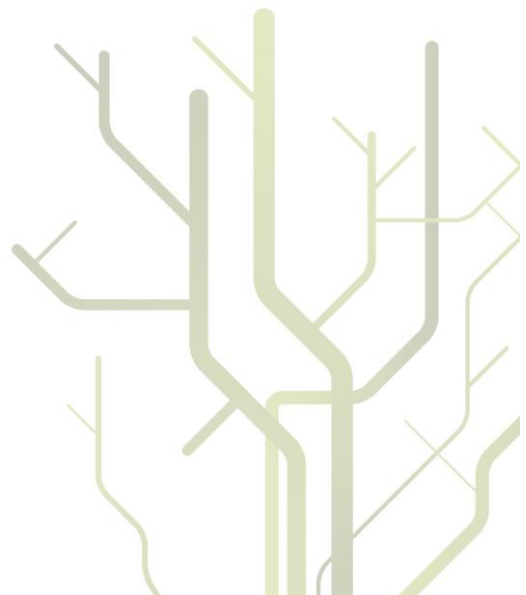


## THE USE OF CELL PHONE FOR MATERNAL HEALTH: THE ABIYE PROJECT



**Sunday Oluwafemi Oyeyemi**

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## **DEDICATION**

I left him alive..., and he died before I completed the degree.

To my Dad, William Folorunso Oyeyemi, the man who created in me  
the need to be a better person.

Rest in Peace.



## **PREFACE**

This thesis was submitted as a partial fulfillment of the requirements for the degree of Master of Science (MSc) at the Faculty of Medicine, Department of Telemedicine and eHealth, University of Tromsø, Norway.

The thesis was intended for researchers, public health experts, policy makers, and politicians who are interested in the use of Information Communication Technology tools such as the cell phone to make a paradigm shift towards a more people-oriented primary healthcare and maternal health improvement, especially in the resource-poor settings. The thesis shall also be a benefit to the telemedicine and eHealth initiatives of the World Bank, World Health Organization, UNICEF and African Union Commission (AUC) and various national governments in the sub Saharan African and south Asian countries who may want to speed up the improvement of the maternal health as we journey toward achieving the fifth Millennium Development Goal.

My motivation to carry out the study sprang from the personal conviction that no woman should lose her life while bringing forth another life. My professional background of many years in clinical practice has afforded me to witness many unfortunate, painful and avertable maternal deaths. Although a medical doctor by profession, my passion also resides in the Information and Communication Technology (ICT) and its potential to mitigate this public health challenge. Telemedicine and eHealth offered me the opportunity to marry my passion with my profession, and in so doing enhancing my profession with my passion.

I wish to express my heartfelt gratitude to my supervisor, Professor Rolf Wynn, for his uncommon enthusiasm and professional guidance in the work. Your interest actually *infected* me with boundless inspirations and aspirations. Your superlative supervision and way of life shaped my reading, thinking and writing. Thank you for the opportunity.

Judy Au, the program coordinator, like the ever-precise time-keeper, always reminding me of the important (and the not-so-important) deadlines and information, I remain most appreciative. I am grateful to the other lecturers in the Department, Professors Gunnar Ellingsen, Alexander Horsch, Gunnar Hartvigsen and the rest, for their contribution to my training.

I thank my Viking (and the not-so-Viking) friends and colleagues, too numerous to mention by names for their affections, assistance and making my stay in the Arctic Circle memorable.

To my adorable wife, my own jewel of inestimable value, for tolerating my quest for knowledge and my absence from home for these years, your spiritual support and encouragement, I am profusely and forever grateful.

And to my awesome God, my source, my strength, my rock of ages, my place of refuge, my ever present help in the time of need, I am eternally thankful.

**Oyeyemi Sunday Oluwafemi**

*femi\_oyeyemi@yahoo.com*

University of Tromsø, Norway

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## ABSTRACT

**Background:** Maternal health is a public health concern worldwide, especially in the sub-Saharan African countries, where the burden of maternal death is the highest in the world. A woman dies of pregnancy or childbirth related complications about every 90 seconds every day, and more than 95 per cent of these deaths occur in the sub-Saharan Africa and South Asia. The rapidly growing presence of cell phones in sub-Saharan Africa may offer a paradigm shift and a unique opportunity to make a significant difference in maternal health services. Set against this backdrop was the Abiye pilot project in the Ifedore Local Government Area (LGA) of Ondo-State of Nigeria, aimed at improving maternal health through the use of cell phones. This research work was designed to explore the project.

**Method:** A quantitative case-control method was used in this study with retrospective data from January 1, 2011 to December 31, 2011 collated from the hospitals' records and patients' casefiles. Semi-structured questionnaires were also used to generate supplemental data. 2 LGAs (i.e. one LGA where cell phones were distributed and one without such distribution) were compared to detect any differences in the facility utilization of pregnant women and the odds ratios of causes of maternal death were calculated in the two areas.

**Findings:** The primary healthcare and the total (primary and secondary) healthcare facility utilization rates were significantly higher in the LGA where cell phones were in use. The primary healthcare facility utilization in Ifedore LGA was 54.4 per cent while that of Idanre was 30.5 per cent ( $p < 0.001$ ). Total facility utilization in Ifedore LGA was 43.4 per cent and Idanre was 36.7 per cent ( $p = 0.0001$ ). The odds ratio of the occurrence of the measured causes of maternal death in the 2 LGAs was 1 (i.e. no difference).

**Conclusion:** The study showed statistical indications that cell phone use increased the facility utilization of the pregnant women. The utilization was found to have increased mainly because of the raise in the primary healthcare utilization in the LGA where cell phones were in use. This means that cell phone usage may be a strengthening factor in the primary healthcare system. The odds of causes of maternal death were *still* the same in the 2 LGAs. This may be due to the relatively recent implementation of the programme. It is possible

that changes in maternal death rates will occur as the programme develops, and this should be examined in further studies.

**Keywords:** maternal health, maternal mortality, maternal death, obstetric complications, obstetric improvement, safe motherhood, developing countries, health service utilization, primary healthcare utilization, pregnant women, cell phone, Abiye project, Nigeria.

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# CHAPTER 1: INTRODUCTION

## 1.1 Background

Maternal mortality remains a constant and major challenge to the healthcare systems in Africa and the resource limited areas of Asia. Worldwide, about 500,000 women die each year from mostly preventable complications related to pregnancy and childbirth, and more than 95 per cent of these deaths occur in sub-Saharan Africa and Southern Asia (WHO, 2007). This translates to about 1,000 women dying every day (WHO, 2012). This is of course unacceptably high, and prompted the United Nations into listing '*Improving Maternal Health*' as the 5<sup>th</sup> Millennium Development Goal which was adopted by the International Community in the year 2000, 12 years ago. The target was to reduce maternal deaths by three quarters by 2015 (WHO, 2012). It is now 3 years to the end of the time frame and many countries are showing worrying signs of failure to achieve this goal.

Africa bears the highest burden of maternal deaths in the world (WHO and UNICEF, 2010), and Nigeria, where this study was conducted, has a population of about 2% of the world's population and inappropriately accounts for an estimate of close to 10% of the world's maternal deaths (WHO, 2007; Hill et. al., 2007; FMOH, 2005). But the question is, why do these women die? Why are there so many maternal deaths?

The direct major causes of maternal death worldwide have long been identified as: severe bleeding mostly after child birth; high blood pressure with fits in pregnancy (eclampsia); maternal infection (sepsis); obstructed labour; and unsafe abortion (Chiwuzie et. al., 1995; WHO, 2012). These causes are mostly preventable, but then, they result in death especially in sub-Saharan Africa. Again, why? It has been established by different authorities that the above conditions result in deaths due to series of delays. These delays are: delay in seeking or recognising the need for healthcare; delay in reaching a healthcare facility; and delay in receiving care at the health care facility (WHO, 2007; Hill et. al., 2007; FMOH, 2005). It

follows that if these delays could be mitigated, then maternal deaths would be reduced. Can these series of delays be removed or at least be reduced?

