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Health Digitalization in Community-Led Programs: A Scoping Review of Successes, Challenges, and Systemic Impacts (2020–2025)

Azizan Omar[1], Mohd Faizal Madrim[1*], Abdul Rahman Ramdzan[1], Aizuddin Hidrus[1]

Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Sabah, Malaysia[1]

Corresponding Author: (MF Madrim)[*]

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KEYWORDS

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Digital Health

mHealth

Digital Frictions

LMICs

ABSTRACT:

Introduction: Community Health Workers (CHWs) are increasingly being equipped with digital tools to address healthcare shortages in low- and middle-income countries (LMICs). While these technologies aim to improve service delivery, their impact on the CHW's professional role and the systemic barriers to their sustainability are not fully understood.

Objectives: This scoping review aims to characterize the integration of digital health tools within community-led programs in LMICs, specifically analysing the emergence of 'technological task-shifting' in CHWs roles. Furthermore, it seeks to identify the systemic barriers, specifically data and energy poverty that act as critical determinants of implementation success and long-term program sustainability.

Methods: A systematic search was conducted in PubMed and Scopus, supplemented by manual snowballing of reference lists. Following the PRISMA-ScR guidelines, 167 records were identified (132 via databases; 35 via manual search). Sources were screened against pre-defined inclusion criteria. A total of 118 records were excluded due to automated filters (n = 62), irrelevant population/setting (n = 36), or lack of focus on digital frictions (n = 20), resulting in 49 included sources

Results: Reviewing 49 studies revealed that digitalization has successfully expanded the clinical capacity of CHWs, improving diagnostic accuracy and real-time data surveillance. This 'technological task-shifting' has empowered CHWs to provide complex screenings in remote areas. However, these successes are often undermined by systemic barriers, specifically 'Data Poverty' (self-funded internet) and 'Energy Poverty' (lack of charging infrastructure), which act as primary barriers to sustainability. Furthermore, the transition frequently introduces an administrative 'dual burden' that complicates daily workflows.

Conclusions: Digital health has successfully transformed CHW reach; however, long-term success requires shifting from technology-centric to worker-centric policies. To sustain these gains, health systems must address the hidden costs of data and energy access to ensure digital tools empower rather than burden the frontline workforce.

1. Introduction

The global landscape of community health is undergoing a fundamental transformation driven by the rapid proliferation of mobile technologies and digital health platforms . Traditionally, Community Health Workers (CHWs) have served as the primary bridge between formal health systems and hard-to-reach populations, with their roles largely defined by health education and basic maternal and child health (MNCH) outreach [1–3]. However, the recent decade has seen a systemic shift toward "technological task-shifting," where digital tools are increasingly utilized to delegate complex clinical

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tasks to non-specialist workers in low-resource settings [4,5].

Despite the documented successes in improving diagnostic accuracy and real-time data surveillance [6,7], the digitalization of community health programs is not without friction. Implementation often faces significant infrastructural barriers, ranging from inconsistent power and network connectivity to the 'dual burden' of administrative double-entry and technical glitches [8–10]. Furthermore, the expectation that CHWs integrate these tools into their daily workflows has raised critical questions regarding 'data poverty', where workers in underfunded systems may personally shoulder the costs of data and internet access to ensure program continuity [11,12].

While existing literature has explored individual pilot projects, there is a lack of comprehensive synthesis that maps the current state of digital health across diverse health domains and geographic regions. Understanding these barriers including energy and data poverty, is essential to prevent technology from inadvertently widening existing health inequities. This scoping review addresses this gap by synthesizing current evidence to identify the successes, barriers, and broader systemic impacts of digitalization on community-led health programs.

2. Objectives

This study aims to systematically map the existing evidence regarding the integration of digital tools within community health frameworks in LMICs. The review seeks to identify the diverse technological modalities and health areas currently addressed by community-led digital health interventions while analysing the evolution of the CHWs professional role from basic outreach to tech-enabled clinical diagnostic support. Furthermore, this study evaluates the systemic and operational risks, specifically energy poverty, data poverty, and referral bottlenecks that threaten the sustainability and safety of digital health implementation in low-resource settings.

3. Methods

The methodological framework for this scoping review was guided by the six-stage process originally proposed by Arksey and O'Malley (2005) [13] and further refined by Levac et al. (2010) [14] to enhance clarity and consistency in study selection and reporting. To ensure the highest standard of transparency, the final synthesis was reported in alignment with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist [15].

Methodological Framework

In accordance with the Arksey and O'Malley framework, this review followed a structured approach involving: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results. The adoption of the PRISMA-ScR guidelines ensured that the selection process was robust and replicable, minimizing the risk of selection bias [15].

Search Strategy and Data Sources

To ensure a comprehensive capture of relevant literature, a systematic search was conducted across PubMed and Scopus. The search strategy was developed using a combination of Medical Subject Headings (MeSH) terms and free-text keywords. The search architecture was built around three primary concepts: (1) Community Health Workers, (2) Digital Health/mHealth technologies, and (3) Low-Resource Settings/LMICs.

The specific Boolean strings utilized were as follows:

PubMed:

("Community Health Workers"[MeSH] OR "CHW" OR "Frontline Health Workers") AND ("mHealth" OR "Digital Health" OR "Mobile Applications"[MeSH] OR "Telemedicine") AND ("LMIC" OR "Developing Countries" OR "Low-resource settings")

Scopus:

TITLE-ABS-KEY ("Community Health Worker" OR "CHW") AND TITLE-ABS-KEY ("mHealth" OR "Digital Health" OR "Mobile App") AND TITLE-ABS-KEY ("LMIC" OR "Developing Country")

The search was limited to articles published in English between January 2020 and 2025. This timeframe was selected to synthesize the most current evidence following the global acceleration of digital health adoption triggered by the COVID-19 pandemic.

