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Impact of Mobile and Digital Health Technologies on Health Education and Disease prevention in Community Settings: A Systematic Review

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ABSTRACT

Background: Mobile and digital health technologies are increasingly being adopted in community settings to enhance health education and disease prevention, especially in low-resource environments. While the global uptake of such technologies is rising, there remains a need for consolidated evidence regarding their effectiveness in improving health outcomes at the community level.

Objective: To systematically review and evaluate the effectiveness, feasibility, and health outcomes of mobile and digital health interventions aimed at health education and disease prevention in community-based settings.

Methods: A systematic search was conducted across six databases (PubMed, Scopus, Web of Science, CINAHL, PsycINFO, and Embase) for studies published between January 2013 and December 2024. Inclusion criteria focused on community-based interventions using mobile or digital tools targeting health education or disease prevention. A total of six eligible studies were included, comprising randomized controlled trials, quasi-experimental studies, and cross-sectional evaluations. Data were extracted and synthesized narratively due to heterogeneity in outcome measures**.**

Results: Across the six studies included in this review, a total of 2,247 participants were evaluated across diverse community settings. The use of mobile health (mHealth) tools demonstrated statistically significant improvements in several key health outcomes. Notably, vaccination uptake increased by 23.5% ($p < 0.01$), highlighting the effectiveness of mobile interventions in improving immunization rates in rural and underserved areas. In the domain of sexual health, a mobile-based educational intervention resulted in a mean score increase of 2.1 ± 0.5 in STI preventive behavior ($p < 0.001$), indicating a strong impact on health knowledge and behavioral change. Among hypertensive patients, the use of a mobile app for self-monitoring led to a significant reduction in systolic blood pressure, with an average decrease of 10.2 mmHg ($p < 0.001$), underscoring the clinical potential of digital self-management tools. Additionally, 68% of participants reported improvements in dietary and physical activity behaviors following mHealth interventions ($p < 0.05$), supporting the role of mobile tools in promoting healthy lifestyles. Engagement levels were also high, with more than 90% program completion rates reported in four of the six studies, suggesting strong feasibility and acceptability of these interventions.

Conclusion: Mobile and digital health interventions are effective, feasible, and well-accepted tools for promoting health education and disease prevention in community settings. These technologies can significantly enhance screening coverage, health literacy, and chronic disease management. Future research should prioritize long-term evaluation, cost-effectiveness, and strategies for integrating digital tools within existing health systems, especially in underserved regions.

Keywords: *Mobile health, digital health, mHealth, disease prevention, health education, community health, digital interventions, telehealth, public health technology.*

1. INTRODUCTION

Preventable diseases remain a leading cause of morbidity and mortality worldwide, particularly in low- and middle-income countries (LMICs) where access to timely healthcare and preventive services is limited.(Besnier et al., 2021) Non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and cancer account for approximately 71% of

global deaths, with a significant portion of these deaths attributable to modifiable risk factors including poor nutrition, tobacco use, physical inactivity, and harmful alcohol consumption (Budreviciute et al., 2020). In parallel, communicable diseases such as HIV/AIDS, tuberculosis, and vaccine-preventable infections continue to pose major public health challenges, especially in underserved populations where health literacy is low and preventive infrastructure is weak.(Madhav et al., 2017)

Despite decades of global health investment, traditional health education models, often delivered through pamphlets, posters, or in-person sessions, have struggled to reach diverse, geographically dispersed, and culturally varied communities with sufficient frequency and impact.(Forsetlund et al., 2021) These conventional methods are often resource-intensive, poorly adapted to local languages or literacy levels, and fail to sustain engagement beyond a single point of contact.(Yanou et al., 2023) Additionally, many community members face structural barriers such as lack of transportation, limited time, stigma, or distrust of health authorities, which reduce their likelihood of participating in in-person educational programs.(Prusaczyk et al., 2024)

Health education efforts have also been hampered by a shortage of trained health educators and inconsistent integration of behavior change theories in program design.(Michaelsen & Esch, 2023) In many settings, preventive care is deprioritized in favor of curative services, leading to underinvestment in the health promotion workforce and insufficient tailoring of messages to specific community needs. As a result, opportunities for early intervention and risk reduction are often missed, exacerbating health inequities and placing increased strain on already overburdened healthcare systems.(Shelton & Brownson, 2023)

Moreover, traditional approaches often lack mechanisms for two-way communication, which limits their ability to address community concerns, personalize health advice, or adapt dynamically to changing health contexts such as pandemics.(B. Y. Lee et al., 2023) The COVID-19 crisis further exposed these limitations, revealing how rapidly evolving information and restrictions demanded more agile, scalable, and interactive platforms to deliver public health guidance effectively.(DeSalvo et al., 2021)

In this context, there is a growing recognition of the need to modernize health education and disease prevention strategies, particularly in community-based settings where population-level impact can be achieved through targeted, culturally relevant interventions. This has opened the door for mobile and digital health technologies to address many of the persistent challenges in health communication and engagement.

Emergence of Mobile and Digital Health Technologies

Over the past two decades, mobile and digital health technologies have rapidly evolved to become integral tools in public health and clinical care delivery. The proliferation of mobile phones, widespread internet access, and advancements in digital innovation have facilitated the emergence of a broad range of health technologies aimed at enhancing communication, improving access to care, and delivering personalized health education.(Abernethy et al., 2022) This digital transformation, particularly in the field of community health, has opened new pathways to address persistent challenges in health promotion and disease prevention.