## **1.2 The Use of Cell Phone**

There is a growing body of evidence demonstrating the potential of information and communication technology (ICT) in tackling most of these challenges of delays of a particular interest in this study was the cell phone technology, which has penetrated deep into sub-Saharan African communities. According to the United Nations agency for Information and Communication Technologies, the International Telecommunication Union, it is extrapolated that by the end of 2012, half of the population of Africa will have access to cell phones (ITU, 2009; Noordam et. al., 2011), with very good cellular telephone signals already present in almost all the remote and poor communities (Byass and D'Ambruso, 2008; ITU, 2009).

The use of cell or mobile phone in the health system, sometimes referred to as *mHealth*, presents a unique opportunity to significantly affect and effect the way in which health challenges are met. Can this powerful ubiquitous ICT tool make a significant difference in the healthcare delivery system in sub-Saharan Africa and in particular reduce maternal deaths? Will it affect the way healthcare facilities are utilized especially in the rural and remote communities?

This research work was set out to examine these questions, and more. It was intended to be achieved by quantitatively researching into a pilot program termed the *Abiye* Project (meaning 'safe motherhood') in the Ifedore Local Government Area (LGA) of Ondo State of Nigeria.

## **1.3 The Abiye Project**

Set against the aforementioned backdrop was the aim of reducing maternal deaths in Ifedore LGA of Ondo State of Nigeria, through the use of cell phones. The project, which was

termed Abiye, involved registering pregnant women in the LGA and giving them free, Closed-Users' Group (CUG) cell phones. Through these phones, the women were expected to communicate free of charge with the healthcare facilities and among themselves. By this, access to the health system was expected to increase, the health facility utilization to increase, and the number of missed medical appointments to reduce. It was also expected that the system would allow for express communication with the healthcare team in times of emergency, better access to family planning information, and ultimately abating the series of inherent delays and hence reducing maternal death in the LGA.

Obviously, any safe motherhood intervention that would significantly reduce maternal deaths is important and most welcome. However, it is also important to scientifically evaluate such an intervention and the overall impact it has on maternal health and the healthcare system in general.

Like many other authors, Mechael et. al., (2010) have expressed great potential for the cell phone technology in the area of healthcare delivery, especially with respect to disease prevention and treatment compliance. However, confirmations of effects were yet to be made. Noordam et. al., (2011) analysed the use of cell phones for maternal health and also underlined the need for studies focusing on the efficacy and effectiveness of cell phones for this purpose.

#### **1.4 Purpose of the Study**

The overall purpose of this study was to explore the effects of the use of cell phones by pregnant mothers in a resource limited setting. This study is envisaged to expand the literature and add to the body of knowledge in the area. This work is also expected to serve as an important material for other parts of sub-Saharan Africa, Southern Asia and other resource-poor settings of the world who are concerned and interested in using cell phone technology for curbing maternal death.

## **1.5 Measuring Maternal Mortality**

It is time-consuming and expensive to measure maternal mortality of a population, particularly in the developing countries like Nigeria where reliable records are not available (Graham, Filippi and Ronsmans, 1996). Establishing the mortality impact of health programmes is difficult as Graham, Filippi and Ronsmans, (1996) pointed out: "... to demonstrate impact using maternal mortality is entering into the realms of the impossible dream". Measuring maternal mortality is thus beyond the scope of the present thesis.

Therefore, in lieu of measuring maternal mortality, this study shall make use of the 5 identified major causes of maternal deaths sometimes referred to as "the big five" namely: severe bleeding (haemorrhage), hypertensive disorder of pregnancy with fits (eclampsia), infection (maternal sepsis), obstructed labour; and unsafe abortion (Chen et. al., 1993; Filippi et. al., 1998). These shall be used for part of the assessment. This concept was based on the obstetric "near miss" or life-threatening complications. The approach was originally developed in the United Kingdom to check the quality of facility based obstetric care and the frequency of life threatening complications at the regional levels (Stones et. al., 1991; Filippi et. al., 1998). This concept and approach shall be adapted to some parts of this work to study the LGAs of interest in Ondo State of Nigeria.

## **1.6 Research Questions and Hypotheses**

The primary aim of this study was to answer these following research questions:

- What are the benefits of the cell phone programme to the pregnant women?
- How does the facility utilization of pregnant women in the cell phone programme area compare statistically to those not in the programme area?
- What is the facility-based prevalence of the 5 major causes of maternal deaths in women in the programme area compared to those who were not in the area?

## Research Hypotheses

These research questions were synthesized in the research hypotheses which were to be “tested”, they are:

1. Cell phone use increases primary healthcare utilization of pregnant women
2. Cell phone use reduces the odds of occurrence of causes of maternal deaths.

It was presumed that if pregnant women utilize health facility, causes of maternal deaths are likely to be detected before they occur and likely to be prevented from occurring. For instance, a pregnant woman with *pre-eclampsia* (high blood pressure, pedal swelling and protein in the urine), could be monitored closely and thus *eclampsia* (a cause of death) could likely to be prevented from occurring. It follows that if cell phones increase health facility utilization, then the odds of occurrence of causes of maternal death could be reduced.

## 1.7 Study Context and Methodology

This research work was carried out in 10 carefully and indiscriminately chosen healthcare centres in the 2 LGAs, 5 from each LGA. The first LGA, Ifedore LGA of Ondo State, where cell phones were provided for the pregnant women by the state government to curb maternal death (under the Abiye Project), and the second LGA, Idanre LGA of the same State, where cell phones were not provided for the pregnant women. The 2 LGAs used to be one and same LGA until some few years ago when it was split into 2.

The study followed a quantitative research methodology with a case-control approach. Data were collected from patient case files, hospital medical records, and semi-structured questionnaires (Khlal, 1997; Greenland, Watson and Neutra, 1981; Rhoads and Mills, 1984; Baker and Curbow 1991; Selby, 1994). Permissions to conduct the study were granted from the the Regional Committees for Medical and Health Research Ethics, Norway, and locally



from the Health Research Ethics Committee of the Federal Medical Centre, Owo, Ondo-State in Nigeria.

## **1.8 Outline of the Thesis**

The thesis was organized in seven chapters

*Chapter One* was the Introduction to the study. It gave the foretaste to the study.

*Chapter Two* presented the literature review, highlighting the relevant previous researches conducted in the area of the current study, with theoretical concepts providing necessary framework for the study.

*Chapter Three* gave details of the research setting and the research sites

*Chapter Four* described the research methodology guiding the study and the hypotheses to be “tested”.

*Chapter Five* contained of the key findings of the study.

*Chapter Six* discussed these key findings and their scientific consonance with the theoretical frameworks and hypotheses.

*Chapter Seven* presents the conclusion drawn from the study with highlights on the implications. References used and Appendices followed this chapter.

## **CHAPTER 2: LITERATURE REVIEW**

### **Searching Databases**

The literature was comprehensively searched in order to identify related and appropriate articles to the research topic. The research topic is interdisciplinary in nature as it has different aspects spanning through various fields such as telemedicine, ehealth, obstetrics, gynaecology, information and communication technology and public health. A broad initial search was conducted in the following electronic database: PubMed, Cochrane, Thomson ISI's Web of Science, and Google Scholar. The keywords used included: maternal health, maternal mortality, maternal death, obstetric complications, obstetric improvement, focused antenatal care, developing countries, health service utilization, pregnant women, cell phone, mobile phone, mHealth.

Reducing maternal death is a major public health challenge worldwide. This is most important in sub-Saharan Africa, where the burden of maternal death is the highest in the world (WHO and UNICEF, 2010). That a woman dies of pregnancy and /or childbirth related complications every 90 seconds is not to sound melodramatic or theatrical but rather exposing a sad fact (WHO, 2012; Hogan et. al., 2010).

