Journal of Public Health for Tropical and Coastal Region (JPHTCR)
Journal homepage: https:/ejournal2.undip.ac.id/index.php/jphtr/index
ISSN: 2597- 4378

A Scoping Review of Strategic Approaches to Enhance Maternal Health and Antenatal Care Services in Coastal Areas

Windu Syawalina Wahyuningsih*, Vivi Rosalin Rajagukguk, Maria Natalia Laro
Maternal and Child Health-Reproductive Health, Department of Biostatistics, Epidemiology and Population Health, Master of Public Health Program, Universitas Gadjah Mada, Indonesia
*Corresponding Author: Email: windusyawalinawahyuningsih@mail.ugm.ac.id

Abstract
Introduction: Globally, maternal mortality remains a major public health concern, with an estimated 223 maternal deaths per 100,000 live births and more than 800 women dying every day from preventable pregnancy-related causes. The burden is disproportionately high in low-resource settings, including coastal and island regions. This review aimed to identify the strategic approaches implemented to improve maternal health and antenatal care in these areas.
Methods: A systematic search was conducted for studies published from 2000 to April 2025 in the PubMed, Scopus, and ScienceDirect databases. Of the 1,054 articles identified, 1,017 were screened, 54 met the eligibility criteria for full assessment, and 41 studies were ultimately included in the review.
Results: The findings revealed several key strategies: mobile clinics, outreach services, and emergency transportation for pregnant women (n=6); telemedicine and mHealth initiatives (n=12); engagement of community health workers and local personnel (n=13); strengthening maternal waiting homes, delivery systems, and referral mechanisms; and integration of ANC with other health programs (n=10). These approaches highlight efforts to overcome socioeconomic, geographic, and cultural barriers to accessing essential maternal health services in coastal regions
Conclusion: We recommend empowering local health workers, leveraging technology for outreach, strengthening referral and transport systems using data for targeted actions, and fostering community engagement to improve maternal health outcomes in coastal regions. Understanding the effectiveness and challenges of these strategies is crucial for developing context-specific interventions to reduce maternal mortality and enhance ANC coverage in underserved coastal communities.

Keywords: antenatal care, coastal, maternal health, pregnant woman, strategic approaches

DOI: https://doi.org/10.14710/jphtcr.v8i3.29232

Article History: Received: 29th August 2025, revised: 13th Dec 2025, accepted: 29th December 2025

Introduction

According to the World Health Organization (WHO)[1] (2024), the global maternal mortality ratio (MMR) was 223 per 100,000 live births in 2020, which equates to approximately 800 women dying every day from pregnancy complications. Despite this, there has been a 34% decrease in

global MMR since 2000. The most significant reductions were recorded in Eastern Europe with a 70% reduction, as well as in South Asia at 67%. Sub-Saharan Africa also showed progress, with a reduction of approximately 33%. However, achieving the Sustainable Development Goal (SDG) 3.1 target of reducing MMR to less than 70 per 100,000 live births by 2030 remains a major challenge, particularly in the Sub-Saharan Africa region.[2]

The reported stagnation of the global maternal mortality ratio (MMR) in 2020 is a pressing issue, with an estimated 287,000 women dying from causes related to pregnancy, childbirth, and the postpartum period. Pre-existing medical conditions (e.g., chronic anemia, chronic hypertension, diabetes) and immediate obstetric complications (such as postpartum hemorrhage, preeclampsia, and infections) are the main biomedical causes of maternal mortality.[3] Mortality can be substantially reduced if quality-assured maternal health commodities and services are consistently available. Appropriate antenatal care during pregnancy can reduce maternal mortality and morbidity. The World Health Organization recommends a minimum of eight ANC visits for optimal prenatal care, including monitoring the health of mother and fetus, identifying possible problems, and maternal and fetal health, identifying potential problems, and providing needed interventions.[4]

Recent studies have shown that completing at least eight ANC visits significantly improves maternal and fetal outcomes. Women who meet the 8-contact schedule are more likely to deliver in health facilities and receive timely postnatal care, both of which reduce maternal and neonatal deaths.[5] More frequent visits also allow for the earlier detection of complications, such as preeclampsia, fetal growth restriction, and gestational diabetes, while providing more opportunities for counseling, supplementation, malaria prevention, and birth preparedness. Evidence from Ethiopia[6] and Malawi[7] similarly shows that ≥8 ANC contacts strengthen maternal monitoring and ensure quicker management of pregnancy risk.

Despite global progress, more than 700 women continue to die every day from preventable causes related to pregnancy and childbirth, meaning that one maternal death occurs approximately every two minutes. Although the global maternal mortality ratio (MMR) decreased by approximately 40% between 2000 and 2023, the vast majority of maternal deaths (more than 90 %) continue to occur in low- and lower-middle-income countries. This shows that there are still large disparities in access to quality healthcare services. Care by skilled health personnel before, during, and after childbirth can save the lives of both mothers and newborns, making it critical to ensure that every woman has access to these services to prevent unnecessary deaths.[1] Persistent disparities in access to quality maternal health services highlight the importance of understanding vulnerable populations, including those living in coastal regions.

Recent studies indicate that maternal health outcomes in coastal and island regions tend to be poorer than those in non-coastal or inland areas. In Bangladesh, women living in coastal and riverine zones were significantly less likely to complete ≥4 ANC visits and were more likely to deliver at home than those living in inland districts, contributing indirectly to higher maternal morbidity in these areas.[8,9] A comparative study from Bangladesh further showed that maternal healthcare utilization was substantially lower in high disaster-prone coastal regions than in low-risk inland areas.[10] Similarly, coastal counties in Kenya, such as Kilifi, Kwale, and Tana River, have consistently reported ANC coverage and facility-delivery rates below national averages, partly explaining the persistently higher maternal mortality reported in these regions.[11] These findings illustrate that coastal areas represent a high-risk subgroup with lower maternal health service uptake than inland populations.

Coastal regions possess distinct geographical, environmental, and

sociocultural characteristics that make them uniquely vulnerable. Seasonal flooding, cyclones, storm surges, and tidal changes commonly disrupt transportation and referral systems, leading to delays in accessing skilled obstetric care in Papua New Guinea. Environmental factors, such as high water salinity in coastal Bangladesh, have been linked to pregnancy complications, including hypertension and preeclampsia.[12,13] Environmental and geographic challenges, as well as physical accessibility barriers, are also crucial issues in coastal areas. Long distances between coastal settlements and health facilities, coupled with high transportation costs, are the most direct and critical barriers to the utilization of antenatal care (ANC) services.[10] Moreover, several coastal communities maintain strong traditional birthing practices and gender norms that influence care-seeking, reducing ANC attendance and skilled delivery uptake.[10,11] These combined environmental, cultural, and infrastructural characteristics demonstrate that coastal areas present challenges that differ considerably from other underserved settings, such as rural highlands or urban slums.

Given these heightened vulnerabilities and unique barriers faced by coastal populations, there is an urgent need to synthesize existing strategies designed to strengthen maternal health and antenatal care services in these contexts. Therefore, this scoping review aims to map and critically examine the strategic approaches implemented to enhance maternal health and ANC services in coastal areas.

