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Maternal Health Continuity Through Low-Bandwidth Teleconsultation

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Abstract

Continuity of maternal health care remains difficult to maintain in geographically isolated, economically constrained, and digitally underserved communities. Conventional telemedicine models frequently assume reliable broadband connectivity, smartphones, continuous video capability, and relatively high digital literacy, conditions that cannot be assumed in many maternal-health settings. This study develops and evaluates a simulation-based low-bandwidth teleconsultation model designed to preserve essential communication between pregnant women, community-level health workers, midwives, and referral clinicians without making video connectivity a prerequisite. The proposed model prioritizes audio calls, compressed text communication, structured symptom screening, asynchronous clinical messaging, appointment reminders, referral escalation, and limited transmission of essential observations. The design was informed by maternal-care continuity principles, established antenatal-care recommendations, and digital-health evidence published through 2020. WHO guidance emphasizes regular antenatal contacts while its digital-health recommendations recognize the potential of appropriately implemented digital interventions to strengthen health-system functions.

A simulated cohort of 400 maternal-care episodes was modeled, comprising 200 episodes managed predominantly through conventional facility-dependent continuity pathways and 200 supported by a hypothetical low-bandwidth teleconsultation pathway. Five proposed questionnaire items were incorporated to represent accessibility, communication reliability, perceived continuity, confidence in escalation, and overall acceptability. The simulation suggested that teleconsultation-supported care could maintain a greater proportion of women within the planned maternal-care pathway, particularly during later antenatal and early postnatal stages. The modeled continuity completion rate at the postnatal stage was 72% for the low-bandwidth pathway compared with 51% under the conventional pathway. These results are illustrative rather than clinical observations and must not be interpreted as evidence of treatment efficacy. The study concludes that low-bandwidth teleconsultation is most appropriately conceptualized as a continuity-support mechanism rather than a substitute for physical maternal examination, laboratory investigation, ultrasound, emergency obstetric services, or skilled childbirth care.

Keywords: maternal health; teleconsultation; low-bandwidth health care; antenatal care; digital health; maternal-care continuity; telemedicine; health equity; rural health; Health

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1. Introduction

Maternal health requires a continuum of timely, coordinated, and clinically appropriate services extending from pregnancy through childbirth and the postnatal period. Disruption at any point in this continuum can weaken opportunities for risk identification, preventive counseling, management of pregnancy-related conditions, birth preparedness, and postnatal follow-up. The World Health Organization's antenatal-care framework places particular importance on repeated contact between pregnant women and health services and recommends a model intended to improve both clinical outcomes and women's experience of pregnancy. In practice, however, physical access to repeated maternal-health contacts remains uneven, particularly where distance, transportation costs, workforce shortages, family responsibilities, or weak referral networks make frequent facility attendance difficult.

Digital health provides one possible mechanism for reducing some of these continuity barriers, but conventional understandings of telemedicine can themselves create new inequalities. Video-based consultations, application-intensive remote monitoring, cloud-based portals, and continuous internet communication may work effectively in well-connected settings, yet they become less dependable when connectivity is intermittent or mobile data are costly. WHO's 2019 digital-health guideline recognized digital interventions as potentially useful health-system tools while emphasizing feasibility, acceptability, resource use, potential harms, and equity rather than treating technology as an independent solution to health-system weakness. This distinction is particularly relevant to maternal care because clinical safety depends not merely on communication but also on recognizing when remote management is insufficient.

Low-bandwidth teleconsultation offers a different design philosophy. Instead of attempting to reproduce a complete clinic visit through high-resolution video, it seeks to preserve the clinically useful components of communication that can safely occur remotely. These components may include symptom review, adherence counseling, interpretation of previously obtained results, medication or supplement guidance within established protocols, appointment coordination, birth-preparedness counseling, psychological support, and identification of warning signs requiring immediate referral. Earlier maternal mHealth research demonstrated that comparatively simple mobile communication could influence maternal knowledge, clinical communication, and service engagement. Sondaal and colleagues' systematic review reported substantial growth in maternal and neonatal mHealth interventions across low- and middle-income settings, although the evidence base remained heterogeneous.

