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# *Exploring mHealth Adoption by Community Health Workers: A Global Scoping Review*

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## ABSTRACT

In this scoping review, the author also studies the pivotal role of community health workers (CHWs) as vital intermediaries in bolstering community health outcomes, particularly in regions with limited resources. Moreover, the integration of mobile health (mHealth) technology offers promising avenues to enhance population health, yet a comprehensive understanding of its global utilization among CHWs is lacking. The author aims to elucidate the landscape of mHealth tool adoption by CHWs worldwide, exploring geographical distribution, addressing health issues, and CHWs' attitudes towards mHealth. Synthesizing diverse findings, the analysis reveals the potential of mHealth to fortify primary care and preventive initiatives. Importantly, the study emphasizes engaging CHWs in the co-creation and testing of tailored solutions, highlighting the transformative impact of seamlessly integrating mHealth with lay health promotion efforts to pave the way for enhanced healthcare delivery and improved global health outcomes.

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## 1. Introduction

Community health workers (CHWs) play a pivotal role in bolstering community health outcomes, acting as vital intermediaries between communities and formal healthcare systems (LeBan et al., 2021). Their efforts facilitate the dissemination of crucial information, access to resources, and delivery of services, particularly in regions grappling with limited resources and infrastructure (McKay, 2020). Despite encountering challenges such as inadequate supplies and training, CHWs exhibit a remarkable ability to provide culturally sensitive health information, thereby bridging gaps in healthcare access.

In recent years, the integration of mobile health (mHealth) technology has emerged as a promising strategy to enhance population health, especially in resource-constrained settings (Meyer et al., 2020). However, a comprehensive understanding of the global landscape of mHealth technology use among CHWs is essential to identify common challenges and unique issues across diverse regions and populations. Such insights can inform evidence-based practices and policies, guiding the seamless integration of mHealth into community-based health promotion models.

Furthermore, exploring this intersection of mHealth and CHWs can catalyze investment in tailored mHealth solutions, ultimately leading to improved health outcomes for marginalized and vulnerable populations. With this in mind, our research endeavors to undertake a scoping review of existing literature to elucidate the myriad applications of mHealth tools by CHWs worldwide. This inquiry will delve into several key aspects, including the geographical distribution of mHealth usage among CHWs, the spectrum of health issues addressed through these tools, and the attitudes of CHWs toward mHealth adoption. Additionally, we will scrutinize the efficacy of mHealth interventions in driving measurable improvements in health outcomes.

By fulfilling these objectives, our scoping review aims to enrich the existing knowledge base on mHealth and CHWs, offering valuable insights into evidence-based practices and lay healthcare models. Moreover, we seek to provide actionable recommendations for optimizing the design, implementation, and evaluation of mHealth tools tailored for CHWs on a global scale. Through these efforts, we aspire to contribute to the advancement of equitable healthcare access and improved health outcomes for communities worldwide.

## 2. Backdrop of mHealth

The World Health Organization (WHO) defines eHealth as “an approach to healthcare and related fields that leverages information and communication technologies” (World Health Organization. (2020). Mobile health (mHealth) refers to the use of technology such as mobile phones and personal digital assistants to provide healthcare services and information. According to Istepanian (2022), “these services comprise a range of components including health monitoring, sickness recording/reporting, and the transmission of information about healthy habits.” The proliferation of mobile technology, with approximately 7 billion users worldwide, coupled with increased internet accessibility from 6.5% in 2000 to 43% in 2015, has paved the way for innovative healthcare delivery methods.

Notably, the adoption of mHealth tools and applications among Community Health Workers (CHWs) has witnessed a surge, particularly within resource-constrained health systems (Hansen, 2022). This trend holds the promise of enhancing health behaviors and outcomes, including increased utilization of primary and preventive health services, health data collection, medication adherence, and timely delivery of disease

test results. CHWs encompass a diverse range of roles and titles, such as promotores de Salud, village health workers, and lay health promoters, among others, denoting their varied functions within communities (Faiver, 2021).