Evidence suggests that providing expectant mothers with adequate maternal care, birth supervision by skilled attendants, and access to emergency obstetric care in pregnancy and delivery can save maternal lives (Freedman et. al., 2007; Obaid, 2007; Starrs, 2007). But the resource-limited setting of sub-Saharan Africa, more often than not, cannot provide these services uniformly and universally. This is especially a challenge in the rural areas which are mostly remote and distant from the urban health system. However, many researchers have suggested that ICT and especially that of cell phone technology could be useful in reducing this problem of access to health services (Chandrasekhar and Ghash, 2001; Geissbuhler et.al., 2003; Krasovec, 2004).

The widespread use of ICT in the banking and finance sector gives much hope for the possibility of more innovative use of ICT in the healthcare delivery system and in the patient

community. However, the challenges are more daunting in the developing countries due to inadequacy of the required basic and relevant infrastructures. Nonetheless, the recent development and deployment of cellular telephone technology and infrastructures have rapidly penetrated into the African communities thereby making cell phones more or less ubiquitous (Byass and D'Ambruso, 2008; Tamrat and Kachnowski, 2011).

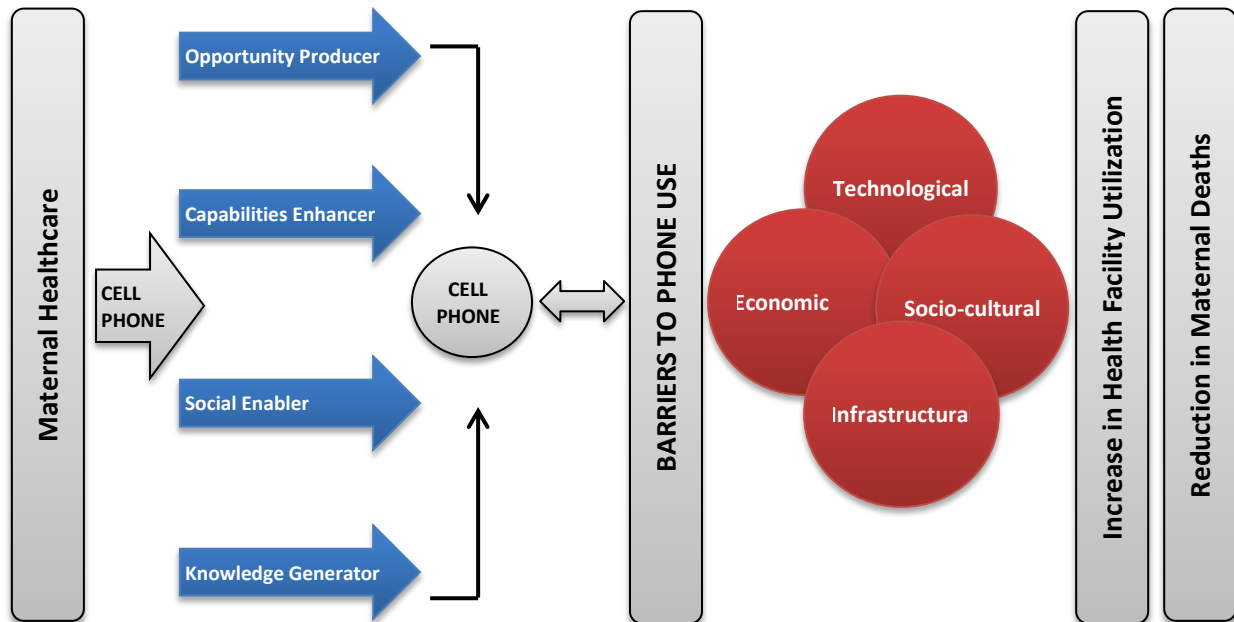
However, there is no full understanding of the elements influencing the adoption of cell phone in reducing maternal death. Even so, I shall be using a theoretical model partly of my own construction to this effect. A theoretical model I have termed the “*cell-phone-for-reducing-maternal-deaths*” model.

## **2.1 The Cell-Phone-for-Reducing-Maternal-Deaths Model**

I adapted this theoretical model from the work of Chib et. al. (2008) in their *ICTs for healthcare development model*. Originally, the theoretical framework was proposed by Banuri, Zaidi and Spanger-Siegfried (United Nations Development Programme, 2005) where they connected education to development through four routes. They expounded that ICT as an agent brings development through these routes: Producer of opportunity; enhancer of capability; enabler of social ties; and generator of knowledge. Chib et. al. (2008) extended the theoretical framework into healthcare context and expanded it to include the common and documented barriers to ICT use in Africa. I refocused this theoretical framework onto the improvement of maternal health through the use of cell phone to effect increase utilization of primary healthcare and reduction in maternal deaths.

In the model, the different benefits of the usage of cell phone were highlighted with the inter-related underlying barriers to the goal of reducing maternal deaths.

Figure 1. The *Cell-phone-for-reducing-maternal-deaths* Model (An adaptation of the ICTs for Health Model)



## 2.2 Benefits of Cell Phone Usage

### Opportunity Producer

Cell phone use can simplify and improve work productivity with better time management, thereby increasing the opportunity to attend to more pregnant women at the healthcare centre (Chib, 2010; Chib et. al., 2008). On the other hand, in a fee-paying setting, more patients translate to opportunity for increased monetary benefits for the healthcare provider (Krasovec, 2004; Martinez and Villaroel, 2003). However, this is not always the case as Chib et. al. (2008) found that an increase in patient-load did not bring extra income benefit to the midwives involved in the cell phone programme as they were on fixed monthly salary from the government.

The time saved from the use of cell phones could be used on other pregnant women or on personal matters (Chib et. al., 2008).

### **Capabilities Enhancer**

For the pregnant women, one of the most important values of cell phone use is in getting support in the time of need. Cell phones enhance the expecting women's capabilities to deal with emergency situations (Sife, Kiondo and Lyimo-Macha, 2010).

For the health workers at the rural setting, the ability and the confidence to face medical situations improves, knowing that help is some few phone buttons away (Chib et. al., 2008; Geissbuhler et. al., 2003). However, when some obstetric complications arise, skilled or expert assistance over the phone might not be adequate enough and the necessity to efficiently refer the patient to a better equipped facility becomes pertinent (Freedman et. al., 2007; Krasovec, 2004). At this point, a cell phone is also an effective and handy device to activate an un-delayed and potentially seamless crucial intervention. This is not only to arrange transportation, but also to prepare the receiving, better equipped facility for the patient while en-route (Chib et. al., 2008). This was well demonstrated in the RESCURER project in Uganda (Musoke, 1999).

The capability for pregnancy monitoring is also enhanced by the use of cell phone. The patient can call to report any observation noticed and the rural health worker, if not sure, can sought expert opinion regarding what to do, treatment options and recommendations (Chib et. al., 2008).

### **Social Enabler**

The use of cell phones can improve the social and professional relationship among the different medical cadres of the health workers such as doctors, nurses, pharmacists, laboratory scientists and so on. The social ties are strengthened by the communication links.

The relationship and ties between the health workers and the community are also enhanced through this means (Toussaint et. al., 2004; Chib et. al., 2008).

### **Knowledge Generator**

The use of cell phones may enhance access to medical information for the health workers and also for the pregnant women in the community. It offers the rural health workers the opportunity to upgrade, update and improve their knowledge by seeking advice from medical experts from time to time (Chib et. al., 2008). Likewise, the pregnant women are able to learn more from the health workers concerning their state of health. Information about the pregnancy, medications during pregnancy, expected date of delivery, diet, sex, stages of pregnancy and prenatal care are readily given to the pregnant mothers (Jayanthi, Chin and Kanaga, 2007).

## **2.3 Potential Barriers to the Use of Cell Phone**

The adapted model shown in Figure 1 further depicted the possible barriers to cell phone usage in sub-Saharan Africa. These inter-related barriers could be the potential impediments to the full realisation of the benefits of the cell phone usage in improving facility utilization and reducing maternal deaths (Chib et. al., 2008).

