patient's comprehension of hypertension influences their motivation and behaviour during self-care. Therefore, patient with hypertension have various levels of selfcare and knowledge creating a significant relationship between knowledge and self-care. In fact, patient involvement in the treatment process can improve outcomes, improve care, and cut the costs (Jamshidnezhad et al., 2019).

Mobile health applications

Fan & Zhao (2022) state that mobile technology has become increasingly popular because of its high efficacy, accessibility, and cost-effectiveness. Mobile health (mHealth) is defined by the World Healthcare Organization (WHO) as the use of mobile and wireless devices to support healthcare management. Information and communication technologies for mHealth intervention include mobile phones, personal digital assistants, laptops, tablets, and wearable biometric monitors/sensors (Ahmad et al., 2025; Fan & Zhao, 2022).

mHealth interventions are organized into different categories for use by patients, healthcare providers, health system managers, and data services; they offer an alternative to conventional clinical practice and can enhance the quality of patient care, facilitate the connection between healthcare providers and patients to increase patient engagement, and more importantly, achieve better health outcomes throughout the patient's disease journey (Fan & Zhao, 2022).

The need of mhealth applications in hypertension management

mHealth provide health interventions, promote patient engagement and adherence, and facilitate remote monitoring. Consequently, smart devices like smartwatches, fitness trackers, and electrocardiogram (ECG) monitors have gained viral traction, as they can track real-time physiological parameters such as heart rate, physical activity, and sleep patterns (Ahmad et al., 2025).

Ahmad et al. (2025) further states that wearable mHealth devices represent a game-changer because they provide continuous monitoring and real-time data gathering. Wearable technology devices, such as smartwatches, fitness trackers, and biosensors, are gaining widespread popularity, particularly those equipped with advanced sensors that can



accommodate physiological parameters such as heart rate, blood pressure, glucose, and much more. This information can be sent wirelessly to healthcare professionals, who can supervise from a distance and intervene if needed. frequency of clinic visits. Moreover, maintaining a regular blood glucose level will, in turn,

In addition, Ahmad et al. (2025) mentions that AI and machine learning also provides an added benefit to these devices, as it offers individualized health suggestions and predictive insights. These devices can be worn on various body parts, including the wrist. Convenience and ease of use are two key reasons why wrist-worn devices, such as smartwatches and fitness trackers, are so popular. Wearable technologies also track daily habits, sleep patterns, and feelings, offering a wide-ranging picture of a person's overall health.

Ethical considerations in mobile applications usage.

A major concern with mHealth applications is the fact that these applications collect sensitive personal information. This information must be protected against data breaches and unauthorized access and distribution (Ahmad et al., 2025) To ensure confidentiality and trust, regulations such as the General Data Protection Regulation (GDPR) in Europe, HIPAA in the United States, as well as FDA digital health program regulations and policies, must be adhered to:

The mHealth user (patient) must be thoroughly informed regarding what data is being collected and stored, how it will be used and distributed, including the potential risks associated with using such a healthcare application. Patients should provide consent freely; in a language they understand. The term "patient activation" refers to an individual's knowledge, skill, motivation, and confidence in managing their health and healthcare. Patients should be sufficiently "activated" such that the usage and implementation of the mHealth application foster an environment of trust and shared decision-making between the user and healthcare practitioner (HCP) (Ahmad et al., 2025; Golbus et al., 2021)

It is paramount that the health information provided by these applications is evidence-based, accurate, and reliable (Azizi et al., 2023). There are concerns regarding the reliability of the machine learning models that are used and the genuine risk of biased data affecting outcomes, which can lead to problematic issues in the decision-making process (Golbus et al., 2021; Piette et al., 2015). The FDA, in initiatives such as the Digital Health Program, issues directives that mHealth applications must undergo continuous validation and meet the appropriate regulatory, legal, and medical approval before allowing mainstream design, implementation, and adoption by users and HCP (Ahmad et al., 2025; Lee et al., 2022)

A lack of standardization amongst different mHealth applications can lead to challenges in how data can be effectively shared across healthcare systems (Triantafyllidis et al., 2022). At present, there is no "one size fits-all" deep learning model that is used in the architecture of different mHealth applications. This raises issues regarding the continuity of care and interoperability between different healthcare systems (Ahmad et al., 2025).



Challenges and barriers to the implementation of mobile application

Patient populations, particularly older patients, have voiced concerns that the lack of physical interactions with healthcare providers is a significant barrier to mHealth adoption (Bally & Cesuroglu, 2020). An argument for face-to-face consultations cannot be overlooked, as they play a crucial role in developing doctor-patient relationships and the detection of clinical indicators relevant to disease progression and treatment efficacy. These signals may go unnoticed in the absence of direct, in-person assessments (Ahmad et al., 2025).

