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Curbing Maternal Mortality Rate Leveraging Information & Communication Technology Tools, in Mgbirichi Community

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Abstract: Maternal mortality remains a major public health challenge in many rural communities in Nigeria, including Mgbirichi Village. This study aims to investigate how Information and Communication Technology (ICT) tools can be leveraged to curb maternal mortality by improving access to maternal healthcare services, health information dissemination, emergency response, and patient monitoring. The objectives are to identify the factors contributing to maternal mortality in Mgbirichi Village, develop an ICT-based intervention framework, and evaluate its effectiveness in enhancing maternal healthcare delivery. The study adopted a descriptive survey and system development methodology. Primary data were collected through questionnaires, interviews, and observations involving pregnant women, healthcare workers, and community stakeholders. The proposed system was designed using a web-based architecture that integrates mobile communication technologies for antenatal reminders, health education, emergency alerts, and patient record management. Software tools utilized include PHP, MySQL, HTML, CSS, JavaScript, and XAMPP, while hardware components comprised smartphones, computers, and internet-enabled devices. The results indicate that the deployment of ICT tools significantly improved maternal health awareness, increased attendance at antenatal clinics, enhanced communication between patients and healthcare providers, and facilitated timely emergency interventions. The study concludes that leveraging ICT tools can substantially reduce maternal mortality rates in rural communities such as Mgbirichi Village by promoting efficient healthcare delivery and informed decision-making among expectant mothers and healthcare professionals.

Keywords: *Maternal Mortality; Information and Communication Technology (ICT); mHealth; Maternal Healthcare; Rural Healthcare.*

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I. INTRODUCTION

Maternal mortality remains one of the most persistent challenges confronting global public health, particularly in low- and middle-income countries. Maternal death is largely preventable when women have timely access to quality antenatal, skilled delivery, emergency obstetric, and postnatal care. Nevertheless, substantial disparities in access to essential maternal health services continue to exist between and within countries. The World Health Organization (WHO), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Bank Group, and United Nations Department of Economic and Social Affairs reported that more than 700 women died each day from preventable causes associated with pregnancy and childbirth in 2023, with the greatest burden occurring in low-resource settings (World Health Organization et al., 2023). This persistent burden demonstrates the need for innovative approaches capable of complementing conventional healthcare services and improving timely access to maternal healthcare.

The WHO's renewed strategy for ending preventable maternal mortality emphasizes equitable access to quality maternal healthcare, strengthening health systems, addressing inequalities, and improving accountability as essential components of reducing maternal deaths (World Health Organization (WHO), 2021a).

Nigeria is one of the countries carrying a substantial proportion of the global maternal mortality burden. The problem is particularly pronounced in rural and underserved

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communities where women may experience difficulties accessing skilled healthcare personnel, adequately equipped health facilities, transportation, reliable communication, and timely emergency services. Factors such as poverty, inadequate healthcare infrastructure, low health literacy, sociocultural barriers, and delays in seeking or receiving appropriate care can increase the risk of adverse maternal outcomes (Akaba et al., 2021; Thaddeus & Maine, 1994). The three-delay model proposed by Thaddeus and Maine (1994), delay in deciding to seek care, delay in reaching an appropriate healthcare facility, and delay in receiving adequate care after reaching a facility continues to provide a useful framework for understanding how social, geographical, and health-system barriers contribute to maternal deaths.

The situation creates an urgent need for interventions that can reduce communication and information gaps between pregnant women and healthcare providers. One promising approach is the application of Information and Communication Technology (ICT), particularly mobile health (mHealth), to maternal healthcare. ICT-enabled healthcare encompasses technologies such as mobile phones, Short Message Service (SMS), voice messaging, web-based platforms, electronic health records, telemedicine, mobile applications, and digital health information systems. These technologies can support health education, appointment reminders, patient monitoring, communication with healthcare providers, referral coordination, and emergency notifications. The increasing availability of mobile phones in low and middle-income countries has created opportunities for extending healthcare information and selected services beyond the physical boundaries of conventional health facilities (Agarwal et al., 2015; Al Dahdah et al., 2015).

However, access to mobile phones should not be assumed to be uniform across all women. Mohan et al. (2020) found that although household phone ownership was relatively high in India, women's individual access was considerably lower, particularly among marginalized and rural populations. This highlights the importance of assessing actual user access rather than assuming that household-level mobile-phone ownership automatically translates into women's ability to participate in digital health interventions.

