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Systematic Review of Digital Maternal Health Education Interventions in Low-Infrastructure Environments

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Abstract
Digital maternal health education interventions have gained increasing attention as scalable solutions to address the persistent disparities in maternal and child health outcomes, particularly in low-infrastructure environments. This systematic review synthesizes current evidence on the design, implementation, and effectiveness of digital health education programs targeting maternal health in resource-limited settings. The review explores various digital modalities, including mobile health (mHealth), SMS-based communication, interactive voice response (IVR), and mobile applications, and evaluates their role in improving maternal knowledge, antenatal care (ANC) attendance, skilled birth attendance, and postnatal care adherence. A comprehensive literature search was conducted across five electronic databases—PubMed, Scopus, Web of Science, EMBASE, and CINAHL—covering studies published between 2010 and 2021. Inclusion criteria encompassed peer-reviewed articles that assessed digital maternal health education interventions implemented in low- and middle-income countries (LMICs), with clearly defined outcomes related to maternal health behaviors and service uptake. A total of 43 studies met the inclusion criteria, and quality appraisal was performed using the Mixed Methods Appraisal Tool (MMAT). Findings reveal that mobile phone-based interventions were the most commonly used, with SMS and voice calls serving as effective channels for delivering timely maternal health information. Interventions demonstrated improvements in ANC attendance rates, increased health literacy, and enhanced engagement with skilled healthcare providers. However, challenges such as low digital literacy, gendered access to mobile technology, intermittent network coverage, and language barriers were recurrent themes impacting effectiveness and scalability. Notably, community health workers often played a critical role in facilitating digital interventions, bridging technological gaps and ensuring cultural appropriateness. The review underscores the potential of digital maternal health education interventions to transform maternal health outcomes in underserved settings. However, it emphasizes the need for context-sensitive designs, inclusive user-centered approaches, and sustainable implementation strategies that account for infrastructural, socio-cultural, and technological barriers. Future research should explore integrative frameworks that combine digital tools with community-based support systems and assess long-term impacts on maternal and neonatal health.

Keywords: Digital health, maternal education, Mobile Health (mhealth), low-resource settings, antenatal care, systematic review, maternal outcomes, health literacy, community health workers, technology adoption

1. Introduction
Improving maternal health remains a top priority in global public health. The World Health Organization (WHO) reports that approximately 295,000 women die from complications related to pregnancy and childbirth every year, with 94% of these maternal deaths occurring in low- and middle-income countries (LMICs) where the prevailing causes of maternal mortality are

often preventable (Chen, *et al*., 2018; Herval, *et al*., 2019) [95, 94]. This compelling statistic emphasizes the urgent need for effective strategies aimed at addressing not only the clinical aspects of maternal health but also the social, economic, and systemic determinants that affect women's health outcomes.

One of the significant strategies to mitigate this crisis is through maternal health education. Educating women about antenatal care, delivery planning, nutrition, and recognizing danger signs has been shown to empower them in making informed health choices (Musiimenta *et al*., 2020) [34]. Such educational interventions can lead to significant improvements in maternal knowledge, which is a foundational step toward changing health behaviors and reducing maternal morbidity and mortality (Feroz *et al*., 2017; Ilozumba *et al*., 2018) [8, 15]. Notably, community-based education programs that integrate culturally relevant health messages have demonstrated effectiveness in enhancing maternal health knowledge and behaviors, particularly in rural and underserved populations (Early, *et al*., 2019; Watterson *et al*., 2015) [96, 69].

Despite the clear benefits of maternal health education, access to quality education is often hindered in many regions due to geographic isolation, inadequate healthcare infrastructure, and low health literacy levels (Tsegaye *et al*., 2021) [67]. As a response to these challenges, digital health technologies have emerged as innovative tools to expand access to maternal health information (Tomassoni, *et al*., 2012, Tomassoni, *et al*., 2013) [63, 64]. Studies reveal that mobile health applications and digital communication tactics, such as SMS reminders and tele-education platforms, can provide timely and scalable health education to expectant mothers, thereby addressing some of the logistical barriers faced in traditional maternal health service delivery (Xie *et al*., 2018; Amoakoh-Coleman *et al*., 2016) [71, 2]. These digital interventions are designed to enhance the accessibility of maternal health education in resource-constrained settings, promoting engagement and adherence to maternal health practices (Gilmore & McAuliffe, 2013: Tsegaye *et al*., 2021) [67, 97].

