

# Effectiveness Of mHealth Intervention In Improving Antenatal And Postnatal Care Outcomes: A Systematic Review And Meta-Analysis Of Recent Evidence

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## Abstract

**Background:** Maternal morbidity and mortality remain major public health challenges, particularly in low- and middle-income countries where access to quality antenatal and postnatal care services is often limited. Mobile health (mHealth) interventions have emerged as a promising strategy for improving maternal and child health outcomes through enhanced communication, reminders, and health education.

**Objective:** This systematic review and meta-analysis evaluated the effectiveness of mHealth interventions in improving antenatal care attendance, facility delivery, exclusive breastfeeding duration, and childhood vaccination compliance compared with standard care among pregnant and postpartum women.

**Methods:** The review followed PRISMA guidelines and was registered in PROSPERO (CRD420251131235). Electronic databases including PubMed, Scopus, Web of Science, CINAHL, and Embase were searched for English-language randomized controlled trials and cluster randomized controlled trials published between 2020 and 2025. Eligible studies examined mHealth interventions such as SMS reminders, mobile applications, online messaging platforms, and electronic job aids. Methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tool. Meta-analysis was conducted using a random-effects model, with effect sizes expressed as risk ratios (RRs).

**Results:** A total of 1,408 records were identified, of which 11 studies met the inclusion criteria. The studies were conducted across nine countries and involved various mHealth interventions. Quality assessment indicated that all included studies were of acceptable methodological quality. Meta-analysis

demonstrated that mHealth interventions significantly increased antenatal care attendance by approximately 50% ( $p = 0.037$ ). However, no statistically significant effects were observed for facility delivery ( $p = 0.566$ ), exclusive breastfeeding duration to 5–6 months ( $p = 0.172$ ), or childhood vaccination completion at 9 months ( $p = 0.180$ ). Publication bias assessment showed no significant evidence of bias.

**Conclusion:** mHealth interventions are effective in improving antenatal care attendance and represent a scalable approach for strengthening maternal healthcare utilization. However, their impact on facility delivery, exclusive breastfeeding, and childhood vaccination compliance appears limited when implemented as standalone interventions. Integrating mHealth strategies with broader health systems and community-based support mechanisms may enhance their effectiveness in improving maternal and child health outcomes.

**Keywords:** Antenatal, Breastfeeding, Delivery, Immunization, mHealth, Postnatal

## INTRODUCTION

Maternal health outcomes is a global midwifery concern. Many low- and middle-income countries report high maternal morbidity and mortality rates (Knop et al., 2024). The high rates may be driven by gaps in access to quality antenatal and postnatal care. The gaps may involve late antenatal booking and inadequate follow-up attendance (Gilano et al., 2024). Effective strategies are therefore needed to enhance timely engagement with routine maternal health services. Ameyaw et al. (2025) highlighted that one promising approach involves the use of mobile health (mHealth) technology to support mothers during pregnancy and the postpartum period. mHealth technologies have expanded rapidly in the past decade. Rising mobile phone ownership has created new opportunities to deliver targeted and scalable health information (Zolfaqari et al., 2024). Many countries now deploy mHealth tools to strengthen communication between pregnant women and health providers (Mbunge & Sibiya, 2024). These tools often include either SMS reminders or voice messages. Ameyaw et al. (2025) noted that mHealth interventions aim to improve knowledge, promote healthy behaviours, support appointment attendance, and enhance continuity of care. The accessibility and relative affordability of mobile technologies make them particularly valuable in settings with limited resources.

Antenatal attendance is a pivotal determinant of maternal and newborn health outcomes. Yet some women still initiate care late or attend ANC irregularly (; Sunday & Etuk, 2024; Olomi et al., 2025). This informed Sunday, U. B. & Neji (2025) to say that missed or delayed visits would limit opportunities for early risk detection in families (Esuabana et al, 2023) and essential health education or intervention. Therefore, strengthening timely antenatal engagement is central to improving pregnancy outcomes. According to Alemneh et al (2024), mHealth interventions have emerged as a promising strategy for addressing late and irregular ANC visits.

Postnatal care (PNC) is equally critical for safeguarding maternal and newborn health. The immediate postpartum period carries heightened risks, yet many women do not return for scheduled PNC visits (Chilunjika & Chilunjika, 2024). Poor awareness of danger signs and low autonomy in decision making may contribute to the low PNC uptake (Olomi et al., 2025). mHealth tools can help address the gaps by extending communication beyond facility walls. They can provide guidance on breastfeeding, newborn care, family planning, and early recognition of complications. They also allow health workers to follow up with mothers who miss appointments, reducing the likelihood of adverse outcomes (Knop et al., 2024).