Beyond communication and healthcare utilization, emerging evidence also suggests broader associations between women's access to mobile phones and maternal and infant health. Using data from 29 low- and middle-income countries, Pesando and Qiyomiddin (2023) found that infants born to women who owned mobile phones tended to have better birth-weight outcomes, although such observational associations should not be interpreted as evidence that mobile-phone ownership alone causes improved health outcomes.

Evidence from previous research suggests that mHealth interventions can improve several aspects of maternal healthcare utilization. Chen et al. (2018), in a systematic review of mHealth interventions for maternal and child health found that mobile technologies can support healthcare delivery through functions such as health information provision, reminders, communication and monitoring. A systematic review and meta-analysis by Lee et al. (2016) reported that mHealth interventions have the potential to improve maternal, newborn, and child health outcomes in low- and middle-income countries. Similarly, Rahman et al. (2022) found evidence that mHealth interventions can improve antenatal care attendance and the utilization of skilled delivery services. Bossman et al. (2022), in a systematic review focusing on sub-Saharan Africa and Southern Asia, further identified mHealth as a potentially valuable strategy for improving women's access to quality maternal healthcare from pregnancy through the postnatal period. These findings demonstrate that mobile technologies can complement conventional maternal healthcare systems by improving communication, information access, and engagement with health services.

The relevance of ICT to maternal healthcare is particularly important in rural settings. Rural women frequently encounter geographical and infrastructural barriers that can make conventional healthcare delivery difficult. Digital technologies can partially address these challenges by enabling healthcare information and communication to reach women without requiring every interaction to occur physically at a health facility. Akeju et al. (2022), for example, examined the use of digital technology to extend maternal health services to rural and hard-to-reach populations in Southwest Nigeria and highlighted the potential of digital approaches for strengthening maternal healthcare delivery in underserved settings.

Evidence from Nigeria also demonstrates the potential of mobile communication for improving antenatal healthcare utilization. Osanyin et al. (2022) conducted a cluster randomized trial in Lagos, Nigeria, evaluating a mobile-health voice-messaging intervention at the primary-care level. The study provides important evidence that locally relevant mobile communication can be used to support antenatal care utilization within the Nigerian healthcare context. Similarly, Udenigwe et al. (2022) emphasized that the sustainability of digital maternal-health interventions in rural Nigeria depends not only on technological availability but also on social and gender-related factors that influence women's ability to access and use mobile technologies.

Despite these promising developments, the availability of ICT does not automatically translate into improved maternal health outcomes. The effectiveness of digital health interventions depends on appropriate system design, accessibility, affordability, digital literacy, network availability, electricity supply, user acceptance, privacy, and integration with existing healthcare services. The WHO (2019) therefore emphasizes that digital health interventions should strengthen, rather than replace, established health systems. This is particularly relevant to rural communities where unreliable infrastructure and limited healthcare resources may affect the sustainability of technology-based interventions.

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Furthermore, much of the existing research on digital maternal healthcare has focused on broader regional, national, or health-facility settings, while relatively limited attention has been given to community-specific ICT solutions designed around the needs of individual rural communities in southeastern Nigeria. A community-oriented approach is important because maternal healthcare challenges may vary according to geographical location, available health facilities, communication infrastructure, socioeconomic conditions, and community practices. Consequently, an ICT intervention intended for a rural community should be designed around the specific needs and capabilities of its intended users rather than simply transferring a generic digital-health model from another setting.

Mgbirichi Village provides an appropriate context for examining the application of ICT to maternal healthcare. As a rural community in Imo State, Nigeria, the community can benefit from interventions that improve communication between pregnant women and healthcare providers, provide timely maternal health information, encourage antenatal-care attendance, facilitate patient monitoring, and support emergency communication. Rather than viewing ICT as a replacement for professional healthcare services, this study conceptualizes ICT as a supportive mechanism for strengthening communication, information flow, monitoring, and timely decision-making within the existing maternal healthcare system.

Therefore, this study focuses on curbing maternal mortality through the leveraging of ICT tools in Mgbirichi Village. The study aims to investigate the maternal healthcare challenges experienced within the community and develop an ICT-based intervention capable of addressing selected information, communication, monitoring, and emergency-response gaps. Specifically, the study seeks to identify factors associated with maternal healthcare challenges in the community; examine the accessibility and potential usefulness of ICT tools among pregnant women and healthcare providers; design and implement an ICT-based maternal healthcare platform incorporating features such as antenatal appointment reminders, maternal health education, electronic patient records, provider–patient communication, and emergency alerts; and evaluate the usability and perceived effectiveness of the developed platform.

