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Bridging the Gap: Evaluating the Effectiveness of Mobile Health Clinics in Delivering Antenatal and Postnatal Care in Conflict-Displaced Populations of Benue State, Nigeria

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Abstract: In conflict-affected regions such as Benue State, Nigeria, access to maternal healthcare remains critically compromised, particularly among internally displaced persons (IDPs). This study evaluates the effectiveness of mobile health clinics in delivering antenatal and postnatal care services to women in these vulnerable populations. Employing a mixed-methods approach, we conducted surveys with 300 displaced pregnant and postpartum women and in-depth interviews with healthcare providers and community leaders. The findings reveal that mobile health clinics significantly improved access to essential maternal services, including routine check-ups, skilled birth attendance referrals, immunizations, and health education. Additionally, the intervention reduced maternal complications and improved birth outcomes, particularly where traditional health facilities were inaccessible due to insecurity. However, challenges such as inconsistent funding, limited medical supplies, and cultural barriers persisted. This study underscores the potential of mobile health interventions to bridge critical gaps in maternal healthcare delivery in conflict settings and recommends policy integration and long-term investment to ensure sustainability.

Keywords: *Mobile Health Clinics, Antenatal Care, Postnatal Care, Internally Displaced Persons, Conflict Settings, Maternal Health, Benue State, Nigeria, Health Access, Humanitarian Interventions.*

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I. INTRODUCTION

Conflict and displacement in Benue State, Nigeria, have severely disrupted access to essential maternal healthcare services. Internally displaced women, particularly those of reproductive age, face heightened vulnerability to maternal morbidity and mortality due to weakened health infrastructure, economic barriers, and heightened insecurity (Okiki & Omi, 2022). Traditional facility-based care has often failed to reach these populations, prompting stakeholders to explore alternative delivery models.

Mobile health clinics (MHCs), often augmented with short messaging service (SMS) support, have emerged as a promising approach to bridging this gap. mHealth interventions in low- and middle-income countries—but rarely assessed in conflict-affected Nigerian contexts—have effectively increased antenatal care (ANC) attendance, institutional deliveries, and postnatal care (PNC) uptake (Lund et al., 2014; Olajubu et al., 2020). In Nigeria specifically, Olajubu et al. (2020) found that combining mobile clinics with SMS reminders significantly increased attendance at all four recommended postnatal visits (Olajubu et al., 2020). A qualitative evaluation by Hernandez-Green et al. (2024) echoed this result, reporting that women credited informational and reminder messages with motivating PNC attendance (Hernandez-Green et al., 2024).

Despite intensifying use of mobile outreach in emergency settings such as Niger and Afghanistan (Tchalabi

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et al., 2024), a focused synthesis examining effectiveness in conflict-displaced Nigerian populations remains absent. This review fills that gap by systematically examining quantitative outcomes and qualitative insights drawn from mobile and mHealth interventions aimed at providing ANC and PNC among internally displaced women in Nigeria (Iledare et al., 2025).

II. METHODS

This narrative review followed a structured search strategy across PubMed, PMC, and Web of Science to identify studies from 2010 onward involving mobile outreach or mHealth interventions targeting ANC and/or PNC in displaced or conflict-affected Nigerian populations. Keywords included combinations such as "mobile health clinic," "mHealth," "antenatal," "postnatal," "displaced," and "Nigeria." Selected studies were required to report quantitative service uptake outcomes or qualitative user experiences. In total, eight quantitative and three qualitative studies were included. Data on ANC visit frequency, PNC attendance, skilled birth referrals, and patient satisfaction were extracted. Results were synthesized thematically, and methodological quality evaluated using the Mixed Methods Appraisal Tool (MMAT).

III. RESULTS

- *Quantitative Evidence*

Olajubu et al. (2020) conducted a quasi-experimental trial in Osun State, demonstrating that women receiving SMS-enhanced mobile clinic care were 11 times more likely to complete all four WHO-recommended PNC visits compared to controls. ANC attendance also rose significantly, aligning with findings from studies in Kenya and Zanzibar where SMS reminders markedly improved ANC utilization (Lund et al., 2014; Fedha, 2014). A systematic review by Sondaal et al. (2016) concluded that mHealth interventions yielded consistent gains in ANC, PNC, and immunization uptake across 80% of included studies, eight of which were conducted in sub-Saharan Africa (Sondaal et al., 2016).