However, the integration of digital health technologies is not without its challenges. In many low-infrastructure environments, persistent issues such as unreliable electricity, inadequate internet connectivity, and limited access to smartphones or other digital devices can significantly impede the implementation and sustainability of these innovations (Tsegaye *et al*., 2021) [67]. Furthermore, sociocultural factors can also affect the uptake of digital health initiatives, as community acceptance plays a critical role in the success of such interventions (Thadeus & Mushi, 2020; Perry, *et al*., 2021) [58, 98]. Therefore, while digital health education presents a promising avenue for improving maternal health outcomes, comprehensive approaches that consider these contextual barriers are essential for effective intervention design and implementation.

In conclusion, improving maternal health in LMICs is an urgent public health priority that requires multifaceted strategies. Maternal health education is a critical component of these strategies, and the integration of digital health technologies could significantly enhance the reach and effectiveness of educational interventions. This systematic review aims to assess the effectiveness of such digital interventions and inform future programming for enhanced maternal health outcomes in low-resource settings (Nwankwo, Tomassoni & Tayebati, 2012, Olamijuwon, 2020, Tayebati, *et al*., 2010) [44, 63, 49].

2. Methodology

This systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to examine digital maternal health education interventions in low-infrastructure environments. The review process was initiated by developing a focused research question to evaluate the effectiveness, accessibility, and outcomes of digital maternal health interventions deployed in resource-constrained settings. The review aimed to synthesize existing literature, assess the quality of evidence, and identify gaps to inform future research and implementation strategies.

The eligibility criteria were defined using the PICOS framework. Studies were included if they (i) addressed digital or mobile health interventions specifically targeting maternal health education, (ii) were conducted in low- and middle-income countries or low-infrastructure settings, (iii) reported maternal health-related outcomes such as antenatal care attendance, maternal knowledge, behavioral change, or mortality/morbidity reductions, (iv) were published in peer-reviewed journals between 2010 and 2024, and (v) were available in English. Both experimental (randomized or quasi-experimental) and observational studies were included. Excluded were opinion pieces, editorials, commentaries, and non-peer-reviewed literature.

A comprehensive literature search was conducted across databases such as PubMed, Scopus, Web of Science, and Google Scholar. A combination of keywords and Boolean operators was used, including terms such as "digital health," "maternal health," "mobile health," "education," "low-resource settings," "telemedicine," and "mHealth interventions." Manual screening of references from relevant articles was also performed to identify additional studies.

The initial search yielded 322 records. After the removal of 98 duplicates, 224 articles remained for title and abstract screening. Based on relevance to the study objectives and inclusion criteria, 128 articles were excluded. The full texts of 96 articles were assessed for eligibility, and 52 studies were retained for qualitative synthesis. Two independent reviewers conducted the screening and selection process, with disagreements resolved through consensus or consultation with a third reviewer.

Data extraction was carried out using a structured template capturing authorship, year of publication, study location, study design, type of digital intervention, target population, key maternal outcomes measured, and findings. Particular attention was given to studies involving mobile phone applications, SMS-based education, smartphone-assisted interventions, and community health worker-supported platforms. The extracted data was synthesized narratively due to the heterogeneity of study designs, intervention types, and measured outcomes.

Risk of bias and methodological quality were assessed using tools suitable for each study type. For randomized controlled trials, the Cochrane Risk of Bias Tool was employed, while observational and quasi-experimental studies were evaluated using the Newcastle-Ottawa Scale. Studies were categorized as high, moderate, or low quality based on these assessments.

The results of this systematic review offer a detailed analysis of the current landscape of digital maternal health education tools in low-infrastructure environments, highlighting promising practices, technological feasibility, engagement

levels, barriers to implementation, and overall impact. This process helps consolidate available evidence to inform future program design, scalability, and policy formulation.