Exclusive breastfeeding for the first six months is globally recommended (Ogaji et al., 2021). The literature demonstrates that it has substantial benefits for infant immunity, nutrition, and development

(Doan, et al., 2023). However, adherence to this recommendation remains inconsistent as it is influenced by cultural norms (Verma et al., 2025).

Despite growing interest in mHealth, evidence regarding its effectiveness remains inconclusive. Some studies like Coleman et al. (2020) and Sabin et al. (2020) report significant improvements in ANC and PNC indicators like ANC attendance, skilled birth utilisation (facility delivery), exclusive breastfeeding duration and childhood vaccination, while others like Adams et al. (2020) and Vanhuyse et al. (2022) report inconsistent effects. The rapid evolution of digital platforms necessitated a review of the current evidence. Previous reviews like Sunday and Orokpo (2023) have examined mHealth applications in maternal health among the aged, but focused on limited geographical areas. Additionally, earlier reviews often included studies published more than a decade ago, before the current wave of smartphone-based platforms. As digital technologies have advanced, newer interventions may offer enhanced functionality, greater usability, and stronger behavioural impact. A systematic review and meta-analysis that examines the most recent evidence is therefore necessary to provide timely insights.

Using the Population, Intervention, Control, and Outcome (PICO; Hamilton, 2025) framework, the present review tested whether mHealth interventions improves ANC and PNC outcomes compared with standard routine care without digital support. The Population (P) comprises pregnant and postpartum women receiving antenatal or postnatal services. The Intervention (I) includes any structured mHealth strategy involving SMS reminders. The Comparison (C) was usual care without mHealth enhancement. The Outcomes (O) are antenatal attendance, facility delivery, exclusive breastfeeding duration, and vaccination compliance. The Research Question was articulated as thus: Among mothers, how effective are mobile health interventions, compared with standard care, in improving antenatal attendance, facility delivery, exclusive breastfeeding duration, and vaccination compliance?

## METHODS

This systematic review and meta-analysis adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Veroniki et al., 2025) guidelines. The review protocol was developed a priori and registered on PROSPERO (an international prospective register of systematic reviews; ID number: CRD420251131235).

**Search Strategy:** A literature search of the electronic databases of PubMed, Scopus, Web of Science, CINAHL, and Embase was conducted to identify relevant peer reviewed studies. The string combined free-text keywords and synonyms: (mHealth OR mobile phone OR SMS OR mobile app) AND (antenatal OR prenatal OR postnatal OR breastfeeding OR immunization) AND (trial OR randomized). Boolean operators were used but no truncations were applied to increase wider database support (Vieira et al., 2021). Hand searching of the reference list of identified studies was done to identify additional studies. The search was limited to English language articles published between 2020 and 2025. Studies were eligible if they examined the effect of mobile health (mHealth) interventions on antenatal attendance, facility delivery, exclusive breastfeeding duration, or vaccination compliance. Cluster randomised controlled trials and randomised controlled trials involving pregnant or postpartum women were included. Studies that lacked an mHealth component, did not report relevant outcomes, or were not primary research were excluded. The search was independently done by two reviewers (FAB and DSO), then discrepancies were discussed with the other members of the review team.

**Screening Protocol:** Screening was conducted in four stages. At the first stage, all retrieved records were checked for duplicates. After removing duplicates, the remaining records underwent title screening for relevance in the second stage. Studies with relevant titles entered the abstract screening in the third stage. Records that met the inclusion criteria were moved to full-text review in the fourth stage. The screening

was performed independently by two reviewers (FAB and DSO), with disagreements resolved through discussion with other members of the review team. A structured data extraction form was used to collect information on study characteristics. Data extraction was performed independently by two reviewers (FAB and DSO) to minimize bias.

**Quality Assessment:** The methodological quality of included studies was assessed independently by two reviewers (FAB and DSO) using the JBI Critical Appraisal tool, which considers randomisation processes, blinding, and outcome measurement analyses. Each domain was rated as Yes (score 1 if criteria was met) and No, Unclear, or Not available (Score 0 if criteria was not met). Disagreements between reviewers were resolved through discussion with the other members of the review team.

**Data Analysis and Meta-Analysis:** When at least two comparable studies reported the same outcome with sufficient statistical detail, a meta-analysis was conducted using a random-effects model to account for heterogeneity between the studies. Effect sizes were calculated as risk ratios (RRs). Heterogeneity was assessed using the  $I^2$  statistic. All analyses were conducted using the online meta-analytic software.

