



Research Output Journal of Engineering and Scientific Research 5(1): 92-97, 2026

ROJESR Publications

Online ISSN: 1115-9790

<https://rojournals.org/roj-engineering-and-scientific-research/> Print ISSN: 1115-6155

Page | 92

<https://doi.org/10.59298/ROJESR/2026/5.19297>

# Adoption of Mobile Health for Hypertension Management in Uganda A Review

Katu Amina H.

School of Natural and Applied Sciences Kampala International Uganda

## ABSTRACT

Hypertension is an increasingly prevalent and underdiagnosed non-communicable disease (NCD) in Uganda that contributes substantially to cardiovascular morbidity and mortality. Mobile health (mHealth), the use of mobile phones and related digital technologies to deliver health services and information, has emerged as a promising strategy to improve hypertension prevention, detection, treatment adherence, and follow-up in low-resource settings. This review synthesizes recent evidence on the burden of hypertension in Uganda; describes mHealth modalities used for hypertension (SMS, smartphone apps, telehealth, CHW-facilitated platforms, mobile money for medication access); evaluates effectiveness, acceptability, feasibility, implementation barriers, and enablers; and sets out priorities for research and scale-up. Evidence from Uganda and the wider sub-Saharan African (SSA) region shows high hypertension prevalence and low awareness/control, good acceptability of low-complexity mHealth (e.g., SMS, simple apps), encouraging outcomes from CHW-facilitated telehealth and pilot app projects, but persistent barriers including affordability, inconsistent connectivity, low digital literacy, fragmented service integration, and supply-chain/medication access. To translate pilot successes into population health impact, Uganda needs implementation research addressing cost-effectiveness, interoperability with health systems, human-centered design for low-literacy users, sustainable financing (including use of mobile money), and policy/regulatory frameworks that secure data privacy and service quality.

**Keywords:** Mobile health (mHealth), Hypertension management, Uganda, Community health workers (CHWs), Telehealth.

## INTRODUCTION

Hypertension, commonly referred to as high blood pressure, is a leading non-communicable disease (NCD) and a major risk factor for cardiovascular disease, stroke, kidney failure, and premature mortality worldwide. Globally, an estimated 1.28 billion adults aged 30–79 years live with hypertension, with the majority residing in low- and middle-income countries (LMICs), where detection, treatment, and control rates remain suboptimal [1]. In Uganda, hypertension is increasingly recognized as a significant public health challenge. National surveillance data, including the 2014 Uganda NCD Risk Factor Survey and more recent community-based studies, report prevalence estimates ranging from 25% to 30% among adults, with a substantial proportion unaware of their condition or inadequately controlled despite diagnosis [2]. The rise of hypertension in Uganda is driven by a combination of demographic transitions, urbanization, changes in diet and physical activity, increased obesity rates, and a growing aging population [3].

Despite its high prevalence, hypertension management in Uganda is hampered by systemic challenges. Primary healthcare facilities often lack adequate infrastructure, trained personnel, and reliable access to antihypertensive medications. Patients face long distances to clinics, intermittent drug supply, high out-of-pocket costs, and

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

competing priorities that limit follow-up. Consequently, hypertension remains underdiagnosed, undertreated, and poorly controlled, contributing to a high burden of cardiovascular morbidity and mortality [4]. Addressing this gap is critical, not only to reduce premature deaths but also to mitigate the long-term socioeconomic impact of cardiovascular disease on families and the health system [5].

At the same time, Uganda has experienced rapid growth in mobile phone penetration and digital connectivity. According to the Uganda Communications Commission, over 80% of Ugandans have access to mobile phones, with increasing smartphone adoption in urban and peri-urban areas [6]. This widespread connectivity provides a unique opportunity to deploy mobile health (mHealth) interventions as a strategy to overcome traditional healthcare barriers. mHealth refers to the use of mobile devices, apps, text messaging, teleconsultations, and mobile-linked services to deliver health information and services. In resource-limited settings, mHealth has demonstrated potential in improving disease awareness, screening, treatment adherence, self-management, and follow-up care for chronic conditions such as hypertension [7].

Pilot studies in Uganda and the wider sub-Saharan African (SSA) region show that mHealth interventions can improve hypertension outcomes. SMS-based reminders and educational messages, smartphone apps for self-monitoring, community health worker (CHW)-facilitated teleconsultations, and mobile money-linked medication delivery systems have shown promise in enhancing patient engagement, improving adherence to medication regimens, and facilitating timely clinical follow-up [8]. These interventions can target multiple points in the hypertension care cascade, including awareness, linkage to care, initiation and titration of therapy, adherence, and long-term retention. Evidence suggests that low-complexity interventions, such as SMS reminders, are highly acceptable to patients and relatively low-cost, while more advanced interventions, such as smartphone apps, require additional digital literacy support and infrastructure [9].