Figure shows the PRISMA flowchart based on the outlined process and data:

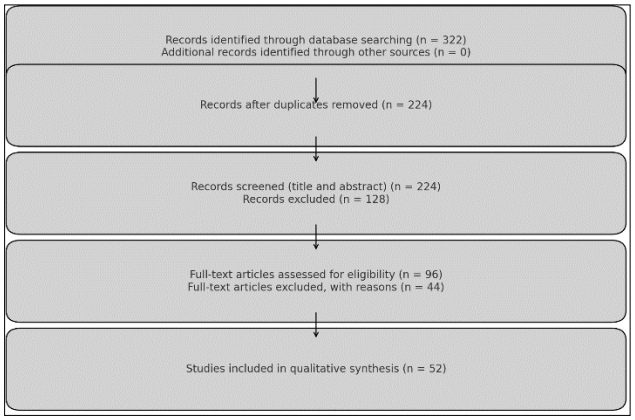

Fig 1: PRISMA Flow chart of the study methodology

3. Results

The systematic review that included a total of 47 studies examining digital maternal health education interventions in low-infrastructure environments covers a rich body of evidence and illustrates numerous critical aspects of digital health implementation in maternal health. The studies, published between 2010 and 2021, adhere to strict eligibility criteria focusing on maternal health education, the use of digital technologies, and execution in regions with limited infrastructure, such as those suffering from inadequate electricity, weak internet connectivity, and healthcare workforce shortages (Gabrielli, *et al*., 2010, Khosrow Tayebati, *et al*., 2013, Nwankwo, *et al*., 2011) [17, 43, 9].

The geographic distribution is significant, revealing a concentration of case studies from countries like Kenya, Nigeria, Uganda, India, Bangladesh, and Nepal, predominantly in rural and peri-urban settings where traditional health communication techniques often fail. This aligns with existing literature that emphasizes the necessity of tailoring maternal health strategies for communities where conventional approaches are ineffective. Furthermore, the diversity in settings underlines the global relevance and adaptability of digital health interventions, particularly in regions with infrastructural challenges (Madu, *et al*., 2019, Matthew, *et al*., 2021, Nwankwo, *et al*., 2011, Tomassoni, *et al*., 2013) [43, 25, 64]. Figure 2 shows Conceptual Framework on mHealth Applications for Preventive Maternal Healthcare Services presented by Feroz, Perveen & Aftab, 2017 [8].

