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Local Health Programs and Their Impact on Pregnancy-Related Deaths in Developing Nations: Analysis of Successful Approaches and Implementation Barriers

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Abstract: Maternal mortality is still pressing global health issue, particularly in economically disadvantaged regions, where women often encounter difficulties obtaining comprehensive and timely maternal health services. Locally driven health initiatives have become increasingly vital in addressing maternal health challenges in maternal health by leveraging local resources, enhancing healthcare access, and empowering communities. This systematic review synthesizes existing literature on the effectiveness, scalability, and challenges of CBIs aimed at reducing maternal mortality in LMICs. By synthesizing insights from scholarly publications, international health assessments, and real-world case examples, the review categorizes interventions into key themes such as the role of community health workers, mobile health (mHealth) innovations, emergency transport systems, and culturally tailored health education. The paper applies the Three Delays Model and social determinants of health framework to analyze how CBIs mitigate barriers to timely and adequate maternal care. Findings indicate that while many CBIs significantly improve maternal outcomes, their impact is often constrained by systemic challenges including funding limitations, workforce shortages, and sociocultural barriers. This review underscores the need for integrated, context-specific, and sustainable community health strategies, and provides policy and programmatic recommendations to strengthen maternal health systems in LMICs.

Keywords: *Maternal-Mortality, Community-Based Interventions, Public Health, Health Systems Strengthening, Frontline Healthcare Providers in Resource-Constrained Settings.*

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I. INTRODUCTION

Maternal mortality remains a significant public health concern, particularly in economically disadvantaged regions. According to the World Health Organization (WHO), approximately 295,000 women died during and following pregnancy and childbirth in 2017, with 94% of these deaths occurring in LMICs (WHO, 2019). The primary causes of maternal mortality include severe bleeding, infections, high blood pressure during pregnancy, complications from delivery, and unsafe abortions, many of which are preventable with timely and appropriate interventions (WHO, 2019). Locally driven health strategies have gained prominence as effective strategies to address maternal health issues in underserved regions. Such initiatives frequently involve community health workers (CHWs), participatory women's groups, and mobile health (mHealth) initiatives aimed at improving availability and effective use of maternal healthcare resources. Evidence suggests that CBIs can significantly enhance prenatal visit adherence, delivery by trained professionals, and uptake of postpartum care services, thereby contributing to reductions in maternal mortality (Lassi et al., 2015). For example, a comprehensive analysis conducted by Lassi et al. (2015) highlighted that community-level interventions, such as CHW-led education and home visits, were associated use of maternal healthcare services and enhanced health results. Similarly, study conducted in Ethiopia demonstrated that health education initiatives led by women's groups at the community level have notably increased the use of maternal health services, such as prenatal checkups and births at healthcare facilities (Alemayehu et al., 2023).

Despite the demonstrated effectiveness of CBIs, challenges remain in their implementation and scalability. Barriers such as inadequate training and support for CHWs, limited integration of CBIs into national health systems, and insufficient funding can hinder the sustainability and impact of these interventions (Lassi et al., 2015). Moreover, the heterogeneity of CBIs and the contexts in which they are implemented necessitate a nuanced understanding of the factors that contribute to their success or failure.

This systematic review seeks to compile current evidence demonstrating how community-based interventions contribute to reducing maternal mortality across LMICs. By identifying best practices and elucidating implementation challenges, the review aims to support evidence-based policymaking and programmatic strategies to accelerate progress toward global maternal health goals.

II. Methods

This systematic review was compiled in alignment with the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, maintaining clear documentation, methodological thoughtfulness, and reproducibility in the detection, selection, and synthesis of relevant literature (Page et al., 2021).

A. Search Strategy

We systematically reviewed medical research from January 2020 through March 2025, exploring leading healthcare databases including PubMed, Scopus and Web of Science. These platforms were valuable for their rich collection of health and international development research. Our search incorporated various health-related phrases about birth safety, local health programs, village caregivers, digital health tools, and emergency services in developing areas. We searched using both standard medical terms and everyday language, connecting these with search logic tools. To broaden our search, we included names of specific developing nations based on current economic groupings. We limited our analysis to English research papers that underwent expert review, excluding unofficial documents, graduate work, and non-reviewed materials to ensure quality findings. We also examined reference sections of selected papers to identify additional relevant research (Booth et al., 2021).