### **Infrastructural Barrier**

This involves the erection of telecommunication networks (infrastructures) across the rural areas and, since the areas are largely rural, the networks are often limited and inadequate. In most places in sub-Saharan Africa, the rollout of rural telecommunication infrastructures is demand-driven for the existing users, among other factors (Baldwin and Thomas, 2005; Spence, 2003; Richardson, Ramirez and Haq, 2000). If the existing users (subscribers) are not of enough commercial value, then the telecom infrastructural expansion is typically neglected. This is hardly surprising as it resembles other pre-existing infrastructural

deficiencies, such as road networks, electricity, and so on, in the rural areas of sub-Saharan Africa.

In the study carried out by Chib et. al., (2008) in Aceh Besar in Indonesia, inadequate physical infrastructure was the major barrier to the effective use of cell phones. This infrastructural shortcoming created a significant obstruction leading to uneven telecommunication network coverage in the area. Network failures are common occurrences in rural areas.

Power supply (electricity) is another infrastructural challenge that could potentially hamper the use of cell phones in the rural community. Electricity is usually epileptic in supply or outrightly unavailable in some communities. This makes regular charging of the cell phone largely impossible and consequently resulting in frequent or perpetual flat phone batteries. This similar situation was what led to the experimentation with solar panel for power supply in one of the peripheral health units of the Bo District in Sierra Leone, where solar panels were used to power the radio communication system used for the facilitation of emergency obstetric care (Samai and Sengeh, 1997)

### **Economic Barrier**

For an average woman in rural sub-Saharan Africa, the relatively high cost of cell phones and the incessant purchase of airtime for the phone are common economic burden and hence potential barrier to widespread use. These financial implications have a negative sway on cell phone adoption (Mathur and Ambani, 2005; Mehta and Kalra, 2006). This is also consistent with the findings of Chib et. al. (2008) among the midwives using cell phones to improve healthcare delivery in Aceh Besar in Indonesia.

### **Technological Barrier**

Minimal technical literacy can pose a substantial barrier to the use of cell phones. A low or no educational background and a corresponding lack of exposure to such devices on the part

of the average rural pregnant woman makes the initial period of use very bothersome. The lack of local language and the dominance of English language or other major foreign languages on the cell phone interface create a challenge to the women who are not proficient in English or the other major foreign languages (Davis, 2005). Nevertheless, most cell phones are user friendly and relatively easy to learn for those who have basic knowledge of English language and even those who have no formal education.

### **Social Cultural Barrier**

Gender inequality in the use of cell phones is not a universal norm, as Chib et al. (2008) observed in their study. There was no significant difference in the usage of cell phones between the men and the women. However, Mitter (2005) pointed out that women are at a disadvantage in sub-Saharan Africa with regard to education and technical skills and these disadvantages do indirectly affect gender related cellular phone uptake rates.

In addition, cell phone do not challenge any known traditional values and practices unlike Dyson (2004) and Irwin (2000) found in the adoption of some other ICTs. There does not seem to be any observable resistance towards this modern device due to any conflicting cultural values and norms.

## **2.4 Why? When? Where? : Delay as the Key Factor in Maternal Deaths**

Deaths secondary to pregnancy and childbirth related causes represent one of the most preventable causes of women's deaths worldwide (Barnes-Josiah et al., 1998; Herz and Measham, 1987). The complications that can potentially lead to death exist in about 9-15percent of all pregnancies worldwide (Royston and Armstrong, 1989; Koblinsky et al., 1993). Whereas the risk of developing these complications is similar in the developed and the developing worlds, however, the risk of death once a complication occurs is not similar. The challenge of not receiving adequate and timely medicare at the crucial moment is the overwhelming factor leading to the deaths of the sub-Saharan African women (Thaddeus and Maine 1990, 1994; WHO, 1986; Krasovec, 2004).



The literature revealed that 75 percent of maternal deaths are as a result of direct causes from severe haemorrhage (bleeding), maternal sepsis (infection), obstructed labour, high blood pressure with fits in pregnancy (eclampsia) and unsafe abortion (Chiwuzie et. al., 1995; WHO, 1986). Most of these deaths are avoidable or avertable if the pregnant women receive adequate and timely medical care at the crucial moments (Maine, 1994; WHO, 1986; Krasovec, 2004).

Numerous studies, confidential enquiry into maternal deaths and findings from clinical audits have confirmed that delays (and substandard practices) are key factors in the high maternal death rates in sub-Saharan Africa (Egypt MOH, 1994; Harrison, 1997; Macfarlane, 2001; McCarthy and Maine, 1992).

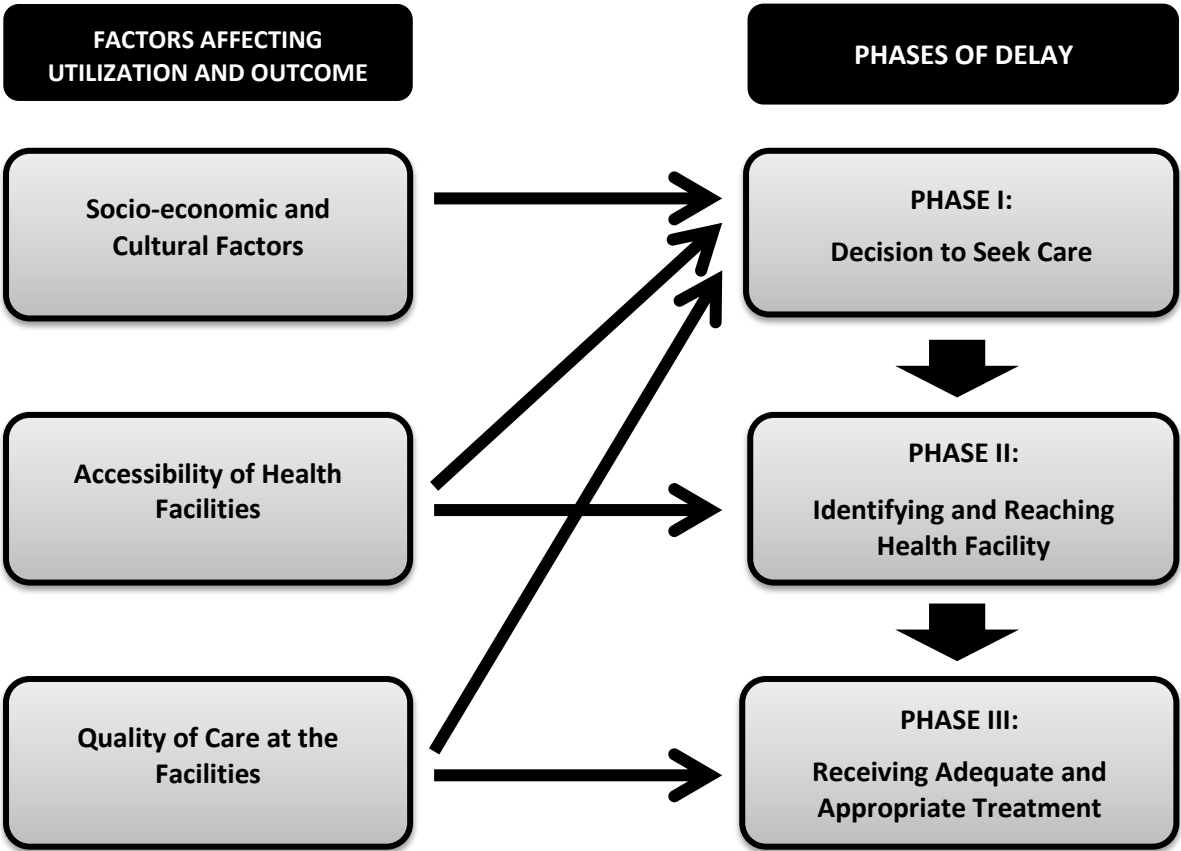
In a national maternal mortality study conducted in Egypt (Egypt MOH, 1994), delay in seeking medical care and (non-compliance with medical advice) by the patient was found to contribute to 42 percent of all the maternal deaths. This similitude exists in Nigeria where Chukudebelu and Ozumba (1998a; 1998b) found that delays or unbooked obstetric emergencies (that is, unregistered pregnancies coming in emergency situations) account for about 70 percent of the maternal deaths. Most of these women fail to receive antenatal care, and/or arrive at the health facility moribund or when life is already endangered by difficult labour, advanced pregnancy complications or concurrent diseases.