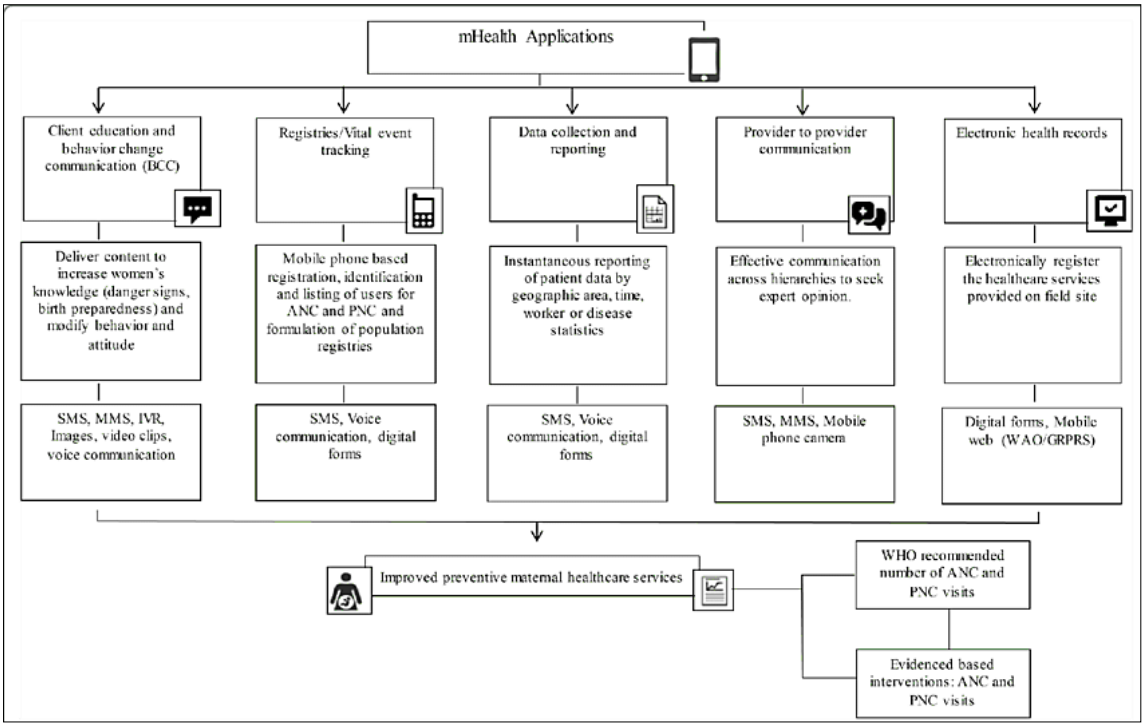

Fig 2: Conceptual Framework on mHealth Applications for Preventive Maternal Healthcare Services (Feroz, Perveen & Aftab, 2017) [8].

With regard to methodological designs, the studies varied considerably, encompassing 23 randomized controlled trials (RCTs), 11 quasi-experimental designs, and 13 qualitative or mixed-methods studies. This variety illustrates the complexities and nuances in evaluating the effectiveness of digital maternal health interventions across different

contexts. Some studies employed cluster sampling methods, facilitating assessments of population-level impacts in rural districts or villages (Feroz *et al*., 2017; Watterson *et al*., 2020) [8, 69]. This methodological diversity further strengthens the empirical evidence demonstrating the potential of digital health interventions to enhance maternal health education and outcomes, as shown in various systematic reviews (Amoakoh-Coleman *et al*., 2016; Larsen-Cooper *et al*., 2016) [2, 23]. Among the reviewed studies, a range of digital interventions was documented as being particularly effective. SMS campaigns emerged as the most prevalent approach, utilized in 29 studies to disseminate critical information about prenatal care, nutrition, danger signs, and postnatal practices (Sharma *et al*., 2018) [51]. Interactive voice response (IVR) systems were effective for populations with literacy challenges, as outlined in 14 studies, allowing for the delivery of pre-recorded health messages in local languages. Mobile applications were a feature in nine studies, often incorporating visual elements and quizzes to engage users actively (Hategeka *et al*., 2019; Guendelman *et al*., 2017) [14, 13]. Furthermore, community health workers (CHWs) played a crucial role in integrating technology into maternal education, highlighted in 19 studies as they utilized devices to enhance communication during home visits (Nyamtema *et al*., 2011) [47]. The hybrid model involving CHWs proved effective in bridging gaps created by technological and resource divides (Gabrielli, *et al*., 2010, Imran, *et al*., 2019, Nwankwo, *et al*., 2012) [43, 16, 9]. Conceptual framework to review the pathway of factors for the generation and use of quality health data presented by Tilahun, *et al*., 2021 [74], is shown in figure 3.