## RESULTS

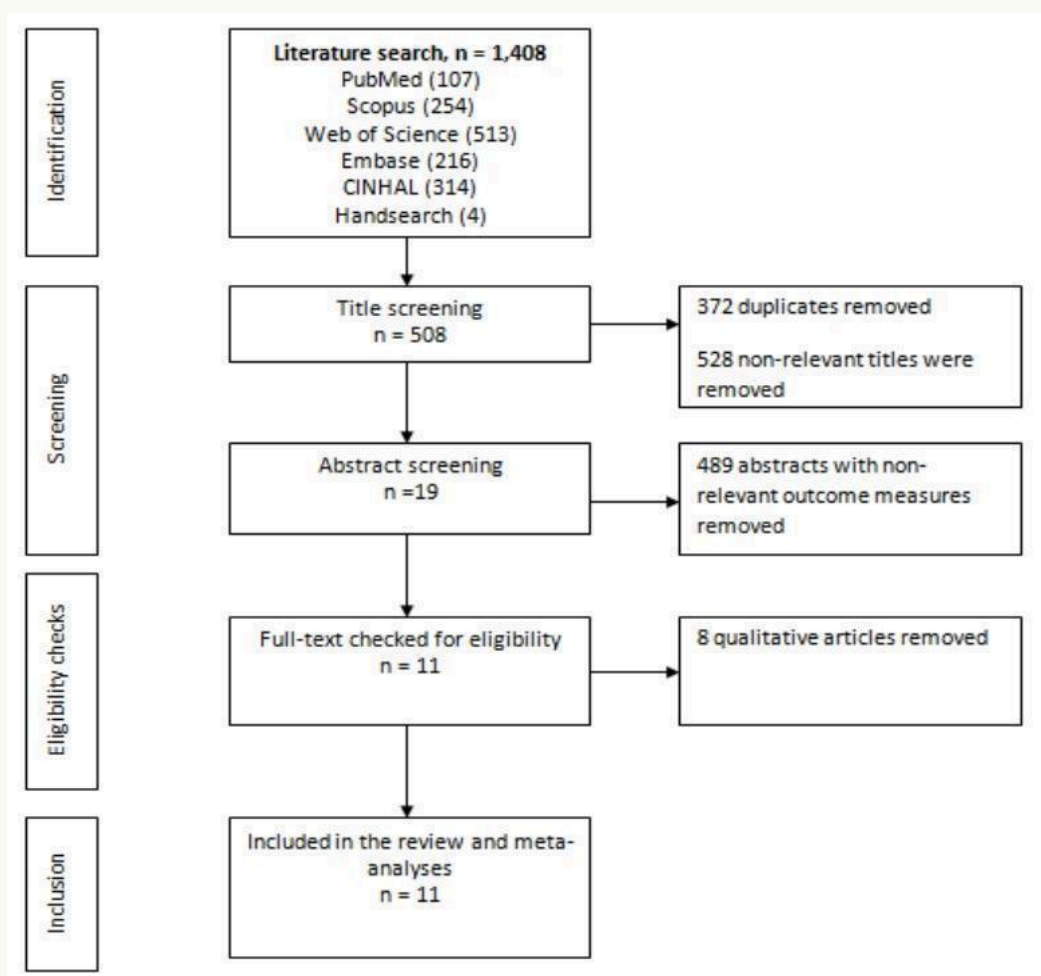


Figure 1: The study selection process (PRISMA flow diagram)= 0.180).

## DISCUSSION

The review found that mHealth interventions significantly increased antenatal care (ANC) attendance by almost 50%. This indicates a strong positive influence of mobile-based communication. This effect may be attributed to the ability of mHealth tools to provide timely reminders and reinforce health messages. SMS reminders may have strengthened perceived support by offering continuous contact with the health system.

These mechanisms align with behavioural theory, which emphasises the role of cueing, reinforcement, and accessible information in promoting health-seeking behaviour. This finding is consistent with earlier reviews that also reported improved ANC uptake following digital reminder systems in low- and middle-income countries. Reviews by Rahman et al. (2022) and Yadav et al. (2022) similarly demonstrated significant gains in ANC attendance with mobile messaging interventions. The magnitude of improvement observed in this meta-analysis suggests that mHealth remains an effective and scalable strategy for increasing ANC attendance.