## **2.5 The Three Conceptual Phases of Delay**

Delay, as an entity, is an all important factor accounting for much of the maternal deaths recorded (and unrecorded) in sub-Saharan Africa (Thaddeus and Marine, 1994; Krasovec, 2004). Delays are due to heterogenic myriads of constraints, including financial, social, cultural, literacy, geographical and so on. Thus, delay in seeking orthodox healthcare has long been lamented by hospital-based researchers of maternal misfortunes.

There are three well documented phases of delays described in the literature; Phase I delay refers to the delay in deciding to seek care by the pregnant women; Phase II is the delay in arriving at the health facility; while Phase III is the delay in receiving care at the health facility.

Figure 2. Phases of Delay and the Interactions of Factors Affecting Them

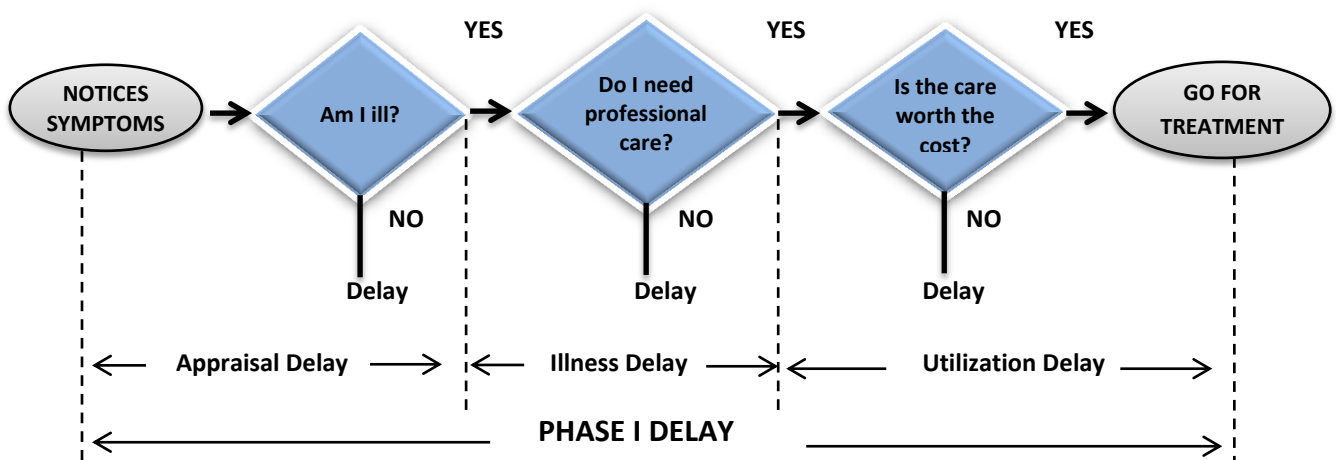


**2.5.1 Phase I delay: Decision to seek care**

This is the delay in deciding to seek healthcare by the pregnant women, the husband, the family or all of them. Acknowledging and accepting the need for health care and the decision-making process is influenced by the type of health problem or illness, status of the

pregnant woman involved, her educational background, location/distance of the health facility, financial implications, previous encounters at the facility and the perceived quality of care obtainable at the health facility (Thaddeus and Maine, 1994).

**Figure 3. Decision to seek (or delay) care in an illness episode. [Adapted from Safer et al. (1979)]**



The pregnant woman typically asks herself such questions as “Am I ill?” “Do I need a professional care?” “Is that care worth the costs?” It is important to have it in mind that the “costs” are not only in monetary terms alone as leaving her business, job, other children at home, time spent reaching the facility, and the waiting time at the health facility, are also important. The opportunity cost or the alternatives forgone of her decision are thus weighed and carefully considered. Even then, the decision to seek care is also influenced by the husband and relatives around. It is only when the answers are yes that she then decides to seek medical care (Safer et. al., 1979).

### **Strategies Using Cell Phone to Mitigating the Phase I Delay**

One of the strategies to decrease the phase I delay is to empower the pregnant women and encourage them to make contact with the health care services and gain access to information as the need arises. A similar example of this is found in the interventional project termed “Wired Mothers” initiated in Zanzibar, Tanzania (Lund, 2010). “Wired mothers” were pregnant women linked to a primary health care centre through cell phones and who could call the health provider in case of health challenges, and also receive text messages as reminders for care appointments.

The project was an integral part of the pre-existing Zanzibar health system. 1,100 wired mothers (interventional group) were to be followed up 42 days post childbirth while 1,375 non-wired mothers (control group) were also to be followed up 42 days post childbirth (Lund 2009; Lund, 2010). The study aimed to study the impact of the cell phone use on facility utilization, quality of services, maternal morbidity and mortality of the wired mothers as compared to the non-wired mothers. As of the time of this literature review, the results of the study were yet to be published.

In a safe motherhood project carried out in rural Brong Ahafo region of central-west Ghana in 1998, the overall project goal was to reduce maternal deaths by linking the rural areas with the district hospital (Matthews and Wiley, 2005) through a radio communication system and walkie talkie units. In this 5-year project, the phase I delay was reduced by the project-trained traditional birth attendants (TBAs). The TBAs who were equipped with walkie-talkie units live within the community and mostly located close to the pregnant women. The TBAs could speed up the decision-making process to seek medical care. This was manifested in the increase of the facility utilization of the pregnant women over the lifespan of the project, as reported by Matthews and Walley (2005). These findings were similar to the findings of Musoke (1999), which were published in ‘The impact of the Rural Extended Services and Care for Ultimate Emergency Relief (RESCUER) in Iganga district of Eastern Uganda’.

### **2.5.2 Phase II Delay: Reaching an Adequate Healthcare Facility**

This refers to the delay involved in arriving at the healthcare facility. It should be noted that accessibility of the health care services plays a double role in the health seeking behaviour of the pregnant women. First, it influences the decision to seek care (as discussed in phase I delay) and second, it determines the actual time spent in reaching a facility after the decision to seek care has been made. This actual time spent (or delayed) in reaching the facility is termed phase II delay (Thaddeus and Maine, 1994). In an interview conducted in rural Kenya, 47 percent of the pregnant women wanted to deliver in the hospital, 40 percent at home, while 13 percent were undecided. Out of all those who wanted to deliver in the hospital, only 36 percent of them did. 64 percent simply could not reach the hospital due to phase II delays (Voohoeve et. al., 1984).

Factors influencing this phase are: locations of health facilities in relation to the homes of the pregnant women, travel distance, means of transportation, transportation time and cost of the transportation and condition of the roads or the water (in the riverine areas) (Thaddeus and Maine, 1994). Some studies reviewed were equivocally suggestive of better access to health facilities in the urban areas than the rural area (Kloos et. al., 1987; Lasker, 1981).

#### **Strategies Using Cell Phones to Decrease Phase II Delay**

One of the strategies to decrease phase II delay in order to improve access to healthcare, especially emergency obstetric care, is good communication linked with transportation. In a project carried out in the Bo district of Sierra Leone to facilitate emergency obstetric care, motorbikes were initially used to summon the referral vehicle. The driver would then come and collect the pregnant women with obstetric complications and transport them to the hospital. The first year of the project witnessed incessant breakdowns in the arrangement, such as an inability to travel at night and road traffic accidents involving the motorbikes. The project consequently decided to replace the motorbike system with a radio communication

system with walkie talkies (Samai and Sengeh, 1997). Samai and Sengeh (1997) found that the number of pregnant women with major obstetric complications arriving at the Bo Government Hospital from the project area increased from 0.9 to 2.6 per month. Furthermore, the case fatality rate dropped from 20 percent to 10 percent.