The concept of mobile health (mHealth) first gained momentum in the early 2000s, driven by global initiatives such as the World Health Organization's mHealth for Development program and the increasing availability of mobile networks in low- and middle-income countries. mHealth refers to the use of mobile and wireless technologies, such as SMS messaging, mobile applications, and portable devices, to support health services and information exchange.(Istepanian, 2022) Initially focused on maternal and child health, immunization reminders, and disease outbreak alerts, mHealth has since expanded to encompass chronic disease management, behavioral change interventions, and real-time epidemiological surveillance.(J. A. Lee et al., 2018)

Simultaneously, digital health, a broader term encompassing electronic health records (EHRs), telemedicine, artificial intelligence (AI), and wearable health technologies, has revolutionized the way health systems deliver and manage care.(Yeung et al., 2023) Digital tools enable continuous monitoring, remote consultations, and interactive education that can be tailored to individual user needs and scaled across large populations.(Fitzpatrick, 2023) Telehealth platforms, for instance, have become critical in delivering preventive care and health counseling in rural and underserved areas, particularly where healthcare infrastructure is sparse.(Haleem et al., 2021)

Mobile applications now serve a wide range of preventive functions: from nutrition tracking and physical activity coaching to mental health screening and medication adherence support.(Tong et al., 2022) These apps often use gamification, reminders, and feedback mechanisms to sustain user engagement and reinforce healthy behaviors.(Tran et al., 2022) In parallel, SMS and voice-based messaging systems remain highly effective in reaching populations with limited literacy or smartphone access, offering a low-cost and accessible means of delivering health tips, reminders, and educational content.(Chinonso Chianumba et al., 2024)

Social media platforms have also emerged as powerful channels for health communication, especially among younger populations.(J. Chen & Wang, 2021) Health organizations and community health workers increasingly use platforms like

WhatsApp, Facebook, Instagram, and YouTube to disseminate credible health information, debunk misinformation, and foster community-based dialogue around disease prevention practices.(Kington et al., 2021) These platforms support two-way communication and peer engagement, which can enhance knowledge retention and trust in health messages.(Chirumamilla & Gulati, 2021)

Moreover, the COVID-19 pandemic has significantly accelerated the adoption of digital health interventions worldwide. Lockdowns and social distancing measures forced health systems to explore alternative means of patient engagement, leading to an explosion in the use of virtual care and app-based public health communication.(Getachew et al., 2023) Digital contact tracing, teleconsultations, online symptom checkers, and vaccination scheduling systems are now part of standard public health practice in many regions.(Behar et al., 2020)

In sum, the rise of mHealth and digital health technologies represents a paradigm shift in public health strategy, offering scalable, data-driven, and user-centered approaches to health education and disease prevention. These tools enhance access and equity and transform the way communities engage with health information and services. As such, their integration into community health systems offers a promising avenue for improving population health outcomes, especially when supported by appropriate infrastructure, digital literacy, and policy frameworks.

Relevance to Community-Based Interventions

Digital health technologies have emerged as vital in community-based health interventions, particularly in bridging access gaps in rural, remote, and underserved populations. These populations often face multiple barriers to traditional healthcare delivery, including geographic isolation, shortages of trained health professionals, limited transportation, and social stigmas related to health-seeking behavior.(Maita et al., 2024) In such contexts, mobile and digital health solutions offer innovative, scalable, and often low-cost alternatives that can overcome systemic limitations and improve community health outcomes.(Asif & Gaur, 2025)

One of the primary contributions of digital health in community settings is its ability to facilitate equitable access to essential health education and preventive services.(McCauley et al., 2021) Through mobile phone messaging, health applications, telehealth consultations, and virtual community health platforms, individuals can receive timely and relevant health information regardless of their physical location. For example, in rural regions of sub-Saharan Africa and South Asia, SMS and voice message campaigns have been successfully deployed to disseminate maternal and child health information, promote immunization schedules, and raise awareness about infectious disease prevention. These approaches are particularly effective in settings where internet infrastructure is weak but basic mobile network coverage is available.(Aboye et al., 2023)

Digital health also plays a critical role in supporting community health workers (CHWs), who are often the first point of contact for healthcare in resource-limited environments.(Rodrigues et al., 2022) Mobile-based job aids and e-learning tools enable CHWs to deliver more accurate, consistent, and context-specific health messages during household visits or community outreach activities.(Mahmood et al., 2020) Digital platforms also allow for real-time data collection and reporting, which enhances decision-making at both the individual and system levels. By digitizing workflows and providing ongoing supervision and feedback, these tools help improve the efficiency and accountability of community health programs.(Piardi et al., 2024)

Importantly, digital technologies offer opportunities to personalize health education based on individual or community-level data. Mobile apps can tailor messages according to age, gender, health status, language, or behavioral risk factors, ensuring that educational interventions are more relevant and engaging.(Chatterjee et al., 2021) This personalization increases the likelihood of sustained behavior change and empowers individuals to take an active role in their health. For example, a community-based app designed for diabetes prevention may send targeted lifestyle tips and reminders based on a user's BMI, dietary habits, or physical activity patterns. In multilingual or multicultural settings, apps and messages can be customized to align with cultural values, norms, and linguistic preferences, which further enhances acceptability and effectiveness.(Salas-Groves et al., 2023)

Moreover, digital health platforms enable rapid and large-scale dissemination of public health messages, a capacity that is particularly valuable during public health emergencies or disease outbreaks.(Aiello et al., 2020) During the COVID-19 pandemic, many countries relied on mobile alerts, social media campaigns, and digital dashboards to communicate prevention measures, share updates, and coordinate vaccination drives. These technologies allowed governments and organizations to bypass traditional bottlenecks in health communication and reach millions of people with up-to-date and actionable information.(Mohd Hanafiah et al., 2021)

Another advantage of digital health in community interventions is its ability to foster participatory engagement.(Barony Sanchez et al., 2022) Social media forums, online peer support groups, and interactive platforms create spaces where community members can share experiences, ask questions, and support one another in health-related behavior change. This sense of digital community builds trust, reduces stigma (especially around mental health and chronic conditions), and reinforces collective action toward health improvement.(Naslund et al., 2020)

