Tele-Nursing Interventions for Maternal and Newborn Health in Low- and Middle-Income Countries: A Systematic Review

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Abstract

Maternal and newborn health remains a major global public health priority, particularly in low- and middle-income countries (LMICs), where healthcare access, workforce shortages, poverty, geographical barriers, and inadequate healthcare infrastructure continue to contribute to preventable maternal and neonatal morbidity and mortality. Digital health innovations have emerged as promising approaches to address these challenges. Among these innovations, tele-nursing has gained increasing attention as a strategy for delivering healthcare services remotely through telecommunications technologies. Tele-nursing encompasses nurse-led interventions such as telephone consultations, mobile health messaging, telemonitoring, video consultations, remote patient education, and digital follow-up care. This systematic review aimed to evaluate the effectiveness, feasibility, and challenges of tele-nursing interventions for maternal and newborn health in LMICs. A systematic search of relevant literature published between 2015 and 2025 was conducted using electronic databases including PubMed, Scopus, Web of Science, CINAHL, and Google Scholar. Studies examining nurse-led digital interventions among pregnant women, postpartum mothers, and newborns were included. The findings revealed that tele-nursing interventions significantly improved antenatal care attendance, maternal health knowledge, birth preparedness, breastfeeding practices, newborn care behaviors, immunization adherence, and postnatal follow-up. Tele-nursing also facilitated early identification of complications and enhanced continuity of care. However, implementation challenges including digital illiteracy, inadequate infrastructure, internet connectivity limitations, privacy concerns, and financial barriers were frequently reported. The review concludes that tele-nursing represents a cost-effective and scalable strategy for improving maternal and newborn health outcomes in LMICs. Strengthening digital infrastructure, enhancing nursing competencies, and integrating tele-nursing into national healthcare systems are essential to maximize its potential.

Keywords: Tele-nursing, Maternal Health, Newborn Health, Telehealth, Digital Health, Mobile Health, Nursing Care, Low- and Middle-Income Countries.

Introduction

Maternal and newborn health is widely recognized as a fundamental indicator of healthcare system performance and societal development. Although remarkable progress has been achieved globally over the last two decades, maternal and neonatal mortality continue to pose significant challenges in low- and middle-income countries. The majority of preventable maternal deaths and neonatal deaths occur in resource-constrained settings where access to quality healthcare services remains limited. Recent evidence suggests that digital health interventions, particularly mobile health and telehealth approaches, have demonstrated considerable effectiveness in improving maternal and newborn healthcare utilization and outcomes in LMICs.

Several factors contribute to poor maternal and neonatal outcomes in LMICs. These include shortages of skilled healthcare professionals, inadequate transportation systems, limited healthcare infrastructure, financial constraints, sociocultural barriers, and insufficient access to health information. Rural and remote populations are disproportionately affected because healthcare facilities are often located far from communities, making timely access to care difficult. Consequently, many women fail to receive adequate antenatal care, skilled birth attendance, and postnatal follow-up. Nurses and midwives constitute the largest component of the healthcare workforce worldwide and play a pivotal role in maternal and newborn healthcare. Their responsibilities encompass antenatal assessment, health education, labor support, postnatal care, breastfeeding counseling, immunization promotion, and family planning services. However, the increasing demand for healthcare services and persistent workforce shortages necessitate innovative strategies to extend nursing care beyond traditional healthcare settings. Tele-nursing refers to

the use of telecommunications technologies to provide nursing care, health education, consultation, monitoring, and support remotely. Tele-nursing interventions can be delivered through telephone calls, SMS messaging, mobile applications, video conferencing, wearable devices, and internet-based communication platforms. These technologies enable nurses to maintain regular communication with patients regardless of geographical distance.The COVID-19 pandemic accelerated the adoption of telehealth services globally and demonstrated the value of remote healthcare delivery. During periods of restricted movement and healthcare system disruptions, tele-nursing enabled continuity of maternal and newborn care while minimizing infection risks. The growing penetration of mobile phones and internet connectivity in LMICs has further expanded opportunities for tele-nursing implementation.