Inclusion and Exclusion Criteria

Following the recommendations of Levac et al. (2010)[14], the research team used an iterative process to

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define inclusion and exclusion criteria based on the PCC (Population, Concept, and Context) framework:

Population: CHWs or equivalent frontline health providers working within community settings.

Concept: Primary focus on a digital health intervention, including mobile applications, SMS-based platforms, or specialized diagnostic hardware.

Context: Programs located within LMICs or underserved, vulnerable communities.

Study Type: Original, peer-reviewed research articles containing empirical data.

Data Charting and Synthesis

A standardised data-charting form was developed to extract key variables, including study design, geographic location, health domain, and technological modality. As advocated by Levac et al. (2010), this stage involved a thematic synthesis to identify overarching patterns in how digitalization impacts the CHW workforce and the broader health system infrastructure.

4. Results

The study selection process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement [16] and the PRISMA Extension for Scoping Reviews (PRISMA-ScR) [15].

The initial search of PubMed (n = 81) and Scopus (n = 41) yielded 132 records. An additional 35 records were identified through manual searching and snowballing of reference lists, resulting in a total of 167 records for screening. During the initial screening phase, 62 records were removed based on pre-defined automated filters, including publication date and article type. The remaining 105 reports were assessed for eligibility through full-text review. Of these, 56 reports were excluded for specific reasons: 36 were deemed to have an irrelevant setting or population, and 20 did not sufficiently address the core concept of digital frictions. A final total of 49 sources were included in the scoping review. The selection process is visually summarized in the PRISMA flow diagram (Figure 1).

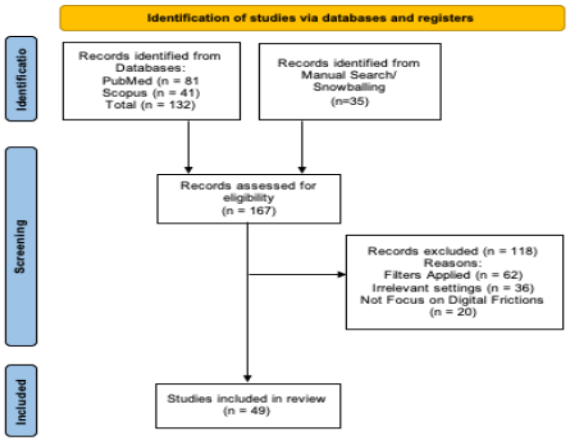

Figure 1: PRISMA 2020 flow diagram illustrating the identification, screening, and inclusion process for the scoping review.

Descriptive Analytics: The Research Landscape

A total of 49 studies met the inclusion criteria for this scoping review. The evidence base reflects a significant surge in recent scholarly interest, with a substantial portion of the included literature published between 2024 and 2025. This temporal trend indicates a rapidly maturing field, transitioning from early pilot phases to more robust evaluations of digital health integration within community health systems.

Geographically, the evidence is predominantly concentrated in the Global South, reflecting a heavy reliance on Community Health Worker (CHW) networks to bridge physician shortages (Table 1). Sub-Saharan Africa (n=13) and South Asia (n=11) emerged as the primary regions for research activity. Studies from Sub-Saharan Africa span a wide geographic range, with 13 contributions from countries such as Kenya, Rwanda, Ethiopia, Malawi, and South Africa [8,12,17–27]. While in South Asia, the literature is led by research from India [3,5,11,28–30] and Bangladesh [7,9,31–33].

Other country/ region with bigger contributions are from the United States (n = 7), primarily examining digital health tools for underserved rural and immigrant populations [6,34–39]. This was followed by Southeast Asia (n = 3), including studies from Malaysia and Indonesia [10,40,41]. Other studies also included in the review are from China (n = 2) [42,43], and Central America (n = 2) [4,44], while a single study was conducted in Australia (n = 1) [45].

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The remaining literature (n=11) utilized a multi-country or global lens to evaluate intervention scalability across diverse low- and middle-income contexts [1,2,46–53]. This distribution suggests that while digital health is a global phenomenon, its application is deeply rooted in local socio-economic contexts where traditional healthcare infrastructure is limited.

Table 1: Geographical distribution of studies included in the review

Region	Paper count
Africa	13
Global/ LMICs	11
USA	7
India	6
Bangladesh	5
South East Asia	3
China	2
Latin America	2
Australia	1
Total	49

Health Area Distribution

The included studies (N=49) covered a broad spectrum of health domains, illustrating the extensive reach of community-led digital health programs (Table 2). The distribution reveals a significant research focus on chronic disease management and life-course health through community-based digital platforms.

i. Non-Communicable Diseases (NCDs)

The largest proportion of the literature (n=19 papers) was dedicated to the prevention and management of NCDs. These studies primarily focused on leveraging digital tools—such as mobile applications and telehealth—to decentralize the care of chronic conditions including hypertension [6,9,20,21,36,41], diabetes [29,38,41,50], cancer [34,35,48,52] and one paper each on child obesity [45], chronic pain [37], chronic obstructive pulmonary disease [46], and cardiovascular disease [10]. By utilizing digital platforms, these programs allowed for long-term monitoring and behavioural support within the community setting.

ii. Maternal and Child Health (MCH)

Maternal and child health emerged as the second most prominent thematic area, accounting for 10 studies [7,22–26,30–33] These interventions utilized digital technologies to support prenatal care, track neonatal outcomes, and provide postnatal guidance. The focus was largely on improving service delivery and health-seeking behaviours among pregnant women and caregivers through SMS reminders and mobile decision-support tools for community workers.