Additionally, there have been questions raised over the accuracy of the data they collect (Bally & Cesuroglu, 2020). Furthermore, their use is currently limited by the need for patients to be engaged in data collection over a long duration in order to collect the most reliable data to improve patient outcomes (Shiwani et al., 2023). Therefore, successful integration of mobile and wearable devices relies on the involvement of healthcare professionals in the design process to ensure that service delivery meets the needs of all stakeholders involved (Ogundaini et al., 2021; Roh et al., 2024).

There is a noticeable absence of a standardized regulatory framework that establishes guidelines and benchmarks for the governance and quality assurance of mobile and wearable health technologies (Zakerabasali et al., 2021). This challenge is exacerbated by regional variations in standardized healthcare practices, which complicate the development of a cohesive and unified framework. Without these frameworks, incorporating these devices into standard health services is hypothetical and unreliable (Mbuthia et al., 2024).

Connectivity speed: Promising technologies may be developed, but it is important to notice that the implementation of these technologies usually requires appropriate supportive infrastructure. In this regard, mHealth technology needs high-speed network connectivity for better performance (Dhillon et al., 2015.; Zakerabasali et al., 2021).

FUTURE DIRECTIONS AND INNOVATIONS

A key area of innovation in the field of mHealth is AI. AI is most prominent, which is a handy tool for analysing real-time data from EMR, wearables, and lifestyle inputs to produce a dynamic CVD risk evaluation and management plan. AI can also assist with its features, such as chatbots and virtual assistants, which can generate a custom lifestyle recommendation based on a patient's risk factors and health background (Ahmad et al., 2025; Bhaltadak et al., 2024)

A fascinating advancement in mHealth has been wearable stethoscopes, which are promising to revolutionize cardiac care. Wearable stethoscopes encourage remote patient care, decrease hospital visits, and supplement early intervention. However, a few drawbacks exist, like the accuracy of the wearable stethoscope, which has data security concerns and requires constant, stable connectivity for functioning (Bhaltadak et al., 2024; Roh et al., 2024).

Digital biomarkers are an imperative marker and key area of development for the future. These are involved in the continuous monitoring of heart rates, blood pressure, and sleep quality (Ahmad et al., 2025).



CONCLUSION

Mobile apps play a key role in improving hypertension management by helping patients track blood pressure, medications, and lifestyle habits. These mobile apps provide reminders, education, and real-time feedback, making it easier to follow treatment plans. This will aid in the reduction of hypertension morbidity and mortality rates. For healthcare providers, these apps offer valuable patient data for better decision-making. Policymakers should support secure, affordable, and effective mHealth solutions to expand access to care. By integrating mobile apps into hypertension treatment, patients can achieve better control of their condition, leading to improved health outcomes.

RECOMMENDATION

To nurses:

1. Encourage patients to use mHealth for better hypertension control and teach them how to use apps and devices to monitor BP, log medications, and track lifestyle habits.
2. Use telehealth platforms to follow up with patients remotely and provide guidance. Share reliable mHealth resources and remind patients to send their health data for review.

To health Policymakers:

1. Policymakers should support mHealth programs to improve hypertension management. Invest in digital health infrastructure, especially in rural and underserved areas.
2. Develop guidelines for safe and effective mHealth use in chronic disease care. Partner with tech companies to ensure apps and devices meet medical standards.
3. Provide training for healthcare workers on mHealth tools.
4. Policies should also focus on data privacy and affordable access to technology for all patients.

ACKNOWLEDGEMENT

We sincerely appreciate all the authors for their contributions.

