

Abstract

Technology-Based Innovative Health Care Solutions for Improving Maternal and Child Health Outcomes in Low- and Middle-Income Countries: Systematic Review and Network Meta-analysis

Md Obaidur Rahman^{1,2}, MSc, PhD; Noyuri Yamaji¹, PhD; Daichi Suzuki³, MNSc; Kiriko Sasayama¹, PhD; Daisuke Yoneoka², PhD; Erika Ota¹, PhD

¹Department of Global Health Nursing, Graduate School of Nursing Science, St Luke's International University, Tokyo, Japan

²Center for Surveillance, Immunization, and Epidemiologic Research, National Institute of Infectious Diseases, Tokyo, Japan

³Department of Nursing, Kanagawa Institute of Technology, Kanagawa, Japan

Corresponding Author:

Md Obaidur Rahman, MSc, PhD
Department of Global Health Nursing
Graduate School of Nursing Science
St Luke's International University
10-1 Akashi-cho
Chuo-ku
Tokyo, 104-0044
Japan
Phone: 81 3 3543 6391 ext 4990
Fax: 81 3 3543 1626
Email: obaaidur006@gmail.com

Abstract

Background: Technology-based health care interventions (TBIs) are being considered as a promising solution to effectively strengthen maternal and child health (MCH) service uptake in resource-limited settings.

Objective: This study aimed to identify the most effective TBIs that could achieve the best functional MCH outcomes in low- and middle-income countries (LMICs).

Methods: A comprehensive search was performed in January 2021. In all, 2 independent researchers identified randomized controlled trials (RCTs) implemented in LMICs using the Population, Intervention, Comparison, Outcomes framework: Population: healthy pregnant women; Intervention: TBIs; Comparison: usual care or non-TBIs; and Outcomes: MCH outcomes. We estimated the direct, indirect, and relative effects, with their certainty based on the Grading of Recommendations, Assessments, Development, and Evaluations approach, for a wide range of MCH outcomes.

Results: In total, 30 trials with 70,807 participants were included, and 80% had low risk of bias. Our network meta-analysis (NMA) estimates indicated that TBIs, particularly SMS text messaging or phone call with mobile voucher interventions, were likely to be effective in improving MCH outcomes. The 1-way communication intervention was likely to be the most effective for the uptake of ≥ 4 antenatal care visits (relative risk [RR] 1.81, 95% CI 1.33-2.45; moderate certainty), facility delivery (RR 1.45, 95% CI 1.10-1.91; moderate certainty), early breastfeeding initiation (RR 1.18, 95% CI 1.02-1.37; moderate certainty), and caesarean delivery (RR 0.87, 95% CI 0.84-0.91; low certainty) outcomes; however, 2-way communication intervention was likely to be the most effective for the skilled birth attendance (RR 1.36, 95% CI 1.14-1.63; low certainty), maternal (RR 2.04, 95% CI 1.05-3.96; very low certainty) and infant's postnatal care use (RR 1.55, 95% CI 1.19-2.04; low certainty), exclusive breastfeeding practice (RR 1.53, 95% CI 1.14-2.05; moderate certainty), and perinatal death (RR 0.51, 95% CI 0.32-0.83; low certainty) outcomes. There was no substantial inconsistency between direct and indirect evidence, but small study effects were detected in the NMA.

Conclusions: Different forms of TBIs have a possibility to improve MCH outcomes in LMICs and can be integrated into the existing health systems based on their priorities. This study suggests the implementation of large-scale, well-designed RCTs in low-income countries due to the limited number of RCTs in the NMA.

Trial Registration: PROSPERO CRD42021239185; <https://tinyurl.com/yuvmp35x>

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KEYWORDS

technology-based interventions; mobile health; digital health; telehealth; eHealth; maternal and child health; systematic review; network meta-analysis; low- and middle-income countries

Conflicts of Interest

None declared.

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