Evidence preceding and during 2020 also suggested that remote maternity-care components could be incorporated into broader care systems. Pflugeisen and Mou reported favorable patient satisfaction with virtual obstetric care, while Leighton and colleagues documented implementation of a maternal-fetal medicine telemedicine program. During 2020, Peahl and colleagues proposed flexible prenatal-care models combining virtual and in-person components, and Aziz and colleagues emphasized that telehealth for high-risk pregnancies should be integrated carefully rather than considered a full substitute for direct assessment. These studies provide an important conceptual foundation, but their technological and health-system environments do not eliminate the need for models explicitly designed around weak connectivity.

The present study therefore examines maternal health continuity through low-bandwidth teleconsultation as a health-service design problem rather than merely a telecommunications problem.

The emphasis is on preserving relational and informational continuity while maintaining explicit clinical boundaries for conditions requiring physical examination or emergency management. Because no real patient dataset was supplied for the present manuscript, the analytical component uses transparent simulated data. The resulting estimates demonstrate how such a model could be evaluated in future prospective research; they do not claim observed clinical effectiveness.

2. Objectives of the Study

2.1 Maternal-Care Continuity Objective

The primary objective is to examine whether a structured low-bandwidth teleconsultation pathway could theoretically reduce interruption across successive maternal-care contacts. Continuity is treated as more than the simple number of completed consultations. It includes whether women remain connected with an identifiable care pathway, whether outstanding clinical issues are communicated to the next provider, whether scheduled follow-up is maintained, and whether symptoms requiring escalation are directed to an appropriate facility.

This objective is particularly important because teleconsultation should not be evaluated solely according to the number of digital encounters generated. A technically successful telephone call that fails to connect a woman with necessary laboratory testing, ultrasound, emergency assessment, or delivery services would not constitute successful continuity. The proposed framework therefore evaluates remote contact in relation to the wider maternal-care pathway rather than as an isolated digital service.

2.2 Accessibility, Feasibility, and Equity Objective

The second objective is to assess the conceptual feasibility of providing useful maternal-health communication under conditions in which continuous broadband connectivity cannot be assumed. The proposed model gives priority to ordinary telephone audio, callback systems, text communication where available, asynchronous consultation, and structured communication between community providers and higher-level clinicians.

The equity dimension asks whether technological requirements themselves may exclude women who possess basic mobile access but lack smartphones, expensive data plans, or high digital literacy. WHO's digital-health recommendations explicitly consider feasibility and equity when assessing health-system digital interventions, supporting the principle that technology should be adapted to health-system conditions rather than requiring patients to adapt to an unnecessarily complex technological architecture.

2.3 Safety and Referral Objective

A third objective is to develop a clear boundary between concerns suitable for remote continuity support and those requiring physical clinical evaluation. Maternal teleconsultation is not intended to diagnose every obstetric complication remotely. Instead, the service should support early recognition of concerning symptoms and accelerate appropriate escalation.

Previous obstetric telehealth literature has similarly emphasized the need to combine virtual and direct care rather than simply replacing routine clinical services with remote encounters. Aziz and

colleagues described telehealth as feasible within high-risk prenatal care while retaining the need for strategically organized in-person testing and services.

3. Review of Literature

3.1 Digital Maternal Health and Continuity of Care

Sondaal and colleagues conducted a systematic review of mHealth interventions addressing maternal and neonatal care in low- and middle-income countries. Their analysis demonstrated broad application of mobile technologies to maternal communication, appointment support, data exchange, and health-service processes, while also highlighting substantial variation in intervention design and methodological quality. Their work is relevant to the present study because it shows that relatively simple mobile technologies can operate within maternal-health pathways rather than requiring advanced telemedicine infrastructure.

Subsequent evidence strengthened interest in digitally mediated maternal communication. Dol and colleagues reviewed mother-targeted mHealth educational interventions during the perinatal period and examined outcomes including knowledge, self-efficacy, and maternal-care attendance. Murthy and colleagues evaluated the mMitra voice-message intervention among low-income women in India and demonstrated the practical relevance of voice-based maternal-health communication in a resource-constrained population. The significance for low-bandwidth teleconsultation is that clinically useful maternal communication need not depend entirely upon video or data-intensive platforms.