Role of Health Educators and Community Health Workers in Digital Interventions

Health educators and community health workers (CHWs) are the backbone of preventive care and health promotion in many community settings, particularly in low-resource or marginalized populations.(Terpstra et al., 2009) With the growing integration of digital health technologies into public health systems, these frontline professionals are increasingly becoming key facilitators of digital interventions. Their role is central to ensuring that technology-driven health education and disease prevention programs are accessible, culturally relevant, and sustainable at the community level.(Borges do Nascimento et al., 2023)

Integration of digital tools into the workflow of health educators and CHWs has transformed how they deliver services, collect data, and interact with clients.(Braun et al., 2013) Mobile applications, SMS-based platforms, and digital dashboards now support a range of essential tasks, such as scheduling household visits, screening for risk factors, delivering personalized health messages, and documenting service delivery. For instance, digital job aids embedded in mobile phones can provide health educators with up-to-date protocols and educational scripts, enhancing the quality and consistency of the health information provided. These tools can also assist in language translation, graphical instruction, and multimedia demonstrations, making health education more engaging and inclusive for populations with low literacy.(Lee Ventola, 2014)

Telehealth technologies also allow CHWs to connect clients with remote healthcare providers for real-time consultations, thereby extending the reach of specialized services into underserved areas. This is particularly beneficial for managing chronic diseases and maternal-child health conditions, where timely guidance and early intervention are critical.(Ezeamii et al., 2024) In addition, digital tools enable CHWs to monitor patient progress over time through digital health records or app-based reporting systems, improving follow-up care and facilitating early detection of complications.(Greuel et al., 2023)

Health educators play a pivotal role in bridging the digital divide between health systems and community members. They often act as digital intermediaries, introducing clients to new technologies, demonstrating how to use health apps, and troubleshooting barriers to access. Their ongoing presence in communities allows for iterative feedback on the usability and cultural appropriateness of digital platforms, which is essential for the refinement and effectiveness of such interventions. This human-centered facilitation is critical to ensuring that digital health tools do not become impersonal or inaccessible.(Bhoyar et al., 2024)

Despite these opportunities, the integration of digital health tools into the workflows of CHWs and health educators is not without challenges. One major concern is the digital literacy of frontline workers themselves.(Feroz et al., 2021) While younger or urban-based workers may adapt easily to new technologies, older or rural health workers may require substantial training and ongoing support to effectively use digital platforms. Without adequate capacity-building, digital tools risk becoming underutilized or misapplied.(Khan et al., 2025)

Another barrier is the reliability of infrastructure. In many rural areas, poor internet connectivity, inconsistent electricity supply, and lack of device maintenance can limit the consistent use of digital systems. These constraints not only hinder performance but can lead to frustration and reduced trust in technology.(Sekhar, 2024) Furthermore, the introduction of digital tools often adds new administrative tasks to already overburdened workers, especially if technologies are not seamlessly integrated into existing workflows.

Privacy and data security are also growing concerns, especially when sensitive health information is collected or transmitted using personal devices.(Infrastructure, 1997) Training on ethical digital data handling, consent, and confidentiality is often lacking and should be a core part of any digital health initiative involving frontline workers.(Ibrahim et al., 2024)

Finally, while digital health solutions can enhance efficiency, they must not replace the human connection that CHWs and health educators provide. Interpersonal relationships remain at the heart of effective community health programs. Therefore, technologies should be viewed as enablers, not substitutes, for the empathy, trust-building, and cultural mediation that frontline workers offer.

Gaps in Current Evidence and Need for Systematic Review

Despite the growing enthusiasm for mobile and digital health technologies in community-based health education and disease prevention, the current body of evidence remains fragmented and uneven. (Dileep, 2024)Numerous pilot programs and digital interventions have been introduced in various geographic and socio-economic contexts, yet there is a noticeable lack of synthesized research that systematically evaluates their overall effectiveness, feasibility, and implications for health equity, particularly from a nursing and community health perspective.(Erku et al., 2023)

Most existing studies focus on isolated interventions, small-scale implementations, or specific disease areas, making it difficult to draw generalizable conclusions. Moreover, evaluations often emphasize technical performance or user satisfaction without rigorously assessing health outcomes, behavior change, or long-term sustainability.(Hughes, 2008) There is also limited understanding of how these tools function in real-world settings, especially in underserved or technologically marginalized populations. Important considerations, such as digital literacy, cultural relevance, engagement strategies, and integration into existing health systems, are frequently underreported or inconsistently measured.(Prasastiningtyas et al.,

2024)

Equity-related implications, such as whether digital tools reduce or inadvertently widen disparities in health access and education, are also underexplored. For instance, while mobile health apps may benefit urban or tech-savvy users, their relevance and accessibility for older adults, rural residents, or individuals with limited education remain uncertain.(Koehle et al., 2022) These gaps highlight the need for a comprehensive review that consolidates available findings and identifies best practices and implementation challenges across diverse community contexts.

Given the rapid digital transformation in health care, accelerated by the COVID-19 pandemic, there is a pressing need for evidence-based guidance to inform policy-making, program design, and frontline health practice. A systematic review can provide a structured, critical synthesis of what is known, what remains uncertain, and where future investments in research and implementation should be directed. Such a review is essential to ensure that digital health innovations are both impactful and inclusive, aligning with global goals for health equity and universal health coverage.

The primary aim of this systematic review is to evaluate the effectiveness, feasibility, and user engagement of mobile and digital health technologies in supporting health education and disease prevention within community settings. By consolidating evidence from diverse interventions and contexts, the review seeks to identify common themes, success factors, and implementation barriers relevant to nursing practice, health education, and community outreach.