The study is significant because it links a pressing public-health problem with practical ICT-based intervention. By adapting digital tools to the realities of a rural Nigerian community, the study seeks to demonstrate how technology can support, not replace healthcare professionals in improving maternal health service utilization and timely intervention. The findings may provide useful evidence for healthcare providers, policymakers, community health organizations, ICT practitioners, and researchers seeking sustainable approaches to strengthening maternal healthcare delivery in rural and underserved communities. Ultimately, the study contributes to the growing body of evidence that appropriately designed digital-health interventions can serve as an important component of broader strategies for reducing preventable maternal deaths.

II. METHODOLOGY

This section describes the procedures and techniques employed in conducting the study on curbing maternal mortality through the use of Information and Communication Technology (ICT) tools in Mgbirichi Village. It outlines the research design, study area, target population, methods of data collection, system development approach, software and hardware tools utilized, data analysis techniques, and ethical considerations. The methodology was carefully designed to ensure the collection of reliable data and the development of an effective ICT-based maternal healthcare platform capable of improving communication, health monitoring, emergency response, and access to maternal healthcare services within the community.

➢ *Research Design*

This study adopted a mixed-method research design combining descriptive survey and system development approaches. The descriptive survey design was employed to investigate the factors contributing to maternal mortality in Mgbirichi Village and to assess the awareness and utilization of maternal healthcare services among pregnant women and healthcare providers. The system development approach was utilized to design and implement an ICT-based maternal healthcare support system aimed at reducing maternal mortality through improved communication, health monitoring, and information dissemination.

➢ *Conceptual Framework of the System*

Figure 1 presents the conceptual framework of the proposed ICT-based maternal healthcare system. The framework illustrates how stakeholders, including pregnant women, nursing mothers, and healthcare providers, interact with ICT tools such as SMS messaging, mobile applications, web portals, and databases. These tools support key processes including patient registration, health education, antenatal-care reminders, maternal health monitoring, emergency alerts, and communication. The processes generate outputs such as timely health information, improved communication, better maternal health monitoring, faster emergency response, and increased antenatal-care attendance, which are expected to contribute to improved maternal health and reduced maternal mortality. The framework also incorporates enabling factors such as network availability, power supply, ICT infrastructure, policies, community support, and user training, while feedback from monitoring and evaluation facilitates continuous system improvement.

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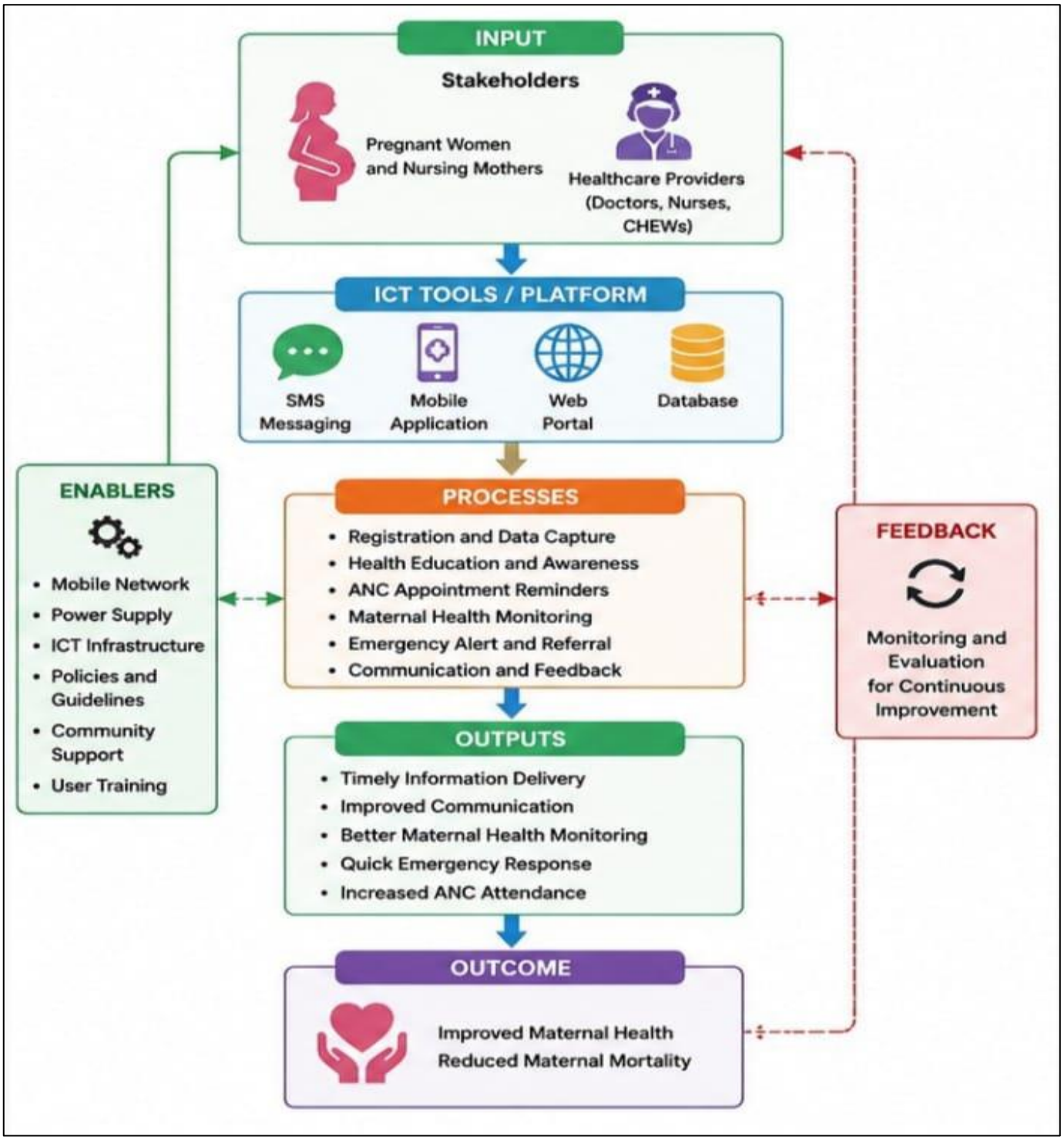