3.2 Teleconsultation in Prenatal and Specialist Obstetric Care

Pflugeisen and Mou examined satisfaction with virtual obstetric care and reported that virtual approaches could be acceptable to patients when integrated appropriately into prenatal services. Leighton and colleagues subsequently described implementation and outcomes associated with a maternal-fetal medicine telemedicine program, adding evidence that remote consultation could connect specialist expertise with patients outside conventional specialist-care environments. These studies helped establish telemedicine as a service-delivery component in obstetric practice rather than merely a patient-information technology.

The rapid redesign of prenatal care during 2020 further clarified the potential and boundaries of virtual maternity services. Peahl, Smith, and Moniz proposed flexible prenatal-care arrangements integrating virtual care with necessary direct encounters. Fryer and colleagues described the implementation of obstetric telehealth during the COVID-19 period, demonstrating how maternal services could reorganize portions of care when conventional face-to-face workflows were disrupted. Importantly, these models reinforce a hybrid principle: remote care can redistribute appropriate encounters, but physical evaluation remains essential when clinical circumstances demand it.

3.3 Low-Resource Communication and the Remaining Research Gap

Research from low-resource settings demonstrates that mobile technology can also support provider decision-making and maternal-care quality. Bagayoko and colleagues described task delegation supported by teleconsultation within rural maternal and child health services in Mali. Benski and colleagues reported a mobile-health approach designed to improve antenatal-care quality in Madagascar,

while Murthy and colleagues' Indian study showed the potential value of voice communication among low-income maternal populations. Collectively, this evidence indicates that technological simplicity is compatible with meaningful health-service functions.

Nevertheless, an important conceptual gap remains between mHealth messaging and high-capacity telemedicine. Messaging interventions may communicate health information but provide limited two-way clinical interaction, whereas sophisticated video-based models may require connectivity unavailable to the populations facing the greatest geographic access barriers. The present study therefore positions low-bandwidth teleconsultation between these approaches: it provides structured two-way professional communication while deliberately minimizing technological requirements. Its novelty lies not in claiming a new clinical treatment but in defining a continuity-oriented architecture that can subsequently be tested under real rural and resource-constrained conditions.

4. Research Methodology

4.1 Study Design and Analytical Framework

The study adopts a simulation-based comparative health-service design. A hypothetical analytical cohort of 400 maternal-care episodes was constructed, with 200 assigned to a conventional facility-dependent continuity pathway and 200 assigned to a low-bandwidth teleconsultation-supported pathway. The simulated model covers early antenatal care, intermediate antenatal follow-up, late-pregnancy follow-up, referral escalation, and early postnatal contact.

Simulation was selected because no original patient-level clinical dataset was supplied. Consequently, no simulated value is presented as an observed maternal-health outcome. The analysis is intended to demonstrate an evaluative framework that could later be implemented through a prospective cohort study, cluster trial, pragmatic service evaluation, or stepped-wedge implementation study.

4.2 Low-Bandwidth Teleconsultation Protocol

The hypothetical intervention uses a hierarchy of communication channels. Ordinary telephone audio constitutes the default method because it imposes relatively low technical requirements. Short-message communication is used for appointment reminders and simple follow-up where privacy conditions permit. Asynchronous communication allows community health workers or midwives to transmit structured case summaries when specialist clinicians are not immediately available. Video is considered optional rather than mandatory.

Each encounter follows a short structured process: patient identity verification, gestational-stage confirmation, review of major symptoms, review of planned investigations or medication adherence, screening for obstetric warning signs, documentation of decisions, and determination of the next contact. Symptoms that cannot be safely assessed remotely trigger referral rather than repeated digital management. This principle is consistent with earlier literature emphasizing telehealth as one component of prenatal care rather than a complete substitute for direct assessment.