In a project earlier cited, Matthews and Wiley, (2005), where the radio communication system was also used to summon the emergency obstetric transport service, the phase II delay was also reduced by 30 minutes. The average response time for the ambulance was initially 100 minutes. However, when walkie-talkies were given to the drivers, the average response time was reduced to 73 minutes (Matthews and Wiley, 2005). This differential in response time could be very important and life-saving in a life and death situation of a major obstetric emergency.

### **2.5.3 Phase III Delay: Receiving Adequate Treatment at the Health Facility**

The Phase III delay is the delay in receiving healthcare at the health facility. It revolves round the quality of care obtainable at the centre and has everything to do with the management, personnel and supplies available. The factors influencing this phase of delay include: inadequacy in personnel both in number and competency, shortage of essential supplies, equipment and medications, bad management, late or wrong decision making processes, actions and inactions (not doing what is expected to be done), and incorrect diagnoses made by the staff (Thaddeus and Maine, 1994).

#### **Strategies using Cell Phones to Decrease Phase III Delay**

It is obvious and understandable that cell phones cannot take the place of medical equipment and supplies nor be a substitute for personnel. Nonetheless, cell phones can be strategic in reducing the delay or in mitigating the effects of the delay.

Case studies have demonstrated means in which cell phones helped to improve the skills of health workers by offering access to expert advice and timely information on what to do and

what not to do (Chandrasekhar and Ghosh, 2001; Geissbuhler et. al., 2003). This can enhance the management of obstetric complications (Krasovec, 2004; Mechael, 2005).

Generally speaking, the phase III delay is reduced by connecting the lesser trained health workers to the better trained ones through cell phones. This builds up the knowledgebase and the capacities of the lesser trained and reflect positively on the third phase of the obstetric delay (Noordam et. al., 2011).

In a study previously referred to in this review and carried out in Indonesia, 15 health centres were randomly selected and midwives selected from 8 of the health centres were given cell phones while the midwives selected from the 7 others (the control group) were not (Chib et. al., 2008). The intervention group reported that the cell phone use improved their capability to handle obstetric situations and they could request for help more easily. The control group reported difficulties in contacting and being contacted, and when faced with difficult situations, there were no means of accessing expert guidance. Thus, the risk of delaying treatment or intervention was higher (Chib et. al., 2008). The findings of Matthews and Walley (2005) was similar as the radio communication system was deemed an advantage for the health centre nurses that had links with the hospital maternity unit and could also summon the ambulance drivers through the communication system.

The 3 different phases of obstetric delays as already presented do not happen in isolation and are not independent of each other. The objective hindrances faced in phases II and III feed back into the subjective decision-making process in phase I. Thaddeus and Maine (1994) noted the existence of complex interconnected multiplicative interactions between the phases. Good proportions of maternal deaths are multi-factorial and are due to the combined results of the different phases. However, any one phase could also singularly result in an obstetric misfortune for the pregnant woman.

A broad agreement exist in the literature that access to communication as provided by cell phones may improves maternal health services and may consequently reduce the occurrence of maternal deaths (Noordam et. al., 2011; Chib et. al., 2008). This happens

through changes in the health seeking behaviours, an increase in facility utilization with more deliveries under trained personnel, increased referrals to better equipped centres, speedy consultations and timely management , confidence building of both health users and providers, prevention of professional isolation, better and calmer management of complications, all as compared to situations before interventional projects in Iganga district of Eastern Uganda (Musoke, 1999); Brong Ahafo region of central-west Ghana (Matthews and Walley, 2005); Bo district of Sierra Leone (Samai and Sengeh, 1997); Mwanza, Phalombe and Zomba districts in the southern region of Malawi (Lungu and Ratsma, 2007); and Kayes region of Mali (Fournier et. al., 2009). However, Noordam et. al., (2011) conceded that there is still need for evidence of concrete, tangible and population-oriented health impacts which could answer the research questions posed in this present study.

Cell phones, as published by Michael et. al., (2010), have great potentials especially in extending the reach of health information and services, and in stimulating a shift towards a more people-oriented healthcare system.





## **CHAPTER 3: THE RESEARCH SETTING**

### **3.1 Introduction to Nigeria**

This study was conducted in Nigeria, the most populous country in Africa, with a population of about 170 million (CIA World Factbook, 2012). This population accounts for approximately 18 per cent or one-sixth of the African population and one-fifth of sub-Saharan African population. Nigeria accounts for approximately 2 per cent of the world's population.

The country is geographically located in West Africa between latitudes 4 and 14 degrees North, and longitudes 2 and 15 degrees East, with a total land mass of about 923,768 kilometre squares (Wikipedia, 2012a). It shares 773 kilometres border with Benin in the West, 1,497 kilometres with Niger in the North, 87 kilometres with Chad in the northeast and 1,690 kilometres with Cameroon in the East. The country has a coastline of about 853 kilometres in the south which lies on the Gulf of Guinea on the Atlantic Ocean (CIA World Factbook, 2012). The southern part of the country has equatorial climate while it is tropical in the centre. The northern part is majorly of arid climate. The country is usually warm and humid throughout the year with temperature ranging between 25 and 45 degree Celsius in most places.

The country is officially known as the Federal Republic of Nigeria, a federal constitutional republic consisting of 36 states and one federal capital territory. Each State is further divided into Local Government Areas (LGAs), and there are 774 LGAs in all. It is a very diverse country with more than 250 ethnic groups, 500 indigenous languages and religions including Christianity, Islam and different traditional or native African beliefs (CIA World Factbook, 2012).

**Figure 4 Map of Africa Showing the location of Nigeria (left), and map of Nigeria showing the 36 States in Nigeria (right)**



Christians who are predominantly Yoruba and Igbo (Ibo) live in the south of the country, whereas Muslims who are predominantly Hausa and Fulani live in the North. The native African religion in which people believe in deities, spirits and ancestor worship are found throughout the country. Rivalries among the ethnic groups and frequent violent clashes are not uncommon along the religion lines and a concerned source of socio-political instability. The official language of Nigeria is English. This reflects the British colonialism and it is widely spoken and used for education, business transactions and other purposes. However, English as a first language is almost an exclusive preserve of the disappearing urban middle class and the country's elites. Most ethnic groups prefer to communicate in their own language, and the major native languages spoken are Yoruba, Hausa and Igbo (Ibo).

Nigeria is a relatively educated and industrialized society. In a survey carried out in 2010, adult literacy based on the ability to read and write in English or any other languages was about 72 per cent on the average with a higher rate for the males (79 per cent) than for the females (64 per cent). However, the literacy rate was markedly higher in the urban where it

was 74 per cent compared to the rural areas where it was found to be about 50 per cent (National Literacy Survey, 2010).

Extended family is the mainstay of the social system. Generally speaking, relations such as the grandparents, uncles, aunts, cousins, sisters, brothers and in-laws exist with mutual caring, responsibility and function as a unit through life. The interactions are largely guided by an age hierarchy and social position. Age and position command a lot of respect as age is believed to confer wisdom. So then, in situations warranting decision-making, the eldest person in age or social standing has the responsibility to make decision in the interest of the family. However, this extended family concept and function is gradually fading away in the urban areas.

Nigeria is naturally endowed with an abundance of arable land and vast quantities of natural resources. It is the sixth largest oil-producing nation in the world. Other resources include but are not limited to natural gas, tin, iron ore, coal, limestone, lead and zinc. Nevertheless, the Nigerian economy is grappling to leverage these vast quantities of natural resources especially that of oil, to shift the devastating and ironic poverty that affects more than half of the population of the country.

### **3.2 The Healthcare Delivery System in Nigeria**

The Healthcare Delivery System in Nigeria is made up of the primary, secondary and the tertiary levels of care. These levels of care are the concurrent responsibility of the three tiers of Government namely the Local, State and Federal Governments, respectively.

The Local Government provides the primary level of care, which is the lowest level of healthcare services, via the primary healthcare centres (PHC). However, the Local Government receives support, provision and directives from the State and Federal Government through the Ministries of Health and within the relevant overall national health policies.