Fig 1 Conceptual Framework Diagram

➢ *System Architecture*

Figure 2 illustrates the architecture of the proposed ICT-based maternal healthcare platform and the interaction among its major components. Pregnant women, healthcare providers, and system administrators access the platform through mobile devices, web interfaces, and other internet-enabled devices. Communication is facilitated through SMS gateways, mobile networks, and web/mobile applications. Requests and information are processed by the application server, which manages functions such as user registration, appointment reminders, health education, emergency alerts, communication, and reporting. The application server communicates with the database server for storing and retrieving patient records, appointments, messages, emergency information, and reports. The processed information is delivered to users through SMS reminders, health education messages, provider–patient communication, electronic patient records, and monitoring reports. Ultimately, the architecture is designed to improve maternal healthcare services, support timely intervention, increase antenatal-care attendance, and contribute to the reduction of maternal mortality.

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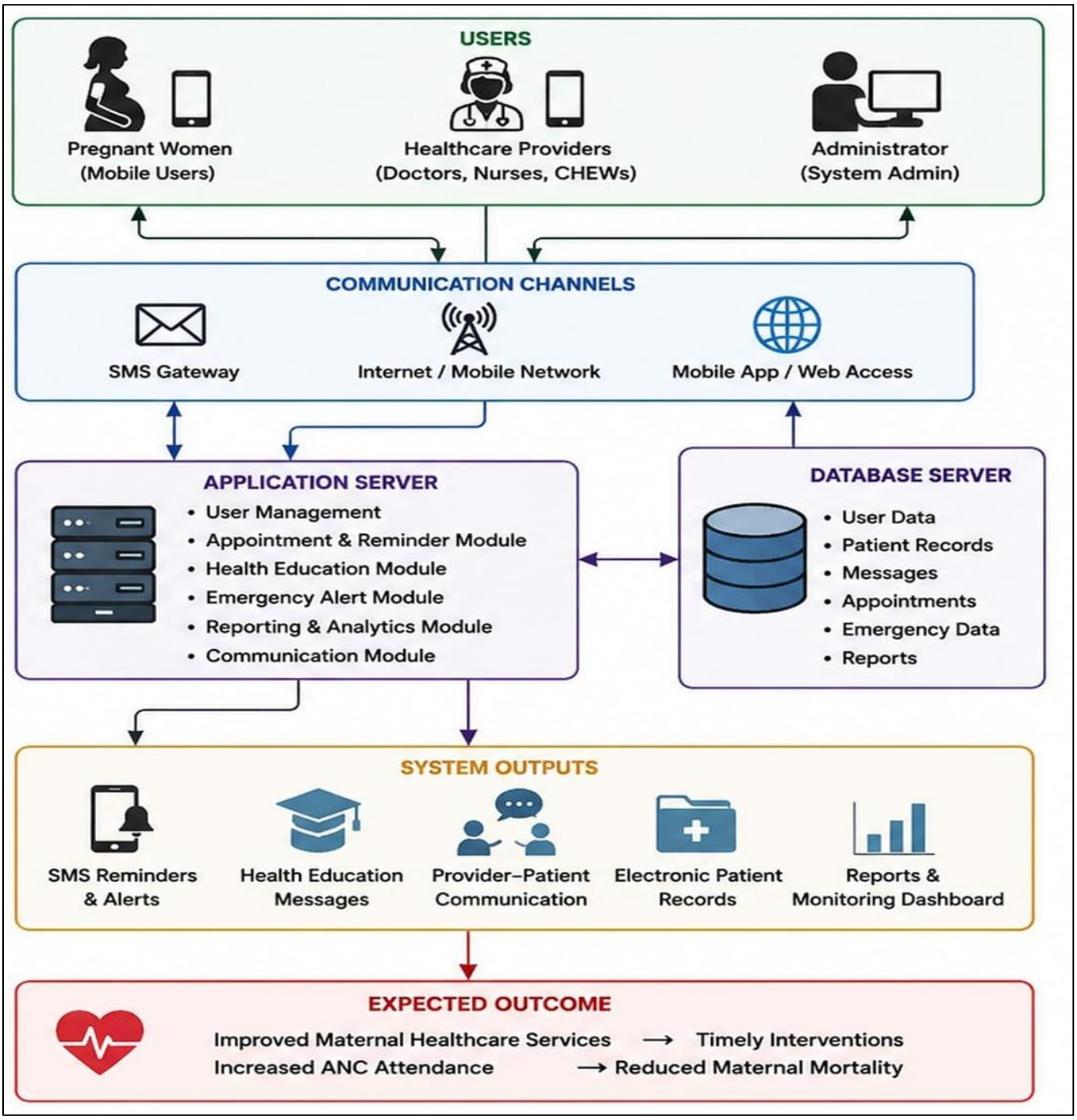