Methods

Study Design and Setting of the Study

This scoping review was conducted following Arksey and O'Malley's methodological framework and referring to the PRISMA-ScR guidelines. This study aimed to identify the strategic approaches implemented to improve maternal health and antenatal care in coastal areas.

Eligibility Criteria

This review included peer-reviewed journal articles published in English from 2000 to the present. Eligible studies addressed maternal health or antenatal care services specifically within coastal, remote, or island settings. This review focused on literature that described or evaluated strategic approaches, interventions, or programs intended to improve maternal health outcomes and/or enhance the accessibility and utilization of ANC services. Studies were included if they employed quantitative research (observational, experimental) and qualitative research designs or mixed methods design. The exclusion criteria encompassed studies not related to maternal health or ANC, those focusing exclusively on urban or non-coastal populations, and non-empirical publications such as editorials, commentaries, or opinion pieces.

Search Strategy

The process was conducted through five stages, namely: formulating research questions, identifying relevant studies through literature searches in PubMed, Scopus, Science Direct databases with keywords such as “maternal health”, “antenatal care”, “coastal areas”, and “strategic approaches”; screening studies based on inclusion criteria such as focus on strategies or interventions in coastal areas and publication in English without limiting the year; and screening titles and abstracts using Rayyan software by involving two independent reviewers to minimize selection bias. Selected studies were extracted based on location, objectives, methods, strategy type, outcomes, and challenges. The results were analyzed descriptively and thematically and presented in narrative and tabular form to illustrate the strategies used and their impact on improving maternal health services in coastal areas.

Data Extraction

A systematic search was conducted for studies published from 2000 to April 2025 in the PubMed, Scopus, and ScienceDirect databases. Of the 1,054

articles identified, 1,017 were screened, 54 met the eligibility criteria for full assessment, and 41 studies were ultimately included in the review.

Data Analysis

After data extraction, all eligible studies were organized and descriptively analyzed. A Microsoft Excel spreadsheet was used to compile the extracted data in a tabular format, which included the following variables: article number, first author, year of publication, study location, type of strategic approach, specific interventions, targeted outcomes, and summarized results of the study. This structured format facilitated a systematic comparison across studies. The data were thematically analyzed to identify recurring patterns, common strategies, and variations in the types of interventions. Strategic approaches were grouped according to their characteristics, such as mobile clinics, telemedicine and mHealth services, outreach programs, and community-based models. The outcomes reported in each study were reviewed to assess their relevance to maternal health improvements and antenatal care service utilization. This analytical approach enabled the synthesis of findings into coherent thematic categories, allowing for a clearer understanding of the scope and diversity of strategic interventions used to enhance maternal health and ANC services in coastal, remote or island settings.

Prisma

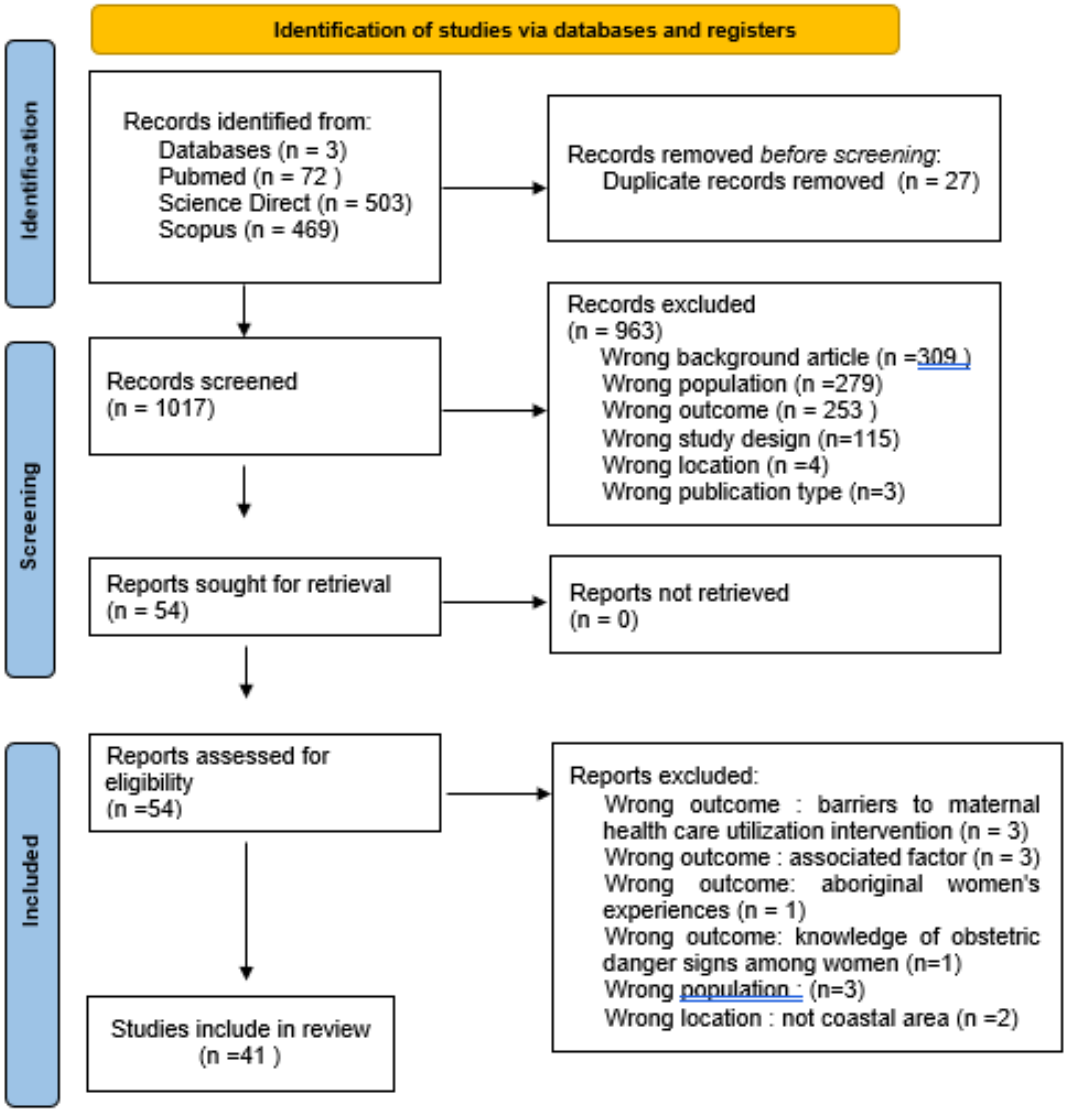

Figure 1. PRISMA Flow Diagram of Study Selection Process

Results

Table 1. shows a total of 41 articles were included in this scoping review. These studies originated from various regions worldwide, with the highest concentration in sub-Saharan Africa, followed by South and Southeast Asia, remote island areas such as the Pacific and Oceania, and parts of Latin America. The primary focus of these articles was on strategies to improve access to and the quality of maternal health services and antenatal care (ANC) in coastal, remote, and island regions. Based on the types of interventions discussed, 13 articles focused on community-based programs, 12 evaluated the use of telemedicine or mHealth, 6 highlighted outreach services such as mobile clinics and ANC outreach programs, and 10 focused on supporting facilities such as maternity waiting homes and emergency referral transport systems, with some articles covering more than one topic. In terms of study design, 21 articles used quantitative methods, 9 were qualitative, 7 employed mixed-methods approaches, and 4 were descriptive or program evaluation studies. These articles were published between 2012 and 2025, with a noticeable increase in publication trends over the past decade, reflecting the growing global attention to improving access to maternal health services in hard-to-reach areas.