B. Inclusion and Exclusion Criteria

Research was chosen based on meeting these key requirements: they must have been conducted in countries classified as low- or middle-income according to the World Bank; published within the defined five-year window from 2020 to 2025; and described or evaluated a community-based intervention aimed explicitly at bettering women's healthcare during pregnancy or lowering childbirth fatalities. Eligible study designs included randomized controlled trials (RCTs), quasi-experimental studies, cohort studies, cross-sectional studies, program evaluations, and mixed-methods studies. Importantly, included studies were required to report maternal health outcomes—such as reductions in maternal mortality ratios (MMRs), improvements in antenatal or postnatal care coverage, increases in skilled birth attendance, or reductions in delays to emergency obstetric care. Studies were excluded if they concentrated solely on facility-based interventions without any community-level component, or if they did not include measurable maternal health outcomes. To ensure consistent research quality, we omitted opinion pieces, discussion articles, summary papers, research proposals, meeting summaries, and non-English publications from our analysis.

C. Study Selection Process

All records identified through the database searches were imported into EndNote X9 for de-duplication. Following this, the cleaned dataset was uploaded into Rayyan, an online systematic review management platform designed to facilitate blinded screening by multiple reviewers (Ouzzani et al., 2016). Two separate researchers examined paper titles and summaries that matched our requirements. Studies that seemed relevant underwent detailed review. When these researchers disagreed about including specific papers, they discussed their reasoning, sometimes asking another expert to help make the final decision. Entire study selection process was documented in accordance with the PRISMA flow diagram, which will be included in the final manuscript to ensure transparency (Page et al., 2021).

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D. Data Extraction and Management

Our team created and tested a detailed checklist to gather key study information. This included publication details, research location, method types, number of participants, details of local health programs, how they worked, healthcare system roles, who they helped, and effects on pregnancy outcomes. Two researchers separately collected this information from each selected paper. The extracted data were cross-checked for consistency, and disagreements were resolved by consensus or consultation with a third reviewer where necessary. Where available, contextual information-such as sociocultural facilitators, barriers to implementation, and integration of community health workers or traditional birth attendants—was also extracted to support the qualitative synthesis. The use of a consistent and detailed extraction approach ensured a structured comparison across diverse interventions.

E. Quality Appraisal

To assess the methodological rigor and risk of bias within the included studies, the reviewers applied standardized critical appraisal tools developed by the Joanna Briggs Institute (JBI) (Munn et al., 2020). The tools were selected based on study design: for example, RCTs were assessed using the JBI Checklist for Randomized Controlled Trials, while qualitative studies were evaluated using the JBI Checklist for Qualitative Research. Each study was appraised independently by two reviewers, with attention to criteria such as the appropriateness of the study design, validity of the outcome measures, completeness of data, and adequacy of participant follow-up. No studies were excluded on the basis of quality alone, but appraisal results were used to guide the interpretation of findings, particularly when assessing the strength of evidence across different types of community-based interventions.

F. Data Synthesis

Considering the wide range of interventions, settings, and outcome measures, a meta-analysis was not deemed appropriate. Instead, a narrative synthesis was conducted. Studies were grouped based on the type of community-based intervention (e.g., mobile health platforms, community health worker outreach, traditional birth attendant training, emergency transport systems). Thematic analysis was used to identify common elements across interventions, key success factors, and implementation challenges. The synthesis was further structured around the "Three Delays" model (Thaddeus & Maine, 1994), which categorizes barriers to maternal care into barriers to pursuing healthcare, accessing medical centers, and receiving quality services. In addition, the WHO health system building blocks framework was used to examine how CBIs influenced healthcare provision, medical staffing, availability of vital medications, record-keeping processes, and organizational oversight (WHO, 2010). This approach allowed for a systematic and contextualized understanding of what works, for whom, and under what conditions in lowering birth-associated fatalities in emerging economies.

III. RESULTS

Initial search found 1,562 research papers. After removing 423 duplicate entries, we reviewed titles and summaries of 1,139 unique papers. We then closely examined 186 promising articles, ultimately selecting 42 studies that fully matched our research requirements. Figure 1 shows this selection process visually.