iii. Population Health and Surveillance

The review identified 7 papers focused on Population Health [1–3,5,11,12,53]. These studies explored systemic community-led initiatives, such as the digital notification of vital events (births and deaths) and broader community health promotion strategies. These interventions highlight the role of digitalization in strengthening civil registration and community-level surveillance.

iv. Communicable Diseases (CDs)

Digital interventions for infectious diseases were the focus of 6 papers [8,17,18,27,39,44]. These studies primarily addressed treatment adherence and patient follow-up for chronic infectious conditions, specifically HIV/AIDS and Tuberculosis. The digital tools in this category were used to bridge the gap between clinical facilities and community-based treatment support.

v. Other Emerging and Specialized Areas

The remaining studies targeted more specialized or cross-cutting health domains. Mental Health was addressed by 3 papers [42,43,47], focusing on community-based support for psychological well-being. Specialist Sensory Care (specifically hearing screening and audiology) was the subject of 2 papers [4,49], demonstrating how digital tools can empower non-specialists to perform screening tasks. Finally, 2 papers focused on Health Systems and Workforce, examining issues such as health worker engagement and the gamification of routine health tasks [28,51].

Table 2: Thematic classification according to key health areas

Health Area	Paper count
Non-Communicable Disease (NCDs)	19
Maternal & Child Health (MCH)	10
Population Health	7
Communicable Diseases (CDs)	6
Mental Health	3

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Hearing	2
Health Systems	2
Total	49

Technological Modalities

The technological landscape identified in this review spans a continuum from ubiquitous, low-bandwidth communication tools to specialized, high-functionality clinical applications. These modalities are categorized by their technical delivery mechanism and the specific functional "jobs" they perform in community settings.

i. Mobile Messaging and Communication-Based Tools

Short Message Service (SMS) and Interactive Voice Response (IVR) represent the most widely adopted modalities for population-level reach. These tools are primarily utilized for patient support and health promotion, particularly in the management of chronic conditions and medication adherence. SMS-based interventions were deployed for hypertension management in Bangladesh [9], schizophrenia adherence in China [43], and general cardiovascular support [10]. Beyond basic messaging, digital tools supported complex treatment and surveillance pathways, such as tuberculosis (TB) contact tracing and treatment monitoring in Uganda [8]. Furthermore, automated voice messaging (IVR) platforms have been implemented at a national scale to deliver stage-based maternal and child health information. Notable examples include the 'Kilkari' program in India, which provides weekly audio messages to pregnant and postpartum women to complement the efforts of frontline workers [28,30]. These modalities prioritize scalability by ensuring compatibility with basic mobile hardware, which remains essential for inclusivity in low-resource environments [8,9,30,43].

ii. Interactive Social Media and Collaborative Platforms

A distinct shift toward utilizing existing social media infrastructure, specifically WhatsApp, was observed for workforce training and professional engagement. These platforms facilitate "microlearning," allowing for the delivery of case-based clinical lessons to healthcare workers in remote areas [17,18]. Unlike one-way messaging, these interactive modalities support peer-to-peer consultation and real-time feedback from supervisors, which was particularly critical for HIV care and peer support [1,18]. This modality leverages familiar interfaces to reduce the technical training burden on community health workers (CHWs).

iii. Digital Applications Support for Frontline Tasks

Smartphone and tablet applications represent a significant shift toward structured clinical workflows, functioning as "digital job aids" that move beyond simple communication to clinical workflow management. These tools are utilized to standardize community-based tasks, such as the registration, health status tracking, and facility referral of pregnant women in rural Malawi [23]. In the context of maternal and child health, these job aids provide structured counselling scripts to support frontline workers; for example, in rural Bangladesh, a feasibility study explored an mHealth platform for delivering preventive nutrition interventions during the "First 1000 Days" of life [32]. Subsequent research on this specific modality demonstrated that electronic job aid-assisted one-to-one counselling significantly improved rates of exclusive breastfeeding among infants aged 0–5 months [33]. Furthermore, these applications often integrate data entry with automated feedback loops, as seen in the use of mobile health-enhanced supportive supervision (MESS) to improve the community case management of malaria, diarrhoea, and pneumonia in Zambia [27]. By transitioning from paper-based registries to digital data capture, these modalities improve data accuracy and operational consistency across diverse health domains [3,12,28].

iv. Clinical Decision Support Systems (CDSS) and Diagnostic Tools

Beyond standardized task management, a subset of digital tools incorporates clinical algorithms to provide Clinical Decision Support (CDSS) and diagnostic capabilities. These tools facilitate task-shifting by enabling non-physician health workers to perform complex screenings. For instance, the SMARTHealth platform allows village health workers to conduct cardiovascular disease (CVD) risk stratifications and provide management recommendations in rural India [5] and Indonesia [10]. Similarly, specialized applications leverage smartphone hardware for high-resolution imaging and screening, such as the detection of oral cancer [48]. A significant body of evidence also highlights the role of mHealth in decentralized audiological care, where smartphone-based tools are

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used for hearing screenings and the provision of hearing aids in community settings [4,39,49]. By integrating automated diagnostic logic, these modalities bridge the gap between community-level identification and formal clinical diagnosis [36].

v. Telehealth and Remote Consultation Modalities

Telehealth platforms were frequently utilized to connect patients in underserved areas with remote specialists, often facilitated by a CHW. These tools functioned primarily to enhance referral pathways and access to specialist care for conditions like hypertension, chronic pain, and mental health [21,37,47]. By integrating video conferencing and remote monitoring—such as digital blood pressure tracking [6]—these modalities allow for specialized clinical oversight without requiring patient travel to urban centres.