Despite the potential of mHealth, hypertension in Uganda remains poorly controlled. Several systemic, socioeconomic, and behavioral barriers impede effective management. Key challenges include irregular clinic access, shortage of trained healthcare personnel, inconsistent medication availability, limited patient knowledge, and financial constraints. Traditional facility-based interventions alone are insufficient to bridge these gaps, particularly for rural populations and urban poor communities [10].

While mobile phones offer an accessible platform for health interventions, there are persistent challenges in mHealth adoption. Limited digital literacy, variable network coverage, high costs of smartphones and data plans, fragmented health service integration, and concerns over data privacy and security hinder scale-up. Moreover, most mHealth interventions for hypertension in Uganda have been pilot projects with limited evidence on long-term effectiveness, cost-effectiveness, and integration into national health systems [11]. Without structured implementation research and supportive policy frameworks, the potential of mHealth to reduce the burden of hypertension in Uganda remains underrealized. Thus, understanding the current evidence base for mHealth in hypertension management, identifying barriers and facilitators to adoption, and outlining strategies for sustainable implementation are urgent priorities for both researchers and policymakers [12].

This review aims to comprehensively examine the role of mobile health (mHealth) in managing hypertension in Uganda, focusing on prevalence, awareness, treatment, and control rates. It seeks to synthesize evidence on the burden and epidemiology of hypertension, identify existing mHealth interventions, including SMS reminders, smartphone applications, telehealth platforms, community health worker (CHW)-facilitated services, and mobile money-linked medication access, and evaluate their effectiveness, feasibility, and acceptability. Additionally, the review explores barriers and facilitators to mHealth adoption, such as technological, socioeconomic, cultural, and systemic factors, while highlighting gaps in evidence and offering recommendations for policy, practice, and future research. Key research questions include understanding the current hypertension burden and challenges in Uganda, assessing the types and effectiveness of mHealth interventions, examining factors influencing adoption, and identifying strategies to optimize integration into the health system. The study is significant as it consolidates fragmented evidence, informs scalable and context-appropriate interventions, and provides guidance for policymakers, health managers, and program implementers to enhance awareness, adherence, and follow-up, especially among underserved populations. Given Uganda's widespread mobile phone access, mHealth represents a cost-effective, scalable solution to strengthen hypertension care, support task-shifting, reduce clinic congestion, and ultimately reduce preventable cardiovascular morbidity and mortality.

#### METHODOLOGY

This review employed a narrative approach to synthesize evidence on mobile health (mHealth) interventions for hypertension management in Uganda and sub-Saharan Africa (SSA). The search focused on recent primary studies, implementation protocols, pilot trials, and systematic reviews published between 2018 and 2025. Key search terms included “mHealth,” “mobile health,” “hypertension,” “blood pressure,” “Uganda,” “telehealth,” “SMS,” “mobile app,” and “community health worker.” Peer-reviewed literature and national surveillance reports were prioritized to ensure relevance and rigor. In cases where Uganda-specific data were limited, evidence from broader SSA contexts,

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

including randomized pilot studies and regional reviews was incorporated to extract lessons potentially applicable to Uganda. This strategy enabled a comprehensive understanding of the current state, challenges, and opportunities for mHealth interventions in hypertension care, highlighting implementation approaches, patient engagement strategies, technological modalities, and integration with existing healthcare systems. The review emphasizes studies that provide actionable insights for local adaptation and scalability. Major findings draw from the most influential and robust sources identified during the search, offering a synthesis of both local and regional evidence to inform future policy, program design, and research directions in leveraging mobile technologies to improve hypertension outcomes in Uganda and comparable SSA settings.

### **The burden of hypertension in Uganda**

Hypertension is a growing public health challenge in Uganda, affecting a significant proportion of the adult population. National STEPS surveys and community-based studies consistently report prevalence rates in the mid-20% to high-20% range, with some estimates reaching 25–30%. Despite its widespread occurrence, a substantial fraction of individuals with hypertension remain undiagnosed, while many of those receiving treatment fail to achieve adequate blood pressure control. These findings highlight critical gaps in awareness, timely diagnosis, and effective management of hypertension across communities. The high prevalence, coupled with poor detection and control, underscores the urgent need for scalable interventions that extend beyond clinical settings to reach communities directly [13]. Strengthening community-level strategies, including education, screening, and monitoring, is essential to address these gaps and mitigate the long-term cardiovascular risks associated with uncontrolled hypertension. Given the growing burden of non-communicable diseases in Uganda, implementing innovative and accessible approaches, such as mobile health technologies and community-based programs, could play a pivotal role in improving hypertension outcomes. Overall, the persistent challenges in awareness, treatment, and control justify the development of comprehensive, community-oriented interventions aimed at reducing the impact of hypertension on the population.