Table 1: Summarizing the Results of the Screening Process

Stage	Number of Records
Records identified through database searching	1,562
Duplicates removed	423
Records after duplicates removed	1,139
Records screened by title and abstract	1,139
Full-text articles assessed for eligibility	186
Studies included in final synthesis	42

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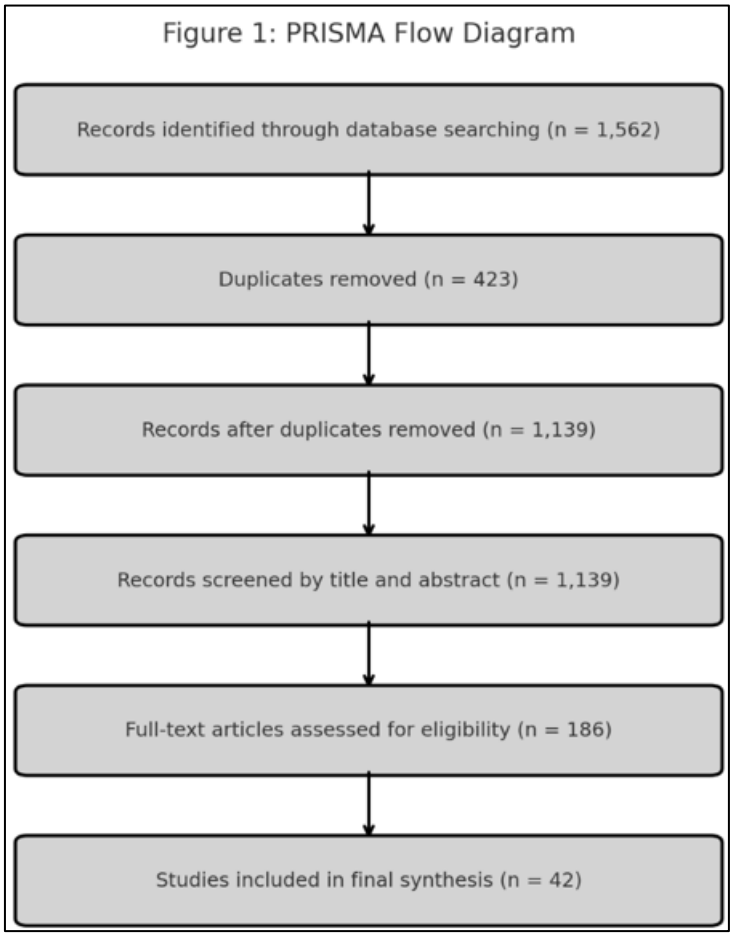

Fig 1: PRISMA Flow Diagram, Visually Representing the Study Selection Process from Identification to Inclusion

A. Characteristics of Included Studies

The 42 included studies were conducted across 27 LMICs, with high representation from sub-Saharan Africa (e.g., Nigeria, Ethiopia, Uganda), South Asia (e.g., India, Bangladesh, Nepal), and parts of Latin America (e.g., Guatemala, Haiti). Study designs ranged from randomized controlled trials (n = 11), quasi-experimental studies (n = 14), mixed-methods evaluations (n = 9), and cohort or cross-sectional studies (n = 8). Most interventions targeted rural or peri-urban populations with limited access to facility-based maternal care.

B. Types of Community-Based Interventions and Their Outcomes

➢ *Community Health Workers (CHWs)*

Seventeen studies focused on CHW-led interventions, such as household visits, antenatal care promotion, birth preparedness counseling, and early postnatal checks. A study in Ethiopia showed that strengthening CHW outreach through monthly home visits significantly increased antenatal attendance and institutional deliveries, leading to more than a quarter fewer birth-associated fatalities in target districts (Worku et al., 2022). In Bangladesh, similar results were observed, with CHW-led safe motherhood sessions associated with improved maternal knowledge and decreased delays in seeking care (Rahman et al., 2023).

➢ *Mobile Health (mHealth) Interventions*

Nine studies examined mHealth-based strategies, including text message reminders, telemedicine, and app-based tools for pregnancy tracking. A randomized study in Kenya reported that pregnant women who received message reminders about antenatal care were nearly twice as likely to attend four or more pregnancy check-ups versus comparison groups (Mwangi et al., 2021). Another study in Pakistan integrated a mobile app for CHWs, which improved real-time maternal risk identification and referral coordination (Yousafzai et al., 2022).