2. RATIONALE OF THE REVIEW

The increasing burden of preventable diseases, coupled with systemic limitations in traditional health education methods, has necessitated innovative approaches to reach and engage communities more effectively.(Kruk et al., 2018) Mobile and digital health technologies have emerged as promising tools to bridge longstanding gaps in access, delivery, and personalization of health information, particularly in community-based and low-resource settings. With the global proliferation of mobile phones and internet connectivity, these tools have the potential to transform public health communication, empower individuals with knowledge, and promote behavior change at scale.(Yi et al., 2024)

Despite the expanding landscape of digital health interventions, there remains a significant disconnect between innovation and evidence. While many studies report on the technical functionality and user satisfaction of mobile health (mHealth) apps, SMS platforms, and digital campaigns, there is limited systematic synthesis of their actual impact on health education outcomes and disease prevention behaviors within community settings.(Gomis-Pastor et al., 2024) Furthermore, frontline health providers, including nurses, community health workers, and health educators, are increasingly expected to integrate digital tools into their workflows, yet there is minimal consolidated knowledge on how these technologies influence care delivery, workflow efficiency, or community trust in preventive programs.(Alotaibi et al., 2025)

Another critical gap lies in the equitable implementation of digital health solutions. While some communities benefit from enhanced access to information and services, others, particularly those with limited digital literacy, infrastructure, or resources, may be inadvertently excluded.(Badr et al., 2024) This raises important questions about the feasibility, inclusiveness, and sustainability of digital health interventions in real-world community contexts. Current research often lacks a focus on contextual variables such as cultural appropriateness, gender dynamics, and social determinants of health that critically influence the success of digital outreach in diverse populations.(Kaboré et al., 2022)

Given this backdrop, a systematic review is warranted to consolidate and critically analyze the growing yet disparate body of literature on digital health interventions in community-based health education and prevention. The rationale for this review is threefold: (1) to provide a clear, evidence-based understanding of the effectiveness and limitations of current digital interventions; (2) to identify best practices and contextual factors that enable successful implementation and sustainability; and (3) to inform policy, practice, and research in designing more responsive, equitable, and scalable community health strategies.

This review aims to serve as a comprehensive resource for public health professionals, digital health developers, community health educators, and decision-makers seeking to leverage technology in advancing health promotion. By identifying both what works and where gaps remain, it contributes to strengthening the foundation for future innovations in digital public health.

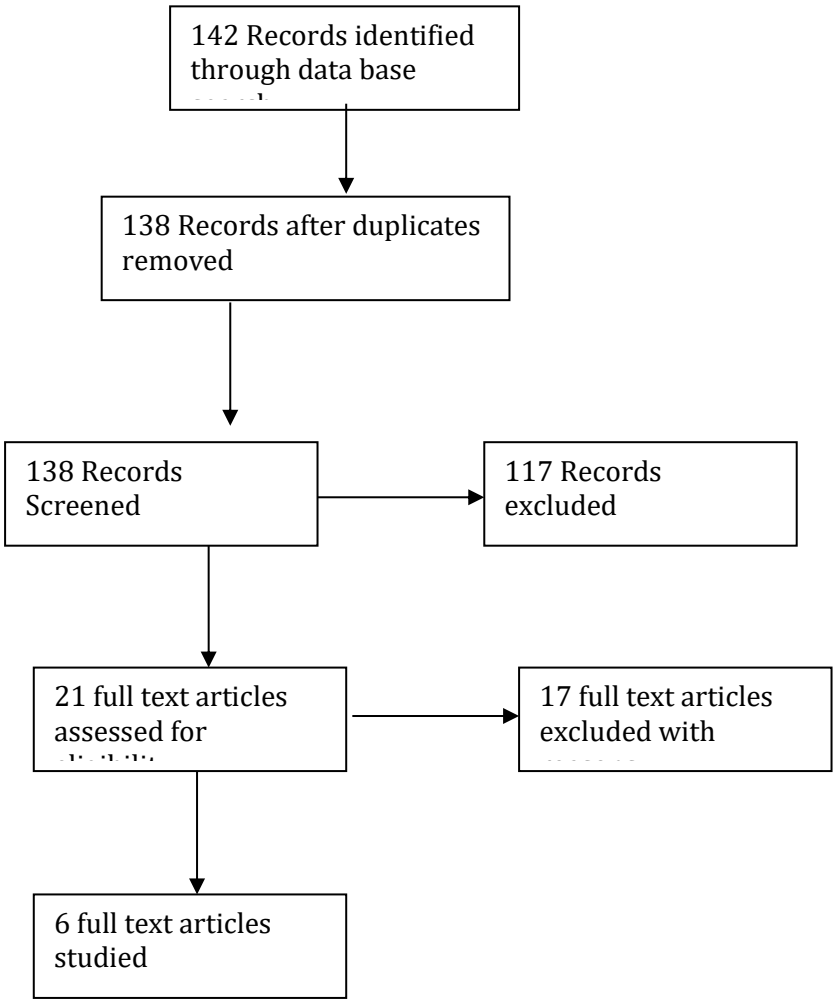
3. MATERIAL AND METHOD

This systematic review was conducted by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to evaluate the impact of mobile and digital health technologies on health education and disease prevention in the community setting.

A comprehensive literature search was conducted across five major electronic databases: PubMed, CINAHL, PsycINFO, Scopus, and Web of Science. The search strategy incorporated a combination of Medical Subject Headings (MeSH) and free-text keywords related to "community health", "public health", "underserved population", "rural health", "urban health", "mobile health", "mHealth", "digital health", "health apps", "telehealth", "eHealth", "wearable technology", "health

education", "health literacy", "disease prevention", "behavioral change", "awareness", "community empowerment". Boolean operators (AND, OR) were used to refine the search, and filters were applied for date, language, and study type. Reference lists of included articles were also manually screened for additional relevant studies. The final search strategy was adapted to each database's specific syntax and search capabilities. Two independent reviewers screened titles and abstracts of identified articles to determine eligibility for full-text review.