Figure 2. illustrates the geographic distribution of the included studies in this review. The visualization indicates that most study sites were located in coastal regions, as shown by their proximity to the shorelines and reliance on marine or coastal environments. The map also presents the number of articles included per country using a blue color gradient. Darker blue represents countries with the highest contributions (three articles), including Uganda, Zambia, Kenya, Nigeria, Ethiopia, Tanzania, India, Pakistan, Bangladesh, Indonesia, and China. Medium blue indicates countries that contributed two articles, such as Madagascar, the Dominican Republic, and Australia. Light blue represents countries that contributed only one article, including Iran and the United States. Countries without any included studies are shown in grey. Coastal countries are highlighted using the same blue gradient scale to emphasize the coastal nature of the study's settings.

Most studies were conducted in sub-Saharan Africa and South or Southeast Asia, where populations commonly inhabit coastal zones and depend on coastal ecosystems for their livelihoods and access to health services. Despite this relatively wide geographical scope, contributions from each country remained limited, with only one to three studies included per setting. This highlights the need for more context-specific research in underrepresented coastal areas to strengthen the overall evidence.

Table 1. Key Findings from Studies on Maternal Health and ANC Interventions in Coastal Area

Author, Year	Location	Study design	Intervention	Results
Type of strategy: Engagement of community health Outcome : ANC Visit, Maternal Health Indicator, skilled birth, empowerment, ANC Utilization				
Ssetaala A et al, 2022 [14]	Lake Victoria, Uganda, East Africa	quantitative study	Community health workers' household visits to provide counselling	90.9% women accepted intervention; OR=2.1 for early ANC; OR=0.9 for ≥4 ANC
Jacobs C, et al, 2018 [15]	Samfya and Luwingu, Zambia, South Africa	qualitative study	Community-based Safe Motherhood Action Groups (SMAGs) involved educating women, referring them to health facilities, assisting women with household tasks.	SMAGs successfully implemented most of the intervention, but targets unmet; barriers included poor access and support.

Author, Year	Location	Study design	Intervention	Results
Lira Huq, N., 2023 [16]	Riverine areas, Bangladesh	quantitative study	NGO maternal healthcare in riverine areas, ≥4 ANC visits from skilled providers	Mothers 3× more likely to receive ≥4 ANC visits (AOR: 2.9; CI: 2.1–4.2)
Alehagen SA, 2012 [17]	Remote rural India	Mixed-methods	Nurse-based mobile ANC clinics	Early ANC visits increasing from 32% to 62%; decreasing maternal mortality from 478 to 121 per 100,000
Hossain J, 2020 [18]	Sunamganj, Bangladesh	quantitative study	Private Community Skilled Birth Attendants (P-CSBAs)	Skilled attendance (aOR: 2.18); complications decreasing during prenatal, delivery, and postnatal
Noorani QA, 2013 [19]	Chitral District, Pakistan	Mixed-methods	Community-Based Savings Groups (CBSGs) provided women with financial resources to cover transportation and service costs, and served as social spaces for empowerment and health education.	Women participating in CBSGs were significantly more likely to use services provided by CMWs, including at least one ANC visit, skilled birth attendance.
Perry H, 2015 [20]	28+ LMICs	descriptive study	Care Groups: peer health education who coordinate groups of 10–15 community-based volunteers. Each volunteer is responsible for regularly visiting 10–15 households to share life-saving health messages and promote service utilization.	High coverage of interventions; improved household-level practices; low-cost and scalable
Salam RA, 2016 [21]	Sindh, Pakistan	qualitative study	Lady Health Workers (LHWs) to be trained and equipped for early identification and emergency management of pre-eclampsia.	Strong potential; needs curriculum, equipment, supervision, and policy support
Li, W., 2025 [22]	Xinxiang, China	quantitative study	Perinatal education program. BPCR knowledge; maternal mental health; delivery method	Improvements in BPCR knowledge (P<0.001) and practice (P=0.047)
Okonofua, F., 2022 [23]		quantitative study	Community-led interventions (community health fund, transport engagement, drug revolving fund, community education, advocacy, retraining of health workers, and provision of basic equipment)	Antenatal care utilization increased significantly (OR 3.87, CI 2.84–5.26, p<0.001). Delivery care utilization increased (OR 3.88, CI 2.86–5.26). Postnatal care utilization increased (OR 3.66, CI 2.58–5.18).

Author, Year	Location	Study design	Intervention	Results
DesLauriers, N.R., 2020 [24]	Mfangano Island, Lake Victoria, Western Kenya	quantitative study	Mfangano Health Navigation Programme: A community-based intervention aimed at improving navigation and timely access to maternal care services. Participatory approach to involving local staff and communities.	The Mfangano Health Navigation programme is a potential model for similar low-resource settings, Reduced emergency care delays; community empowerment in feedback and planning
Kermode, M., 2017 [25]	Laikipia and Samburu, Kenya	Mixed-methods	Collaborative model of maternal health care involving skilled birth attendants (SBAs) and traditional birth attendants (TBAs)	A collaborative SBA/TBA model can maximize maternal and neonatal safety during the transition from TBA-led to SBA-led births and may speed up the transition.
Serbanescu, F., 2019 [26]	Uganda and Zambia	Mixed-methods	Community engagement, public health outreach, community workers, incentives for facility delivery	SMGL initiative significantly increased facility deliveries to 90.2%) reduced maternal deaths Uganda (45.5% to 66.8%), Zambia (62.6%)
Type of strategy; telemedicine/mHealth initiatives Outcome: Access to care, early detection of complications, maternal health outcomes, management of high-risk pregnancies				
Baatar T, 2012 [27]	Ulaanbaatar, Mongolia	Descriptive	Telemedicine consultations between local healthcare providers and expert teams for pregnancy complications	Telemedicine improved early diagnosis and management of pregnancy complications, strengthened provider capacity, and reduced maternal and newborn morbidity and mortality in intervention areas.
Nazari M,2024 [28]	Guilan province, north of Iran, West Asia	quantitative study	Improved remote monitoring and user satisfaction; contribution Supporting Factors in Using a Smartphone to Support Access Maternal Health Services in Rural Indonesia: A Qualitative Study used to better health outcomes	Improved remote monitoring and user satisfaction. Its contributed to better health outcomes
Bonnell S et al, 2018 [29]	San Juan Province, Dominican Republic, Caribbean, Central America	community-based research	Mobile-based third-trimester ANC assessment by CHWs.= CHWs were taught to provide third-trimester antenatal assessment, upload the data on a mobile phone application, send the data to the local physician who monitored data for "red flags," and call directly if a mother had an urgent problem	52 enrolled, 95 ANC visits; 2 urgent cases managed at home, no deaths, high acceptability