Despite increasing interest in tele-nursing, evidence regarding its effectiveness in maternal and newborn health remains scattered across diverse settings and intervention models. Therefore, a systematic review is necessary to synthesize existing evidence and identify implications for nursing practice, healthcare policy, and future research.

Objectives

The primary objective of this systematic review was to evaluate the effectiveness of tele-nursing interventions in improving maternal and newborn health outcomes in low- and middle-income countries.

Specific objectives:

1. To identify types of tele-nursing interventions used in maternal and newborn healthcare.
2. To evaluate the effectiveness of tele-nursing interventions on maternal health outcomes.
3. To assess the impact of tele-nursing interventions on newborn health outcomes.
4. To examine barriers and facilitators influencing tele-nursing implementation.
5. To identify implications for nursing practice, education, and health policy.

Methods

This systematic review was conducted according to PRISMA principles for evidence synthesis. A comprehensive search strategy was developed to identify relevant literature examining tele-nursing interventions for maternal and newborn health in LMICs. Electronic databases including PubMed, Scopus, Web of Science, CINAHL, ScienceDirect, and Google Scholar were searched. Keywords included “tele-nursing,” “telehealth,” “maternal health,” “newborn health,” “mobile health,” “mHealth,” “digital health,” “remote nursing,” “antenatal care,” “postnatal care,” “pregnancy,” “neonatal care,” and “low- and middle-income countries.”

Studies published in English between January 2015 and March 2025 were considered. Eligible studies included randomized controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies, mixed-methods research, qualitative studies, and systematic reviews involving tele-nursing or nurse-led digital interventions. Studies were included if they involved pregnant women, postpartum mothers, newborns, caregivers, nurses, or midwives and reported maternal or neonatal health outcomes. Studies focused exclusively on physician-led telemedicine without nursing involvement were excluded. Data extraction included information on study design, country, sample size, intervention type, duration, outcomes measured, and key findings. Methodological quality was assessed using standardized appraisal criteria appropriate to each study design. Because of substantial heterogeneity in intervention characteristics and outcome measures, a narrative synthesis approach was adopted.

Results

Characteristics of Included Studies

The review identified studies from diverse LMIC settings including India, Bangladesh, Pakistan, Nepal, Kenya, Ethiopia, Nigeria, Uganda, South Africa, Indonesia, Cambodia, and several Latin American countries. Collectively, these studies represented thousands of participants across urban, rural, and remote populations. Interventions varied considerably but generally involved nurse-led or midwife-led communication and support delivered through mobile phones, SMS reminders, teleconsultations, smartphone applications, video calls, remote monitoring systems, and digital educational platforms. Recent systematic reviews have shown that digital health interventions are increasingly integrated across the continuum of maternal and child healthcare in LMICs.

Types of Tele-Nursing Interventions

The most common tele-nursing intervention identified was telephone-based counseling. Nurses conducted scheduled calls to provide health education, assess maternal well-being, monitor symptoms, answer questions, and reinforce health recommendations. Telephone counseling was widely used because of its simplicity, low cost, and accessibility. SMS-based interventions represented another frequently used strategy. Text messages provided appointment reminders, educational information, medication adherence support, breastfeeding guidance, and newborn care recommendations. SMS interventions were particularly effective in regions where smartphone ownership was limited. Mobile health applications were increasingly utilized to support maternal self-management. These applications enabled symptom tracking, appointment scheduling, educational content delivery, and direct communication with nurses. Video consultations facilitated remote clinical assessments and personalized counseling. Although less common in rural settings due to connectivity challenges, video-based tele-nursing demonstrated substantial potential for improving healthcare accessibility. Remote monitoring technologies allowed nurses to track maternal vital signs,

blood glucose levels, blood pressure measurements, and fetal well-being. Such interventions supported early identification of complications and timely referrals.

Impact on Antenatal Care Utilization

Improved utilization of antenatal care services was among the most consistently reported outcomes. Tele-nursing interventions significantly increased attendance at recommended antenatal visits. Reminder messages and nurse-led follow-up calls encouraged women to seek routine care and comply with scheduled appointments. Women receiving tele-nursing support demonstrated higher rates of antenatal care completion compared with those receiving standard care. Improved attendance facilitated earlier detection of pregnancy-related complications and promoted preventive healthcare practices. Evidence from systematic reviews indicates that mobile technology interventions significantly enhance maternal healthcare utilization in LMIC settings. The ability of nurses to maintain regular communication with pregnant women contributed substantially to increased healthcare engagement. Personalized interactions enhanced trust and encouraged women to seek assistance when concerns arose.