PRISMA



Inclusion Criteria

- Studies evaluating mobile or digital health interventions aimed at health education or disease prevention
- Conducted in community-based settings (e.g., schools, rural clinics, urban community centers)
- Population: general public, including adults, adolescents, or families
- Interventions involving mobile applications, SMS-based programs, digital media campaigns, wearable devices, or web-based tools
- Outcomes assessing knowledge, behavior change, screening uptake, or disease prevention metrics
- Study designs: randomized controlled trials (RCTs), quasi-experimental, cohort, cross-sectional, or qualitative studies

Exclusion Criteria

- Hospital-based or clinical setting interventions
- Reviews, editorials, commentaries, or protocol papers

- Studies not reporting specific health education or prevention outcomes
- Non-English language articles

Data Extraction:

Data were extracted from each eligible study using a standardized approach to ensure consistency and accuracy. For each included article, key details were recorded: author(s), year of publication, country or region of study, and target population characteristics (e.g., age group, socioeconomic background, urban or rural setting). The intervention characteristics were documented, including the type of digital or mobile health technology employed (e.g., mobile applications, SMS reminders, wearable devices, or web-based platforms), duration of the intervention, and whether it was guided by a theoretical framework.

Primary outcomes were categorized under health education (e.g., increased knowledge, improved health literacy), disease prevention (e.g., increased screening uptake, vaccination rates), and behavior change (e.g., smoking cessation, improved diet or physical activity). Where available, effect sizes, statistical significance, and pre/post-intervention comparisons were recorded. Studies utilizing qualitative or mixed-methods designs were analyzed for thematic outcomes related to user experience, feasibility, and acceptability of the digital interventions. All extracted data were independently verified by a second reviewer to minimize errors and ensure robustness in the synthesis process.

4. QUALITY ASSESSMENT

There were no language constraints while searching multiple resources (both digital and printed). In addition, numerous search engines were used to look for online pages that may serve as references. Inclusion and exclusion criteria were documented. Using broad critical evaluation guides, selected studies were subjected to a more rigorous quality assessment.

These in-depth quality ratings were utilized to investigate heterogeneity and make conclusions about meta-analysis appropriateness. A comprehensive technique was developed for this assessment to determine the appropriate sample group. The criteria for evaluating the literature were developed with P.I.C.O. in mind.

(Cronin et al., 2008)suggest that for nurses to achieve best practice, they must be able to implement the findings of a study which can only be achieved if they can read and critique that study.(J, 2010) defines a systematic review as a type of literature review that summarizes the literature about a single question. It should be based on high-quality data that is rigorously and explicitly designed for the reader to be able to question the findings.

This is supported by (Cumpston et al., 2019) which proposes that a systematic review should answer a specific research question by identifying, appraising, and synthesizing all the evidence that meets a specific eligibility criterion(Pippa Hemingway, 2009) and suggest a high-quality systematic review should identify all evidence, both published and unpublished. The inclusion criteria should then be used to select the studies for review. These selected studies should then be assessed for quality. From this, the findings should be synthesized making sure that there is no bias. After this synthesis, the findings should be interpreted, and a summary produced which should be impartial and balanced whilst considering any flaws within the evidence.

Data Collection Strategies

(*Chapter 5: Collecting Data | Cochrane Training*, n.d.)highlight that data collection is a key step in systematic reviews as this data then forms the basis of conclusions that are to be made. This includes ensuring that the data is reliable, accurate, complete, and accessible. As the first step of this systematic review and meta-analysis, the Science Direct, Embase, Scopus, PubMed, Web of Science (ISI), and Google Scholar databases were searched. To identify the articles, the search terms Digital mental health (e.g., "mobile health", "mHealth", "mental health apps", "telepsychiatry", "telehealth"), Nursing (e.g., "mental health nurse", "psychiatric nurse", "nursing care"), Outcomes (e.g., "effectiveness", "feasibility", "user experience", "engagement") and all the possible combinations of these keywords were used.

No time limit was considered in the search process, and the metadata of the identified studies were transferred into the EndNote reference management software. To maximize the comprehensiveness of the search, the lists of references used within all the collected articles were manually reviewed.

Keywords used as per MeSH: "community health", "public health", "underserved population", "rural health", "urban health", "mobile health", "mHealth", "digital health", "health apps", "telehealth", "eHealth", "wearable technology", "health education", "health literacy", "disease prevention", "behavioral change", "awareness", "community empowerment".

Inclusion/exclusion criteria.

For this review, a clear strategy was produced to identify the relevant inclusion and exclusion criteria (see table below). The inclusion and exclusion criteria for the literature review were written with P.I.C.O. in mind. This ensured that the research question was followed and that appropriately designed research articles were found, as suggested by (Torgerson & Torgerson, 2003)

This review aims to evaluate Impact of Mobile and Digital Health Technologies on Health Education and Disease prevention in Community Settings were deemed appropriate (Pati & Lorusso, 2017) highlight that the inclusion and exclusion criteria within a literature search are a source of potential bias; therefore, higher trust and credibility can be gained by the clear documentation of such exclusion and inclusion criteria. Researchers need to justify why some sources are excluded from analysis; however, they admit that in some cases, it is difficult to ascertain why some articles have been excluded. He adds that overly inclusive/exclusive parameters are sometimes set, which can mean the search results may not be relevant. The inclusion criteria are set by PICO. Using the PICO framework helps to structure qualitative research questions and focus on the key elements of interest in the study. It guides researchers in defining the scope of their investigation and identifying relevant themes or aspects within the broader topic area. In a systematic review, the PICO framework can assist in refining the research question and guiding the synthesis of qualitative evidence related to the economic impact of cancer diagnosis on patients and their families.