Author, Year	Location	Study design	Intervention	Results
Pagalday-Olivares P, et al, 2017 [30]	Remote peninsulas and islands in Kpando Municipality, Ghana	qualitative study	Feasibility assessment of eHealth/mHealth solutions including mobile apps for CHNs, clinical decision support systems, EMRs, and pregnancy monitoring tools.	eHealth shows strong potential to reduce delays in maternal care. Potential to improve ANC access and quality, enhance referral and record systems, support high-risk pregnancy monitoring, and reduce maternal mortality. Main barriers: infrastructure, staff rotation, culture.
Itanyi, I.U., 2023 [31]	Benue State, Nigeria	qualitative study	Smartcard system for pregnant women to record and manage antenatal care services. The smartcards store medical information digitally, are accepted across facilities, and are distributed through culturally-acceptable events like "Baby showers."	Smartcard system is well accepted. Smartcards useful and efficient for maternal care with key facilitators: integration with local practices, logistical ease, family and provider support. Smartcards reduced wait time; increased facility access; cultural integration helped uptake
MacDonald, M.E., et al, 2019 [32]	Rural Senegal	qualitative study	Comm Care mHealth maternal program	Successful engagement with local context
Benski, A.C., 2017 [33]	Ambanja District, Madagascar	quantitative study	PANDA mHealth ANC system to conduct standardized antenatal care based on WHO guidelines	100% data successfully collected; system feasible per WHO standards
Gilbert, 2023 [34]	Australia (QLD, WA, NSW sites)	Mixed-method	mHealth nutrition tool co-designed with Indigenous women	Tool addresses cultural gaps; inclusive design fosters relevance and acceptability. Strengthens evidence on mHealth as a medium for Indigenous maternal health promotion.
Atinafu, W.T., 2023 [35]	Ambo Town, Ethiopia	quantitative study	Mobile mental health support in pregnancy	77.3% intended use; key predictors: attitude (β=0.662), usefulness (β=0.253), ease of use (β=0.579), trust. Strengthen digital mental health support through trust-building and perceived benefit approaches, especially in remote ANC settings
Noh, K.B.M., 2021 [36]	Rural area in Indonesia	qualitative study	Use of smartphones with health-related applications (tailored to social characteristics of the area). - Integration of internet-based services for health monitoring and education.	Majority of pregnant women used smartphones for daily activities and health-related purposes. This can be a valuable method to enhance antenatal care coverage.

Author, Year	Location	Study design	Intervention	Results
Kikuchi K et al, 2021 [37]	Shariatpur, Bangladesh	quantitative study	PHC for MCH: Health workers use sensor devices and video consultations to manage maternal health	ANC ≥4 visits increased from 29% to 51%, PNC from 27% to 78%, improved detection of anemia (45–54%) and abnormal pulse (20–40%). >40% of women improved health status after receiving ANC/PNC.
Sullivan, C., et al, 2023 [38]	Hawai'i, United States	descriptive study	Maternal telehealth including tele-ultrasound and remote monitoring	Improved access during pandemic. Effective for high-risk pregnant women and maternal care.
Type of strategy; emergency transportation for pregnant women Outcome : ANC and PNC accessibility, maternal health status, Maternal and newborn health service utilization				
Edmond K et al, 2020 [39]	Remote regions of Afghanistan	quantitative study	Mobile outreach health services	ANC ≥1 visit: 83.6% (intervention) vs 61.3% (control); measles vaccine: 73.8% vs 57.3%; AMD for ANC 14.8% (95% CI: 1.6–28.0). No significant effect on PNC or clinic-level ANC provision.
Mwilike, B.E et al, 2024 [40]	Pwani, Tanzania	mixed method	Mobile ANC clinic "Mkunga Kitaani" equipped with tools and midwives, serving 7 villages lacking health facilities for one year.	ANC early initiation 17%, third trimester 36%. Mobile clinics preferred due to convenience. Barriers: seasonal access, limited diagnostic tools. Suggested expansion.
Oguntunde, O., et al, 2018 [41]	Northern Nigeria (Jigawa and Kaduna)	qualitative study	Emergency Transport Scheme (ETS) compared as stand-alone vs integrated with demand-generation	ETS vital in rural areas. Integrated ETS with community strategies (TBAs, religious leaders) increased community awareness, acceptance, and use of maternal health services. Its more effective, reliable, and responsive.
Neke NM, 2018 [42]	Tanzania	qualitative study	Mobile Health Clinics (MCH delivery)	Mobile clinics improved MCH access and community awareness. Barriers: funding, HR, logistics. Need for evaluation of sustainability and continuity of care.
Eba, K., 2025 [43]	Somali & Afar, Ethiopia	qualitative study	Mobile Health Service (MHS)	Improved service coverage and RMNCH utilization; enhanced family planning, nutrition, and maternal-child care.

Author, Year	Location	Study design	Intervention	Results
Mwanzia, L., 2024 [44]	Western Kenya	quantitative study	Phone-based midwife navigation	Phone-based navigation by midwives is feasible to support ANC services, strategy complements existing ANC to promote facility births, higher facility birth among women with personal phones suggests enhanced ANC engagement (89% of the intervention group)
Strengthening maternal waiting home/delivery and referral systems/integration with ANC Outcome : reducing maternal health barriers, Maternal health, MWH utilization				
Dewi, A., et al, 2023 [45]	Remote areas of Indonesia	mixed method	implementation of standardized Maternity Waiting Homes (MWH)	3x improvement in knowledge (Rs = 0.26, p = 0.032); improved willingness to use MWH (p = 0.037). CHW midwife collaboration is effective in promoting MWH use
Wondo MB, et al, 2024 [46]	Dangur District, Northwestern Ethiopia	quantitative study	MWH utilization	Utilization was 36.4%. Associated factors: knowledge (AOR=3.9), transportation affordability (AOR=2.4)
Gezimu W, et al, 2021 [47]	Gamo Gofa zone, Southern Ethiopia	quantitative study	MWH utilization	Significant factors: occupation, childbirth history, past MWH use, social norms, perceived behavioral control.
Asmamaw, D.B, 2023 [48]	Gidan District, Ethiopia	quantitative study	Home delivery during ANC	Despite antenatal care visits, nearly 1 in 3 women gave birth at home. Home delivery prevalence: 28.8% (95% CI: 25.7–32.2)- Significant factors: • Rural residence (AOR = 2.02) • Unmarried women (AOR = 11.16)• Husband's education (AOR = 2.60)• Not involved in women's development army (AOR = 1.64) • Fear of COVID-19 (AOR = 3.86) Key barriers: rural residence, low husband education, fear of COVID-19, lack of women's group participation. Recommendations: enhance spousal education, emphasize institutional birth benefits during ANC, and strengthen women's groups (WDA) targeting vulnerable populations,
Beck, D., 2021 [49]	Rural Zambia	Secondary data	Maternity waiting homes as part of a community mobilization package. The CM approach aimed to empower and engage communities to reduce maternal mortality through collective action.	Community mobilization improved empowerment and participation; further testing needed for marginalized groups.
Scott, N.A., 2021 [50]	Rural Zambia	quantitative study	The improved MWH model included better infrastructure, policies, and linkages to health centers for increased access to maternity care.	care capacity, and improved exposure to counselling. MWHs are effective in increasing facility-based childbirth in remote areas.