The State Government manages the secondary level of healthcare mainly through the various General Hospitals. This level of healthcare provides specialised services to patients, and also referrals from the primary healthcare level through the outpatient and inpatient services of the hospital for general medical, surgical, paediatric, obstetric and gynaecological services.

The Federal Government focuses on the tertiary healthcare level through the University Teaching Hospitals and the Federal Medical Centres. This level consists of highly specialised services providing referral support to the other levels of healthcare.

The aforementioned healthcare responsibilities of the different tiers of government are concurrent and simultaneously co-existing with some inevitable overlaps of services. For instance, the State Government provides some tertiary care through state specialist hospitals and state-owned teaching hospitals, while the Federal Government provides some primary healthcare (PHC) services through the general outpatient departments of the tertiary hospitals.

### **3.3 Introduction to Ondo-State, Nigeria**

Ondo-State is one of the 36 states in the Federal Republic of Nigeria. It is located in the south-western region of the country with a population of about 3.44 million people, thus ranking 20<sup>th</sup> (in population) out of the 36 states. However, the State has the largest number of public schools in Nigeria with over 880 primary schools and 190 secondary schools (Wikipedia, 2012b).

The State is divided into 3 senatorial districts which are further divided into 18 Local Government Areas (LGAs). This study was conducted in 2 of these LGAs, namely Ifedore and Idanre LGAs. The ethnic composition of the State and that of the 2 LGAs of interest is largely of Yoruba extraction. The State is one of the 13 oil-producing States in Nigeria, and the Gross Domestic Product based on the Purchasing Power Parity (PPP) as of 2007 totalled 8.41 billion

dollars, and the GDP per capita of 2,392 dollars per person, which was slightly above the national value (Wikipedia, 2012b).

Figure 5 Map of Nigeria showing the location of Ondo State (left), and the map of Ondo-State Showing the 18 Local Government Areas (right)



### 3.4 Ondo-State Healthcare System

Ondo-State has various categories of health facilities owned by the government (public), individuals (private), and religions organisations. There is a Federal Medical Centre in the State (from where the local research ethic permission for this study was obtained). There are 4 State Specialist Hospitals, 15 General Hospitals and 18 Comprehensive Health Centres. There are about 203 (still increasing) Basic Health Centres in the 18 LGAs administered by the various local government authorities.

## **Operation and Functions of the Hospitals**

The Specialist and the General Hospitals (GHs) are operated by the State through the State Ministry of Health, while the Comprehensive Health Centres (CHCs) are jointly managed by the State and the Local Governments. The Basic Health Centres (BHCs) are largely controlled by the Local Government but with major strategic policy directives from the Federal and State Governments.

The Basic Health Centres (BHCs) are the basic healthcare units existing in almost all the small villages and towns. These Centres provide routine medical care to the people by looking after their general health and treating them for common ailments mostly free of charge or at nominal cost. Preventive medicine is usually encouraged especially to check the spread of local endemic diseases and thus, information are given in the local language about the causes and prevention of diseases. The Basic Health Centres also run family planning care, maternal and child health services. No surgical intervention is performed in any of these Centres as surgical or potentially surgical cases are promptly referred to the nearest Comprehensive Health Centre, General Hospital or State Specialist Hospital.

The Comprehensive Health Centres are bigger, better equipped and staffed than the Basic Health Centres. The scope of functions covers more effectively the essential elements of primary health care as outlined by the Alma Ata Declaration (Alma Ata Declaration, 1978). In addition to the functions of the Basic Health Centres, they also perform basic laboratory services, collection and reporting of vital statistics, simple surgical interventions, caesarean sections and referral services.

The 15 General Hospitals are about evenly distributed all over the State with one in each LGA, while the State Specialist Hospitals exist in the major towns of each of the three sensational districts of the State. The fourth and the most equipped, well-staffed of the Specialist Hospitals is located in Akure, the capital of the state. This capital is about equi-distance to the 2 LGAs where this study was carried out.

### **3.5 The Abiye Project**

“Abiye” in the local parlance and language simply translates to “safe motherhood”. The project is reportedly a home grown initiative, with a primary healthcare approach, targeted at reducing maternal and infants’ mortality in Ondo State of Nigeria. However, the initiative started as a pilot programme in one of the local government areas of the state.

Prior to this, the state was reportedly having the highest maternal death rate in the south western Nigeria as stated by the World Bank and quoted by the State Government on the State website (ODSG, 2012a). A baseline survey carried out by the State Government just before the commencement of the Abiye programme found that only 16% of pregnant women who register at the health facilities eventually deliver their babies there (ODSG, 2012b).

The Abiye project was launched at Ifedore LGA on 28<sup>th</sup> of October 2009 to achieve 3 goals by the end of 2011 (that is, in 2 years): 60 per cent increase in facility utilization, 50 per cent reduction in maternal deaths and 50 per cent reduction in neonatal mortality. The state started by embarking on an advocacy sensitization to focus people’s attention on the challenge on ground and to get the local government health workers and the corresponding communities aware of the proposed effort to reverse the not-so-good maternal statistics.

### **3.6 Prevention of Maternal Death**

#### **Identification of Phases of Delay**

The baseline survey carried out by the State Government identified 4 phases of delays predisposing to maternal death in the state. These delays were similar to the literature-documented phases of delay earlier discussed (Thaddeus S., and Maine D., 1994), however a fourth phase of delay was identified in the state. The four phases were: (1) delay in seeking care; (2) delay in reaching care when decision to seek care is taken; (3) delay in accessing care on arrival at the health facility; (4) delay in referring care from where it is initiated to where it could be completed.



### 3.7 Strategies by the State to Counter the Delays

#### Health Rangers

These are specially trained Community Health Extension Workers residing in the locality. Their training includes, but is not limited to, basic obstetric care, intensive care, expanded life saving skills and family planning. Each Health Ranger is assigned 25 registered pregnant women whom she is expected to track and monitor regularly with a customised checklist. She is equipped with an Abiye cell phone to connect with the pregnant women, the means of transportation and the health facility. This strategy was expected to counter the first and second phases of delay.

#### Transportation

In order to evacuate patients and mobilise the Health Ranger as required, appropriate means of transportation suitable for the LGA of operation were provided in form of motorcycles, tricycles and four-wheel drive ambulances. This strategy was intended to counter the second phase of delay.

*Figure 6 Tricycle Ambulance*

### Tricycle Ambulance



### **Improved Facilities**

The Basic Health Centres and the Comprehensive Health Centres in the LGA were renovated and drugs, consumables and other necessary materials were provided. The services were made free of charge to the pregnant women. This strategy was expected to counter the third phase of delay.

### **Provision of the Abiye Cell Phone**

The cornerstone of the strategy to reducing maternal deaths in the pilot project was the Abiye cell phones. The State Government, through a public-private partnership with a telecom company called *Globacom* provided Closed-Users'-Group (CUG) cell phones to the pregnant women, Health Rangers, nurses, health facilities, ambulance drivers and so on. The cell phones were given out free, and calls made free of charge within the CUG. Thus, the pregnant mothers did not need to pay or be charged to make calls (at any time) to the Health Rangers or the health facilities. Likewise all other stakeholders in the CUG. As far as the call is within the group, it is free of charge. This strategy was intended to facilitate referrals and intended to counter the third and fourth phases of delay. It could also potentiate other strategies, such as the tracking and monitoring done by the Health Rangers.

The cell phone "network" was like a web in which all other strategies to reducing maternal deaths were embedded.

### **3.8 The Research Sites**

The research sites were chosen from 2 LGAs: Ifedore LGA and Idanre LGA. Ifedore LGA was chosen because that was where the Abiye pilot project was on-going and Idanre LGA was used as a comparison because it was a nearby and largely similar to Ifedore LGA in socio-economy and healthcare arrangements, apart from the Abiye Phone Project. The 2 LGAs were also approximately equi-distance to Akure, the state capital city where the apex referral centres (Mother and Child Hospital and State Specialist Hospital) were located.