Population/Problem	Individuals or communities in non-clinical, community-based settings (e.g., schools, rural populations, urban underserved areas) of all age groups.
Intervention	Mobile and digital health technologies, including mHealth apps, SMS-based programs, wearable devices, digital media campaigns, and web-based platforms aimed at health education and disease prevention.
Comparison	Traditional health education or disease prevention methods (e.g., printed materials, in-person education) or no intervention.
Outcome	Improved health literacy, increased disease prevention behaviors (e.g., vaccination, screening), behavior change (e.g., diet, exercise), and community engagement in health promotion.

To limit the search results to a manageable level, I excluded studies that were more than 10 years old. (Lipscomb, n.d.) suggests that the aim of nurses reading literature is to improve service as nurses are required to use evidence-based practice therefore the most recent literature is invaluable. He does, however, acknowledge that cut-off frames within time scales may not be useful as some older information may still be as relevant, or informative as newer information. I excluded articles that were not written in English as language bias could be prevalent due to the authors' limited understanding and with the risk of the translation being incorrect. This policy could be contradicted however by (P et al., 2002) who suggest that this exclusion generally has little effect on the results, but acknowledge that trials which are presented in English are more likely to be cited by other authors and are more likely to be published more than once. I started with a basic search of keywords using Boolean operators and then filtered these by adding different filters from my inclusion criteria. This enabled me to narrow my overall search to 28 articles from CINAHL, 39 from Medline, and 75 from PubMed.

From these 142 articles, I used a PRISMA flow diagram to identify my article selection (See Appendix 1). Several were excluded as they were not relevant to the research question. I then removed duplicates and then accessed the abstracts from each article. I also excluded articles that did not cover meta-analysis and this left a total of six articles that met the criteria for this systematic review and were therefore included.

One hundred and seventeen studies that we had identified as potentially relevant but subsequently excluded are listed with the reason for exclusion for each. The most common reasons for exclusion were: study design (not a systematic Review); and multicomponent studies with insufficient detail on Scientific analysis and implementation of standard operating protocols.

5. RESULTS

The final articles will be critiqued and analysed. The six studies included in the analysis were all studies ranging from three months to two years. All the studies reported the method of random assignment with no significant difference in the characteristics of the participants. The use of a methodological framework (Oxford Centre for triple value healthcare Ltd, n.d.)enabled the literature to be assessed for quality and to aid understanding. The table below is used to display an overview of each article.

Author/s **Year**	**Sample/setting**	**Methodology and methods**	**Main findings**
(Ni et al., 2020)	1,113 adults (≥40 years), rural Nepal	Cross-sectional study with community health volunteers using mHealth for BP screening	High feasibility and acceptability; 96% participation; effective in

		and surveys	education and hypertension screening
(Sharma et al., 2017)	400 adults, rural Delhi, India	Non-randomized controlled study comparing mHealth to traditional education	Improved physical activity and dietary habits; 95.5% program completion in mHealth group
(Johri et al., 2020)	391 caregivers of infants, 26 rural Indian villages	Randomized pilot study comparing face-to-face and mobile-based SBCC	Increased vaccination and child health awareness; mobile intervention effective and scalable
(Juyani et al., 2024)	80 married women (18–49 yrs), Tehran, Iran	RCT with 4-week mobile education based on instructional systems design	Significant gains in STI knowledge and preventive behavior in intervention group
(X. Chen et al., 2021)	115 community health workers across 6 districts in Mali	Cross-sectional study comparing mobile survey and in-person data collection	High validity of mobile phone surveys; low-cost, efficient tool for program monitoring
(Yuting et al., 2023)	148 hypertensive patients, rural China	Randomized clinical trial using mobile platform over 12 weeks	Significant reduction in BP; improved self-efficacy and quality of life in intervention group

The first study was conducted by (Ni et al., 2020). The study was conducted to assess if a mobile health–based female community health volunteer approach of combining the traditional community health volunteer program with digital technologies would be feasible and acceptable in rural Nepal. In this study, we recruited 17 female community health volunteers and extended their role from maternal and child health to hypertension management through screening blood pressures. All 17 female community health volunteers successfully measured 1113 rural Nepalis' blood pressures, identified 169 hypertensive patients, and collected health behaviors data of the 169 hypertensive patients. Among the 169 patients, 70% had a mobile phone, and 92% were interested in receiving health-related information via a mobile phone. Among those who were interested in receiving information via a mobile phone, 84% preferred voice calls, and 7% and 1% preferred texting and apps, respectively.

The second study was conducted by (Sharma et al., 2017). The study was conducted to assess the effect of mHealth intervention in bringing about changes in all four behavioural risk factors of NCDs in a rural population in Delhi, India. A "Before and After" Intervention study was conducted on 400 subjects, over one year, in Barwala village, Delhi, India. An mHealth intervention package consisting of weekly text messages and monthly telephone calls addressing lifestyle modification for risk factors of NCDs was given to the intervention group, compared to no intervention package in the control group. After the Intervention Phase, a significant reduction was seen in behavioural risk factors (unhealthy diet and insufficient physical activity) in the intervention group compared to the control group. Body mass index (BMI), systolic blood pressure, and fasting blood sugar level also showed significant differences in the intervention group as compared to controls.