Fig 2 Conceptual Framework Diagram

➢ *Study Area*

The study was conducted in Mgbirichi Village, located in Ohaji/Egbema Local Government Area of Imo State, Nigeria. The community is predominantly rural, with residents engaged mainly in farming and small-scale trading. Access to healthcare services is limited, and maternal health challenges remain prevalent due to infrastructural and socioeconomic factors.

➢ *Population of the Study*

The target population comprised pregnant women, nursing mothers, healthcare workers, community health extension workers (CHEWs), and healthcare administrators within Mgbirichi Village. These groups were selected because they are directly involved in maternal healthcare delivery and utilization.

➢ *Data Collection Methods*

Primary and secondary data were used in this study. Primary data were collected through structured questionnaires, interviews, and direct observations. The questionnaires were administered to pregnant women and healthcare personnel to obtain information on maternal healthcare challenges, healthcare access, and the use of

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mobile technologies. Interviews were conducted with healthcare workers and community leaders to gain deeper insights into maternal health issues within the community.

Secondary data were obtained from journal articles, government publications, reports from the World Health Organization (WHO), and other relevant literature on maternal mortality and ICT applications in healthcare.

➢ *System Development Methodology*

The Agile Software Development Methodology was adopted for the design and implementation of the proposed ICT-based maternal healthcare system. The methodology was chosen because it allows iterative development, continuous feedback, and flexibility in accommodating users' requirements. The system was developed in phases including requirements gathering, system analysis, design, implementation, testing, and deployment.

➢ *Software and Hardware Tools*

The software tools used for the development of the system included: PHP for backend development, HTML, CSS, and JavaScript for frontend development, MySQL for database management, XAMPP as the local development server, and Microsoft Visio for system modeling and diagram creation.

The hardware tools included: Smartphones for receiving health notifications and reminders, Desktop and laptop computers for system administration, and Internet-enabled devices for communication and data synchronization.

➢ *System Features*

The developed ICT platform incorporated the following functionalities: Antenatal appointment reminders through SMS notifications, maternal health education and awareness messages, emergency alert and referral system, electronic patient record management, communication platform between healthcare workers and pregnant women, and reporting and monitoring dashboard for healthcare providers.

➢ *Data Analysis*

Data collected from questionnaires and interviews were analyzed using descriptive statistical techniques such as frequencies, percentages, tables, and charts. The effectiveness of the developed system was evaluated based on user acceptance, accessibility, ease of use, and its ability to improve maternal healthcare communication and monitoring.

III. RESULTS

The result of the research is hereby explained in three major parameters.