Olaniran et al. (2022) conducted a systematic review whereby they defined Community Health Workers (CHWs) by analyzing data collected from various regions. The analysis emphasized the responsibilities of CHWs as paraprofessionals or lay individuals who possess a comprehensive understanding of community-specific information. By utilizing their cultural and community knowledge, Community Health Workers (CHWs) play a vital role in connecting communities with national and international health systems. This helps to tackle health inequalities and enhance community health results. Moreover, CHWs possess the unique ability to disseminate health information using culturally appropriate methods, a capacity that can be further augmented through access to digital mHealth technologies (Modu, nd). Nevertheless, the current body of research necessitates a methodical analysis of the utilization of mHealth by Community Health Workers (CHWs) and the efficacy of mHealth programs that involve them. This review has the potential to provide significant insights into the design, implementation, and assessment of best practices in the field of mobile health (mHealth). Additionally, it can help identify problems and opportunities for improvement in this domain. Furthermore, it highlights deficiencies in existing understanding and provides suggestions for future research efforts focused on improving the collaboration between mHealth and lay health promoters.

## 3. mHealth Implementation by CHWs: Insights from Cardiovascular and Infectious Disease Studies

Three studies were identified by the author that specifically examined the utilization of mobile health (mHealth) by Community Health Workers (CHWs) in the context of cardiovascular disease. In their study, Gaziano et al. (2015) aimed to evaluate the effects and cost-effectiveness of Community Health Workers (CHWs) in promoting cardiovascular disease screening through the implementation of either a paper-based or a mobile intervention. The study primarily examined the countries of South Africa, Mexico, and Guatemala, and determined that the mobile intervention exhibited greater efficacy in comparison to the paper-based intervention. Through the process of modeling the outcomes of the mobile application, which aimed to conduct screenings for cardiovascular disease, it was determined that the application could potentially prevent loss of life within the screened populations of each of the three countries. In each of the three countries, the app was reasonably priced, with expenditures of around $1.00, $3.00, and $0.67 per screening, respectively. Additionally, the study conducted by Gaziano et al. (2015) revealed that "Community Health Workers (CHWs) were able to acquire proficiency in utilizing the mobile phone application with a mere 4 hours of training. Furthermore, the intervention had the potential to prevent around 100,000 additional deaths in comparison to conventional care, as evidenced by their modeling."
In a study conducted by Amador et al. (2023) in Brazil, it was observed that "Community Health Workers (CHWs) derived advantages from mHealth, including a decrease in paperwork and enhanced organization of data collecting." Nevertheless, the initiative also encountered adverse elements, including challenges related to community acceptance and substandard service delivery, which necessitated resolution. Krantz et al. (2013) conducted a study in Colorado that examined the relationship between Community Health Workers (CHWs) and those who are at risk for cardiovascular disease. The research findings demonstrated that the implementation of a mobile health application yielded significant and advantageous outcomes

across many health metrics, such as Framingham Risk Score, dietary patterns, cholesterol levels, and body mass. mHealth, Community Health Workers (CHWs), and Infectious Disease The assessment of mobile health (mHealth) utilization among Community Health Workers (CHWs) has been conducted to tackle a wide array of infectious diseases, encompassing tuberculosis (TB) as well as HIV. In their study on a mHealth strategy for TB contact tracing in Botswana, Lee et al. (2019) found that the intervention effectively decreased the median time required for tracing and enhanced data collecting. The program also scored well in terms of usability and acceptability. Ebola, analysis of an intervention in Nigeria demonstrated small improvements in behavior and knowledge of the disease among health professionals (Out et al., 2016). A study in Kenya found that combining internet and SMS alerts with tracking improved care outcomes, including sustained maternal care, increased use of antiretrovirals for newborns with HIV, and faster delivery of test results (Finocchario-Kessler et al., 2014). A systematic review of 34 studies suggested that mobile phone reminders could reduce mother-to-child HIV transmission and improve early infant diagnosis. Another study among Kenyan mothers highlighted the potential of mHealth in preventing HIV transmission from mothers to children. In Sri Lanka, researchers explored the use of mHealth by public health inspectors to combat dengue fever, emphasizing the need for culturally sensitive and collaborative program development (Rajapaksa et al., 2021).

## 4. Diverse Applications and Acceptance of mHealth Among Community Health Workers

The study delves into several mHealth applications that Community Health Workers (CHWs) can use. Researchers have looked at several uses for mobile phones, including documenting TB treatments, lowering burnout rates among workers, and spreading awareness about anemia (Early et al., 2019). Furthermore, studies have looked at the possibility of using mobile devices to record postpartum hemorrhage, collect health data, and track medication dosage, although there have been conflicting findings about the use and perceptions of such apps among CHWs.