The Evolving Role of Community Health Workers (CHWs)

Our review reveals a troubling trend that we call ‘technological task-shifting,’ where the actual role of a Community Health Worker is being fundamentally rewritten. It is ironic; these digital tools were supposed to make healthcare more efficient and accessible, but the data tells a different story. In reality, the heavy lifting of data entry and digital reporting is now pushing aside the vital clinical and face-to-face care these workers provide. This isn't just a minor inconvenience. It’s a shift that degrades the quality of patient interactions and places a massive cognitive strain on CHWs—particularly in places where the power stays off and the internet is non-existentIn the field of audiology, the role of the CHW has transitioned into that of a specialized diagnostic assistant. Using smartphone-based tools, CHWs can now conduct community-level hearing screenings and manage the provision of hearing aids, effectively decentralizing ear health services [4,49].

Furthermore, digital applications have formalized the delivery of maternal and child health interventions. By using electronic job aids, CHWs provide structured nutrition counselling during the critical "First 1000 Days" of life and support exclusive breastfeeding practices with greater consistency [7,32]. These tools also enhance operational management through "supportive supervision" and supply-chain tracking platforms, ensuring that CHWs adhere to evidence-based protocols when managing childhood illnesses like malaria, pneumonia, and diarrhoea [27].

The professionalization of the workforce is further evidenced by the shift toward integrated care models where CHWs manage multiple chronic conditions simultaneously through digital support [21,51]. Finally, the CHW role now encompasses long-term behavioural support and medication adherence for mental health conditions, such as schizophrenia, facilitated by digital tracking and messaging interventions [42,43].

Systemic Impacts of Digitalization

The digitalization of community health services extends beyond individual task performance, driving significant shifts in broader health system dynamics. A primary impact is the transition from fragmented, paper-based registries to integrated digital data capture, which facilitates the scaling of complex interventions across diverse geographical contexts [3,51]. By embedding clinical protocols into mobile platforms, systems can achieve higher levels of data accuracy and better resource allocation at the population level, particularly in the management of non-communicable diseases (NCDs) and hypertension [31,36].

However, the systemic impact of these tools is heavily contingent on implementation quality and "adoption readiness." Current research emphasizes that digitalization must move toward integrated care models that allow CHWs to manage multiple health conditions through a single interface, rather than using disconnected pilot tools [21]. This systemic transition is currently being mapped through systematic reviews to identify how mHealth can more effectively improve maternal health service utilization in Sub-Saharan Africa [24].

Furthermore, large-scale global evidence from surveys of over 1,000 health workers highlights that while technology is viewed optimistically, its success at a system level is often bottlenecked by structural issues. Specifically, the lack of continuous training and reliable infrastructure remains a significant barrier to sustained digital health integration [12]. Ultimately, for digitalization to move from isolated projects to sustainable system-wide improvement, it must integrate training, supervision, and technical infrastructure into a unified national framework.

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5. Discussion

The Re-defined CHW Role in a Digitalised Health Landscape

The traditional image of Community Health Workers (CHWs) who were mainly seen as an outreach volunteer is undergoing a profound transformation. They are now repositioning themselves as tech-enabled clinical assistants, taking on a much broader and more complex scope of practice. This 'technological task-shifting' allows them to step into roles, to be much more involved in complex diagnostics and patient management directly or indirectly. These tasks were once strictly reserved for doctors working in clinics.

This transformation is seen on the ground, particularly in regions like India and Indonesia. Digital tools have enabled the CHWs to perform cardiovascular risk assessments and start treatment protocols with high levels of accuracy [5,10]. Beyond these specialities, CHWs are now using their smartphones as powerful medical tools for early detection of specialised conditions, including oral cancer [48,52] and hearing impairments, bringing advanced screening directly to the doorsteps of those who need it most [4,49].

The move toward 'professionalisation' is also ensures a more reliable care for the patients. By using electronic job aids, health workers can offer consistent, high-quality counselling to new mothers during the critical 'First 1000 Days' of a child's life, specifically regarding breastfeeding [7,32]. Their influence has even grown to include behavioural clinical management. This is evident in the use digital platforms to support and monitor patients struggling with mental health conditions or chronic infectious diseases [39,42].

At its heart, this digital shift creates a 'clinical safety net' that protects both the patient and the worker. By embedding medical protocols into mobile apps, the system reduces the mental burden on the health worker while ensuring the care they provide meets national safety standards. Ultimately, this evolution demands that we stop seeing CHWs as informal volunteers and start recognising them as a skilled, digitally literate tier of the healthcare workforce whose clinical judgment is vital to the community. To understand this shift, one might think of these health workers as navigators who once relied only on their memory of the local terrain but have now been equipped with a high-tech GPS system. The GPS (the digital tools) doesn't just show them the path; it gives them the confidence and the data needed to safely lead their community.

Successes: Enablers of Digital Adoption and Clinical Accuracy

Success in community-led digital health relies on empowering local health workers with tools that make their daily lives easier and their care more effective. This success is built on three main pillars: reliable clinical guidance, supportive mentorship, and accessible learning.

Clinical Decision Support Systems (CDSS) is one of the examples under the 'reliable clinical guidance' pillar. This system acts as a 'digital safety net' for frontline workers. In resource-limited areas, such as Zambia, these tools help the CHWs to accurately diagnose childhood illnesses and provide mothers with consistent, evidence-based advice [27]. By using electronic job aids, workers can feel confident that they are delivering high-quality care that matches the clinical standards, reducing the pressure and risk of human errors [7].

Digital health also changes the relationship between the CHWs and their supervisors. In the past, many CHWs felt isolated or neglected due to the long distances between them and their managers. Today, an automated supportive supervision turns oversight into 'remote mentorship'. Instead of a stressful, 'punitive check-in', this allows for a continuous supportive supervision environment. These systems ensure that medicine supplies remain stocked, and services are delivered in a more consistent manner. [27]. Indirectly, the CHWs feel valued, which is essential for keeping dedicated people in the healthcare workforce.