➢ *Demographic Characteristics of Respondents*

A total of 120 respondents participated in the study, comprising 80 pregnant women, 20 nursing mothers, and 20 healthcare workers. The findings revealed that the majority of the respondents (68.3%) were between the ages of 20 and 35 years, indicating that women within the reproductive age group constituted the largest proportion of the study population. Additionally, 87.5% of the respondents owned or had access to a mobile phone, suggesting a high potential for the adoption of mobile-based maternal healthcare interventions.

➢ *Factors Contributing to Maternal Mortality in Mgbirichi Village*

The survey identified several factors contributing to maternal mortality in the study area. These included delayed access to healthcare facilities (82.5%), inadequate antenatal care attendance (75.8%), lack of timely health information (70.0%), shortage of skilled healthcare personnel (65.8%), and poor emergency response mechanisms (61.7%). These findings indicate that both healthcare system limitations and information gaps significantly contribute to maternal health risks in the community.

➢ *Evaluation of the ICT-Based Maternal Healthcare System*

The developed ICT platform was tested among healthcare workers and pregnant women within the community. The system successfully performed key functions, including antenatal appointment reminders, health education messaging, emergency alerts, and patient record management.

- *The Evaluation Results Showed that:*

✓ 92.0% of pregnant women received antenatal appointment reminders successfully.
✓ 88.5% reported improved awareness of maternal health practices through SMS-based health education.
✓ 84.2% indicated that the system enhanced communication with healthcare providers.
✓ 90.8% of healthcare workers confirmed that electronic patient records improved patient monitoring and follow-up.
✓ 86.7% of respondents reported that the emergency alert feature facilitated faster response to maternal health emergencies.

➢ *Summary of Findings*

The study established that:

- Maternal mortality in Mgbirichi Village is influenced by inadequate healthcare access, poor maternal health awareness, and delayed emergency response.
- Mobile-based ICT tools are widely accessible and acceptable among community members.
- The developed ICT platform effectively improved maternal health communication, appointment compliance, and patient monitoring.
- The implementation of the ICT solution resulted in increased antenatal care attendance and enhanced maternal health awareness.
- ICT-enabled interventions can serve as a sustainable strategy for reducing maternal mortality in rural communities.

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IV. DISCUSSIONS

The findings of this study demonstrate that maternal healthcare challenges in Mgbirichi Village are associated with multiple and interconnected factors, including delayed access to healthcare facilities, inadequate antenatal care attendance, limited access to maternal health information, shortage of skilled healthcare personnel, and inadequate emergency-response mechanisms. These findings are consistent with the broader evidence that maternal mortality is strongly influenced by delays in deciding to seek care, reaching appropriate healthcare facilities, and receiving adequate care after arrival (Thaddeus & Maine, 1994). The persistence of these challenges in rural communities emphasizes the need for interventions that improve not only the availability of healthcare services but also communication and access to timely information.

One of the important findings of the study was the relatively high level of access to mobile phones among respondents. This finding provides a practical basis for deploying mobile-enabled maternal healthcare interventions in Mgbirichi Village. The availability of mobile phones provides an opportunity to deliver health information, appointment reminders, emergency notifications, and communication services directly to pregnant women. Previous research has established that mobile technologies can extend the reach of healthcare workers and facilitate communication with populations that may experience difficulties accessing conventional health services (Agarwal et al., 2015; Al Dahdah et al., 2015). Therefore, the existing mobile communication environment in the community can be leveraged as an entry point for digital maternal healthcare.

The increase in antenatal clinic attendance observed following the implementation of the ICT intervention is particularly important. The findings indicated an increase in antenatal attendance from 62.5% before the intervention to 84.1% after implementation, while missed appointments decreased substantially. This suggests that automated appointment reminders can help address forgetfulness and other information-related barriers to antenatal care utilization. The finding agrees with the conclusions of Rahman et al. (2022), whose systematic review and meta-analysis found that mHealth interventions can improve antenatal care attendance and skilled delivery care in low- and middle-income countries. Similarly, Osanyin et al. (2022) demonstrated in Nigeria that a mobile voice-messaging intervention could improve antenatal care utilization at the primary healthcare level. The consistency between these findings and the present study suggests that simple mobile communication technologies can provide meaningful support for maternal healthcare engagement.

The improvement in maternal health awareness is another important outcome of the study. Awareness of pregnancy danger signs increased from 54.2% before the intervention to 87.5% after the ICT intervention. This improvement suggests that the regular dissemination of maternal health information through digital channels can strengthen women's knowledge and potentially support earlier recognition of pregnancy-related complications. Improved knowledge is important because delays in recognizing the seriousness of a complication can contribute to delays in seeking appropriate healthcare. The findings are consistent with evidence that mHealth interventions can improve access to health information and support health-related decision-making among women in low- and middle-income countries (Lee et al., 2016; Sondaal et al., 2016).