Author, Year	Location	Study design	Intervention	Results
Brown, S.J., 2025 [51]	South Australia (urban, regional, and remote areas)	quantitative study	Aboriginal Family Birthing Program (AFBP)	The Aboriginal Family Birthing Program enhances access to culturally responsive antenatal care and improves maternal experiences. Higher likelihood of positive experiences with Aboriginal Family Birthing Program services in metropolitan and regional areas (adj OR 3.4 and 2.4)
Kaur, M., 2024 [52]	Himachal Pradesh, India	quantitative study	Maternal health service utilization	ANC visits >4 associated with 2.86 times higher odds of institutional delivery (CI = 0.41–4.23). Importance of strengthening health infrastructure and transportation in remote areas
Dominico, S., 2022 [53]	Kigoma, Tanzania	quantitative study	Decentralizing comprehensive emergency obstetric and newborn care (EmONC) from hospitals to health centers, where services were delivered by associate clinicians and nurses. Implementing continuous quality improvement and demand creation strategies to ensure women use services.	Significant improvements were observed, including increased lifesaving interventions (2.8 to 4.7 per facility), institutional deliveries (49% to 85%), caesarean rates (2.6% to 4.5%), and emergency obstetric care coverage (44% to 61%). Maternal mortality dropped from 303 to 174 per 100,000 live births, and stillbirths decreased from 26.7 to 12.8 per 1,000 births.
Nyamtema, A.S., 2016 [54]	Remote rural areas in Tanzania	quantitative study	Decentralization of EmONC services, staff training, infrastructure upgrades	Upgraded remote health centres increased institutional deliveries by 151%, reduced referrals from 9% to 3%, and improved maternal and neonatal outcomes.

Figure 2. Distribution of studies based on the world geographic map

Discussion

Based on the results of this analysis, several strategies can be employed to improve antenatal care and maternal health services in coastal areas. These strategies are categorized into four main themes: engagement of community health workers, mobile clinics, outreach services emergency transportation, telemedicine and mHealth initiatives, and strengthening maternity waiting homes and referral systems.

1. Engagement of community health workers and involvement of local cadres or personnel

The engagement of community health workers (CHWs), local cadres, and trained traditional birth attendants (TBAs) has been widely recognized as a critical strategy for enhancing maternal health services in coastal areas. These actors serve as a bridge between the community and formal health systems by delivering context-sensitive education, facilitating referrals, and supporting antenatal care (ANC) utilization in the community. Several studies have demonstrated the effectiveness of CHWs in increasing early ANC visits and promoting facility-based delivery. For instance, a quasi-experimental study in Malawi reported that home visits by CHWs led to a 200% increase in first-trimester ANC attendance and improved delivery outcomes.[55] Similarly, a population-based analysis in India found that engagement with community-based workers such as ASHA and AWW was associated with significantly higher rates of ANC attendance, early breastfeeding, and reduced infant mortality.[56]

The findings of this scoping review further support the role of CHWs and community-based interventions in improving maternal health indicators. Studies in Zambia 15, Pakistan19 and Bangladesh16 underscore the effectiveness of Care Groups, Safe Motherhood Action Groups, and Community Savings Groups in increasing ANC visits, delivery services by trained health personnel, and reproductive health education and advocacy. The strength of this approach lies in the capacity of the cadres to provide contextualized information, educate using local culture, and serve as an extension of the health facility. However, the lack of ongoing training, incentives, and logistical support remains a serious challenge in maintaining the motivation and effectiveness of the cadres.

The review findings also recommend that strengthening the engagement of CHWs must be complemented by broader health system support, such as clear role definitions, workload management, cross-sectoral collaboration, and sufficient policy backing. Integrating these workers into telemedicine and mHealth initiatives has shown promise in further extending the reach and quality of ANC in these challenging coastal settings.[57]

Although these findings are encouraging, sustainability remains a major concern. Many programs struggle with limited training, lack of incentives, and weak supervision systems. Without stronger institutional support, volunteer motivation and its long-term impact may be reduced. Ultimately, strengthening maternal health through community engagement must go hand-in-hand with improved health systems, infrastructure, and policies to ensure that every mother receives the care she needs, regardless of where she lives.

2. Telemedicine / mHealth

The findings of this scoping review indicate that telemedicine and mobile health (mHealth) strategies hold significant potential for expanding access to and improving the quality of maternal health services in coastal and remote areas. These strategies have been implemented in various forms, including mobile-based applications, electronic medical record systems, tele-ultrasound, smart cards, and remote consultations between local health providers and specialists.

Telehealth refers to the delivery and facilitation of health services and related healthcare activities using electronic information and telecommunication technologies. This innovation has enabled healthcare access for patients residing in rural areas, where in-person services are limited. Moreover, telehealth plays a crucial

role in supporting the provision of care during emergencies or disasters, when physical travel is restricted and face-to-face services are disrupted.[58]

Several studies, including those by Baatar et al.[27] and Kikuchi et al. [37] have demonstrate that telemedicine is effective in the early detection of pregnancy complications and in accelerating referral processes. This is particularly important in coastal areas that frequently face specialist shortages, limited healthcare infrastructure, and transportation challenges. mHealth strategies also contribute to strengthening the management of high-risk pregnancies, as reported in studies from Ghana and the Dominican Republic. [29,30]

The adoption of digital technologies and mHealth systems has emerged as a growing strategy, especially since the COVID-19 pandemic. Interventions such as teleconsultations, remote pregnancy monitoring, and the use of mobile applications have been shown to improve pregnant women's knowledge of danger signs, expedite referrals for high-risk cases, and facilitate interactions between health workers and patients in remote locations. Some interventions have also demonstrated positive outcomes, such as increased antenatal care visits, greater utilization of health facilities, and enhanced community engagement. For example, the use of smart cards in Nigeria[31] adapted to local cultural contexts, was associated with improved community acceptance and more efficient service delivery. Similarly, community-based approaches involving health cadres and community health workers (CHWs) have proven effective in improving early risk monitoring and detection.[29]

However, the implementation of these strategies is not without its challenges. Several studies have noted barriers such as limited digital infrastructure (e.g., Internet access and electricity), staff turnover, and low digital literacy. Additional challenges include cultural misalignment and the lack of integration between new digital systems and existing health structures, which may hinder the sustainability of these programs.

3. Mobile clinics

Emergency transportation strategies and mobile health services are widely adopted approaches in coastal and remote regions to address geographical barriers, limited health facilities, and poor accessibility to maternal health services. The studies analyzed in this review consistently demonstrated that these interventions generally improved access to and coverage of antenatal care (ANC) services, enhanced early detection of pregnancy-related complications, and promoted facility-based deliveries.