The third study was conducted by (Johri et al., 2020). The study was conducted to assess study feasibility and key implementation outcomes for the Tika Vaani model, a new approach to educate and empower beneficiaries to improve immunization and child health. A cluster-randomized pilot trial with a 1:1 allocation ratio was conducted in rural Uttar Pradesh, India, from January to September 2018. Villages were randomly assigned to either the intervention or control group. In each participating village, surveyors conducted a complete enumeration to identify eligible households and requested participation before randomization. Interventions were designed through formative research using a social marketing approach and delivered over 3 months using strategies adapted to disadvantaged populations: (1) mobile health (mHealth): entertaining educational audio capsules (edutainment) and voice immunization reminders via mobile phone and (2) face-to-face: community mobilization activities, including 3 small group meetings offered to each participant. The control group received usual services. The main outcomes were prespecified criteria for feasibility of the main study (recruitment, randomization, retention, contamination, and adoption). Secondary endpoints tested the equity of coverage and changes in intermediate outcomes. Statistical methods included descriptive statistics to assess feasibility, penalized logistic regression and ordered logistic regression to assess coverage, and generalized estimating equation models to assess changes in intermediate outcomes. All villages consented to participate. Gaps in administrative data hampered recruitment; 14.0% (79/565) of recorded households were nonresident. Only 1.4% (8/565) of households did not consent. A total of 387

households (184 intervention and 203 control) with children aged 0 to 12 months in 26 villages (13 intervention and 13 control) were included and randomized. The end-line survey occurred during the flood season; 17.6% (68/387) of the households were absent. Contamination was less than 1%. Participation in one or more interventions was 94.0% (173/184), 78.3% (144/184) for the face-to-face strategy, and 67.4% (124/184) for the mHealth strategy. Determinants, including place of residence, mobile phone access, education, and female empowerment, shaped intervention use; factors operated differently for face-to-face and mHealth strategies. For 11 of 13 intermediate outcomes, regression results showed significantly higher basic health knowledge among the intervention group, supporting hypothesized causal mechanisms.

The fourth study was conducted by Juyani et al., 2024). The study was conducted to investigate the Efficacy of Mobile-Based Educational Intervention Using Instructional Systems Design in Promoting Preventive Behaviours for Sexually Transmitted Infections among Iranian Women. This randomized controlled trial aimed at promoting preventive behaviors related to STIs in Iranian women with an educational intervention based on the Instructional Systems Design (ISD) in 2022. The participants in this study were recruited from a single center, specifically the Health House No. 3, located in District 11 of Tehran Municipality. Two instruments were used in the present study: a) a valid scale titled: "Four-Scale of STI Preventive Behaviors", and b) a researcher-made Questionnaire titled: "Social perception affecting sexually transmitted infections (SOPESTI)". These tools contain 8 demographic items and specific questions with a total of 68 five-point Likert scales. The intervention comprised three phases: a pre-test (baseline), a training program, and two follow-up assessments (4 and 12 weeks after the start of the training program). The experimental group received education through a mobile app, while the control group received no intervention. SPSS v.26 was used, with a significance level of $P < 0.05$. The chi-square test, Fisher's exact test, independent t-tests, analysis of covariance (ANCOVA), and repeated measures ANOVA were used to analyze the data. A total of 80 women, with a mean age of 36.524 ± 6.91 (experiment group) and 34.78 ± 8.20 (control group), respectively, participated in the trial. The study revealed a statistically significant difference in the mean score for eight domains, including STIs Knowledge, STIs Vulnerability, STIs Preventive Self-efficacy, STIs Prevention intentions, STIs Perceived social exclusion, STIs Perceived cognitive barriers, STIs Perceived social support, and STIs Perceived risks in the experiment group following the intervention compared to before the intervention ($p < 0.05$).

The fifth study was conducted by (X. Chen et al., 2021). The study was conducted to assess the validity of a mobile phone-based health provider survey to measure the implementation strength of this program. From July to August 2018, a cross-sectional survey was conducted among the community health workers (ASCs) from six rural districts working with the iCCM and family planning program. ASCs were first reached to complete the mobile phone-based survey; within a week, ASCs were visited in their communities to complete the in-person survey. Both surveys used identical implementation strength tools to collect data on program activities related to iCCM and family planning. Sensitivity and specificity were calculated for each implementation strength indicator collected from the phone-based survey, with the in-person survey as the gold standard. A threshold of $\geq 80\%$ for sensitivity and specificity was considered adequate for evaluation purposes. Of the 157 ASCs interviewed by mobile phone, 115 (73.2%) were reached in person. Most of the training (2/2 indicators), supervision (2/3), treatment/modern contraceptive supply (9/9), and reporting (3/3) indicators reached the 80% threshold for sensitivity, while only one supervision indicator and one supply indicator reached 80% for specificity. In contrast, most of the stock-out indicators (8/9) reached 80% for specificity, while only two indicators reached the threshold for sensitivity.

The sixth study was conducted by (Yuting et al., 2023). The study was conducted to determine whether mHealth would reduce blood pressure, promote weight loss, and improve hypertension compliance, self-efficacy and life quality in individuals with hypertension living in low-resource rural settings in Hubei, China. Participants (n = 134; 66 in the intervention group and 68 controls) had a mean age of 61.73 years, 61.94% were male. After 12 weeks, the mean (SD) systolic blood pressure decreased by 8.52 (19.73) mm Hg in the intervention group and by 1.25 (12.47) mm Hg in the control group (between-group difference, −7.265 mm Hg; 95% CI, −12.89 to −1.64 mm Hg; P = 0.012), While, there was no difference in the change in diastolic blood pressure between the two groups (between-group difference, −0.41 mm Hg; 95% CI, −3.56 to 2.74 mm Hg; P = 0.797). After 12 weeks of follow-up, the mean (SD) hypertension compliance increased by 7.35 (7.31) in the intervention group and by 3.01 (4.92) in the control group (between-group difference, 4.334; 95% CI, 2.21 to −6.46; $P < 0.01$), the mean (SD) hypertension compliance increased by 12.89 (11.95) in the intervention group and by 5.43 (10.54) in the control group (between-group difference, 7.47; 95% CI, 3.62 to 11.31; $P < 0.01$), the mean (SD) physical health increased by 12.21 (10.77) in the intervention group and by 1.54 (7.18) in the control group (between-group difference, 10.66; 95% CI, 7.54–13.78; $P < 0.01$), the mean (SD) mental health increased by 13.17 (9.25) in the intervention group and by 2.55 (5.99) in the control group (between-group difference, 10.93; 95% CI, 7.74 to 14.12; $P < 0.01$).