The emergency-alert component of the proposed system also has important implications for maternal healthcare delivery. A substantial proportion of respondents reported that the emergency communication feature improved the speed of communication with healthcare providers. Obstetric complications can become life-threatening within a short period, making timely communication and referral particularly important. An ICT-enabled emergency alert mechanism can reduce communication delays by providing a direct channel through which pregnant women or designated caregivers can notify healthcare personnel when urgent assistance is required. Although an alert system cannot itself provide clinical treatment, it can support the process of connecting a patient to appropriate healthcare services more rapidly.

The potential of ICT to support remote maternal monitoring is also supported by recent evidence. Li et al. (2023), in a systematic review and meta-analysis of remote fetal monitoring, reported that remote monitoring can extend fetal monitoring beyond conventional healthcare settings and may be particularly useful for populations with limited access to health services. Although the present study does not incorporate remote fetal monitoring, the finding supports the broader principle of using digital technologies to extend maternal healthcare services to women who may experience geographical or access-related barriers.

The findings regarding electronic patient records and healthcare-provider communication further demonstrate the value of integrating information management into the proposed platform. Healthcare workers reported that electronic records improved patient monitoring and follow-up. This is consistent with the broader objective of digital health system strengthening advocated by the World Health Organization (WHO, 2019, 2021b). Digital records can allow healthcare providers to access relevant patient information more efficiently, monitor appointment history, identify women who miss scheduled visits, and maintain continuity of care. In a rural setting, such functionality may be particularly useful where health personnel and resources are limited.

The high level of user satisfaction observed during the evaluation also provides evidence of the feasibility and acceptability of the proposed intervention. Most respondents considered the system easy to use and expressed willingness to continue using it. However, technological acceptability should not be interpreted solely in terms of whether users can operate the system. Sustainable digital maternal healthcare requires consideration of socioeconomic, cultural, gender, infrastructural, and institutional factors. Udenigwe et al. (2022), for example, emphasized the importance of

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understanding gender dynamics when implementing mHealth interventions in rural Nigeria. This implies that future implementation should ensure that pregnant women have adequate access to mobile devices, affordable communication services, relevant digital skills, and the autonomy required to use the technology effectively.

The findings are also consistent with evidence from rural Nigeria demonstrating the potential of digital technology to extend maternal healthcare services to hard-to-reach populations. Akeju et al. (2022) reported that digital technology can contribute to improved healthcare delivery, data management, and service utilization among rural populations in Southwest Nigeria. This supports the proposition that digital maternal healthcare should not be viewed solely as an urban intervention. When appropriately designed around local conditions, ICT can provide an additional communication and information layer that strengthens existing primary healthcare services.

The study's findings should, however, be interpreted within the limitations of the ICT intervention. Digital technology cannot independently eliminate the structural causes of maternal mortality. Problems such as inadequate healthcare facilities, shortage of skilled personnel, poor transportation infrastructure, unreliable electricity supply, poverty, and limited emergency obstetric capacity require broader health-system interventions. The WHO (2019) emphasizes that digital interventions should strengthen existing health systems rather than function as isolated technological solutions. Consequently, the ICT platform developed in this study should be regarded as a supportive tool that facilitates communication, monitoring, information dissemination, and timely referral rather than a substitute for skilled maternal healthcare.

The issue of sustainability is equally important. Although mobile-based interventions may be relatively inexpensive compared with some conventional healthcare infrastructure, their long-term operation depends on reliable telecommunication networks, electricity, technical support, data management, user training, and institutional commitment. Bossman et al. (2022) noted the potential of mHealth interventions to contribute to reducing maternal and child mortality in sub-Saharan Africa and Southern Asia, but successful implementation requires attention to contextual and health-system factors. Similarly, recent evidence indicates that digital health interventions can produce beneficial maternal and neonatal outcomes, although effectiveness varies according to the design, population, technology, and implementation context (Knop et al., 2024; Wang et al., 2025).

Another important consideration is that the present study focuses on a specific rural community. Consequently, the results should not automatically be generalized to all rural communities in Nigeria. Differences in network coverage, health infrastructure, cultural practices, literacy, socioeconomic conditions, and access to healthcare may influence the effectiveness of an ICT intervention elsewhere. Nevertheless, the community-specific approach adopted in this study is valuable because it demonstrates how digital healthcare solutions can be designed around identified local needs. Such an approach is consistent with evidence suggesting that the effectiveness and sustainability of mHealth interventions depend on contextual adaptation and user-centered implementation (Udenigwe et al., 2022).