The review found that mHealth interventions did not significantly increase facility delivery rates. This finding indicates that digital reminders and messages alone may be insufficient to influence women's delivery choices. Facility delivery is shaped by a complex interplay of factors, including transportation challenges, financial constraints, sociocultural norms, perceptions of provider attitudes, and broader structural barriers. While mHealth may enhance knowledge and birth preparedness, it may not directly eliminate physical and economic obstacles that deter many women from choosing health facilities for childbirth. The limited effect observed, therefore, reflects deeper systemic and contextual barriers that require interventions beyond digital messaging alone. Bossman et al. (2022) and Gayesa et al. (2023) reported a contrasting finding in a previous review and noted a significant impact of mHealth interventions on facility birth. This finding suggests that mHealth may be more effective when integrated within wider maternal health programmes rather than delivered as a stand-alone strategy.

The review found that mHealth interventions did not significantly increase the duration of exclusive breastfeeding (EBF) to 5–6 months. This suggests that while digital platforms may support maternal knowledge, they may not adequately address the complex psychosocial, cultural, and environmental factors that influence breastfeeding continuation. Breastfeeding is a behaviour that depends heavily on social support, maternal confidence, and family influence. Mobile messages or digital counselling alone may thus be insufficient to sustain breastfeeding through the recommended six months, especially where mothers face significant contextual barriers. The non-significant finding contrasts findings in a review by Gayesa et al. (2023) that highlighted that mHealth improved breastfeeding duration. The present result suggests that digital interventions alone may not adequately substitute for interpersonal breastfeeding support.

The review found that mHealth interventions did not significantly improve completion of childhood vaccination by 9 months. This finding indicates that digital reminders may have a limited influence on full immunization adherence. Although reminders can improve awareness of upcoming doses, vaccination schedules involve multiple visits across the first year of life, and caregivers may face recurring barriers such as transportation costs, competing household responsibilities, and health system inefficiencies. These obstacles may prevent timely attendance even when mothers receive reminders. Additionally, some reminder systems may lack specificity, tailoring, or sufficient frequency to sustain adherence across multiple immunization appointments. The non-significant finding corresponds with evidence from prior reviews like Knop et al. (2024) who reported no improvements in long-term compliance. The observed pattern suggests that improving full completion of the vaccination schedule likely requires broader system-level support, such as caregiver engagement strategies.

## CONCLUSION

This systematic review and meta-analysis demonstrated that mHealth interventions significantly improved antenatal care attendance but did not yield meaningful effects on facility delivery, exclusive breastfeeding duration, or completion of childhood vaccination. In general, mHealth remains a valuable, scalable approach for strengthening antenatal behaviours.



## Implications for Practice

The findings of this review underscore the relevance of mHealth interventions as a practical tool for strengthening antenatal care utilisation. Health systems in low-resource settings can incorporate mobile reminders and digital counselling to support timely ANC attendance and enhance continuity of care. However, the limited impact of mHealth on facility delivery, exclusive breastfeeding duration, and vaccination completion suggests that digital tools should not be implemented as isolated solutions. Instead, practitioners should integrate mHealth within broader maternal and child health programmes that address transportation difficulties, financial constraints, health worker availability, and family or community influences.

## Recommendations

Future research should prioritise multi-component mHealth interventions that address both behavioural and structural determinants of maternal and child health outcomes. Policymakers should invest in digital health strategies only alongside efforts to strengthen health system readiness, workforce capacity, and community support, ensuring that mHealth is embedded within comprehensive maternal and child health programmes.