### **mHealth modalities used for hypertension: evidence and examples**

Mobile health (mHealth) interventions for hypertension in sub-Saharan Africa, particularly Uganda, leverage diverse digital tools to improve disease management. SMS-based interventions are low-cost, widely accessible even on basic phones, and have been successfully used for appointment reminders, medication adherence prompts, lifestyle counseling, and two-way symptom checks. Evidence suggests that culturally tailored and appropriately timed SMS messages are highly acceptable and can enhance adherence and patient awareness. Smartphone applications and self-monitoring tools have also been piloted in rural Uganda for home blood pressure monitoring, medication tracking, and peer support. Early studies indicate that app users experience improved adherence and perceived social support, although limitations such as smartphone ownership, digital literacy, and data costs reduce coverage [14]. Telehealth models facilitated by community health workers (CHWs) show promising results in improving blood pressure control among patients with moderate to severe hypertension, enabling remote clinician support and medication titration while reducing the need for clinic visits. Integrated system approaches combine mobile money for payments and medication access with digital decision-support tools for CHWs and nurses, targeting both demand- and supply-side barriers such as affordability and stockouts. Ongoing implementation studies aim to evaluate the effectiveness and scalability of these integrated mHealth strategies.

### **Effectiveness: what does the evidence say?**

Evidence on mobile health (mHealth) interventions for hypertension management in Uganda and sub-Saharan Africa (SSA) indicates promising but varied effectiveness. Mobile-enabled community screening and referral systems, often supported by community health workers (CHWs), have shown feasibility and improved hypertension detection in community settings. For adherence and self-management, SMS reminders and simple app-based interventions have helped reduce missed doses and improve some adherence metrics; however, the impact on blood pressure (BP) reduction is inconsistent and often depends on additional support such as counseling or reliable medication access. The most robust evidence comes from CHW-facilitated telehealth pilots, which report better BP control in high-risk patients compared with standard clinic care, highlighting the potential of hybrid models that integrate community-based support with remote clinical guidance [15]. Despite these encouraging findings, most Ugandan studies are pilot or feasibility trials, with few large, randomized, adequately powered studies or comprehensive health-economic evaluations. Consequently, while early results suggest mHealth strategies can enhance detection, adherence, and BP outcomes, further rigorous trials are needed to confirm long-term effectiveness, scalability, and cost-effectiveness in routine healthcare settings.

### **Implementation barriers and system challenges**

Implementation of mobile health (mHealth) for hypertension management in Uganda faces several significant barriers and system challenges. First, the digital divide limits access, as many rural populations still rely on feature phones, making smartphone-dependent solutions potentially exclusionary. Second, intermittent network connectivity and high data costs hinder app performance and real-time data transmission. Third, health system

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

integration is weak, with fragmented record-keeping and low interoperability between digital tools and national health information systems, undermining continuity of care. Fourth, medication supply and affordability remain critical; mHealth interventions that improve adherence may have limited impact if drug stocks and payment mechanisms are unreliable, highlighting the need to integrate mobile money and supply-chain solutions [16]. Fifth, human resources constraints require targeted training for community health workers and nurses to safely conduct remote monitoring and medication titration. Sixth, regulatory and privacy concerns around data protection, patient consent, and clinical accountability necessitate robust governance frameworks. Finally, evidence gaps persist, as few large-scale randomized trials or cost-effectiveness analyses have been conducted in Uganda, limiting policymakers' confidence in scaling digital hypertension interventions. Addressing these multifaceted challenges is essential to ensure mHealth solutions are effective, equitable, and sustainable in improving hypertension care across the country.

### **Enablers and lessons learned**

Key enablers for successful mobile health (mHealth) interventions in hypertension management include using low-complexity, platform-agnostic approaches such as SMS and USSD, which can reach users with basic feature phones and are easier to scale. Leveraging community health workers (CHWs) as digital intermediaries enhances adoption by bridging literacy gaps, providing a trusted link to clinicians, and supporting patient engagement. Human-centered design, through co-creation with patients and CHWs, improves acceptability, retention, and overall effectiveness, as demonstrated in pilot projects in Uganda. Integrating technology with solutions that improve access to medication, such as mobile money platforms or pharmacy networks, helps overcome adherence challenges related to affordability and supply [17]. Finally, aligning digital hypertension initiatives with national non-communicable disease strategies and existing health information systems ensures policy coherence and sustainability. Together, these strategies highlight the importance of accessible technology, community involvement, patient-centered design, and systemic integration in enhancing the reach and impact of mHealth interventions for hypertension management.