The most effective tools are often the simplest ones. Rather than using complex, unfamiliar hardware, successful programs use 'low-tech' options like familiar communication platforms and gamified training [18,51]. This approach respects the worker's time and effort by minimizing cognitive load and using tools that are already culturally integrated into their lives [31]. When digital tools are easy to use and built into the national healthcare framework, they stop being temporary projects and become permanent, sustainable parts of the health system [51].

Think of these digital tools like a GPS for healthcare workers: they don't replace the driver's skill or local

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knowledge, but they provide the right directions at the right time, warn of obstacles ahead, and ensure everyone reaches their destination safely.

Persistent Barriers: From Infrastructure Gaps to Implementation Burnout

Even though mobile health tools have shown real success, they often run into systemic barriers that make it difficult for local programs to survive. One major problem is the gap between high-tech tools and the basic infrastructure available to support them. CHWs are often optimistic, but they frequently lack the electricity to charge devices, or the technical support needed to keep them running [12]. These failures are more than just glitches; they can create dangerous gaps in patient monitoring and cause life-threatening delays in emergency referrals.

The financial reality for these CHWs adds another layer of difficulty, as many are forced to pay for their own data costs just to sync patient data and files. This 'economic friction' leads to delays that can distort the accuracy of health data [24]. If this new digital interface feels like an extra paperwork instead of a helpful clinical tool, CHWs can experience 'implementation burnout', acceptance rate will be low, causing them to stop using the technology altogether [21,24].

Finally, the current system is often fragmented, requiring health workers to juggle multiple, disconnected apps for different health conditions. This prevents them from seeing a complete picture of a patient's health and increases the chance of a clinical oversight [21]. Moving away from the 'tech-first' designs and focusing more on 'human-centric' systems that respect the worker's financial reality and local infrastructure, could ensure that the technology narrows rather than widens health gaps. This makes it possible to fully utilise the progress in health digitisation to deliver better services, particularly to the population that is difficult to reach.

Systemic and Population Health Impacts of Digital Integration

Digital technology is fundamentally changing the way we approach healthcare, turning what used to be a scattered system into one where everyone is connected through shared data. Instead of just reacting to health problems as they arise, communities are now using real-time information to stay ahead of the curve, ensuring that resources and medical help reach the most isolated populations. This transition from old paper records to digital updates is a massive leap toward making Universal Health Coverage (UHC) a reality for everyone [51].

Beyond helping patients, these tools are providing CHWs with the professional recognition they deserve. By creating a clear digital 'audit trail' of their daily tasks, the system makes it easier for supervisors to offer support and ensures that health workers are held to a high standard. This digital link makes the hard work happening on the ground visible to national policymakers, ensuring that local efforts are valued and integrated into the country's larger health strategy. [27].

Finally, we are seeing a shift toward a more holistic way of providing care. Instead of treating different diseases in separate 'silos', new digital platforms allow health workers to address multiple health issues, from infections diseases to chronic conditions, all in one visit [21]. Even though challenges like poor infrastructure still exist, these digital strategies are transforming isolated volunteers into the modern, responsive frontline of a resilient healthcare system. This evolution is the key to making sure our health systems are strong enough to handle future global challenges.

6. Conclusion

Technology is doing much more for community health than just sending text messages; it is fundamentally changing how healthcare is delivered. CHWs are no longer just volunteers who reach out to neighbours; they have become tech-savvy clinical assistants who can perform specialized diagnostics and help manage long-term illnesses [4,5]. While these digital tools make healthcare more accurate and help teams make better decisions [27,51], their full impact is ironically often limited by the technology itself. Poor technology infrastructure and fragmentated implementation were the most common barriers encountered in this review [12,21]. Having said that, technology is not a replacement for a strong health system, but it is a powerful spark that can help bring healthcare to everyone when it is built into a country's national plan.

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7. Recommendations

To really make this technology work, we need to stop using separate, disconnected apps and start building unified platforms that can handle many different health needs at once [21,51]. This requires us to shift our focus back to the people at the heart of the system. Instead of just buying new gadgets, we should invest in better ways to support health workers, such as using mobile phones for quick, ongoing learning and providing automated supervision to help them manage their increasingly complex roles [18,27].

We also need to officially recognize how much the professional identity of the CHW has grown. Since these workers are now managing specialized tasks like hearing tests and chronic disease care, their pay, certifications, and career paths must be updated to reflect their technical expertise [4,10]. Finally, to ensure that technology is fair for everyone, it must be built to last in difficult environments. This means making sure apps work offline, providing affordable data plans, and using solar power so that technology serves as a bridge to care for the most vulnerable people, rather than a barrier [12,22].