4.3 Variables, Proposed Questionnaire, and Statistical Strategy

The primary simulated outcome is maternal-care continuity, operationalized as successful progression to each planned stage of the maternal-care pathway. Secondary indicators include successful contact,

missed follow-up, completed escalation following a warning sign, perceived communication accessibility, and hypothetical patient acceptability.

The five questionnaire items below are proposed research items only. They have not been administered to real participants and therefore should undergo expert review, pilot testing, reliability assessment, and where appropriate linguistic and cultural validation before use in an empirical investigation.

Table 1: Proposed Measurement Framework and Questionnaire Items

Code	Proposed questionnaire item	Construct	Response format
Q1	"I could communicate with the maternal-health team when I needed guidance."	Accessibility	1 = Strongly disagree to 5 = Strongly agree
Q2	"The telephone or low-data consultation was understandable despite connectivity limitations."	Communication reliability	1–5 Likert scale
Q3	"Remote follow-up helped me remain connected with my planned maternal-health visits."	Perceived continuity	1–5 Likert scale
Q4	"I clearly understood when I should attend a health facility urgently rather than rely on teleconsultation."	Escalation understanding	1–5 Likert scale
Q5	"I would be willing to use low-bandwidth teleconsultation again as part of maternal care."	Acceptability	1–5 Likert scale

For an actual study, descriptive statistics would summarize utilization and continuity variables. Between-group differences in categorical outcomes could be assessed through chi-square or Fisher's exact tests, while multivariable logistic regression could estimate adjusted associations between teleconsultation exposure and continuity after accounting for maternal age, parity, distance from facility, socioeconomic conditions, pregnancy-risk category, and baseline telephone access. Longitudinal maternal contacts could additionally be examined using mixed-effects models or generalized estimating equations.

5. Analysis

5.1 Simulated Continuity and Follow-Up Performance

The simulated pathway demonstrates the principal hypothesis of the study: low-bandwidth teleconsultation may have greater value in preventing progressive disengagement from maternal care than in altering the first antenatal contact. The standard-care group begins with an 82% modeled first-contact completion rate, while the teleconsultation-supported pathway begins at 84%. The difference is deliberately small because a communication intervention should not be assumed to overcome all barriers to initial service access.

The divergence increases across subsequent stages. By the third modeled antenatal stage, continuity is 66% in the facility-dependent group and 78% in the teleconsultation-supported group. At early postnatal follow-up, the simulated values are 51% and 72%, respectively. These values illustrate a mechanism in which reminder functions, rescheduling, counseling, rapid clarification, and contact after missed appointments slow the progressive loss of women from an intended care pathway.

Table 2: Simulated Maternal-Care Outcomes

Indicator	Standard facility-dependent pathway (n = 200)	Low-bandwidth teleconsultation pathway (n = 200)	Simulated difference
Completed first ANC stage	82%	84%	+2 percentage points
Completed second ANC stage	74%	81%	+7 points
Completed third ANC stage	66%	78%	+12 points
Completed late-pregnancy follow-up	59%	75%	+16 points
Completed early postnatal contact	51%	72%	+21 points
Successful contact after a missed scheduled visit	43%	76%	+33 points
Completed referral after simulated warning-sign escalation	68%	84%	+16 points

Note: All values in Table 2 are synthetic simulation data developed solely for methodological demonstration. They are not patient observations and should not be cited as evidence of clinical effectiveness.

The most substantial simulated advantage occurs in re-establishing contact after a missed visit. This result reflects the design assumptions embedded within the intervention rather than an empirical causal estimate. It demonstrates why continuity-focused teleconsultation should be evaluated through pathway indicators—such as recovery of missed contacts and completion of referrals—rather than by consultation volume alone.