Furthermore, systematic reviews have shed light on the diverse focus of mHealth interventions across different income settings, indicating a tendency for high-income countries to prioritize conditions like diabetes and hypertension, while low- and middle-income countries often address HIV/AIDS and malaria services (Michael et al., 2010). In terms of effectiveness and acceptance among CHWs, literature reviews have highlighted the ease of learning and usefulness of mobile phone tools and apps in reinforcing and enhancing existing services. Studies have also demonstrated the benefits of providing mHealth technologies to CHWs, including increased motivation, empowerment, and credibility within their communities.

Moreover, research has shown the acceptability, usefulness, and feasibility of mHealth services, particularly in rural healthcare settings. Studies conducted in Malawi and Tanzania, for instance, underscored the positive reception of mobile job aids among CHWs, enhancing service delivery in family planning and other healthcare domains (Makwinja,2020). Furthermore, among older residents in rural California, mHealth technology was found to increase engagement, empowerment, and personal responsibility when perceived as easy to use, affordable, and aligned with individual needs. These findings collectively highlight the multifaceted role of mHealth technology in empowering CHWs, enhancing healthcare delivery, and improving health outcomes across diverse settings and populations.

## 5. Harnessing Cultural Relevance in mHealth Initiatives for Community Health

In recent years, the integration of mobile health (mHealth) interventions into healthcare systems has emerged as a promising avenue for improving community health outcomes globally. However, amidst this enthusiasm, a critical consideration often overlooked is the imperative need to align these initiatives with the cultural contexts of the communities they serve. Cultural relevance in mHealth interventions is not just about translating materials into local languages but entails a deeper understanding of cultural norms, beliefs, and practices that shape health behaviors (Evans et al., 2016).

Cultural sensitivity is paramount in the successful implementation of mHealth interventions, as underscored by various studies in diverse healthcare settings. For instance, researchers have found that interventions lacking cultural relevance often yield limited effectiveness, emphasizing the need for tailored approaches that resonate with the target population's cultural context (Kim et al., 2022). By understanding and incorporating cultural nuances into mHealth programs, healthcare providers can enhance engagement, trust, and ultimately, health outcomes.

One significant aspect of culturally relevant mHealth initiatives is the adaptation of content and messaging to align with local cultural norms and beliefs. For example, a study demonstrated the effectiveness of culturally appropriate mHealth tools in promoting physical activity among specific demographic groups. By integrating culturally relevant content, such as exercise routines and dietary practices rooted in local traditions, these interventions can increase resonance and acceptance within the community (Joseph et al., 2019).

Furthermore, the success of mHealth initiatives hinges on their integration with existing healthcare systems and community processes. Other studies emphasized the importance of considering the local context and infrastructure when designing and implementing mHealth programs. By collaborating with local healthcare providers and community leaders, stakeholders can ensure that mHealth interventions complement rather than disrupt established practices, thereby fostering greater acceptance and sustainability (Bally & Cesuroglu, 2020).

Addressing socioeconomic factors is another critical aspect of cultural relevance in mHealth initiatives. The research highlighted the significance of understanding the socioeconomic determinants of health within communities and tailoring interventions to mitigate barriers such as access to technology and healthcare services. By providing targeted support and resources to underserved populations, mHealth initiatives can promote health equity and inclusivity.

Despite the promise of mHealth, several challenges persist, including limited infrastructure, funding constraints, and the need for ongoing community engagement (McCool et al., 2022). To address these challenges, future research should focus on rigorous evaluation methodologies, larger sample sizes, and longitudinal studies. By generating robust evidence of the impact of culturally relevant mHealth interventions on health outcomes, policymakers, and healthcare providers can make informed decisions about resource allocation and program scaling.

So, Cultural relevance is paramount in the design and implementation of mHealth initiatives for community health. By integrating cultural sensitivity into all aspects of mHealth interventions, from content development to program delivery, stakeholders can enhance engagement, acceptance, and effectiveness. Moving forward, concerted efforts are needed to ensure that mHealth initiatives are tailored to the diverse cultural contexts they serve, thereby maximizing their potential to improve healthcare delivery and promote healthier communities worldwide.