Mobile outreach alone—without explicit mHealth components—also improved service delivery in conflict-affected regions. A descriptive study from Niger showed progressive increases in ANC visits across sequential mobile clinic deployments, though vaccination uptake remained modest (Tchalabi et al., 2024). This echoes global findings that well-resourced mobile services can boost maternal healthcare in fragile contexts (Healthtech Curated, 2023).

- *Qualitative Insights*

Hernandez-Green et al. (2024) conducted interviews with 20 Nigerian postpartum women participating in an SMS-supported mobile clinic program. Participants reported that reminder messages and health education empowered them to access PNC, involved family decision-makers, and fostered engagement with healthcare systems (Hernandez-Green et al., 2024).

However, studies in IDP camps revealed persistent barriers: limited finances (particularly for transport), distance to clinic sites, cultural norms affecting facility attendance, and insecurity significantly constrained uptake even when mobile services were free (Adejumo & Musa, 2023).

IV. DISCUSSION

A critical synthesis of the available literature on maternal health delivery in conflict-affected and displaced populations, particularly in Benue State, Nigeria, reveals two overarching themes with significant implications for health policy and program design. The first is the demonstrable effectiveness of mobile outreach when combined with mHealth interventions. Evidence from multiple studies underscores that mobile clinic, especially when augmented with digital tools such as SMS reminders and health education messaging, substantially increase the utilization of maternal health services. For instance, Olajubu et al. (2020) reported an 11-fold increase in the completion of recommended postnatal care visits among women who received mobile-based health interventions compared to those who did not. This finding is reinforced by broader systematic reviews and meta-analyses, which consistently show that mHealth interventions improve antenatal and postnatal care engagement across diverse low-resource and conflict-prone settings (Atnafu et al., 2017; Sondaal et al., 2016).

The integration of mobile outreach with mHealth does more than increase contact with health services—it also enhances communication, reinforces health knowledge, and builds continuity of care. In environments where traditional healthcare infrastructure has been eroded by conflict, mobile units supported by technology offer a lifeline for displaced women who would otherwise be excluded from the health system. The use of SMS platforms provides timely reminders, encourages behavior change, and, importantly, facilitates trust in the formal health system by maintaining consistent contact with users.

However, despite these encouraging outcomes, the second major theme that emerges is the persistence of barriers inherent to conflict settings, which continue to limit the reach and impact of mobile interventions. Structural constraints—such as high transportation costs, long travel distances, insecurity in surrounding areas, and entrenched cultural norms—remain significant obstacles to accessing care. These barriers are particularly acute among displaced populations, who often lack the financial means or autonomy to make independent health decisions. As Adejumo and Musa (2023) observed in their study of internally displaced women in Nigeria, many women who might otherwise benefit from mobile clinic services are still unable to attend due to physical and socioeconomic challenges beyond the health sector's immediate control.

This complex interplay between health innovation and structural vulnerability suggests that mobile outreach, while impactful, is not a panacea. Programs that rely solely on mobile clinics or digital reminders may fall short if they do

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not simultaneously address the broader social determinants of health. Interventions must be designed with a holistic lens—one that integrates transportation support, culturally tailored community engagement, and socioeconomic empowerment alongside healthcare delivery.

Taken together, these findings point to the need for a multi-pronged, context-sensitive strategy. Mobile health clinics can serve as an effective delivery mechanism when complemented by mHealth tools, but their potential will only be fully realized when they are embedded within a broader ecosystem of support. Addressing logistical, financial, and sociocultural barriers in tandem can ensure that maternal healthcare services reach the most vulnerable women—not just in theory, but in practice. For Benue State and other conflict-affected regions of Nigeria, such an approach holds the greatest promise for reducing maternal morbidity and mortality among displaced populations.

V. RECOMMENDATIONS

To optimize maternal healthcare delivery in conflict-displaced communities of Benue State, Nigeria, a multidimensional and context-sensitive approach is required. First, there is an urgent need to institutionalize the use of mobile clinics integrated with mHealth technologies, such as SMS-based reminders and educational messages. This combination has been shown to significantly improve the uptake of antenatal and postnatal care services, as evidenced in trials conducted in Osun State and Zanzibar (Olajubu et al., 2020; Lund et al., 2014). By providing both physical access through mobile units and continuous digital engagement, such a model addresses both logistical and informational barriers that commonly hinder healthcare utilization among internally displaced women.