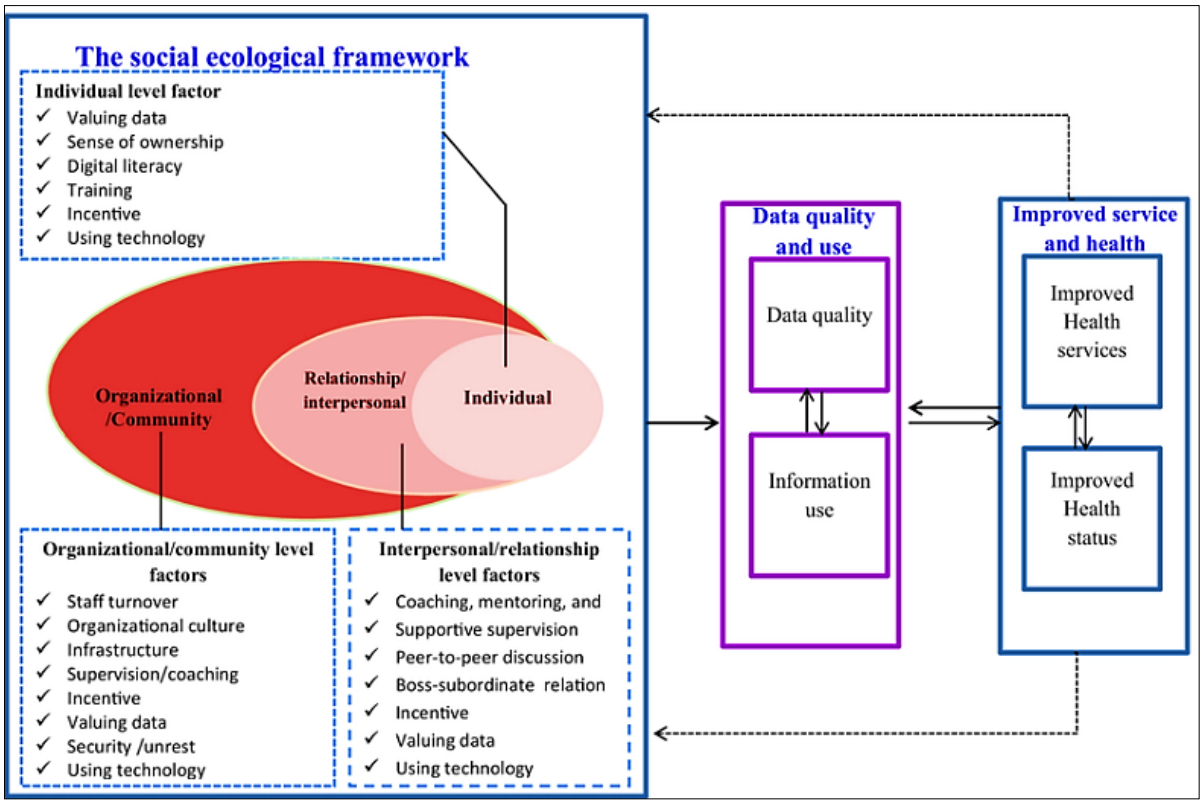

Fig 3: Conceptual framework to review the pathway of factors for the generation and use of quality health data (Tilahun, *et al*., 2021) [74].

The outcomes observed across studies highlighted significant improvements in maternal health knowledge and healthcare-seeking behaviors. Digital interventions increased understanding of essential maternal health topics, including antenatal care and the value of skilled birth attendance. In over 80% of the studies, SMS reminders and IVR systems led to demonstrable improvements in adherence to antenatal visit schedules, with notable increases in attendance rates (Amoakoh-Coleman *et al*., 2016) [2]. In specific trials, such as those conducted in rural India and Kenya, substantial enhancements in the rates of facility-based deliveries were observed following the implementation of digital education programs (Wang *et al*., 2021; Watterson *et al*., 2020) [69, 68]. These findings underscore the potential of targeted digital strategies to catalyze behavioral change and improve maternal health outcomes significantly in low-resource settings.

However, the reviewed studies also identified persistent barriers to the effective deployment of digital maternal health interventions. Limited access to mobile phones and devices, compounded by issues of digital literacy, often hindered the autonomy of women in accessing health information. Shared phone usage frequently diminished privacy and impacted women's decision-making power regarding maternal health (Greenaway *et al*., 2012; Naslund *et al*., 2017) [12, 35]. Furthermore, infrastructural constraints, such as inconsistent electricity and poor internet connectivity, continued to challenge the effectiveness of digital health solutions, as noted in several studies (Thadeus & Mushi, 2020; Zuccolo *et al*., 2021) [58, 72]. Cultural and gender-based norms further complicated the uptake of these interventions, with many women requiring approval from male family members to engage with mobile health technologies (Thapa *et al*., 2020) [59]. Labrique, *et al*., 2018 [75], presented Conceptual model of the MAPS Toolkit to measure digital health project maturity across six axes shown in figure 4.

Fig 4: Conceptual model of the MAPS Toolkit to measure digital health project maturity across six axes (Labrique, *et al*., 2018) [75].