## References

- Adam, M., Johnston, J., Job, N., Dronavalli, M., Le Roux, I., Mbewu, N., ... & Bärnighausen, T. (2021). Evaluation of a community-based mobile video breastfeeding intervention in Khayelitsha, South Africa: The Philani MOVIE cluster-randomized controlled trial. *PLoS Medicine*, 18(9), e1003744. <https://doi.org/10.1371/journal.pmed.1003744>
- Alemneh, E., Kebebew, T., Nigatu, D., Azage, M., Misgan, E., & Abate, E. (2024). Electronic maternal and child health application usability, feasibility and acceptability among healthcare providers in Amhara region, Ethiopia. *PLOS Digital Health*, 3(5), e0000494.
- Ameyaw, E. K., Amoah, P. A., Asiama, A. A., & Agbadi, P. (2025). mHealth knowledge and usage in maternal healthcare delivery: perspectives and experiences of healthcare practitioners in Ghana. *BMJ Open*, 15(1), e092746.
- Billah, S. M., Ferdous, T. E., Siddique, A. B., Raynes-Greenow, C., Kelly, P., Choudhury, N., ... & Dibley, M. J. (2022). The effect of electronic job aid assisted one-to-one counselling to support exclusive breastfeeding among 0–5-month-old infants in rural Bangladesh. *Maternal & Child Nutrition*, 18(3), e13377. <https://doi.org/10.1111/mcn.13377>
- Bossmann, E., Johansen, M. A., & Zanaboni, P. (2022). mHealth interventions to reduce maternal and child mortality in Sub-Saharan Africa and Southern Asia: a systematic literature review. *Frontiers in Global Women's Health*, 3, 942146.
- Chilunjika, S. R., & Chilunjika, A. (2024). Using Mobile-Health Technologies to Promote Maternal Health Care in Developing Countries: A Case of Zimbabwe. *African Journal of Gender, Society & Development*, 13(4), 359.
- Coleman, J., Black, V., Thorson, A. E., & Eriksen, J. (2020). Evaluating the effect of maternal mHealth text messages on uptake of maternal and child health care services in South Africa: a multicentre cohort intervention study. *Reproductive Health*, 17(1), 160. <https://doi.org/10.1186/s12978-020-01017-3>.

- Esuabana, S. B. & Sunday, U. B. & Neji, G. N. (2023). Family related variables and undergraduate students' tendencies to social behaviour in university environment in Cross River State, Nigeria. *AFRIBVAM Journal*, 4(5), 54-60.
- Knop, M. R., Nagashima-Hayashi, M., Lin, R., Saing, C. H., Ung, M., Oy, S., ... & Yi, S. (2024). Impact of mHealth interventions on maternal, newborn, and child health from conception to 24 months postpartum in low-and middle-income countries: a systematic review. *BMC Medicine*, 22(1), 196.
- Maghalian, M., Veisi, S., Mirghafourvand, M., Rezaei, M., Samad-Soltani, T., Naghizadeh, A., & Ghanbari-Homaie, S. (2025). Developing and testing a mobile application for imparting knowledge: the positive birth experience guideline to midwifery students. *BMC Medical Education*, 25(1), 577.
- Mbunge, E., & Sibiya, M. N. (2024). Mobile health interventions for improving maternal and child health outcomes in South Africa: a systematic review. *Global Health Journal*, 8(3), 103-112.
- Ogaji, D. S., Arthur, A. O., & George, I. (2021). Effectiveness of mobile phone-based support on exclusive breastfeeding and infant growth in Nigeria: a randomized controlled trial. *Journal of Tropical Pediatrics*, 67(1), fmaa076.
- Oladebo, O., Dipeolu, I. O., & Oladunni, O. (2021). Outcome of reminder text messages intervention on completion of routine immunization in rural areas, Nigeria. *Health Promotion International*, 36(3), 765-773. <https://doi.org/10.1093/heapro/daaa092>
- Olomi, G. A., Manongi, R., Makasi, C. E., Woodworth, S., Mlay, P., Yeates, K., ... & Khashan, A. S. (2025). The mHealth clinical decision-making tools for maternal and perinatal health care in Sub-Saharan Africa: A systematic review. *PLoS One*, 20(4), e0319510.
- Orokpo, M. O., & Sunday, U. B. (2023). Prevalence of Health Challenges among the Aged in Southern Cross River State, Nigeria: Implications for Educational Research in Counselling services. *Prestige Journal of Education*, 6(2), 198-209.
- Qureshi, R. N., Sheikh, S., Hoodbhoy, Z., Sharma, S., Vidler, M., Payne, B. A., ... & Bhutta, Z. A. (2020). Community-level interventions for pre-eclampsia (CLIP) in Pakistan: a cluster randomised controlled trial. *Pregnancy Hypertension*, 22(1), 109-118. <https://doi.org/10.1016/j.preghy.2020.07.011>
- Rahman, M. O., Yamaji, N., Nagamatsu, Y., & Ota, E. (2022). Effects of mHealth interventions on improving antenatal care visits and skilled delivery care in low-and middle-income countries: systematic review and meta-analysis. *Journal of Medical Internet Research*, 24(4), e34061.
- Sabin, L. L., Halim, N., Hamer, D. H., Simmons, E. M., Jonnalagadda, S., Larson Williams, A., ... & Messersmith, L. J. (2020). Retention in HIV care among HIV-seropositive pregnant and postpartum women in Uganda: results of a randomized controlled trial. *AIDS and Behavior*, 24(11), 3164-3175.
- Short, V. L., Bellad, R. M., Kelly, P. J., Washio, Y., Ma, T., Chang, K., ... & Derman, R. (2022). Feasibility, acceptability, and preliminary impact of an mHealth supported breastfeeding peer counselor intervention in rural India. *International Journal of Gynecology & Obstetrics*, 156(1), 48-54.
- Small, Z., Thompson, S. E., Sharma, A., Majumdar, S., Thout, S. R., Praveen, D., & Hirst, J. E. (2024). Mobile health (mHealth) interventions for health promotion during the perinatal period in India: a scoping review. *Frontiers in Global Women's Health*, 5, 1427285.
- Souza, F. M. D. L. C., Santos, W. N. D., Santos, R. S. D. C., Silva, V. L. M. D., Abrantes, R. M. D.,