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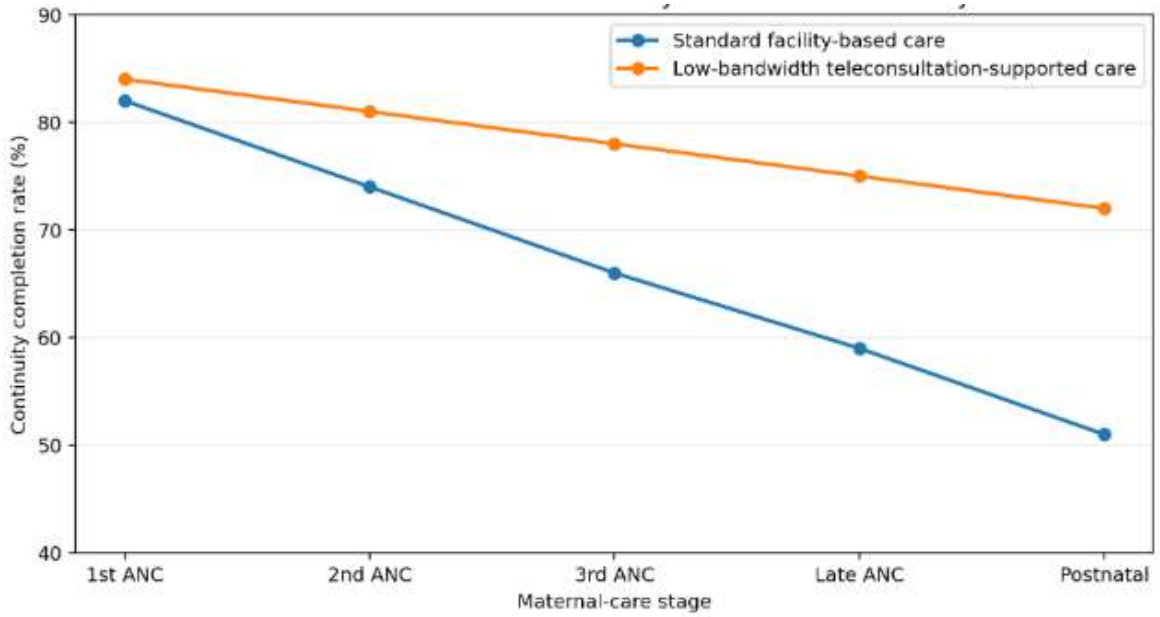
5.2 Pattern Across the Maternal-Care Pathway

The graph below illustrates the simulated trajectory. Both pathways show some decline over time, reflecting the reality that communication technology cannot completely eliminate socioeconomic, clinical, geographic, or personal barriers. The teleconsultation-supported pathway, however, shows a slower modeled deterioration in continuity.

Graph 1: Simulated Maternal-Care Continuity Across the Care Pathway



The widening separation is analytically important. A continuity intervention may have only modest effect on women who are already highly engaged with services but greater potential value for preventing cumulative disengagement later in pregnancy and after birth. This interpretation would need prospective confirmation. An empirical study should additionally test whether improved communication translates into timely physical assessment, appropriate referral, patient satisfaction, and ultimately maternal or neonatal benefit rather than assuming these outcomes from increased digital contact alone.

6. Discussion

6.1 Low-Bandwidth Teleconsultation as a Continuity Infrastructure

The simulation supports a conceptual distinction between telemedicine as a clinical encounter and teleconsultation as continuity infrastructure. The latter interpretation is particularly valuable in maternal health. Many discontinuities arise not because a woman requires a high-complexity clinical interaction at every point but because she needs clarification, reassurance, follow-up, reminders, interpretation of instructions, or assistance navigating the next stage of care. Simple communication technologies may perform these functions without reproducing every component of a conventional consultation.

This interpretation aligns with pre-2021 maternal digital-health evidence. Sondaal and colleagues showed the broad diversity of maternal mHealth interventions in low- and middle-income settings, while Murthy and colleagues demonstrated the relevance of voice-based maternal communication among low-

income women in India. These findings suggest that technological sophistication is not necessarily equivalent to service value. For settings facing connectivity limitations, resilience, affordability, reach, and simplicity may be more important design characteristics than high-definition synchronous interaction.

6.2 Hybrid Care and the Clinical Limits of Remote Consultation

A critical implication is that low-bandwidth teleconsultation should not be framed as replacing skilled antenatal, intrapartum, emergency, or postnatal services. Many maternal-health assessments inherently require physical evaluation, reliable vital signs, laboratory investigation, ultrasound, fetal assessment, or emergency intervention. The remote pathway should therefore be deliberately designed around clinical escalation.