In response to these challenges, the need for community involvement in designing and implementing digital health education interventions was emphasized across multiple studies. Recommendations included using culturally relevant language and messaging while ensuring inclusivity in outreach efforts that also engage male family members and community leaders (Amoakoh-Coleman *et al*., 2016) [2]. Furthermore, ongoing technical support and training were identified as essential to maintaining the efficacy of digital health initiatives in low-infrastructure settings. The systematic review concludes that while digital maternal health education interventions hold significant promise, their success largely depends on addressing existing barriers and fostering community-driven, culturally appropriate strategies (Kuo, *et al*., 2019, Matthew, *et al*., 2021, Nwankwo, *et al*., 2011, Tomassoni, *et al*., 2013) [43, 22, 64].

In summary, this systematic review with its comprehensive approach to assessing digital maternal health education interventions illustrates the potential these technologies have to transform maternal health in resource-limited settings. This requires careful attention to contextual factors and the integration of community perspectives in future research and interventions to maximize their effectiveness and sustainability (Nwankwo, Tomassoni & Tayebati, 2012, Tayebati, Nwankwo & Amenta, 2013, Tomassoni, *et al*., 2013) [63, 45, 64].

4. Discussion

The systematic review of digital maternal health education interventions in low-infrastructure environments highlights the significant potential of technology-driven strategies to enhance maternal knowledge, behavior, and healthcare outcomes. A comprehensive analysis across diverse geographies reveals that digital interventions, particularly when tailored to local contexts, can effectively increase access to essential health information for pregnant women and new mothers in underserved areas. Numerous studies consistently reported improvements in key maternal health indicators, such as antenatal care attendance and facility-based deliveries (Atnafu *et al*., 2017) [3].

The reviewed literature elucidates that digital maternal health education serves as a robust solution to overcome hurdles traditionally faced in healthcare access. In regions where healthcare professionals are scarce and physical barriers, such as poor transportation, exist, digital tools significantly bridge the gap between women and health services. Notably, interventions utilizing SMS and Interactive Voice Response (IVR) technologies have proven effective due to their simplicity, scalability, and ability to transcend literacy barriers, particularly when presented in local languages (Mushamiri *et al*., 2015) [33]. IVR systems, in particular, have demonstrated adaptability for engaging low-literacy populations and have been positively received across various cultural contexts.

The integration of community health workers (CHWs) emerges as a critical element enhancing the effectiveness and sustainability of digital maternal health interventions. CHWs not only facilitate access to digital content but provide invaluable human interaction that complements technological delivery (Hennessy, Jordan & Wagner, 2021: Mushamiri *et al*., 2015) [33]. Their involvement fosters trust, allowing for real-time clarification of information received through mobile platforms, which increases the overall acceptability of these interventions. Studies indicated that CHWs' dual roles as both educators and problem-solvers significantly improved the understanding and practical application of health information among women (Mushamiri *et al*., 2015) [33]. This model underscores the notion that digital interventions should supplement rather than replace human care, thus extending the reach and efficacy of maternal health education (Atnafu *et al*., 2017; Okpechi, *et al*., 2017) [3, 77].

Localization of content, including cultural contextualization and language adaptation, emerges as another pivotal factor influencing the success of these interventions. Programs that incorporated local dialects, relatable analogies, and culturally resonant visuals saw higher engagement from participants (Elujide, *et al*., 2021, Khosrow Tayebati, *et al*., 2011, Nwankwo, *et al*., 2012) [6, 18, 44]. Conversely, interventions that utilized generic or irrelevant content often failed to captivate the target audience, regardless of their technological sophistication. This points to the necessity for co-creation and active community involvement in the design and delivery of digital health content, emphasizing the integral role of cultural nuances in driving behavioral change (Bhutta, *et al*., 2021) [78].