Maternal Health Knowledge and Health Literacy

Tele-nursing interventions significantly improved maternal health knowledge. Women receiving digital education demonstrated greater understanding of nutrition, anemia prevention, birth preparedness, danger signs during pregnancy, family planning, and newborn care. Educational content delivered through telecommunication platforms enabled repeated exposure to important health information. Unlike traditional health education sessions, tele-nursing allowed continuous reinforcement of key messages throughout pregnancy and postpartum periods. Improved health literacy empowered women to make informed healthcare decisions. Increased awareness of warning signs contributed to earlier healthcare seeking and improved maternal outcomes.

Birth Preparedness and Skilled Delivery

Several studies reported improvements in birth preparedness among women receiving tele-nursing interventions. Nurse-led counseling enhanced awareness regarding delivery planning, transportation arrangements, emergency preparedness, and financial planning. Women exposed to tele-nursing support were more likely to deliver in healthcare facilities under skilled supervision. Increased facility-based delivery rates contribute significantly to reductions in maternal and neonatal mortality. Tele-nursing also facilitated coordination between mothers and healthcare facilities, reducing delays in accessing emergency obstetric services.

Maternal Psychological Well-being

Pregnancy and childbirth are associated with substantial emotional and psychological challenges. Many studies reported reductions in maternal anxiety and stress among women receiving tele-nursing support. Regular communication with nurses provided reassurance, emotional support, and opportunities to discuss concerns. Women appreciated the accessibility of professional guidance, particularly during periods of uncertainty. Tele-nursing interventions also contributed to improved maternal confidence and self-efficacy regarding pregnancy management and newborn care. These psychosocial benefits may indirectly influence physical health outcomes by promoting positive health behaviors.

Identification and Management of Complications

Remote monitoring and teleconsultation services facilitated early detection of pregnancy-related complications. Nurses were able to assess symptoms, monitor risk factors, and identify warning signs requiring referral. Conditions such as hypertension, gestational diabetes, infections, anemia, and preeclampsia were frequently monitored through tele-nursing interventions. Early identification enabled timely intervention and reduced the risk of severe complications. The capacity for continuous monitoring represents one of the most valuable features of tele-nursing, particularly in settings where routine face-to-face consultations are difficult.

Breastfeeding Outcomes

Breastfeeding support emerged as one of the most successful applications of tele-nursing. Multiple studies reported increased rates of early breastfeeding initiation and exclusive breastfeeding among mothers receiving tele-nursing counseling. Nurses provided education regarding breastfeeding techniques, common challenges, infant feeding cues, and strategies for maintaining milk production. Ongoing support helped mothers overcome difficulties and increased breastfeeding confidence. Recent evidence suggests that telehealth interventions improve exclusive breastfeeding rates and maternal retention in maternal-child health programs.

Newborn Care Practices

Tele-nursing interventions significantly improved newborn care practices. Mothers demonstrated greater adherence to recommended hygiene measures, thermal protection, cord care, safe sleeping practices, and recognition of neonatal danger signs. Digital educational interventions enabled continuous reinforcement of essential newborn care recommendations. Nurses also provided individualized guidance based on each family's circumstances and needs.

Improved newborn care practices contribute directly to reductions in neonatal infections, hypothermia, malnutrition, and mortality.

Immunization Uptake

Several studies demonstrated improved childhood immunization coverage following tele-nursing interventions. Reminder messages and nurse follow-up calls encouraged timely vaccination attendance. Mothers receiving tele-nursing support exhibited greater adherence to immunization schedules and higher awareness regarding vaccine benefits. Increased vaccination coverage contributes significantly to child survival and disease prevention.

Postnatal Care Utilization

The postpartum period remains a critical yet frequently neglected phase of maternal healthcare. Tele-nursing interventions enhanced postnatal care utilization by maintaining contact between healthcare providers and mothers after discharge. Nurses conducted follow-up assessments, monitored recovery, addressed breastfeeding concerns, and evaluated newborn health status. Remote follow-up improved continuity of care and facilitated early identification of postpartum complications. Women consistently reported high satisfaction with tele-nursing services during the postnatal period because of convenience and accessibility.