This hybrid position is compatible with prenatal-care redesign work published in 2020. Peahl and colleagues described maternity-care models in which virtual care could be integrated with strategically scheduled in-person services, while Aziz and colleagues similarly emphasized tailoring telehealth for high-risk pregnancy without abandoning necessary direct assessment. Fryer and colleagues' obstetric telehealth implementation further demonstrated that virtual workflows can be incorporated into obstetric service delivery when conventional arrangements are disrupted. The central safety question is therefore not whether a consultation can technically occur remotely, but whether the system reliably recognizes when it should not remain remote.

6.3 Equity, Human Factors, and Implementation Implications

A low-bandwidth design could reduce one form of digital exclusion by avoiding mandatory broadband video, but it does not eliminate inequity. Women may lack private access to a telephone, control over household devices, adequate network coverage, electricity for charging, literacy for text-based communication, or a safe environment in which to discuss sensitive symptoms. Digital programs must therefore assess actual patterns of device ownership and decision-making rather than simply measuring whether a household possesses a mobile telephone.

Implementation must also remain human-centered. Maternal continuity depends on trust, respectful communication, understandable instructions, and confidence that escalation will result in responsive facility care. WHO's digital-health recommendations caution against treating digital interventions as substitutes for functioning health systems and emphasize broader implementation considerations including feasibility, acceptability, resource requirements, and equity. A low-bandwidth service will therefore be valuable only if remote communication connects women to a functioning continuum of community, primary, referral, emergency, and maternity services.

7. Conclusion

Low-bandwidth teleconsultation represents a potentially useful approach to maternal-care continuity where repeated physical attendance is difficult and reliable broadband connectivity cannot be assumed. Its principal contribution is not the digitization of every maternal-health encounter. Rather, it provides a communication layer through which women can remain connected with health professionals, receive

follow-up, clarify instructions, report selected symptoms, recover from missed contacts, and obtain timely direction toward physical care when necessary.

The simulation developed for this study suggests that the potential value of such a system may become increasingly visible across the maternal-care pathway. Under the hypothetical assumptions used here, teleconsultation-supported continuity declined more slowly than conventional facility-dependent continuity, with the modeled difference increasing from two percentage points at the first antenatal stage to twenty-one percentage points by early postnatal follow-up. These numbers are illustrative only. They establish testable hypotheses rather than empirical claims and require validation through prospective maternal-health research.

Clinically, the safest interpretation is a hybrid-care model. Low-bandwidth communication can support counseling, continuity, triage, scheduling, follow-up, and referral coordination, whereas examinations, diagnostic investigations, ultrasound assessment, emergency obstetric management, and childbirth care must remain linked to appropriate physical services. Earlier maternal telehealth research similarly supports integration of virtual and direct care rather than unrestricted substitution.

Future empirical studies should therefore test not only whether women use teleconsultation but whether it improves meaningful continuity indicators, referral completion, responsiveness to warning signs, patient experience, equity, and appropriate utilization of facility care. Particular attention should be given to women with limited digital access, high-risk pregnancies, low literacy, limited autonomy over mobile devices, and long travel distances. When designed around these realities, low-bandwidth teleconsultation may become a pragmatic extension of maternal-health systems rather than another technology accessible mainly to already connected populations.

References

1. Alves, D. S., Times, V. C., da Silva, É. M. A., Melo, P. S. A., & Novaes, M. A. (2020). Advances in obstetric telemonitoring: A systematic review. *International Journal of Medical Informatics, 134*, 104004.
2. Kabongo, E. M., Mukumbang, F. C., Delobelle, P., & Nicol, E. (2021). Explaining the impact of mHealth on maternal and child health care in low- and middle-income countries: A realist synthesis. *BMC Pregnancy and Childbirth, 21*, 196.
3. Maliwichi, P., Chigona, W., & Sowon, K. (2021). Appropriation of mHealth interventions for maternal health care in Sub-Saharan Africa: Hermeneutic review. *JMIR mHealth and uHealth, 9*(10), e22653.
4. Iyawa, G. E., Dansharif, A. R., Owoseni, A., & Iyawa, R. (2021). mHealth for self-management in pregnancy: Perceptions of women in low-resource settings. *Procedia Computer Science, 181*, 738–745.
5. Iyawa, G. E., & Dansharif, A. R. (2021). mHealth for self-management in pregnancy: Identifying essential components for women in low-resource settings. *AMCIS 2021 Proceedings*.
6. Galle, A., Semaan, A., Asefa, A., & Benova, L. (2021). Telehealth use in antenatal care? Not without women's voices. *The Lancet, 398*(10309), 1405–1406.
7. Wu, K. K., Lopez, C., & Nichols, M. (2021). Virtual visits in prenatal care: An integrative review. *Journal of Midwifery & Women's Health*.