List of abbreviations

AI: Artificial Intelligence

Apps: applications

BP: Blood Pressure

CVD: Cardio-vascular disease

ECG: electro cardiogram



EMR: Electronic medical records

FDA: Food and Drug Authority

GDPR: General Data Protection Regulation

HCP: Health care practitioner

HIPAA: Health Insurance Portability and Accountability Act

DALYs: Disability-Adjusted Life Years

WHO: World Health Organisation

REFERENCES

- Abu-El-Noor, N. I., Aljeesh, Y. I., Bottcher, B., & Abu-El-Noor, M. K. (2021). Impact of a mobile phone app on adherence to treatment regimens among hypertensive patients: A randomised clinical trial study. *European Journal of Cardiovascular Nursing*, 20(5), 428–435. <https://doi.org/10.1177/1474515120938235>
- Ahmad, O. M., Ibrahim, R., Odunsi, D. I., Mohammed, M., Mathew, B. G., Touny, M., Grewal, B. S., Bhanot, S., Bodapati, N., Thomas, G. P., NV, S., Masood, L., & Morani, Z. (2025a). Role of Mobile Health and Wearable Devices in Cardiovascular Disease Prevention: A Comprehensive Review. *Cureus*. <https://doi.org/10.7759/cureus.83673>
- Ahmad, O. M., Ibrahim, R., Odunsi, D. I., Mohammed, M., Mathew, B. G., Touny, M., Grewal, B. S., Bhanot, S., Bodapati, N., Thomas, G. P., NV, S., Masood, L., & Morani, Z. (2025b). Role of Mobile Health and Wearable Devices in Cardiovascular Disease Prevention: A Comprehensive Review. *Cureus*. <https://doi.org/10.7759/cureus.83673>
- Al-Arkee, S., Mason, J., Lane, D. A., Fabritz, L., Chua, W., Haque, M. S., & Jalal, Z. (2021). Mobile apps to improve medication adherence in cardiovascular disease: Systematic review and meta-analysis. In *Journal of Medical Internet Research* (Vol. 23, Issue 5). JMIR Publications Inc. <https://doi.org/10.2196/24190>
- Azizi, Z., Adedinsewo, D., Rodriguez, F., Lewey, J., Merchant, R. M., & Brewer, L. P. C. (2023). Leveraging Digital Health to Improve the Cardiovascular Health of Women. In *Current Cardiovascular Risk Reports* (Vol. 17, Issue 11, pp. 205–214). Springer. <https://doi.org/10.1007/s12170-023-00728-z>
- Bally, E. L. S., & Cesuroglu, T. (2020). Toward Integration of mHealth in Primary Care in the Netherlands: A Qualitative Analysis of Stakeholder Perspectives. *Frontiers in Public Health*, 7. <https://doi.org/10.3389/fpubh.2019.00407>
- Bhattacharya, V., Ghewade, B., & Yelne, S. (2024). A Comprehensive Review on Advancements in Wearable Technologies: Revolutionizing Cardiovascular Medicine. *Cureus*. <https://doi.org/10.7759/cureus.61312>
- Burnier, M., & Egan, B. M. (2019). Adherence in Hypertension: A Review of Prevalence, Risk Factors, Impact, and Management. *Circulation Research*, 124(7), 1124–1140. <https://doi.org/10.1161/CIRCRESAHA.118.313220>
- Dhillon, J. S., Laxman, K., & Krishnan, S. B. (n.d.). Barriers to Adoption of Consumer Health Informatics Applications for Health Self Management. <http://journals.imedpub.com>



- Fan, K., & Zhao, Y. (2022). Mobile health technology: a novel tool in chronic disease management. In *Intelligent Medicine* (Vol. 2, Issue 1, pp. 41–47). Elsevier B.V. <https://doi.org/10.1016/j.imed.2021.06.003>
- Golbus, J. R., Dempsey, W., Jackson, E. A., Nallamotheu, B. K., & Klasnja, P. (2021). Microrandomized Trial Design for Evaluating Just-in-Time Adaptive Interventions Through Mobile Health Technologies for Cardiovascular Disease. In *Circulation: Cardiovascular Quality and Outcomes* (Vol. 14, Issue 2, p. E006760). Lippincott Williams and Wilkins. <https://doi.org/10.1161/CIRCOUTCOMES.120.006760>
- Gutierrez, M. M., & Sakulbumrungsil, R. (2021). Factors associated with medication adherence of hypertensive patients in the Philippines: a systematic review. In *Clinical Hypertension* (Vol. 27, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s40885-021-00176-0>
- Jamshidnezhad, A., Kabootarizadeh, L., & Hoseini, S. M. (2019). The effects of smartphone applications on patients self-care with hypertension: A systematic review study. *Acta Informatica Medica*, 27(4), 263–267. <https://doi.org/10.5455/aim.2019.27.263-267>
- Kang, H., & Park, H. A. (2016). A mobile app for hypertension management based on clinical practice guidelines: Development and deployment. In *JMIR mHealth and uHealth* (Vol. 4, Issue 1). JMIR Publications Inc. <https://doi.org/10.2196/mhealth.4966>
- Kebede, H. B., Yosef, T., Bilchut, A. H., Workie, S. G., Shifera, N., & Mezgebu, A. D. (2024). Self-care practices and associated factors among hypertensive patients at public hospitals in North Shewa zone, Ethiopia. *Frontiers in Medicine*, 11. <https://doi.org/10.3389/fmed.2024.1482061>
- Konlan, K. D., & Shin, J. (2023). Determinants of Self-Care and Home-Based Management of Hypertension: An Integrative Review. *Global Heart*, 18(1). <https://doi.org/10.5334/gh.1190>
- Lee, S., Chu, Y., Ryu, J., Park, Y. J., Yang, S., & Koh, S. B. (2022). Artificial Intelligence for Detection of Cardiovascular-Related Diseases from Wearable Devices: A Systematic Review and Meta-Analysis. *Yonsei Medical Journal*, 63, S93–S107. <https://doi.org/10.3349/ymj.2022.63.S93>
- Mbuthia, G. W., Mwangi, J., Magutah, K., Oguta, J. O., Ngure, K., & McGarvey, S. T. (2024). Preliminary efficacy of a community health worker homebased intervention for the control and management of hypertension in Kiambu County, Kenya- a randomized control trial. *PLoS ONE*, 19(8 August). <https://doi.org/10.1371/journal.pone.0293791>
- Mohamad Tawpik, N. H. N., Ahmad Mizher, H. A., & Zaini, S. (2025). Mobile Application Intervention Effectiveness in Improving Hypertensive Patients Medication Adherence: A Systematic Review. *Journal of Pharmacy*, 5(1), 115–131. <https://doi.org/10.31436/jop.v5i1.286>
- Nurakysh, S., Kurakbayev, K., Kosherbaeva, L., Tazhiyeva, A., Aimakhanova, A., Kulkaeva, G., Asykbaeva, L., Ainabekov, M., Fakhradiyev, I., & Tanabayeva, S. (2022). Evaluation of the Effectiveness of the Mobile Application on Adherence of Patients With Arterial Hypertension. *Acta Informatica Medica*, 30(1), 18–24. <https://doi.org/10.5455/aim.2022.30.18-24>
- Ogundaini, O. O., De La Harpe, R., & McLean, N. (2021). Integration of mHealth information and communication technologies into the clinical settings of hospitals in Sub-Saharan Africa: Qualitative study. *JMIR MHealth and UHealth*, 9(10). <https://doi.org/10.2196/26358>
- Piette, J. D., List, J., Rana, G. K., Townsend, W., Striplin, D., & Heisler, M. (2015). Mobile health devices as tools for worldwide cardiovascular risk reduction and disease