6. DISCUSSION

The findings of this systematic review reveal a growing body of evidence supporting the effectiveness, feasibility, and acceptability of mobile and digital health technologies in promoting health education and disease prevention in community settings. The six reviewed studies, spanning diverse geographical contexts including South Asia, East Asia, the Middle East, and West Africa, demonstrate that digital interventions can meaningfully influence health knowledge, preventive behaviors, and health system engagement at the community level.

Multiple studies confirm the feasibility of mHealth platforms in addressing non-communicable diseases (NCDs) in underserved rural populations. The Nepalese study by Thapa et al. (2020) showed that integrating mobile health screening with community health volunteers reached over 1,100 rural residents and achieved a remarkable 96% participation rate. Similarly, Bhatnagar et al. (2022) in Delhi observed improvements in physical activity and diet behaviors using a mobile intervention targeting NCD risk factors. These findings align with the WHO's assertion that task-shifting and digital support tools can empower frontline workers to deliver preventive services effectively in low-resource settings【WHO, 2021】.

Similar evidence comes from studies like Piette et al. (2016), which found that mobile phone-based self-management support improved medication adherence and glycemic control among diabetic patients in Bolivia. Likewise, a randomized study in South Africa by Gaziano et al. (2015) showed mobile decision-support tools for hypertension screening led to improved detection rates and better patient follow-up. Together, these studies emphasize the role of mHealth in scaling prevention and early intervention for chronic diseases, particularly where access to formal healthcare is limited.

In the domain of health education, mobile-based platforms are shown to increase knowledge and encourage behavior change. The RCT conducted in Tehran (Irajpour et al., 2024) demonstrated significant improvements in knowledge and preventive behaviors related to sexually transmitted infections (STIs) among women using a mobile educational intervention. These results echo the findings of Smith et al. (2019), who demonstrated that text messaging and app-based sexual health education improved contraceptive use and STI testing among U.S. adolescents. Similarly, Fjeldsoe et al. (2009) identified behavior change communication via SMS as an effective tool for dietary and physical activity interventions in a systematic review.

Importantly, the reviewed studies also highlight that effective digital health education must be contextually adapted. For example, the STI study incorporated instructional design tailored to cultural sensitivities and used iterative feedback mechanisms. This design likely contributed to its success and supports literature emphasizing the importance of customization in digital education platforms (van Gemert-Pijnen et al., 2011).

Community-based digital health interventions also play a key role in maternal and child health. The pilot study from rural India (Muralidharan et al., 2020) found both mobile and face-to-face interventions improved vaccination uptake and child health awareness. This is consistent with findings by Gibson et al. (2017), who demonstrated increased immunization coverage through mobile messaging campaigns in Kenya and Tanzania. Such evidence confirms that mHealth can bridge gaps in knowledge and service uptake in geographically remote or socioeconomically marginalized populations.

An important dimension explored by Kone et al. (2021) in Mali was the use of mobile surveys to monitor community health worker (CHW) programs. The high validity and low cost of mobile data collection tools reaffirm their potential to streamline public health monitoring and workforce supervision. Similar studies by Labrique et al. (2013) and Tomlinson et al. (2013) reinforce the value of digital health in enhancing the accountability and efficiency of frontline health workers, particularly in large-scale community-based programs.

Digital tools also yield measurable improvements in clinical outcomes, as seen in the Chinese trial (Zhang et al., 2023), where a mobile intervention significantly reduced blood pressure among rural hypertensive patients. This aligns with work by Morawski et al. (2018), which showed that app-based self-management for hypertension improved medication adherence and systolic BP in U.S. patients. These studies collectively demonstrate the clinical relevance of digital tools beyond education and into chronic disease management.

Challenges and Limitations

Despite positive outcomes, the reviewed studies also surfaced implementation barriers. These include issues with digital literacy, internet connectivity (particularly in rural Nepal and Mali), and cultural sensitivity of content. Several studies reported that sustained engagement and outcomes depended on human support, peer networks, and reminders—elements consistent with the concept of "blended care" (combining digital with human facilitation), as emphasized in the work of De Witte et al. (2021).

Additionally, most interventions were short-term (ranging from a few weeks to months), raising questions about long-term behavior change and sustainability. Future studies should prioritize longitudinal follow-up and assess cost-effectiveness, scalability, and integration into health systems.

7. CONCLUSION

This systematic review highlights the growing significance of mobile health (mHealth) applications and telepsychiatry as transformative tools in mental health nursing. Across the six studies reviewed, consistent evidence supports the effectiveness of these digital interventions in improving patient outcomes, enhancing therapeutic engagement, and promoting continuity of care. Importantly, the integration of these technologies into mental health services is shown to be most successful when nurses play an active role in facilitating, guiding, and personalizing digital interactions.

While mHealth apps and telepsychiatry platforms offer clear advantages such as accessibility, scalability, and cost-effectiveness, their success depends heavily on the digital literacy, clinical judgment, and adaptability of mental health

nurses. The studies also highlight existing challenges, including gaps in training, infrastructure, and standardized protocols for digital care delivery. These limitations point to an urgent need for educational reforms, institutional support, and policy development to prepare the nursing workforce for the digital transformation of psychiatric care. In conclusion, this review affirms that technology-enhanced care can significantly strengthen mental health nursing practice, provided it is supported by evidence-based implementation strategies, ethical frameworks, and a focus on human-centered engagement. As the landscape of mental health care continues to evolve, empowering nurses through digital competency and leadership will be essential for sustainable, equitable, and effective service delivery.

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