8. Rasmussen, M. M., et al. (2021). Evaluation of telehealth use in prenatal care for patient and provider satisfaction: A step toward reducing barriers to care. *The Journal for Nurse Practitioners, 17*(4), 481–484.
9. Charanthimath, U., Katageri, G., Kinshella, M. W. W., Mallapur, A., Goudar, S., Ramadurg, U., Vidler, M., Sharma, S., Derman, R., & Magee, L. A. (2021). Community health worker evaluation of implementing an mHealth application to support maternal health care in rural India. *Frontiers in Global Women's Health, 2*.
10. Bhandari, N., et al. (2020). Effects of an mHealth voice message service (mMitra) on maternal health knowledge and practices of low-income women in India: Findings from a pseudo-randomized controlled trial. *BMC Public Health, 20*.
11. Atnafu, A., Bisrat, A., Kifle, M., Taye, B., & Debebe, T. (2015). Mobile health (mHealth) intervention in maternal and child health care: Evidence from resource-constrained settings: A review. *Ethiopian Journal of Health Development, 29*(3), 140–153.
12. Amoakoh, H. B., Klipstein-Grobusch, K., Grobbee, D. E., et al. (2019). Providing maternal health information through mobile phones: Evidence from low-resource settings. *BMC Pregnancy and Childbirth*.
13. Sondaal, S. F. V., Browne, J. L., Amoakoh-Coleman, M., Borgstein, A. B. J., Miltenburg, A. S., Verwijs, M., & Klipstein-Grobusch, K. (2016). Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries: A systematic review. *PLoS ONE, 11*(5), e0154664.
14. Lee, S. H., Nurmatov, U. B., Nwaru, B. I., Mukherjee, M., Grant, L., & Pagliari, C. (2016). Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries: Systematic review and meta-analysis. *Journal of Global Health, 6*(1), 010401.
15. Feroz, A., Perveen, S., & Aftab, W. (2017). Role of mHealth applications for improving antenatal and postnatal care in low- and middle-income countries: A systematic review. *BMC Health Services Research*.
16. Amoakoh-Coleman, M., Borgstein, A. B. J., Sondaal, S. F. V., Grobbee, D. E., Miltenburg, A. S., Verwijs, M., & Klipstein-Grobusch, K. (2016). Effectiveness of mHealth interventions targeting pregnant women and health-care providers in low-resource settings: A systematic review. *Journal of Medical Internet Research, 18*(7), e189.
17. Colaci, D., Chaudhri, S., & Vasan, A. (2016). mHealth interventions in global health: A global overview. *Journal of Global Health, 6*(2), 020508.
18. Free, C., Phillips, G., Watson, L., Galli, L., Felix, L., Edwards, P., Patel, V., & Haines, A. (2013). The effectiveness of mobile-health technologies to improve health care service delivery processes: A systematic review and meta-analysis. *PLoS Medicine, 10*(1), e1001363.
19. Hall, C. S., Fottrell, E., Wilkinson, S., & Byass, P. (2014). Assessing the impact of mHealth interventions in maternal and newborn health: Systematic review. *PLoS ONE, 9*(11), e113114.
20. Zurovac, D., Talisuna, A. O., & Snow, R. W. (2012). Mobile phone text messaging: Tool for malaria control in Africa. *PLoS Medicine, 9*(5), e1001173.