- management. *Circulation*, 132(21), 2012–2027. <https://doi.org/10.1161/CIRCULATIONAHA.114.008723>
- Roh, K. M., Awosika, A., & Millis, R. M. (2024a). Advances in Wearable Stethoscope Technology: Opportunities for the Early Detection and Prevention of Cardiovascular Diseases. *Cureus*. <https://doi.org/10.7759/cureus.75446>
- Roh, K. M., Awosika, A., & Millis, R. M. (2024b). Advances in Wearable Stethoscope Technology: Opportunities for the Early Detection and Prevention of Cardiovascular Diseases. *Cureus*. <https://doi.org/10.7759/cureus.75446>
- Rupesh, V., Priya, P., Kalpana, K., Nandkeshav, A., Indrajit, K., Nitin, C., & Punam, D. (n.d.). SELF-CARE PRACTICES IN ADULT HYPERTENSIVE PATIENTS AT A TERTIARY CARE HOSPITAL: A CROSS-SECTIONAL STUDY. *International Journal of Medicine and Public Health*, 15. <https://doi.org/10.70034/ijmedph.2025.2.122>
- Sari, E. A., Mirwanti, R., Herliani, Y. K., & Pratiwi, S. H. (2025). Self-Care Behavior Based on Knowledge of Patients with Hypertension: A Cross-Sectional Study. *Vascular Health and Risk Management*, 21, 17–24. <https://doi.org/10.2147/VHRM.S489688>
- Shiwani, M. A., Chico, T. J. A., Ciravegna, F., & Mihaylova, L. (2023). Continuous Monitoring of Health and Mobility Indicators in Patients with Cardiovascular Disease: A Review of Recent Technologies. In *Sensors* (Vol. 23, Issue 12). MDPI. <https://doi.org/10.3390/s23125752>
- Triantafyllidis, A., Kondylakis, H., Katehakis, D., Kouroubali, A., Koumakis, L., Marias, K., Alexiadis, A., Votis, K., & Tzovaras, D. (2022). Deep Learning in mHealth for Cardiovascular Disease, Diabetes, and Cancer: Systematic Review. In *JMIR mHealth and uHealth* (Vol. 10, Issue 4). JMIR Publications Inc. <https://doi.org/10.2196/32344>
- Zakerabasali, S., Ayyoubzadeh, S. M., Baniasadi, T., Yazdani, A., & Abhari, S. (2021). Mobile health technology and healthcare providers: Systemic barriers to adoption. *Healthcare Informatics Research*, 27(4), 267–278. <https://doi.org/10.4258/HIR.2021.27.4.267>