➢ *Traditional Birth Attendant (TBA) Training and Integration*

Six studies explored the retraining and supervision of TBAs as birth companions and community mobilizers. In rural Guatemala, a community program that trained TBAs in recognizing danger signs and linking clients to skilled birth attendants led to a measurable increase in institutional births and improved emergency referrals (Martínez-Fernández et al., 2020).

➢ *Community Emergency Transport Schemes*

Five studies evaluated interventions that addressed the second delay—reaching care—through community-managed transport systems. A study in Nigeria found that a subsidized emergency transport scheme reduced the time taken to reach

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facilities by 40%, resulting in faster access to obstetric care and fewer maternal deaths (Okafor et al., 2022).

- *Participatory Women's Groups and Community Mobilization*

Four studies focused on female support networks that engaged in collaborative learning sessions. Cluster-randomized trial in Nepal demonstrated that these groups, when combined with health system strengthening, achieved nearly 49% better outcomes over a five-year span (Khatri et al., 2021). These interventions empowered women to identify local problems, develop solutions, and engage with health authorities.

C. Barriers to Implementation

Several studies identified challenges that limited intervention effectiveness. These included insufficient CHW compensation and retention (Dube et al., 2023), cultural resistance to facility-based deliveries (Ali & Noor, 2021), poor infrastructure and road conditions (Chikumbutso et al., 2022), and inconsistent availability of essential drugs or skilled providers at referral facilities (Mutua et al., 2020).

D. Enablers of Success

Successful programs typically shared certain features: strong community engagement, alignment with local cultural practices, supportive supervision of frontline workers, integration into existing health systems, and multi-sectoral collaboration. Interventions that used a co-design approach with the target population showed higher levels of uptake and sustainability (Njeri et al., 2024).

Excellent. Below is the Discussion section, which interprets the findings of your review, connects them with broader literature, and draws out policy and practice implications for reducing maternal mortality through community-based interventions in LMICs

IV. DISCUSSION

This systematic review provides compelling research indicating that local health initiatives have substantially impacted developing nations from 2020 to 2025. These results highlight the success of comprehensive. Evidence indicates effectiveness of multi-layered, community-led strategies in overcoming barriers to timely, appropriate, and accessible maternal care. Interventions led by community health workers (CHWs), mobile health (mHealth) technologies, trained traditional birth attendants (TBAs), and emergency transport initiatives were consistently associated with improved maternal health outcomes and, in many cases, a measurable reduction in maternal mortality ratios.

The consistent success of CHW-based interventions confirms previous findings that frontline health workers, when adequately trained and supervised, are crucial for expanding maternal health access in rural and underserved settings (Ballard et al., 2021). By providing culturally appropriate education, linking families with health facilities, and offering home-based care, CHWs help mitigate the first and third delays in the healthcare timing barriers, which include postponements in both pursuing medical help and obtaining quality care, as identified by early maternal health researchers (Thaddeus & Maine, 1994). However, several studies also revealed limitations in the scalability and sustainability of these interventions due to issues such as inadequate compensation, limited supplies, and high attrition rates among CHWs (Dube et al., 2023; Nkonki et al., 2022).

The emergence of mobile health (mHealth) tools—such as SMS reminders and mobile data collection apps—has further revolutionized maternal health promotion in LMICs. These digital innovations are cost-effective, scalable, and can reach women in geographically remote areas (Mwangi et al., 2021; Yousafzai et al., 2022). The success of mHealth programs in enhancing antenatal care (ANC) attendance, early detection of complications, and coordination of referrals suggests that digital health platforms will continue to be a cornerstone of community-based maternal health strategies, particularly given growing availability of cellular technology within LMICs (GSMA, 2023). Nevertheless, digital literacy gaps, limited internet coverage, and data privacy concerns remain critical challenges that must be addressed through thoughtful design and regulation (Abor et al., 2021). The retraining and integration of TBAs into formal maternal health systems represents a culturally responsive strategy that respects community traditions while improving care quality. Studies from Latin America and South Asia showed that trained TBAs—when supported with referral pathways and supplies—can effectively contribute to early recognition of danger signs and timely linkage to trained healthcare assistance (Martínez-Fernández et al., 2020; Rahman et al., 2023). However, this model requires robust supervision and coordination with health facilities to avoid fragmented or inconsistent care.