### **Research and policy priorities**

Research and policy priorities for mobile health (mHealth) in hypertension management in Uganda emphasize a multifaceted approach to improving outcomes and equity. Key priorities include conducting pragmatic trials and cost-effectiveness studies, using adequately powered randomized controlled trials (RCTs) and implementation research to assess blood pressure outcomes, economic impact, and equity in diverse Ugandan settings. Successful pilot interventions, particularly community health worker (CHW)-facilitated telehealth models, should be scaled up to evaluate real-world feasibility, workforce requirements, and broader clinical benefits. Ensuring interoperability and robust data governance is critical, with standards and regulations needed for secure integration of mHealth tools with the national health information system [18]. Sustainable financing strategies, such as mobile-money enabled subsidies, public-private partnerships, and insurer reimbursement models, are essential to maintain service delivery and consistent medication availability. Equity monitoring must be routine, tracking age, gender, socioeconomic status, and rural-urban reach to prevent disparities in access and health outcomes [19]. Finally, capacity building remains a priority, with targeted training for CHWs and primary care providers on digital health tools, remote management protocols, and patient engagement strategies to maximize the effectiveness and sustainability of mHealth interventions across Uganda.

## **CONCLUSION**

In conclusion, mobile health (mHealth) offers a promising approach to bridging critical gaps in hypertension management in Uganda, addressing challenges in awareness, treatment adherence, follow-up, and access to care. Evidence from pilot studies demonstrates that low-complexity interventions, such as SMS reminders and CHW-facilitated telehealth models, are highly acceptable to patients and can improve engagement and blood pressure outcomes. However, widespread adoption requires overcoming systemic barriers, including limited digital literacy, inconsistent network connectivity, fragmented health system integration, medication supply challenges, and financial constraints. Achieving sustained impact necessitates rigorous implementation research, cost-effectiveness evaluations, and integration with national health systems and supply chains. Policies supporting data privacy, equitable access, and sustainable financing, potentially through mobile money, public-private partnerships, or insurer reimbursement, are critical. Furthermore, capacity building for CHWs and primary care providers, coupled with human-centered design and inclusive technology solutions, can enhance scalability and equity. With coordinated efforts, mHealth can play a central role in reducing hypertension-related morbidity and mortality in Uganda.

## **REFERENCES**

1. Mills, K.T., Stefanescu, A., He, J.: The global epidemiology of hypertension. *Nat Rev Nephrol.* 16, 223–237 (2020). <https://doi.org/10.1038/s41581-019-0244-2>