- Soares, V. F. R., & Silva, R. A. R. D. (2021). Effectiveness of mobile applications in pregnant women's adherence to prenatal consultations: randomized clinical trial. *Revista Brasileira De Enfermagem*, 74(Suppl 5), e20190599. <https://doi.org/10.1590/0034-7167-2019-0599>.
- Sunday, U. B. & Etuk, I. S. (2024). Statistical Analysis of Marital Adjustment: An Evaluation of Sustainable Peace among Upper Basic Education (UBE) Teachers in Akwa Ibom State, Nigeria. *Journal of Qualitative Education*, 16(1), 175-196.
- Sunday, U. B. & Neji, G. N. (2025). Dichotomization of family structure and prenatal preference in Phi-coefficient Analysis: Implication for Educational Review. *British American University Journal of Social and Contemporary Issues (BAUJSOCI)*, 1(1), 288-306.
- Vanhuyse, F., Stirrup, O., Odhiambo, A., Palmer, T., Dickin, S., Skordis, J., ... & Copas, A. (2022). Effectiveness of conditional cash transfers (Afya credits incentive) to retain women in the continuum of care during pregnancy, birth and the postnatal period in Kenya: a cluster-randomised trial. *BMJ open*, 12(1), e055921. <https://doi.org/10.1136/bmjopen-2021-055921>
- Verma, G. S., Gopalakrishnan, L., Ayadi, A. E., Diamond-Smith, N., Bagga, R., Dhir, S. K., ... & Duggal, M. (2025). Preliminary Effectiveness of a Postnatal mHealth and Virtual Social Support Intervention on Newborn and Infant Health and Feeding Practices in Punjab, India: Quasi-Experimental Pre-Post Pilot Study. *JMIR Pediatrics and Parenting*, 8, e65581.
- Veroniki, A. A., Hutton, B., Stevens, A., McKenzie, J. E., Page, M. J., Moher, D. & Tricco, A. C. (2025). Update to the PRISMA guidelines for network meta-analyses and scoping reviews and development of guidelines for rapid reviews: a scoping review protocol. *JBI evidence synthesis*, 23(3), 517-526.
- Vieira, R., Sousa-Pinto, B., & Figueira, L. (2021). Beware of word truncation in PubMed: unexpected problems and potential solutions. *BMJ Evidence-Based Medicine*, 26(1), 34-36.
- Von-Dadelszen, P., Bhutta, Z. A., Sharma, S., Bone, J., Singer, J., Wong, H., ... & Sotunsa, J. O. (2020). The Community-Level Interventions for Pre-eclampsia (CLIP) cluster randomised trials in Mozambique, Pakistan, and India: an individual participant-level meta-analysis. *The Lancet*, 396(10250), 553-563.
- Wu, Q., Huang, Y., Liao, Z., van Velthoven, M. H., Wang, W., & Zhang, Y. (2020). Effectiveness of WeChat for improving exclusive breastfeeding in Huzhu County China: randomized controlled trial. *Journal of Medical Internet Research*, 22(12), e23273. <http://doi.org/10.2196/23273>
- Yadav P, Kant R, Kishore S, et al. (January 14, 2022) The Impact of Mobile Health Interventions on Antenatal and Postnatal Care Utilization in Low- and Middle-Income Countries: A Meta-Analysis. *Cureus* 14(1): e21256. <http://doi.org/10.7759/cureus.21256>
- Zolfaqari, Z., Ayatollahi, H., Ranjbar, F., & Abasi, A. (2024). Motivating and inhibiting factors influencing the application of mhealth technology in post-abortion care: a review study. *BMC Pregnancy and Childbirth*, 24(1), 73.



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