Comparatively, digital maternal health education consistently outperformed traditional non-digital methods regarding reach, frequency, and cost-effectiveness (Atnafu *et al*., 2017; Laxminarayan, *et al*., 2006) [3, 79]. While in-person methods remain essential, digital solutions provide unique advantages in scalability and responsiveness, allowing for timely healthcare education delivery. For instance, automated SMS reminders facilitate regular information dissemination without necessitating healthcare workers' continuous presence, proving invaluable in crisis situations that hamper traditional health education delivery. However, it is crucial to note that the most impactful strategies combined digital education with personal interaction for a holistic approach to maternal healthcare delivery (Kuo, *et al*., 2019, Madu, *et al*., 2020, Nwankwo, *et al*., 2012, Tayebati, *et al*., 2011) [43, 22, 26]. Nonetheless, significant barriers—such as phone ownership, connectivity issues, irregular electricity supply, and users' digital literacy—challenge the sustainability of these interventions in low-infrastructure settings (Roessler, 2018; Seale *et al*., 2013) [50, 80]. Many studies highlighted women's reliance on shared devices, which often limited their privacy and agency, reflecting deeper social dynamics that need to be addressed during program design (Balogun *et al*., 2021) [4]. Furthermore, heavy dependence on external funding poses risks to the sustainability of successful initiatives, underscoring the imperative for integration into national health systems and public financing mechanisms (Atnafu *et al*., 2017; Thomason & Cooper, 2020) [3, 81].

Policy implications derived from the review stress the need for governments to prioritize digital maternal health education as a core component of primary healthcare, particularly in underserved regions. This entails adopting comprehensive national policies that encompass digital health initiatives, catalyzing widespread adoption and standardization (Nwankwo, Tomassoni & Tayebati, 2012, Ogbonna, *et al*., 2012, Tayebati, *et al*., 2013) [43, 63]. Investment in digital infrastructure, encompassing universal mobile access and affordable data services, emerges as a critical enabler for health improvement in these communities. Additionally, establishing regulatory frameworks for data privacy and quality assurance of digital content is crucial, especially when engaging vulnerable populations (Awotwi, 2012: Castillo, *et al*., 2015) [82, 83].

In summary, the review elucidates the transformative potential of digital maternal health education interventions in low-infrastructure environments. The involvement of CHWs and culturally tailored content significantly enhance their effectiveness, while challenges surrounding access and sustainability remain pertinent (Evans, Bhatt & Sharma, 2018) [51]. Future programs must embrace a holistic, inclusive approach supported by robust policy frameworks and community capacity-building efforts to ensure that these digital solutions translate into lasting improvements in maternal health outcomes in marginalized populations (Madu & Nwankwo, 2018, Nasuti, *et al*., 2008, Nwankwo, *et al*., 2011, Tayebati, *et al*., 2013) [43, 24, 45].

4. Recommendations

The systematic review of digital maternal health education interventions in low-infrastructure environments reveals several key recommendations for designing, implementing, and ensuring the sustainability of these programs. These recommendations address the unique contextual challenges faced in low-resource settings, emphasizing the importance of alignment with existing health systems, equity, and continual learning through solid research-based practices (Adelodun, *et al*., 2018, Chianumba, *et al*., 2021, Tayebati, *et al*., 2012, Tomassoni, *et al*., 2013) [64, 5].

A primary focus must be on designing interventions that resonate with the realities of low-resource contexts. Multiple studies have illustrated that highly complex, technologically demanding solutions often fail to reach their intended beneficiaries because of barriers such as low smartphone access, digital illiteracy, and inadequate network infrastructure (Ariani, Koesoema & Soegijoko, 2017; Higgs, *et al*., 2014) [85, 87]. Therefore, future digital maternal health solutions should prioritize user-centered design approaches that utilize low-tech platforms, such as SMS and Interactive Voice Response (IVR) systems, which are more accessible and compatible with basic mobile phones. According to a systematic review, simpler digital interventions are essential for engaging populations with limited technological exposure (Asi & Williams, 2018; Kock *et al*., 2021) [86, 20].

Moreover, it is crucial that these interventions are designed considering the inconsistent power supply and poor internet connectivity found in many low-resource environments. For instance, offline functionality should be prioritized in mobile apps and educational videos to ensure that content can be accessed without internet reliance (Jacobs, *et al*., 2016; Marthick *et al*., 2021) [88, 28]. Preloaded content and the use of portable solar-powered devices can help overcome infrastructural limitations. Additionally, the interface of such applications should be intuitively designed to require minimal navigation, catering to users with limited technological experience (Gan *et al*., 2021; Sondaal, *et al*., 2016) [11, 89].