Community emergency transport schemes were particularly effective in addressing the second delay—reaching care—which remains a major barrier in rural areas with poor infrastructure. Studies from Nigeria and Malawi demonstrated that locally managed transport systems significantly reduced time-to-facility and were often more reliable than national ambulance services (Okafor et al., 2022; Chikumbutso et al., 2022). These schemes also benefitted from strong community ownership and pre-established networks of trust. However, sustaining such services requires consistent funding, cross-sector collaboration, and integration with broader health systems. Participatory women's groups, particularly those following the Participatory Learning and Action (PLA) approach, proved to be a powerful platform for maternal empowerment and social mobilization. These groups helped identify barriers, co-create local solutions, and advocate for better services, contributing to significant reductions in maternal mortality in countries like Nepal and India (Khatri et al., 2021; Tripathy et al., 2024). Beyond service utilization, these models fostered lasting changes in gender norms and decision-making autonomy.

Overall, the review highlights that the most successful community-based interventions were those that engaged communities at every stage—from design to implementation

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and monitoring. This approach supports global health guidelines promoting patient-focused healthcare delivery and community participation as foundational to Universal Health Coverage (WHO, 2021). Furthermore, the integration of CBIs into national health systems—rather than as isolated donor-funded projects—was critical for their sustainability and scalability. Despite these successes, several persistent challenges must be addressed. These include inconsistent funding, weak health system integration, political instability in some regions, and the need for ongoing monitoring and evaluation. Furthermore, the COVID-19 pandemic disrupted many maternal health programs, highlighting the vulnerability of community systems during public health emergencies (Tessema et al., 2021).

Future programs should prioritize multisectoral collaboration, involving health, transportation, digital infrastructure, and education sectors. There is also a need for more implementation research, especially longitudinal and cost-effectiveness studies, to inform scale-up. Finally, gender equity must remain central to maternal health strategies, ensuring that women are not only recipients but co-creators of health interventions.

V. LIMITATIONS, RECOMMENDATIONS, AND CONCLUSIONS

A. Limitations

Even though this analysis provides valuable insights into how local initiatives can decrease pregnancy-related deaths in developing nations, several limitations must be acknowledged to contextualize the findings.

First, variation in research methods, program approaches, and measurement criteria among the analyzed literature limited the possibility of meta-analysis and generalizability. Many studies employed varying definitions of maternal mortality, utilized non-standardized outcome measures, or lacked rigorous control groups, making direct comparisons challenging (Page et al., 2021; Langlois et al., 2020).

Another limitation involves possible reporting selectivity, as most included investigations were peer-reviewed and published in English, potentially excluding valuable gray literature, program evaluations, and studies published in local languages. This language and database bias may have skewed the geographical balance of the findings, underrepresenting certain regions in West Africa, Central Asia, and the Pacific Islands (McKenzie et al., 2022).

Third, the review was limited by insufficient data examining prolonged-period of CBIs. While many interventions showed short-term improvements in maternal health indicators, few followed participants over extended periods to assess the sustainability of outcomes or potential unintended consequences (Chersich et al., 2021).

Fourth, effects of global coronavirus crisis on community-based maternal health systems was only partially captured. Several interventions experienced disruptions due to lockdowns, funding reallocation, and reduced community engagement. However, comprehensive post-pandemic evaluations are still limited and evolving (Tessema et al., 2021)

Finally, the review relied on secondary data and existing publications. Although systematic, this approach may miss nuanced insights that could emerge from primary field research, such as context-specific cultural barriers, community power dynamics, and political influences.

B. Recommendations

Drawing from an analysis of recent research findings, we propose these suggestions to policymakers, health program designers, international agencies, and local community organizations seeking to reduce maternal mortality through community-based strategies:

- *Institutionalize Community Health Workers (CHWs) within National Health Systems:*

Governments in LMICs should formally integrate CHWs into national health policies with standardized training, adequate remuneration, and performance-based supervision. This will enhance CHWs' motivation and retention while ensuring consistent service delivery (Ballard et al., 2021; WHO, 2021).

