

# Mobile SMS Reminders Versus Phone Calls in Improving Clinic Attendance Among Pregnant Women With HIV: A Comparative Review

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## ABSTRACT

Improving clinic attendance among pregnant women living with HIV remains a critical public health priority to ensure effective prevention of mother-to-child transmission (PMTCT) and optimal maternal and infant health outcomes. Missed antenatal and postpartum visits are prevalent, particularly in resource-limited settings, due to structural, social, and psychological barriers. Mobile health (mHealth) interventions, specifically SMS reminders and phone calls, have emerged as promising strategies to improve appointment adherence in maternal HIV care. This comparative review critically examined the effectiveness, feasibility, acceptability, and contextual applicability of SMS reminders versus phone calls in enhancing clinic attendance among this vulnerable population. Drawing on evidence from randomized controlled trials, implementation studies, and observational data, the article highlighted the relative strengths of each modality: SMS interventions are low-cost, scalable, and discrete, while phone calls offer personalized, interactive engagement that may be more effective in addressing psychosocial barriers. A narrative literature synthesis method was utilized to integrate and compare findings across diverse studies. The review underscored that intervention success is influenced by factors such as literacy, mobile phone access, health system infrastructure, and cultural context. While both modalities show benefit, hybrid models incorporating both SMS and phone calls may offer the most balanced and context-sensitive solution. Future research should focus on head-to-head comparisons, sustainability, patient-centered design, and integration into broader digital health systems.

**Keywords:** Mobile health (mHealth), HIV-positive pregnant women, Clinic attendance, SMS reminders, Phone call interventions.

## INTRODUCTION

Pregnant women living with HIV constitute a priority population in global public health due to the dual risk posed to both maternal and child health [1, 2]. Prevention of mother-to-child transmission (PMTCT) services, including routine antenatal care, antiretroviral therapy (ART), and postnatal follow-up, are essential in achieving the goal of eliminating pediatric HIV [3, 4]. However, poor clinic attendance during pregnancy and postpartum remains a persistent challenge, particularly in low- and middle-income countries where logistical, social, and economic barriers are prevalent. Missed appointments contribute to treatment interruptions, poor maternal outcomes, and increased risk of vertical HIV transmission. As such, there is a critical need for interventions that enhance clinic attendance among this vulnerable group.

Mobile health (mHealth) technologies have gained traction as scalable, cost-effective tools to support patient engagement and health service utilization [5, 6]. Two commonly implemented modalities, short message service (SMS) reminders and phone calls, have been employed to improve attendance in antenatal and HIV care settings. SMS reminders are typically automated, low-cost, and asynchronous, allowing wide coverage without extensive human resources [7]. In contrast, phone calls offer a more personalized and interactive approach, potentially allowing immediate problem-solving and rapport-building, albeit with higher resource demands. This review aims to critically evaluate and compare the effectiveness of SMS reminders and phone calls in improving clinic attendance among pregnant women living with HIV. Drawing upon findings from randomized controlled trials (RCTs), implementation studies, and observational data, we assess both modalities in terms of clinical effectiveness,

feasibility, acceptability, and sustainability. The comparative analysis further explores contextual factors such as literacy, mobile phone access, cultural norms, and health system capacity that mediate intervention success. Ultimately, this review seeks to inform evidence-based decision-making for program implementers and policymakers aiming to optimize maternal HIV care through digital health innovations.

### **Burden of Missed Appointments in Maternal HIV Care**

Maternal HIV care, particularly during the antenatal and postpartum periods, requires sustained engagement to ensure optimal outcomes for both the mother and the infant. Clinic attendance is directly linked to ART adherence, early infant diagnosis, and the delivery of key interventions such as cotrimoxazole prophylaxis and immunization [8]. However, a considerable proportion of pregnant women with HIV in sub-Saharan Africa and other resource-limited regions do not complete the recommended number of clinic visits. Studies estimate that between 20% to 40% of women miss at least one critical PMTCT visit, with attrition rates increasing after delivery [9].