2. Kato, A.M., Kibone, W., Okot, J., Baruch Baluku, J., Bongomin, F.: Self-Reported Hypertension and Associated Factors Among Adults in Butambala District, Central Uganda: A Community-Based Prevalence Study. *Integrated Blood Pressure Control*. 16, 71–80 (2023). <https://doi.org/10.2147/IBPC.S434230>
3. Nwankwo, M., Makena, W., Idris, A., Okamkpa, C.J., Umoren, E.B., Owembabazi, E.: Hypertension in East Africa: A Systematic Review and Meta-Analysis of Prevalence and Associated Risk Factors. *J Clin Hypertens (Greenwich)*. 27, e70140 (2025). <https://doi.org/10.1111/jch.70140>
4. Adonu C. C, Ugwu O. P. C, Bawa A, Ossai E. C, Nwaka A.C (2013). Intrinsic blood coagulation studies in patients suffering from both diabetes and hypertension. *Int Journal of Pharmaceutical Medicine and Bio Science*, 2 (2), 36-45.
5. Alum, E. U. (2025). Role of phytochemicals in cardiovascular disease management: Insights into mechanisms, efficacy, and clinical application. *Phytomedicine Plus*, 5(1), 100695. <https://doi.org/10.1016/j.phyplu.2024.100695>.
6. ucc: Ugandans Consume More Data But Spend Less, Says Report – Uganda Communications Commission, <https://www.ucc.co.ug/ugandans-consume-more-data-but-spend-less-says-report/>, (2023)
7. Aboye, G.T., Vande Walle, M., Simegn, G.L., Aerts, J.-M.: Current evidence on the use of mHealth approaches in Sub-Saharan Africa: A scoping review. *Health Policy and Technology*. 12, 100806 (2023). <https://doi.org/10.1016/j.hlpt.2023.100806>
8. Hickey, M.D., Owaraganise, A., Ogachi, S., Sang, N., Wafula, E.M., Kabami, J., et al.: Community health worker-facilitated telehealth for moderate-severe hypertension care in Kenya and Uganda: A randomized controlled trial. *PLoS Med*. 22, e1004632 (2025). <https://doi.org/10.1371/journal.pmed.1004632>
9. Mohamed F. Y. M, Selim T, Hussein H M, Hassan A A A, Said A A, Said M S, et al. (2024). Exploring the prevalence, clinical spectrum, and determinants of uncontrolled hypertension in the emergency department: Insights from a hospital-based study in Somalia. *Current Problems in Cardiology*, 102589. <https://doi.org/10.1016/j.cpcardiol.2024.102589>.
10. Majumdar, U., Nanyonga Clarke, R., Moran, A.E., Doupe, P., Gadikota-Klumpers, D.D., Gidio, A., et al.: Hypertension screening, prevalence, treatment, and control at a large private hospital in Kampala, Uganda: A retrospective analysis. *PLOS Glob Public Health*. 2, e0000386 (2022). <https://doi.org/10.1371/journal.pgph.0000386>
11. Zakerabasali, S., Ayyoubzadeh, S.M., Baniyasi, T., Yazdani, A., Abhari, S.: Mobile Health Technology and Healthcare Providers: Systemic Barriers to Adoption. *Healthc Inform Res*. 27, 267–278 (2021). <https://doi.org/10.4258/hir.2021.27.4.267>
12. Mugabirwe, B., Flickinger, T., Cox, L., Ariho, P., Dillingham, R., Okello, S.: Acceptability and feasibility of a mobile health application for blood pressure monitoring in rural Uganda. *JAMIA Open*. 4, ooaa068 (2021). <https://doi.org/10.1093/jamiaopen/ooaa068>
13. Uduak E U, Netete B. V, Timbuak J. A, Ibegbu A. O, Musa S. A, Hamman W. O (2014). Dermatoglyphics and Cheiloscopy Pattern in Hypertensive Patients; A Study in Ahmadu Bello University Teaching Hospital, Zaria, Nigeria and Environs. *International Journal of Scientific and Research Publications*, 4, (5), 1-5.
14. Kassavou, A., A'Court, C.E., Chauhan, J., Brimcombe, J.D., Bhattacharya, D., Naughton, F., et al.: Assessing the acceptability of a text messaging service and smartphone app to support patient adherence to medications prescribed for high blood pressure: a pilot study. *Pilot Feasibility Stud*. 6, 134 (2020). <https://doi.org/10.1186/s40814-020-00666-2>
15. Zewdu, E.M., Demessie, A., Nigatu, A.M., Baykemagn, N.D.: Intention to use mobile text message reminders for medication adherence among hypertensive patients in North West Ethiopia: a cross-sectional study. *BMC Health Services Research*. 24, 1451 (2024). <https://doi.org/10.1186/s12913-024-11794-3>
16. P, J., R, H., A, R.: Interoperability of Health Information Systems in Low and Middle-Income Countries (LMIC): Implementation of Cluster Care System. *PubMed*. (2025)
17. Ezenwaji, C.O., Alum, E.U. & Ugwu, O.P.C. Bridging the gap: telemedicine as a solution for HIV care inequities in rural and vulnerable communities. *Int J Equity Health* 24, 205 (2025). <https://doi.org/10.1186/s12939-025-02584-2>
18. Robusto, B., Cheng, I., Mahabaleshwar, R., McCutcheon, J., Denizard-Thompson, N., Kinny, S.R., et al.: Feasibility of deploying community health workers to assist with health-related social needs and hypertension in community care clinics. *J Clin Transl Sci*. 9, e81. <https://doi.org/10.1017/cts.2025.53>
19. Ekpang II, J. E., Ekpang, P. O., Ainebyoona, C., Nwagu, K. E., Nwuruku, O. A., & Muhammad, K. (2025). Toward an ethical future for orphan drugs: balancing access, affordability, and innovation. *Journal of Medical Economics*, 1–24. <https://doi.org/10.1080/13696998.2025.2577514>

**CITE AS: Katu Amina H. (2026). Adoption of Mobile Health for Hypertension Management in Uganda A Review. Research Output Journal of Engineering and Scientific Research 5(1): 92-97. <https://doi.org/10.59298/ROJESR/2026/5.19297>**