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References

1. Odendaal WA, Anstey Watkins J, Leon N, Goudge J, Griffiths F, Tomlinson M, et al. Health workers' perceptions and experiences of using mHealth technologies to deliver primary healthcare services: a qualitative evidence synthesis. Cochrane Database Syst Rev [Internet]. 2020;2020(3). Available from: doi:10.1002/14651858.CD011942.pub2
2. Greuel M, Sy F, Bärnighausen T, Adam M, Vandormael A, Gates J, et al. Community Health Worker Use of Smart Devices for Health Promotion: Scoping Review. JMIR mHealth uHealth [Internet]. 2023;11:1–12. Available from: doi:10.2196/42023
3. Manapurath R, Raran Veetil D, Kamath MS. Use of modern technologies for promoting health at the population level in India. Lancet Reg Heal - Southeast Asia [Internet]. 2024;23(March 2023). Available from: doi.org/10.1016/j.lansea.2023.100338
4. Saunders JE, Bessen S, Magro I, Cowan D, Quiroz MG, Mojica-Alvarez K, et al. Community health workers and mHealth systems for hearing screening in rural Nicaraguan schoolchildren. J Glob Health [Internet]. 2022;12. Available from: doi: 10.7189/jogh.12.04060
5. Schierhout G, Praveen D, Patel B, Li Q, Mogulluru K, Ameer MA, et al. Why do strategies to strengthen primary health care succeed in some places and fail in others? Exploring local variation in the effectiveness of a community health worker managed digital health intervention in rural India. BMJ Glob Heal [Internet]. 2021;6:1–14. Available from: doi:10.1136/%0Dbmjgh-2021-005003
6. Katz ME, Mszar R, Grimshaw AA, Gunderson CG, Onuma OK, Lu Y, et al. Digital Health Interventions for Hypertension Management in US Populations Experiencing Health Disparities A Systematic Review and Meta-Analysis. JAMA Netw Open [Internet]. 2024;7(2):E2356070. Available from: doi:10.1001/jamanetworkopen.2023.56070
7. Billah SM, Ferdous TE, Siddique AB, Raynes-Greenow C, Kelly P, Choudhury N, et al. The effect of electronic job aid assisted one-to-one counselling to support exclusive breastfeeding among 0–5-month-old infants in rural Bangladesh. Matern Child Nutr [Internet]. 2022;18(3). Available from: doi:10.1111/mcn.13377
8. Meyer AJ, Armstrong-Hough M, Babirye D, Mark D, Turimumahoro P, Ayakaka I, et al. Implementing mhealth interventions in a resource-constrained setting: Case study from Uganda. JMIR mHealth uHealth [Internet]. 2020;8(7):1–10. Available from: doi:10.2196/19552
9. Jahan Y, Rahman MM, Faruque ASG, Chisti MJ, Kazawa K, Matsuyama R, et al. Awareness development and usage of mobile health technology among individuals with hypertension in a rural community of Bangladesh: Randomized controlled trial. J Med Internet Res [Internet]. 2020;22(12):1–15. Available from: doi:10.2196/19137
10. Gadsden T, Sujarwoto S, Salsabilla SA, Maharani A, Praveen D, Tampubolon G, et al. PLOS Global Public Health A quality improvement approach to scaling up a complex health system intervention for the prevention and management of cardiovascular disease in rural Indonesia. 2022;112(cycle 1):1–13. Available from: doi.org/10.1371/journal.pgph.0005577
11. Gopichandran V, Subramaniam S, Thiagesan R. Ethical issues in m-Health applications in community health work in India — a scoping review. Indian J Med Ethics [Internet]. 2023;8(4):266–73. Available from:

doi:10.20529/IJME.2023.037

12. Blondino CT, Knoepflmacher A, Johnson I, Fox C, Friedman L. The use and potential impact of digital health tools at the community level: results from a multi-country survey of community health workers. BMC Public Health [Internet]. 2024;24(1):1–14. Available from: doi.org/10.1186/s12889-024-18062-3

13. Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. Int J Soc Res Methodol Theory Pract [Internet]. 2005;8(1):19–32. Available from: doi:10.1080/1364557032000119616

14. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology Danielle. Represent Interv [Internet]. 2012;1–18. Available from: doi:10.1186/1748-5908-5-69

15. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Ann Intern Med [Internet]. 2018;169(7):467–73. Available from: doi:10.7326/M18-0850

16. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. Bmj [Internet]. 2021;372. Available from: doi:10.1136/bmj.n71

17. Chisholm BS, Mapahla L, Lombard C, Blockman M, Orrell C. Effectiveness and uptake of WhatsApp-based HIV microlearning for healthcare workers in remote South African clinics: A pragmatic, mixed-methods, cluster-randomised trial. Nurse Educ Pract [Internet]. 2025;86(December 2024):104326. Available from: doi.org/10.1016/j.nepr.2025.104326

18. Chisholm BS, Wallace ML, Blockman M, Orrell C. "WhatsApp is best!" Acceptability and feasibility of WhatsApp-based HIV microlearning for healthcare workers in remote South African clinics: A pragmatic, mixed-methods, cluster-randomised trial. Nurse Educ Pract [Internet]. 2025;86(December 2024):104407. Available from: doi.org/10.1016/j.nepr.2025.104407

19. Haregu T, Delobelle P, Shrestha A, Panniyammakal J, Thankappan KR, Parasuraman G, et al. Shifting roles of community health workers in the prevention and management of noncommunicable disease during the COVID-19 pandemic: a scoping review. Health Policy Plan [Internet]. 2024;39(7):771–81. Available from: doi.org/https://doi.org/10.1093/heapol/czae049

20. Hickey MD, Owaraganise A, Ogachi S, Sang N, Wafula EM, Kabami J, et al. Community health worker–facilitated telehealth for moderate–severe hypertension care in Kenya and Uganda: A randomized controlled trial. PLOS Med [Internet]. 2025;22(6):1–18. Available from: doi.org/10.1371/journal.pmed.1004632

21. Hickey MD, Owaraganise A, Ogachi S, Sunday H, Aoko C, Sang N, et al. A prospective cohort study of the SEARCH integrated HIV/hypertension community health worker-led intervention in rural Kenya and Uganda. J Int AIDS Soc [Internet]. 2025;28(S3):17–28. Available from: doi.org/10.1002/jia2.26500