Discussion

The findings of this systematic review demonstrate that tele-nursing interventions have substantial potential to improve maternal and newborn health outcomes in LMICs. Across diverse geographical settings and intervention models, tele-nursing consistently enhanced healthcare utilization, maternal knowledge, preventive behaviors, and continuity of care. One of the most important strengths of tele-nursing is its ability to overcome geographical barriers. In many LMICs, transportation difficulties, long travel distances, and limited healthcare infrastructure restrict access to maternal healthcare services. Tele-nursing enables healthcare delivery directly to patients' homes, reducing these barriers. The effectiveness of tele-nursing can be explained through several mechanisms. First, regular communication strengthens patient-provider relationships and promotes healthcare engagement. Second, continuous education improves health literacy and empowers women to make informed decisions. Third, remote monitoring facilitates early detection of complications and timely intervention. The findings align with broader evidence regarding digital health interventions in maternal and child healthcare. Large systematic reviews have demonstrated positive effects of mobile health technologies on antenatal care attendance, facility delivery, postnatal care utilization, and child health outcomes. Tele-nursing also offers economic advantages. Remote care delivery reduces transportation costs for patients and may decrease healthcare system expenditures associated with preventable complications. Resource-constrained healthcare systems can potentially extend service coverage without proportional increases in workforce requirements.

Despite these benefits, significant implementation challenges remain. Digital literacy limitations affect both healthcare providers and patients. Many women, particularly in rural areas, have limited experience using digital technologies. Educational initiatives are necessary to improve confidence and competence. Infrastructure deficiencies represent another major barrier. Reliable electricity, internet connectivity, mobile network coverage, and access to digital devices are not universally available. Investments in telecommunications infrastructure are essential for sustainable tele-nursing implementation. Privacy and confidentiality concerns must also be addressed. Healthcare organizations require robust data protection policies to ensure secure communication and maintain patient trust.

Implications for Nursing Practice

The expansion of tele-nursing has significant implications for nursing practice. Nurses require competencies in digital communication, virtual assessment, telehealth ethics, and remote patient monitoring. Nursing curricula should incorporate digital health education to prepare future practitioners. Healthcare organizations should develop evidence-based tele-nursing protocols and standards to ensure quality care. Integration of tele-nursing into routine maternal and newborn health services can improve efficiency while maintaining patient-centered care.

Nurses should also play leadership roles in telehealth implementation, policy development, and evaluation. Their unique understanding of patient needs positions them to guide effective digital health innovations.

Recommendations

- Healthcare policymakers should prioritize investment in digital health infrastructure and telecommunications networks, particularly in rural and underserved regions.
- Training programs should be developed to enhance digital competencies among nurses, midwives, and community health workers.
- Future research should focus on large-scale randomized controlled trials, cost-effectiveness analyses, implementation science studies, and long-term outcome evaluations.
- National maternal and newborn health programs should incorporate tele-nursing services as complementary components of healthcare delivery systems.
- Community awareness programs should promote digital literacy and encourage acceptance of telehealth services.

Conclusion

Tele-nursing has emerged as an effective and innovative approach for improving maternal and newborn health in low- and middle-income countries. Evidence synthesized in this review indicates that tele-nursing interventions enhance antenatal care attendance, maternal knowledge, birth preparedness, breastfeeding practices, newborn care, immunization adherence, and postnatal follow-up. The ability of tele-nursing to overcome geographical barriers, strengthen continuity of care, and facilitate early identification of complications makes it particularly valuable in resource-constrained settings. Although challenges related to infrastructure, digital literacy, privacy, and sustainability persist, the overall evidence strongly supports the integration of tele-nursing into maternal and newborn healthcare programs. Strategic investments in technology, workforce development, and supportive policies can maximize the impact of tele-nursing and contribute to achieving global maternal and child health goals. As healthcare systems increasingly embrace digital transformation, tele-nursing is poised to become an essential component of comprehensive maternal and newborn healthcare delivery in LMICs.

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