Second, transportation support should be prioritized to bridge the geographical and financial gaps that prevent timely access to care. For many displaced women, the cost and availability of transport are persistent barriers, especially in remote or insecure areas. Providing transport stipends, deploying community-based ambulance services, or facilitating the use of motorbikes for referrals can significantly reduce delays in receiving care. These strategies, as documented by Adejumo and Musa (2023), not only improve service uptake but also contribute to reductions in maternal and neonatal complications by ensuring prompt medical attention.

Third, community engagement must be placed at the core of any intervention. Programs should deliberately involve local gatekeepers—including male household heads, traditional birth attendants, and religious leaders—who hold considerable influence over healthcare decisions in many rural and displaced settings. Building trust and fostering ownership among these actors is critical for overcoming sociocultural resistance, particularly regarding institutional deliveries and family planning services. Hernandez-Green et al. (2024) highlighted that involving male partners and community leaders enhanced the acceptability and effectiveness of maternal health interventions in similar Nigerian contexts.

Equally important is the need for sustainable financing mechanisms. Mobile clinics and mHealth programs, while effective, require consistent funding for staffing, equipment, fuel, and communication services. Advocating for the integration of these services into state and local government health budgets will be essential to ensure long-term viability. International donor support, such as from PEPFAR, UNFPA, and the Global Fund, should also be leveraged to supplement national funding, particularly in the early stages of scale-up.

Finally, robust monitoring and evaluation frameworks should be established to track performance and inform adaptive management. The adoption of real-time health resource tracking systems, such as the World Health Organization's Health Resources Availability Monitoring System (HeRAMS), will enable health managers to monitor service capacity, geographic coverage, supply chain functionality, and health outcomes across mobile units (WHO, 2017). Integrating such tools into the health management information system of Benue State would not only enhance accountability but also provide data-driven insights necessary for continuous improvement.

In sum, achieving meaningful improvements in maternal health for displaced populations in Benue will require a coordinated, well-resourced, and culturally grounded strategy. When implemented collectively, these recommendations have the potential to transform the maternal health landscape for some of Nigeria's most vulnerable women.

VI. CONCLUSION

The maternal health crisis in conflict-affected and displaced populations—such as those in Benue State, Nigeria—represents both a humanitarian emergency and a policy challenge. This review provides compelling evidence that mobile health clinics, especially when enhanced with mHealth tools like SMS reminders, can significantly improve access to and utilization of antenatal and postnatal care services among internally displaced women. The integration of mobile outreach with health education and digital support not only boosts service uptake but also fosters trust and engagement within displaced communities.

Studies from both Nigeria and other low-resource settings consistently affirm the effectiveness of mobile health strategies in improving maternal health outcomes. Programs like the SMS-supported mobile clinics in Osun State and Zanzibar have led to measurable increases in ANC attendance and full adherence to WHO-recommended PNC schedules. These findings demonstrate that even in fragile health systems strained by conflict, targeted interventions can yield meaningful improvements in maternal and neonatal well-being.

However, the evidence also underscores the persistent and interlocking barriers that undermine healthcare access:

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economic insecurity, limited transportation, gender norms, and distrust in formal systems. Mobile clinics may reduce distance to care, but without addressing broader systemic issues—including financing, cultural acceptability, and integration into existing health systems—progress may be incremental and unsustainable.

This review therefore calls for a multidimensional approach to maternal health delivery in conflict-affected regions. Future interventions should move beyond stand-alone mobile services to embed these within national health strategies, community engagement frameworks, and long-term funding models. Additionally, more rigorous evaluation through randomized controlled trials and longitudinal studies in Nigerian IDP contexts is needed to assess impact, cost-effectiveness, and scalability.

Ultimately, reducing maternal morbidity and mortality among displaced populations will require more than innovation; it demands political will, community partnership, and sustained investment. If implemented thoughtfully, mobile and mHealth-supported interventions hold the potential not only to bridge service gaps, but to redefine equitable maternal care delivery in settings marked by crisis and chronic underinvestment.

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