Mobile ANC services offer a practical solution to overcome access challenges and improve maternal care quality in rural communities. These services serve as an alternative to expand the reach of ANC in hard-to-reach areas, enabling women to receive care directly in their communities. Mobile clinics are especially critical in serving populations often neglected by conventional healthcare systems by providing essential services for pregnant women. Through these services, expectant mothers can obtain the necessary antenatal care, supporting both maternal and neonatal health and well-being. This model has been proven to be lifesaving in areas with limited or no access to medical facilities.[40]

The implementation of outreach-based services, such as mobile clinics, has been effective in reaching areas with inadequate infrastructure. Studies conducted in Afghanistan[39] and Tanzania[40,42] reported significant improvements in ANC coverage, particularly for early visits, and increased community awareness of the importance of antenatal care. Initiatives such as the "Mkunga Kitaani" mobile ANC clinic and other outreach units successfully promoted early ANC initiation and broadened access to maternal services in underserved villages. These successes underline how proactive outreach-based services can compensate for the lack of fixed healthcare infrastructure. [40,42]

Additionally, community-based emergency transportation strategies, such as those developed in Nigeria[34], highlight the importance of engaging local stakeholders, including traditional leaders

and birth attendants. The outcomes revealed increased community acceptance of referrals for obstetric complications to higher-level facilities in the intervention group. This emphasizes that culturally adapted, community-led interventions can significantly strengthen maternal-referral systems in hard-to-reach areas.

These strategies have proven effective in reaching pregnant women in areas with significant geographical and infrastructure challenges. Evidence from Tanzania, Afghanistan, Ethiopia, and Bangladesh shows that mobile clinics and emergency transport services have led to improved antenatal care coverage (≥4 ANC visits), increased child immunization rates, and reduced maternal complications. However, the long-term implementation of these strategies still faces notable barriers, including extreme weather conditions, lack of diagnostic equipment, and poor road access.

Therefore, while emergency transportation and mobile health services hold great potential for expanding maternal health coverage in coastal areas, their sustained impact requires stronger local support systems, cross-sector integration, and sustainable financing mechanisms. These elements are crucial for ensuring that such strategies meaningfully contribute to reducing maternal morbidity and mortality in remote regions.

4. Strengthening Maternal Waiting Homes, Delivery Systems, and Referral Mechanisms

The presence of functional maternal waiting homes (MWH) contributes to increased facility deliveries and decreased maternal mortality, as women become more likely to deliver under the supervision of skilled health workers.[59] This strategy is important for addressing delays in accessing maternity services, especially in areas with difficult terrain or far from referral facilities. Studies from Ethiopia, Indonesia, and Zambia show that Maternity Waiting Homes increase facility-based delivery rates, improve maternal preparedness for complications, and strengthen referral systems. MWHs directly contribute to improved maternal health by reducing the risk of delayed treatment of obstetric complications, which are among the leading causes of maternal death. MWHs also provide a safe and monitored space for high-risk pregnant women before labor, facilitating the early detection of pregnancy problems.

However, MWH utilization rates are low due to limited information, high transport costs, and lack of family support. Therefore, the integration of MWH with education during antenatal care (ANC) visits is crucial. This education can include the benefits of MWH, identification of pregnancy risks, and inclusive delivery planning for pregnant women. The involvement of husbands and family members during ANC is also important to strengthen emotional, logistical, and financial support for pregnant women. With this integrated approach, MWH utilization may increase, thereby improving continuity of care from ANC to delivery, ultimately supporting the achievement of overall maternal health targets.

Conclusion

This scoping review identified four key strategic approaches to improving access to maternal health services in coastal areas: (1) the provision of mobile clinics to reach remote communities, (2) the implementation of outreach services and emergency transportation systems as a response to geographical barriers, (3) the utilization of digital technologies such as telemedicine and mHealth to expand access to information and medical consultations, and (4) the engagement of community health workers alongside the strengthening of referral systems through maternity waiting homes and the integration of antenatal care services. These approaches have enhanced the availability, affordability, and continuity of maternal health services for geographically isolated populations. The findings hold significant implications for developing context-specific, intersectoral, and sustainable policies to support accelerated progress toward achieving Sustainable Development Goals (SDGs) 3.1, particularly in reducing maternal mortality and increasing coverage of essential health services in underserved areas.

Recommendation

Based on the findings of this review, strengthening maternal health services in coastal and remote areas requires strategically distributing responsibilities among key stakeholders. Local governments should ensure that mobile antenatal care services and emergency transportation systems are adequately established to address geographical and environmental barriers, thereby enabling timely access to referral services for pregnant women to reduce maternal mortality. At the national level, ministries and relevant health authorities should prioritize the expansion of telemedicine and other digital health solutions by improving network connectivity and enhancing the capacity of health personnel to serve geographically isolated coastal populations. Strengthened coordination between national health regulators, healthcare facilities, and the health technology industry is essential to ensure reliable infrastructure, system interoperability, and smooth integration of telemedicine into routine maternal health services.

At the service delivery level, health facilities must optimize the utilization of Maternity Waiting Homes (MWHs) by incorporating standardized antenatal education and promoting stronger family involvement to increase acceptability, utilization, and birth preparedness. In parallel, non-governmental organizations and community-based actors can contribute by reinforcing the capacity of local cadres and community leaders, ensuring culturally appropriate maternal health promotion, and increasing community engagement with available services. To achieve sustained improvements in maternal health outcomes, these efforts must be supported by robust cross-sectoral governance and long-term, well-aligned funding mechanisms from the government and development partners. Furthermore, future research should assess the sustainability, cost-effectiveness, and transferability of these interventions across diverse coastal settings while documenting context-specific innovations that may contribute to more resilient and equitable maternal health systems.

Limitation

This scoping review had several limitations. First, most of the examined research came from South Asia and Africa, which restricts the applicability of the findings to other isolated or coastal locations, such as Indonesia. Second, because assessing the risk of bias was not the main goal of this review, no formal risk assessment was performed. Third, only peer-reviewed English-language publications were considered, which would have excluded pertinent research from the gray literature or other languages. Finally, this research may have overlooked successful local practices that are not included in the published literature because it only examined formal strategies that were documented.

Ethics approval

Not applicable

Availability of data and materials

Data sharing is not applicable to this article, as no new datasets were generated or analyzed during the current study. All information used was derived from publicly accessible sources that are cited in the article.

Acknowledgment

Not applicable.

Funding

The authors declare that no financial support was received for the research, authorship, or publication of this article. This study is based entirely on secondary data from the existing literature.

Author Contribution

WSW conceptualized the study, developed the research framework, formulated the search strategy, and identified relevant literature from the selected databases. WSW also prepared the initial drafts of the Introduction, Results, Discussion, Conclusion, and Abstract. VRG and MN contributed to the article screening process through double-blind checks, assisted in data synthesis, and refined the discussion. All the authors have

reviewed and approved the final version of the manuscript.