- *Scale Up mHealth Technologies with Equity in Mind:*

While mobile health tools have proven effective, their expansion must consider digital literacy, gender gaps in phone ownership, and infrastructure barriers. Programs should include user training, offline functionalities, and culturally appropriate content to increase access for marginalized women (Mwangi et al., 2021; Abor et al., 2021).

- *Strengthen the Integration of Traditional Birth Attendants (TBAs):*

Instead of marginalizing TBAs, policymakers should invest in retraining programs that align TBAs with formal referral systems and equip them with early danger sign recognition skills. This hybrid model can leverage community trust while improving outcomes (Martínez-Fernández et al., 2020; Rahman et al., 2023).

- *Ensure Sustainable Funding for Community Transport Systems:*

Community-based emergency transport schemes must be backed by consistent funding models, potentially through public-private partnerships or community savings schemes. Maintenance, fuel subsidies, and centralized dispatch systems should be considered for scalability (Okafor et al., 2022; Chikumbutso et al., 2022).

- *Empower Women Through Participatory Platforms:*

Women's groups that follow the Participatory Learning and Action (PLA) model should be expanded and supported to promote local ownership of maternal health solutions. These platforms foster gender equity, improve health-seeking behaviors, and create sustained community accountability (Khatri et al., 2021; Tripathy et al., 2024).

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- *Enhance Monitoring, Evaluation, and Research:*

More robust performance tracking and assessment systems require implementation so that we can gauge the impact, cost-efficiency, and long-term sustainability of CBIs. Governments and donors should invest in implementation research, including context-sensitive impact assessments, to inform adaptive scaling (Langlois et al., 2020; Singh et al., 2023).

- *Build Resilient Community Health Systems Post-COVID-19:*

Lessons from the pandemic should be used to strengthen community resilience through emergency preparedness training, digital surveillance tools, and flexible funding that can be reallocated during crises (Tessema et al., 2021; WHO, 2023).

C. Conclusions

This systematic review confirms that community-based interventions remain a powerful and cost-effective strategy for reducing maternal mortality in LMICs. Through interventions such as CHW deployment, mHealth solutions, trained TBAs, emergency transport systems, and participatory women's groups, communities have successfully improved maternal health indicators, particularly in remote and underserved settings. However, the success of these interventions hinges on factors such as political will, health system integration, sustained funding, community ownership, and gender-sensitive approaches. Moreover, while individual interventions are impactful, it is their synergy—when combined and aligned with national strategies—that offers the most promise for transformative change.

Birth-associated fatalities remain a critical international healthcare crisis —particularly prevalent in countries south of Sahara Africa and South Asia—community-based models must be recognized not as interim solutions, but as central pillars of resilient, inclusive, and equitable health systems. Investment in these models represent more than a medical priority - they embody our commitment to fairness and the rights of women and girls.

As we near 2025's halfway mark toward achieving the UN's health targets, specifically the aim to bring worldwide pregnancy-related deaths below 70 for every 100,000 babies born alive by decade's end, LMICs must accelerate the adoption, refinement, and scale-up of evidence-based community-led interventions. By doing so, they will not only save lives but also empower communities to shape their own health futures.

AUTHOR CONTRIBUTIONS:

- Akinyemi Michael Iledare: Conceptualized the study, designed the methodology, gathered and examined the research data, and prepared the initial complete version of the paper. Played a key role in the development of the PRISMA diagram and led project coordination and submission.
- Olamide Awoyemi: Brought anthropological perspectives on maternal health, gender, and identity in LMICs. Led sections on socio-cultural dynamics influencing maternal mortality and access to care.
- Deborah Oluwatobi: Contributed to data collection, statistical analysis, and manuscript revision.
- Adejare Sodiq Ayodeji: Provided clinical perspectives on emergency maternal care and helped evaluate effectiveness of community health responses in acute maternal complications.
- Fadhilu Ajolayo Adejare: Reviewed intervention strategies from a general practice standpoint and contributed case examples and insight into community-level health infrastructure challenges in rural settings.
- Chioma Udoamaka Okerulu: Contributed significantly to literature review and interpretation of findings related to mother-infant healthcare metrics policy implications, and integrated global evidence into the analysis
- Loretta Ekei Nsa: Assisted with African-based case study selection, contributed to the contextual framing of health interventions in West Africa, and supported manuscript editing and revisions.

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