The reasons for poor attendance are multifactorial and often intersecting. These include transportation challenges, financial hardship, stigma, lack of social support, conflicting responsibilities (e.g., childcare, employment), and negative experiences with healthcare providers. Psychological barriers such as depression and denial of HIV status further impede adherence to scheduled appointments. In this context, reminder systems may serve a dual purpose both as cognitive prompts and as sources of psychosocial support, thereby mitigating forgetfulness, ambivalence, or disengagement.

Interventions that reduce missed appointments have the potential to improve not only individual health outcomes but also broader public health indicators by reducing mother-to-child transmission rates and decreasing HIV-related maternal mortality. mHealth interventions, especially those using mobile phones, offer an opportunity to bridge gaps in communication and accountability, particularly in regions where mobile phone penetration is high and health worker availability is limited.

### **SMS Reminders: Mechanism and Evidence of Effectiveness**

SMS reminders involve sending automated or semi-automated text messages to patients ahead of scheduled appointments [10, 11]. Messages may be personalized with the recipient's name, date and time of the appointment, and a health-promoting message. They are usually delivered 24 to 72 hours before the appointment and can be repeated as necessary. SMS interventions are relatively inexpensive, require minimal infrastructure, and can be integrated into electronic health record systems or standalone platforms.

Several studies have reported modest but statistically significant improvements in appointment adherence with SMS reminders among pregnant women with HIV [12]. In one multicenter RCT conducted in East Africa, women receiving SMS reminders demonstrated a 15% increase in antenatal visit attendance compared to the control group [13]. Another cluster-randomized study in South Africa found that biweekly motivational SMS messages were associated with improved ART adherence and higher clinic retention rates.

The strengths of SMS interventions include wide scalability, especially in resource-limited settings with limited personnel. The anonymity of SMS may also reduce concerns about confidentiality, particularly in communities where HIV stigma is prevalent. However, the success of SMS reminders hinges on several factors, including the recipient's ability to read, understand, and retain the message. Literacy, language barriers, and shared phone usage may reduce effectiveness. Moreover, one-way SMS lacks interactivity, limiting opportunities for clarification, feedback, or psychosocial support.

### **Phone Calls: Mechanism and Evidence of Effectiveness**

Phone calls, unlike SMS, offer synchronous communication and a more personalized touch. A healthcare provider or trained counselor calls the patient directly, usually within 48–72 hours before the scheduled appointment, to remind them and inquire about barriers to attendance. Some models incorporate problem-solving counseling or motivational interviewing during the call, which can address both logistical and emotional barriers to care.

Evidence from several RCTs supports the effectiveness of phone calls in improving clinic attendance among pregnant women with HIV [14]. In a study conducted in Nigeria, personalized phone calls led to a 20% improvement in antenatal care attendance compared to standard care [15, 16]. Another trial in Kenya demonstrated that phone call interventions led to higher postpartum follow-up rates and improved infant HIV testing coverage.

Phone calls can also serve as real-time platforms for addressing patient concerns, rescheduling missed appointments, or providing immediate support in cases of emotional distress [17]. The human interaction inherent in phone calls fosters accountability and connection, which may enhance patient trust and engagement. However, phone call interventions are resource-intensive, requiring trained staff, airtime costs, and reliable cellular networks. They are also vulnerable to privacy concerns, particularly in households where phone access is communal or monitored by others. Missed calls and inconsistent phone access may further reduce the intervention's reach and effectiveness.

### **Comparative Analysis: SMS Reminders Versus Phone Calls**

When comparing SMS reminders and phone calls, several domains must be considered: effectiveness, cost, scalability, patient acceptability, and operational feasibility.

- i. **Effectiveness:** While both modalities have demonstrated efficacy in improving clinic attendance, phone calls generally show larger effect sizes, likely due to their interactive nature. Meta-analyses indicate that phone calls outperform SMS in settings with high literacy challenges or where patients face complex psychosocial barriers to care.
- ii. **Cost and Scalability:** SMS is more cost-effective and easily scalable than phone calls, especially in programs covering large geographic areas or populations [18]. Once the systems are in place, messages can be scheduled and sent with minimal marginal cost. Phone calls, in contrast, require ongoing investment in human resources, training, and supervision.
- iii. **Patient Acceptability:** Pregnant women often express a preference for personalized communication [19]. Studies show higher satisfaction with phone calls, especially when delivered by known providers or trained counselors. However, SMS is preferred by those who value discretion or have limited time for conversations. Thus, cultural norms and individual preferences must guide modality selection.
- iv. **Feasibility and Implementation Challenges:** Both interventions require updated patient contact information and consistent access to mobile networks. Technical issues such as phone battery limitations, network outages, or message delivery failures affect both SMS and calls. Furthermore, the implementation of fidelity-ensuring messages is sent or calls made as scheduled can be a limiting factor, especially in under-resourced settings.