References

1. World Health Organization (WHO). Maternal Mortality 2024. 2024;
2. Adu-Fokuo D. Improving Maternal Health Care Accessibility and Utilization in Remote and Island Communities: An Explorative Study in Ghana. Claremont Grad Univ. 2024;
3. Souza JP, Day LT, Rezende-Gomes AC, Zhang J, Mori R, Baguiya A et al. A global analysis of the determinants of maternal health and transitions in maternal mortality. Lancet Glob Heal. 2024;12(2):e306–16.
4. Al-Mamun M, Kalam A UN. Factors affecting maternal health and antenatal care services of working mothers in Southwestern Coastal Bangladesh: a cross-sectional study. Ann Med Surg. 2025;87(2):487-496.
5. Chilot D, Aragaw FM, Belay DG, Asratie MH, Merid MW, Kibret AA et al. Effectiveness of eight or more antenatal contacts on health facility delivery and early postnatal care in low-and middle-income countries: a propensity score matching. Front Med. 2023;10:1107008.
6. Wakjira GI, Solbana LK, Digilu YG, Tafese ZT, Gindaba BG, Boru JD et al. Compliance with≥ 8 antenatal care contacts and its associated factors among postnatal women attending public health facilities in Nekemte town, Western Ethiopia: a cross-sectional study. BMC Pregnancy Childbirth. 2025;25(1):1058.
7. Mwenebanda E, Machado A, Patel AI, Nyondo-Mipando AL CI. Factors influencing antenatal care attendance in the eight contact era policy: a case of selected maternal health service facilities in Blantyre, Malawi. BMC Pregnancy Childbirth. 2024;24(1):704.
8. Huq NL, Ahmed A, Islam TT, Rahman F, Hanson M, Sayeed A et al. Community-based integrated intervention for skilled maternal health care utilization in riverine remote areas, Bangladesh. Sex Reprod Healthc. 2023;37:100892.
9. Khan MN, Alam MB, Chowdhury AR, Kabir MA KM. Availability and readiness of healthcare facilities and their effects on antenatal care services uptake in Bangladesh. BMC Heal Serv Res. 2024;24(1):431.
10. Begum A HS. Maternal healthcare utilization in rural Bangladesh: A comparative analysis between high and low disaster-prone areas. PLOS Glob Public Heal. 2023;7:e0001409.
11. KENYA'S I. ASSESSING THE ADEQUACY OF ANTENATAL CARE SERVICES AND DETERMINANTS AMONG WOMEN OF REPRODUCTIVE AGE IN KENYA'S MARGINALIZED COASTAL COUNTIES: A CASE STUDY OF KWALE, KILIFI, AND TANA RIVER. 2024;
12. Ahmed Psyche A. Prevelance and Determinations of Hypertesnion among The Pregnant Women in Coastal and Non-coastal Areas in Bangladesh: A Croas-sectional Study. AUW. 2024;
13. Rahman MS, Hossain KM, van Loenhout J, Wallemacq P GSD. Effects of salinity on health due to environmental exposure: experiences from Bangladesh. Coast Disaster Risk Manag Bangladesh Routledge. 2023;15–43.
14. Ssetaala A, Ssempiira J, Wambuzi M, Nanyonjo G, Okech B, Chinyenze K et al. Improving access to maternal health services among rural hard-to-reach fishing communities in Uganda, the role of community health workers. Womens Heal. 2022;18:17455057221103992.
15. Jacobs C, Michelo C MM. Implementation of a community-based intervention in the most rural and remote districts of Zambia: a process evaluation of safe motherhood action groups. Implement Sci. 2018;13(1):74.

16. Lira Huq N, Ahmed A, Tahrin Islam T, Rahman F, Hanson M, Sayeed A et al. Community-based integrated intervention for skilled maternal health care utilization in riverine remote areas, Bangladesh. Sex Reprod Healthc. 2023;37:100892.
17. Alehagen SA, Finnström O, Hermansson GV, Somasundaram KV, Bangal VB, Patil A et al. Nurse-based antenatal and child health care in rural India, implementation and effects - an Indian-Swedish collaboration. Rural Remote Heal. 2012;12:2140.
18. Hossain J, Laterra A, Paul RR, Islam A, Ahmmed F SB. Filling the human resource gap through public-private partnership: Can private, community-based skilled birth attendants improve maternal health service utilization and health outcomes in a remote region of Bangladesh? PLoS One. 2020;15(1):e0226923.
19. Noorani QA, Azam I, Shaikh BT, Ranasinghe T, Abbas S, Wali S et al. Role of community based savings groups (CBSGs) enhancing the utilization of community midwives in chitral district of Pakistan. BMC Pregnancy Childbirth. 2013;13(1):185.
20. Perry H, Morrow M, Borger S, Weiss J, DeCoster M, Davis T et al. are Groups I: An Innovative Community-Based Strategy for Improving Maternal, Neonatal, and Child Health in Resource-Constrained Settings. Glob Heal Sci Pr. 2015;3(3):358–69.
21. Salam RA, Qureshi RN, Sheikh S, Khowaja AR, Sawchuck D, Vidler M et al. Potential for task-sharing to Lady Health Workers for identification and emergency management of pre-eclampsia at community level in Pakistan. Reprod Heal. 2016;13(Suppl 2):107.
22. Li W, Ren T, Xu G WY. Evaluating the impact of a multimodal perinatal education program on birth preparedness, mental health, and birth outcomes among rural primiparous women: a retrospective cohort study. BMC Pregnancy Childbirth. 2025;25(1):56.
23. Okonofua F, Ntoimo LF, Yaya S, Igboin B, Solanke O, Ekwo C et al. Effect of a multifaceted intervention on the utilisation of primary health for maternal and child health care in rural Nigeria: a quasi-experimental study. BMJ Open. 2022;12(2):e049499.
24. DesLauriers NR, Ogola E, Ouma G, Salmen M, Muldoon L, Pederson BL et al. he MOMENTUM study: Putting the “Three Delays” to work to evaluate access to emergency obstetric and neonatal care in a remote island community in Western Kenya. Glob Public Heal. 2020;15(7):1016-29.
25. Kermode M, Morgan A, Nyagero J, Nderitu F, Caulfield T, Reeve M et al. Walking Together: Towards a Collaborative Model for Maternal Health Care in Pastoralist Communities of Laikipia and Samburu, Kenya. Matern Child Heal J. 2017;21(10):1867-73.
26. Serbanescu F, Goodwin MM, Binzen S, Morof D, Asiimwe AR, Kelly L et al. Addressing the First Delay in Saving Mothers, Giving Life Districts in Uganda and Zambia: Approaches and Results for Increasing Demand for Facility Delivery Services. Glob Heal Sci Pr. 2019;7(Suppl 1):S48-s67.
27. Baatar T, Suldsuren N, Bayanbileg S SK. Telemedicine support of maternal and newborn health to remote provinces of Mongolia. Stud Heal Technol Inf. 2012;182:27–35.
28. Nazari M, Moayed Rezaie S, Yaseri F, Sadr H NE. Design and analysis of a telemonitoring system for high-risk pregnant women in need of special care or attention. BMC Pregnancy Childbirth. 2024;24(1):817.
29. Bonnell S, Griggs A, Avila G, Mack J, Bush RA, Vignato J et al. Community Health Workers and Use of mHealth: Improving Identification of Pregnancy Complications and Access to Care in the Dominican Republic. Heal Promot Pr.