22. Kachimanga C, Divala TH, Ket JCF, Kulinkina A V., Zaniku HR, Murkherjee J, et al. Adoption of mHealth Technologies by Community Health Workers to Improve the Use of Maternal Health Services in Sub-Saharan Africa: Protocol for a Mixed Method Systematic Review. JMIR Res Protoc [Internet]. 2023;12(June). Available from: doi:10.2196/44066

23. Kachimanga C, Ng'ambi WF, Kazinga D, Ndarama E, Amulele MA, Munyaneza F, et al. Impact of Mobile Health (mHealth) Use by Community Health Workers on the Utilization of Maternity Care in Rural Malawi: A Time Series Analysis. Int J Womens Health [Internet]. 2025;17:245–57. Available from: doi.org/10.2147/IJWH.S497100

24. Kachimanga C, Zaniku HR, Divala TH, Ket JCF, Mukherjee JS, Palazuelos D, et al. Evaluating the Adoption of mHealth Technologies by Community Health Workers to Improve the Use of Maternal Health Services in Sub-Saharan Africa: Systematic Review. JMIR mHealth uHealth [Internet]. 2024;12:1–21. Available from: doi:10.2196/55819

25. Christiansen AMH, Sørensen BL, Boas IM, Bedesa T, Fekede W, Nielsen HS, et al. The impact of the Safe Delivery Application on knowledge and skills managing postpartum haemorrhage in a low resource setting: a cluster randomized controlled trial in West Wollega region, Ethiopia. Reprod Health [Internet]. 2023;20(1):1–11. Available from: doi.org/10.1186/s12978-023-01635-7

26. Kateera F, Riviello R, Goodman A, Nkurunziza T, Cherian T, Bikorimana L, et al. The Effect and Feasibility of mHealth-Supported Surgical Site Infection Diagnosis by Community Health Workers After Cesarean Section in Rural Rwanda:

Journal of Chemical Health Risks

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JCHR (2026) 16(1), 1119-1130 | ISSN:2251-6727

Randomized Controlled Trial. JMIR mHealth uHealth [Internet]. 2022;10(6):1–12. Available from: doi:10.2196/35155

27. Biemba G, Chiluba B, Yeboah-Antwi K, Silavwe V, Lunze K, Mwale RK, et al. Impact of mobile health-enhanced supportive supervision and supply chain management on appropriate integrated community case management of malaria, diarrhoea, and pneumonia in children 2-59 months: A cluster randomised trial in Eastern Province, Zambia. J Glob Health [Internet]. 2020;10(1):1–12. Available from: doi:10.7189/jogh.10.010425

28. Dutt P, Godfrey A, Chamberlain S, Mitra R. Using behavioural design and theories of change to integrate communication solutions into health systems in India: evolution, evidence and learnings from practice. Integr Healthc J [Internet]. 2022;4(1):e000139. Available from: doi:10.1136/ihj-2022-000139

29. Bassi A, Arora V, Arfin S, John O, Yadav K, Praveen D, et al. Preliminary effectiveness and feasibility of ASHA-led mobile health intervention for diabetes care in Indian primary health care settings. Sci Rep [Internet]. 2025;15(1):1–11. Available from: doi:10.1038/s41598-025-20728-w

30. Scott K, Ummer O, Shinde A, Sharma M, Yadav S, Jairath A, et al. Another voice in the crowd: The challenge of changing family planning and child feeding practices through mHealth messaging in rural central India. BMJ Glob Heal [Internet]. 2021;6:1–15. Available from: doi:10.1136/bmjgh-2021-005868

31. Jahan F, Foote E, Rahman M, Shoab AK, Parvez SM, Nasim MI, et al. Evaluation of community health worker's performance at home-based newborn assessment supported by mHealth in rural Bangladesh. BMC Pediatr [Internet]. 2022;22(1):1–12. Available from: doi.org/10.1186/s12887-022-03282-6

32. Ferdous TE, Jaman MJ, Siddique AB, Sultana N, Hossain T, Arifeen S El, et al. Feasibility of Employing mHealth in Delivering Preventive Nutrition Interventions Targeting the First 1000 Days of Life: Experiences from a Community-Based Cluster Randomised Trial in Rural Bangladesh. Nutrients [Internet]. 2024;16(20):1–20. Available from: doi:10.3390/nu16203429

33. Billah SM, Ferdous TE, Kelly P, Raynes-Greenow C, Siddique AB, Choudhury N, et al. Effect of nutrition counselling with a digital job aid on child dietary diversity: Analysis of secondary outcomes from a cluster randomised controlled trial in rural Bangladesh. Matern Child Nutr [Internet]. 2022;18(1):1–14. Available from: doi:10.1111/mcn.13267

34. Han HR, Lee YJ, Min D, Chepkorir J, Hwang DSA, Chae S. Web-Based Delivery of an Effective Church-Based Intervention Program to Promote Cancer Screening (Community-based Health litEracy-focused intervention for breast and cervical Cancer Control) Among Korean Immigrant Women in the United States: Randomized Co. JMIR Hum Factors [Internet]. 2025;12. Available from: doi:10.2196/66092

35. Casten R, Leiby BE, Kelley M, Rovner BW. A randomized controlled trial to test the efficacy of a diabetes behavioral intervention to prevent memory decline in older blacks/African Americans with diabetes and mild cognitive impairment. Contemp Clin Trials [Internet]. 2022;123(Mci):1–18. Available from: doi:10.1016/j.cct.2022.106977

36. Commodore-Mensah Y, Liu X, Ogungbe O, Ibe C, Amihere J, Mensa M, et al. Design and Rationale of the Home Blood Pressure Telemonitoring Linked with Community Health Workers to Improve Blood Pressure (LINKED-BP) Program. Am J Hypertens [Internet]. 2023;36(5):273–82. Available from: doi:10.1093/ajh/hpad001