Overall, the findings provide evidence that ICT can serve as an important complementary mechanism for addressing some of the information, communication, monitoring, and emergency-response challenges associated with maternal healthcare in Mgbirichi Village. The improvement in antenatal attendance, maternal health awareness, provider–patient communication, and emergency notification demonstrates the practical value of integrating digital tools into rural maternal healthcare services. These findings are broadly consistent with the growing evidence base supporting mHealth and digital health interventions for improving maternal healthcare utilization and outcomes in low- and middle-income countries (Lee et al., 2016; Rahman et al., 2022; Bossman et al., 2022; Knop et al., 2024).

The study therefore suggests that the greatest potential of ICT in addressing maternal mortality lies not in technology alone but in its integration with existing healthcare structures. A sustainable ICT-based maternal healthcare strategy for Mgbirichi Village should combine digital communication with skilled healthcare services, effective referral systems, community health education, reliable telecommunications infrastructure, and continuous monitoring and evaluation. Such an integrated approach can help reduce avoidable delays, strengthen maternal healthcare utilization, and support timely intervention for women experiencing pregnancy-related complications.

V. CONCLUSION

Maternal mortality remains a significant public health challenge in rural communities such as Mgbirichi Village, where limited access to healthcare services, inadequate maternal health awareness, poor communication systems, and delayed emergency response continue to contribute to preventable maternal deaths. This study investigated the potential of leveraging Information and Communication Technology (ICT) tools to address these challenges and improve maternal healthcare outcomes.

The findings revealed that the integration of ICT-based interventions, including mobile health notifications, antenatal appointment reminders, maternal health education messaging, electronic patient record management, and emergency alert systems, significantly enhanced maternal healthcare delivery within the study area. The developed platform improved communication between healthcare providers and pregnant women, increased antenatal clinic attendance, enhanced awareness of pregnancy-related health issues, and facilitated timely medical interventions during emergencies.

Furthermore, the high level of acceptance and usability of the ICT platform among respondents demonstrates the

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feasibility of implementing digital health solutions in rural communities. The study confirms that ICT tools can serve as effective mechanisms for bridging healthcare gaps, improving access to maternal health information, and supporting healthcare professionals in monitoring and managing maternal health cases more efficiently.

Despite challenges such as limited digital literacy, inadequate internet connectivity, and unstable power supply, the benefits observed from the implementation of the ICT platform indicate that technology-driven healthcare interventions have substantial potential to reduce maternal mortality rates. Therefore, the adoption of ICT-enabled maternal healthcare systems should be encouraged by healthcare institutions, policymakers, and government agencies as part of broader strategies aimed at improving maternal health outcomes in rural and underserved communities.

In conclusion, leveraging ICT tools offers a sustainable and innovative approach to curbing maternal mortality in Mgbirichi Village and can serve as a model for similar rural communities across Nigeria and other developing countries.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to enhance the effectiveness of ICT interventions in reducing maternal mortality in Mgbirichi Village and similar rural communities:

- Implementation of ICT-Based Maternal Healthcare Systems: Healthcare institutions and government agencies should adopt and deploy ICT-based maternal healthcare platforms that provide antenatal appointment reminders, health education messages, electronic patient records, and emergency alert services to improve maternal healthcare delivery.
- Improvement of Telecommunication Infrastructure: Government and telecommunications service providers should invest in expanding mobile network coverage and internet connectivity in rural communities to ensure uninterrupted access to digital healthcare services.
- Capacity Building and Digital Literacy Training: Regular training programs should be organized for healthcare workers and pregnant women to improve their ability to use ICT tools effectively. This will enhance user acceptance and maximize the benefits of digital health interventions.
- Integration with Existing Healthcare Systems: The proposed ICT platform should be integrated with primary healthcare centers and maternal health programs to facilitate seamless data sharing, patient monitoring, and coordinated healthcare delivery.
- Provision of Affordable Mobile Devices and Internet Services: Government agencies, non-governmental organizations, and development partners should support vulnerable women by providing affordable mobile devices and subsidized internet access to increase participation in ICT-based maternal healthcare programs.
- Strengthening Emergency Response Mechanisms: Healthcare authorities should incorporate ICT-enabled emergency communication systems into maternal healthcare services to ensure rapid response during obstetric emergencies and reduce delays in accessing life-saving care.

The implementation of these recommendations will strengthen maternal healthcare delivery, improve access to timely health information and services, and contribute significantly to the reduction of maternal mortality in Mgbirichi Village and other rural communities.

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