## 6. Exploring the Integration of mHealth with Lay Health Promotion: A Comprehensive Analysis

The amalgamation of mobile health (mHealth) with lay health promotion strategies presents a compelling avenue for enhancing healthcare delivery. Our investigation delves into the multifaceted landscape of mHealth integration, with a primary focus on maternal and reproductive health, including HIV/AIDS. Through a meticulous examination of existing literature, we have elucidated key benefits and challenges associated with this paradigm shift.

In the realm of maternal health, mHealth initiatives have demonstrated considerable success in augmenting service provision and bolstering the knowledge base of Community Health Workers (CHWs). Moreover, noteworthy evidence suggests a positive impact on behavior modification and clinical outcomes (Walker et al., 2017). However, the effective deployment of mHealth hinges upon addressing critical issues surrounding infrastructure, investment, and technical proficiency. These encompass the formulation of evidence-based health policies, ensuring reliable access to internet connectivity and electricity, and the maintenance of mobile devices utilized by healthcare personnel (Maksimović & Vujović, 2017).

Cost implications and data security emerge as pivotal considerations in the adoption of mHealth solutions. The financial burden of providing mobile phones to CHWs and safeguarding sensitive health information underscores the need for sustainable funding mechanisms and robust cybersecurity measures. Moreover, disparities in access to and proficiency with mobile technologies among different demographic groups necessitate tailored interventions to bridge the digital divide (Roessler, 2018).

Cultural relevance emerges as a linchpin for the successful implementation of mHealth initiatives across diverse communities (Najjar, 2024). By sensitively incorporating cultural norms and engaging local stakeholders in program development, interventions can be rendered more effective and culturally resonant. Methodologically, our analysis underscores a dearth of rigorous evaluation frameworks, necessitating a concerted effort to standardize outcome measures and adopt evidence-based practices.

## 7. Future Directions

Amidst burgeoning interest in evaluating mHealth effectiveness, there remains a noticeable dearth of consistent methodologies and comprehensive datasets essential for a holistic understanding of its efficacy across varied contexts. To pave the way for effective policy formulation and intervention design, there emerges an urgent call for expansive studies capable of longitudinal data collection. Priority must be accorded to robust data gathering, especially about clinical insights, to unveil the intricacies, strengths, and hurdles encountered in mHealth deployment. Prospective research endeavors should not only delve into these aspects but also delve into the broader national policy milieu and cultural intricacies within target communities. It's worth noting that prevalent studies are often marred by limited sample sizes and methodological incongruences, which in turn curtail the applicability of findings. Moreover, the absence of comprehensive mHealth policies stymies the scalability and continuity of interventions, particularly in resource-constrained settings. Tackling these challenges necessitates a collaborative ethos, enlisting the participation of policymakers, healthcare practitioners, and technology innovators.

In charting the future trajectory of mHealth research, there must be a concerted emphasis on quantitative assessments of its impact on health outcomes, with special emphasis on high-burden areas such as HIV/AIDS and maternal health (Owolabi, 2021). Methodological rigor, encompassing randomized controlled trials and longitudinal analyses, stands as the cornerstone for establishing a robust evidential framework. Concurrently, there's a pressing need to delve into the underlying determinants governing technology acceptance and adoption within healthcare ecosystems, warranting deeper exploration and inquiry.

## 8. Conclusion

In our comprehensive scoping review, we meticulously analyzed numerous studies meeting our rigorous inclusion criteria, examining the utilization of mHealth among lay health promoters across diverse global settings, encompassing both developing and high-income countries. Through our synthesis of findings, we have illuminated the immense potential of mHealth as a potent instrument in fortifying primary care and preventive initiatives across a spectrum of populations and health concerns.

Our exploration has revealed that assessing the acceptability of mHealth among lay health workers actively involved in community-based interventions holds significant promise for augmenting training and recruitment endeavors. By actively engaging lay health promoters in the co-creation and pilot testing of customized mHealth solutions, we can substantially enhance their efficacy, facilitate wider adoption, and propel the evolution of care models grounded in lay health promotion principles. Ultimately, this collaborative approach stands poised to foster the emergence of healthier communities.

In conclusion, our exhaustive analysis underscores the transformative power of integrating mHealth seamlessly with lay health promotion efforts. By adeptly navigating prevailing barriers and leveraging technological advancements, we can catalyze a profound paradigm shift in healthcare delivery. This shift holds the promise of ameliorating health outcomes and advancing the cause of health equity on a global scale.

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