37. Janevic M, Robinson-Lane SG, Courser R, Brines E, Hassett AL. A Community Health Worker-Led Positive Psychology Intervention for African American Older Adults With Chronic Pain. Gerontologist [Internet]. 2022;62(9):1369–80. Available from: doi:10.1093/geront/gnac010

38. Vaughan EM, Naik AD, Amspoker AB, Johnston CA, Landrum JD, Balasubramanyam A, et al. Mentored implementation to initiate a diabetes program in an underserved community: A pilot study. BMJ Open Diabetes Res Care [Internet]. 2021;9(1):1–11. Available from: doi:10.1136/bmjdrc-2021-002320

39. Shourya S, Liu J, McInerney S, Casimir T, Kenniff J, Kershaw T, et al. A Remote Intervention Based on mHealth and Community Health Workers for Antiretroviral Therapy Adherence in People With HIV: Pilot Randomized Controlled Trial. JMIR Form Res [Internet]. 2025;9. Available from: doi:10.2196/67997

40. Schliemann D, Jamil ASA, Mohan D, Tan MM, Cardwell CR, Ismail R, et al. The development and evaluation of a mHealth, community education and navigation intervention to improve clinical breast

examination uptake in Segamat Malaysia: A randomised controlled trial. PLoS One [Internet]. 2023;18(10 October). Available from: doi:10.1371/journal.pone.0288437

41. Pardoel ZE, Reijneveld SA, Lensink R, Widyaningsih V, Probandari A, Stein C, et al. Core health-components, contextual factors and program elements of community-based interventions in Southeast Asia – a realist synthesis regarding hypertension and diabetes. BMC Public Health [Internet]. 2021;21(1):1–14. Available from: doi:10.1186/s12889-021-11244-3

42. Cai Y, Gong W, He H, Hughes JP, Simoni J, Xiao S, et al. Mobile texting and lay health supporters to improve schizophrenia care in a resource-poor community in rural China (LEAN Trial): Randomized controlled trial extended implementation. J Med Internet Res [Internet]. 2020;22(12). Available from: doi:10.2196/22631

43. Cai Y, Gong W, He W, He H, Hughes JP, Simoni J, et al. Residual Effect of Texting to Promote Medication Adherence for Villagers with Schizophrenia in China: 18-Month Follow-up Survey After the Randomized Controlled Trial Discontinuation. JMIR mHealth uHealth [Internet]. 2022;10(4). Available from: doi:10.2196/33628

44. Castillo M, Alexander N, Rubiano L, Rojas C, Navarro A, Rincon D, et al. Randomized trial evaluating an mHealth intervention for the early community-based detection and follow-up of cutaneous leishmaniasis in rural Colombia. PLoS Negl Trop Dis [Internet]. 2023;17(3):1–15. Available from: doi:10.1371/journal.pntd.0011180

45. Betts JM, Gooey M, Chung A, Craig H, Bergmeier H, Amirtharajah C, et al. Childhood obesity in the first 2000 days: A focus on primary health care in regional and rural Australia. Aust J Rural Health [Internet]. 2025;33(1):1–15. Available from: doi:10.1111/ajr.13208

46. Adhikari S, Thapa S, Rattanapan C, Laosee O, Sriram S, Bhatta J. Evaluating the impact of self-management interventions on COPD outcomes in low- and middle-income countries in Asia: a systematic review. Health Qual Life Outcomes [Internet]. 2025;23(1). Available from: doi:10.1186/s12955-025-02382-y

47. Chau LW, Lam RW, Minas H, Hayashi K, Nguyen VC, O'Neil J. Digital Health Interventions for Depression and Anxiety in Low- and Middle-Income Countries: Rapid Scoping Review. JMIR Ment Heal [Internet]. 2025;12. Available from: doi:10.2196/68296

48. Dailah HG. Mobile Health (mHealth) Technology in Early Detection and Diagnosis of Oral Cancer-A Scoping Review of the Current Scenario and Feasibility. J Healthc Eng [Internet]. 2022;2022. Available from: doi:10.1155/2022/4383303

49. Frisby C, Manchaiah V, Swanepoel DW. Feasibility, efficacy and effectiveness of community health worker-facilitated hearing aid provision: a systematic review. BMJ Open [Internet]. 2025;15(11):1–15. Available from: doi:10.1136/bmjopen-2025-108591

50. Favas C, Ansbro É, Eweka E, Agarwal G, Lazo Porras M, Tsiligianni I, et al. Factors Influencing the Implementation of Remote Delivery Strategies for Non-Communicable Disease Care in Low- and Middle-Income Countries: A Narrative Review. Public Health Rev [Internet]. 2022;43(June):1–12. Available from: doi:10.3389/phrs.2022.1604583

51. Paudel B, Al-Shehabi H, Dörner R, El Bcheraoui C, Lennemann T, Bernasconi A. Use of Gamified Digital Tools in Daily Tasks of Health Care Workers: Scoping Review. JMIR serious games [Internet]. 2025;13:e70480. Available from: doi:10.2196/70480

52. Singh A, Dalben GB, Adio N, Costa M de C, de Carli ML, Ogenchuk M, et al. Screening tools and strategies for early detection of oral cancer and potentially malignant disorders in rural and low-resource populations: A systematic review. J Stomatol Oral Maxillofac Surg [Internet]. 2026;127(3):102667. Available from: doi.org/10.1016/j.jormas.2025.102667

53. Vasudevan L, Glenton C, Henschke N, Maayan N, Eyers J, Fønhus MS, et al. Birth and death notification via mobile devices: a mixed methods systematic review (Review). J Psychiatr Res [Internet]. 2017;94(3):36–46. Available from: doi:10.1002/14651858.CD012909.pub2