2018;19(3):331–40.
30. Pagalday-Olivares P, Sjöqvist BA, Adjordor-van de Beek J, Abudey S, Silberberg AR BR. Exploring the feasibility of eHealth solutions to decrease delays in maternal healthcare in remote communities of Ghana. BMC Med Inf Decis Mak. 2017;17(1):156.
31. Itanyi IU, Iwelunmor J, Olawepo JO, Gbadamosi S, Ezeonu A, Okoli A et al. Acceptability and user experiences of a patient-held smart card for antenatal services in Nigeria: a qualitative study. BMC Pregnancy Childbirth. 2023;23(1):198.
32. MacDonald ME DG. ocio-cultural contextual factors that contribute to the uptake of a mobile health intervention to enhance maternal health care in rural Senegal. Reprod Heal. 2019;16(1):141.
33. Benski AC, Stancanelli G, Scaringella S, Herinainasolo JL, Jinoro J, Vassilakos P et al. Usability and feasibility of a mobile health system to provide comprehensive antenatal care in low-income countries: PANDA mHealth pilot study in Madagascar. J Telemed Telecare. 2017;23(5):536-43.
34. Gilbert S, Irvine R, D'or M, Adam MTP, Collins CE, Marriott R et al. Indigenous Women and Their Nutrition During Pregnancy (the Mums and Bubs Deadly Diets Project): Protocol for a Co-designed mHealth Resource Development Study. JMIR Res Protoc. 2023;12:e45983.
35. Atinafu WT, Tilahun KN, Yilma TM, Mekonnen ZA, Walle AD AJ. Intention to use a mobile phone to receive mental health support and its predicting factors among women attending antenatal care at public health facilities in Ambo town, West Shoa zone, Ethiopia 2022. BMC Health Serv Res. 2023;23(1):1368.
36. Noh KBM HM. Supporting Factors in Using a Smartphone to Support Access Maternal Health Services in Rural Indonesia: A Qualitative Study. Malaysian J Med Heal Sci. 2021;17.
37. Kikuchi K, Sato Y, Izukura R, Nishikitani M, Kato K, Morokuma S et al. Portable health clinic for sustainable care of mothers and newborns in rural Bangladesh. Comput Methods Programs Biomed. 2021;207:106156.
38. Sullivan C, Cazin M, Higa C, Zalud I LM. Maternal telehealth: innovations and Hawai'i perspectives. J Perinat Med. 2023;51(1):69–82.
39. Edmond K, Yousufi K, Naziri M, Higgins-Steele A, Qadir AQ, Sadat SM et al. Mobile outreach health services for mothers and children in conflict-affected and remote areas: a population-based study from Afghanistan. Arch Dis Child. 2020;105(1):18–25.
40. Mwilike BE, Welsh J, Nyamuryekung'e KK, Nyaruchary AJ, Pembe AB GM. Midwife-Led Mobile Antenatal Clinic: An Innovative Approach to Improve Utilization of Services in Pwani, Tanzania. Int J Env Res Public Heal. 2024;21(11).
41. Oguntunde O, Yusuf FM, Nyenwa J, Dauda DS, Salihu A SI. Emergency transport for obstetric emergencies: integrating community-level demand creation activities for improved access to maternal, newborn, and child health services in northern Nigeria. Int J Womens Heal. 2018;10:773-82.
42. Neke NM, Gadau G WJ. Policy makers' perspective on the provision of maternal health services via mobile health clinics in Tanzania-Findings from key informant interviews. PLoS One. 2018;13(9):e0203588.
43. Eba K, Gerbaba MJ, Abera Y, Tadessse D, Tsegaye S, Abrar M et al. Mobile health service as an alternative modality for hard-to-reach pastoralist communities of Afar and Somali regions in Ethiopia. Pastoralism. 2023;13(1):17.
44. Mwanzia L, Baliddawa J, Biederman E, Perkins SM CV. Promoting childbirth in a rural health facility: A

quasi-experimental study in western Kenya. Birth. 2024;51(2):319–25.
45. Dewi A, Sugiyo D, Sundari S, Puspitosari WA, Supriyatiningsih DT. Research implementation and evaluation of the maternity waiting home program for enhancing maternal health in remote area of Indonesia. Clin Epidemiol Glob Heal. 2023;23:101369.
46. Wondo MB, Debelew GT, Tsega M ZM. Maternity waiting home utilization and associated factors in the rural community of Dangur District, Northwestern Ethiopia: results from a community-based cross-sectional household survey. BMC Pregnancy Childbirth. 2024;24(1):661.
47. Gezimu W, Bitewa YB, Tesema MT W TE. ntention to use maternity waiting home and associated factors among pregnant women in Gamo Gofa zone, Southern Ethiopia, 2019. PLoS One. 2021;16(5):e0251196.
48. Asmamaw DB, Habitu YA, Mekonnen EG NW. Antenatal care booked rural residence women have home delivery during the era of COVID-19 pandemic in Gidan District, Ethiopia. PLoS One. 2023;18(12):e0295220.
49. Beck D, Veliz PT, Munro-Kramer M, Boyd C, Sakala I, Chiboola N et al. Exploring change over time in community mobilization domains: results from a maternity waiting home intervention in rural Zambia. Int J Equity Health. 2021;20(1):228.
50. Scott NA, Kaiser JL, Ngoma T, McGlasson KL, Henry EG, Munro-Kramer ML et al. f we build it, will they come? Results of a quasi-experimental study assessing the impact of maternity waiting homes on facility-based childbirth and maternity care in Zambia. BMJ Glob Heal. 2021;6(12).
51. Brown SJ, Weetra D, Glover K, Buckskin M, Ah Kit J, Leane C et al. Improving Aboriginal Women's Experiences of Antenatal Care: Findings from the Aboriginal Families Study in South Australia. Birth. 2015;42(1):27–37.
52. Kaur M. tilization of Institutional Maternal Delivery and Associated Factors among Rural Women: A Case Study of High Priority District of Himachal Pradesh. Indian J Public Health. 2024;68(4).
53. Dominico S, Serbanescu F, Mwakatundu N, Kasanga MG, Chaote P, Subi L et al. Comprehensive Approach to Improving Emergency Obstetric and Newborn Care in Kigoma, Tanzania. Glob Heal Sci Pr. 2022;10(2).
54. Nyamtema AS, Mwakatundu N, Dominico S, Mohamed H, Pemba S, Rumanyika R et al. Enhancing Maternal and Perinatal Health in Under-Served Remote Areas in Sub-Saharan Africa: A Tanzanian Model. PLoS One. 2016;11(3):e0151419.
55. Kachimanga C, Dunbar EL, Watson S, Cundale K, Makungwa H, Wroe EB et al. Increasing utilisation of perinatal services: estimating the impact of community health worker program in Neno, Malawi. BMC Pregnancy Childbirth. 2020;20(1):22.
56. Nadella P, Subramanian SV RUA. The impact of community health workers on antenatal and infant health in India: A cross-sectional study. SSM Popul Heal. 2021;15:100872.
57. Gamberini C, Angeli F AE. Exploring solutions to improve antenatal care in resource-limited settings: an expert consultation. BMC Pregnancy Childbirth. 2022;22(1):449.
58. Manocchia A. Telehealth: Enhancing Care through Technology. R I Med J. 2022;22(1):449.
59. van Lonkhuijzen L, Stekelenburg J van RJ. 1. World Health Organization (WHO). Maternal Mortality 2024 [Available from: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality. 2. Adu-Fokuo D. Improving Maternal Health Care Accessibility and Utilization in Remote and Island Communities. Cochrane Database Syst Rev. 2009;Cd006759.