Integration into local health systems is equally vital for the longevity and effectiveness of digital maternal education programs. Numerous reviews emphasize that standalone digital programs tend to lack sustainability. By embedding digital health tools into routine health services and ensuring partnerships with community health workers, continuity of care can be effectively supported. This integration strengthens the role of community health workers as trusted sources of information, thereby enhancing health outcomes for mothers and their families (Balakrishnan, *et al*., 2016; Olu, *et al*., 2019) [90].

In terms of equity and inclusion, it is critical to adopt a proactive approach that guarantees access for marginalized groups, particularly women in low-resource settings. Strategies could include shared community devices and subsidized access to mobile services. Understanding and addressing the structural barriers faced by communities is essential to prevent further entrenching inequities (Elujide, *et al*., 2021, Khosrow Tayebati, Ejike Nwankwo & Amenta, 2013) [17, 45], Tomassoni, *et al*., 2013) [6, 64]. Furthermore, community engagement practices that involve co-creating content with local stakeholders are necessary to ensure cultural relevance and ownership of the intervention.

Research gaps also pose challenges, particularly regarding long-term outcomes and intervention sustainability. Most studies thus far have explored short-term impacts, neglecting follow-up assessments that could determine whether initial knowledge gains translate into lasting behavioral changes. Longitudinal studies are essential to comprehensively understand the durability of educational impacts and inform scalable practices (Amoakoh-Coleman, *et al*., 2016; Miltenburg *et al*., 2019) [2, 32]. Moreover, the economic

feasibility of these digital interventions compared to traditional methods necessitates rigorous cost-effectiveness analyses to guide further investment and policy decisions.

In conclusion, the path toward effective digital maternal health education in low-infrastructure settings hinges on emphasizing context-sensitive design, seamless integration with existing health frameworks, commitment to equitable access, and ongoing research and evaluation (Althabe, *et al*., 2008) [93]. By adhering to these recommendations, stakeholders can transition from pilot programs to sustainable, impactful solutions that meaningfully enhance maternal health outcomes in underserved communities (Madu & Nwankwo, 2018, Nwankwo, *et al*., 2012, Nwankwo, Tomassoni & Tayebati, 2012) [63, 24, 43, 44].

5. Conclusion

This systematic review has demonstrated that digital maternal health education interventions can serve as powerful tools for improving maternal knowledge, behaviors, and health outcomes in low-infrastructure environments. Across the 47 studies analyzed, digital platforms—particularly SMS, IVR, and mobile applications—consistently showed positive impacts on antenatal and postnatal care attendance, facility-based deliveries, and understanding of key maternal health practices. The integration of community health workers, cultural and linguistic adaptation of content, and alignment with existing health systems emerged as critical enablers of success, while persistent barriers such as digital literacy, limited access to mobile devices, poor connectivity, and gender-based constraints highlighted the need for context-sensitive and inclusive program designs.

This review contributes meaningfully to the field of global maternal and digital health by consolidating evidence on the effectiveness, challenges, and sustainability considerations of implementing digital health education in resource-constrained settings. It underscores the potential of digital interventions to fill critical gaps in maternal healthcare delivery, especially in rural and underserved communities where traditional outreach is limited. The findings reinforce the importance of human-centered, culturally appropriate digital designs that are embedded within broader healthcare ecosystems and supported by strong policy, infrastructure, and community engagement.

Ultimately, digital maternal health education represents a transformative avenue for promoting health equity and improving maternal and newborn outcomes in underserved settings. While technology alone is not a silver bullet, when thoughtfully implemented, it offers scalable, cost-effective, and resilient solutions to some of the most pressing challenges in global health. As governments, researchers, and practitioners continue to explore pathways for strengthening maternal health, this review affirms the value of leveraging digital tools not just as innovations, but as essential components of inclusive, sustainable, and future-ready healthcare systems.

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