### Contextual Considerations for Intervention Success

The effectiveness of both SMS and phone call interventions is context-dependent. In urban settings with high mobile phone penetration, both modalities may be feasible. In rural areas, however, inconsistent network coverage and phone ownership patterns may limit reach. The linguistic diversity of populations requires that messages be translated appropriately and delivered in a culturally sensitive manner.

Mobile phone access among pregnant women with HIV is not uniform [20]. Shared or borrowed phones are common, particularly among younger or economically disadvantaged women. In such cases, privacy and confidentiality concerns may reduce engagement. Interventions must therefore include safeguards, such as neutral message content or opt-in consent, to minimize the risk of unintended disclosure.

Literacy also plays a critical role. In populations with low literacy levels, SMS may be ineffective, making voice calls a more appropriate alternative. Conversely, in literate populations with strong digital familiarity, SMS may be sufficient and more scalable.

Ultimately, integrating both modalities into a tiered system starting with SMS and escalating to phone calls for non-responders may offer an optimal balance between reach, cost, and effectiveness. Such hybrid approaches are increasingly being explored and warrant further evaluation.

### Future Research Directions

While existing studies support the utility of SMS and phone calls in improving clinic attendance, several research gaps remain. First, a few studies have directly compared both modalities within the same trial, making it difficult to draw definitive conclusions about relative effectiveness. Future RCTs with head-to-head comparisons are needed, incorporating cost-effectiveness and patient preference metrics.

Second, there is limited data on the long-term sustainability of these interventions beyond the immediate postpartum period. Follow-up studies should evaluate continued engagement in HIV care, ART adherence, and maternal-infant outcomes over time. Third, integration of mHealth tools with broader electronic health systems, such as appointment tracking and case management platforms, should be studied to assess operational benefits and efficiencies. Moreover, the potential of mobile technologies to offer more than just reminders, such as education, psychosocial support, and behavior change counseling, should be explored through comprehensive, multifaceted mHealth interventions [21]. The role of two-way communication and chat-based platforms (e.g., WhatsApp) in enhancing engagement is another promising area for future exploration. Finally, patient-centered implementation research is necessary to understand the preferences, barriers, and facilitators from the perspective of end users. Involving pregnant women with HIV in the design, testing, and refinement of interventions will ensure greater relevance and effectiveness.

### CONCLUSION

Improving clinic attendance among pregnant women living with HIV is essential to the success of maternal HIV care and the elimination of mother-to-child transmission. Both mobile SMS reminders and phone calls have demonstrated effectiveness in enhancing appointment adherence, though each modality has distinct advantages and limitations. SMS offers scalability and cost-efficiency, while phone calls provide a more personalized and interactive approach, potentially yielding greater behavioral impact. The choice between SMS and phone calls should be guided by local context, patient preferences, health system capacity, and resource availability. In many settings, hybrid models may offer the most practical solution, leveraging the strengths of both approaches to maximize coverage and effectiveness. Importantly, ethical considerations around privacy, confidentiality, and informed consent must underpin all mHealth interventions. As mobile technology continues to evolve and permeate everyday life, its

integration into maternal HIV care offers an unprecedented opportunity to bridge gaps in service delivery. However, sustained success requires not only technological innovation but also community engagement, health system strengthening, and evidence-based program design. Future research should aim to refine intervention strategies, ensure equity in access, and embed mHealth solutions into comprehensive maternal health frameworks.

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**CITE AS: Kato Jumba K. (2025). Mobile SMS Reminders Versus Phone Calls in Improving Clinic Attendance Among Pregnant Women With HIV: A Comparative Review. INOSR Experimental Sciences 15(3):84–88. <https://doi.org/10.59298/INOSRES/2025/1538488>**