## **Ifedore Local Government Area**

The LGA has a population of about 176,000 and its headquarters is in the town of Igbara-Oke. This is the LGA where the Abiye Project was being piloted. The pilot project involved 17 health facilities: 1 General Hospital, 2 Comprehensive Health Centres and 14 Basic Health Centres. Out of these centres, 5 research sites were chosen: 1 General Hospital (the only General Hospital in the LGA), the 2 Comprehensive Health Centres where the programme was on-going, and 2 Basic Health Centres selected indiscriminately (at random) out of the 14 where Abiye programme was on-going. By names, the 5 research sites were: General Hospital Igbara-Oke; Comprehensive Health Centre, Ijare; Comprehensive Health Centres, Ilara Mokin; Basic Health Centre, Isarun; and Basic Health Centre, Molete.

*Figure 7* **General Hospital Igbara-Oke**



**Figure 8 Comprehensive Health Centres, Ilara Mokin**



### **Idanre Local Government Areas**

This Local Government Area has a population of about 129,000 inhabitants and its headquarters is in Owena Idanre.

5 research sites (health facilities) were also chosen from this LGA just as the other LGA: 1 General Hospital (the only general hospital in the LGA), 2 Comprehensive Health Centres, and 2 Basic Health Centres. The Comprehensive Health Centres and Basic Health Centres were selected indiscriminately (at random) from a list. That is, each facility had about the same probability of being chosen as research sites. By names, the research sites were: General hospital, Idanre; Comprehensive Health Centre, Owena; Basic Health Centre, Ofosu; Basic Health Centre, Ese-Oke; and Basic Health Centre, Alade Atosin.

Figure 9 General hospital, Idanre



Figure 10 Comprehensive Health Centre, Owena





Figure 11 Basic Health Centre, Ese-Oke



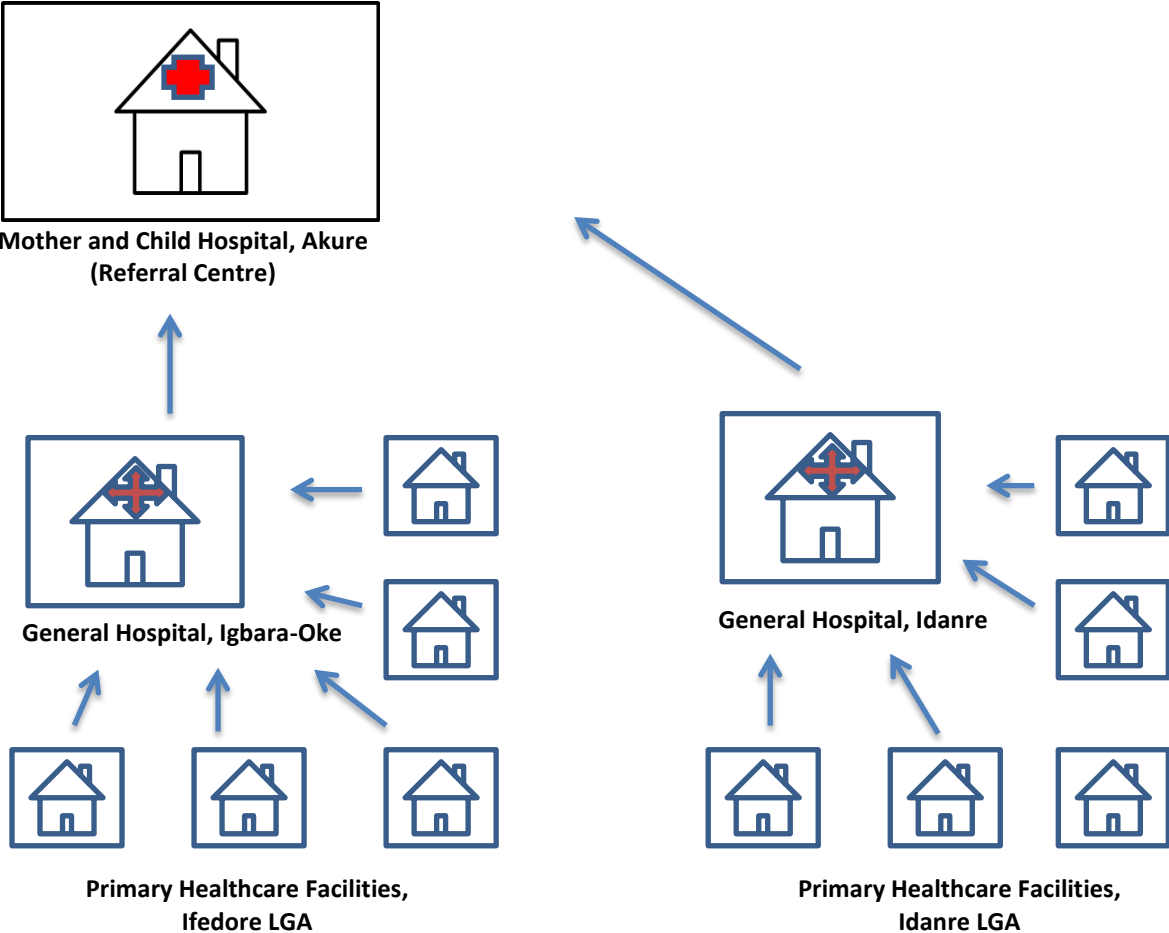
### 3.9 How the System Works

When a pregnant woman visits any of the Abiye designated health facilities for the first time, she is registered and her bio-data and contact address documented. She is assigned a Health Ranger and subsequently given an Abiye cell phone. The phone number of her Health Ranger is made available to her and also other necessary numbers to call whenever the need arises.

Phone calls made on the cell phones between the pregnant women, Health Rangers, health centres and anyone within the CUG were free. The pregnant women were furthermore monitored regularly on phone by the health rangers and reports documented. The pregnant women were also visited at home if necessary, such as in situations when the phone is consistently unanswered, unavailable, not within cell phone network areas or switched off. Each Health Ranger was assigned 25 pregnant women at a time. The phone was also used to summon transportation (ambulance) for patient referral.

On the other hand, in the other LGA where the Abiye phones project were not in use, the pregnant women also get registered at the health facility and necessary bio-data were also documented. However, there were no cell phones given to them, neither were they tracked nor monitored by phones. Referrals were also not, at least not officially, assisted by cell phone use.

Figure 12 Structure of the referral system in the 2 LGAs to the referral centre



## **CHAPTER 4: THE RESEARCH METHODOLOGY**

### **4.1 Ethical Considerations and Permissions**

The permission to carry out this project was obtained from the North Norway Regional Committees for Medical and Health Research Ethics (REK V), and locally in Nigeria from the Health Research Ethics Committee of the Federal Medical Centre at Owo in Ondo-State. Official authorization and clearance to use the hospital data was also obtained from the State Ministry of Health and the 2 LGA headquarters.

Data were collected from the hospital records and the patients' casefiles. These data included antenatal attendance record, baby deliveries at the facility, record diagnoses, and patients' casefiles to confirm diagnoses. All these were collected anonymously. Names, addresses or personal data of any of the patients were never collected.

### **4.2 Research Objective and Hypotheses**

The primary purpose of this study was to identify the benefits of the use of cell phones in reducing maternal death in the Abiye project with the following objectives in mind:

- To identify the benefits of the Abiye cell phones to the pregnant women attending antenatal and postnatal care.
- To compare facility utilization of the pregnant woman under Abiye phone project to those not under it.
- To examine the frequency of occurrence of the 5 major causes of maternal deaths in Ifedore LGA and compare to that of Idanre LGA.



These set objectives inevitably give rise to some analogous but pertinent research questions which are:

- What are the specific benefits of the cell phones to these aforementioned stakeholders?
- Is there any difference in the facility utilization in the two local government areas? And if so, is it statistically significant?
- What about the five major causes of maternal death. Is the use of cell phones reducing the facility-based prevalence?

### **Research Hypotheses**

1. Cell phone use increases primary healthcare utilization of pregnant women
2. Cell phone use reduces the odds of occurrence of causes of maternal deaths

### **4.3 Research Design**

The study was designed to answer these above questions, and thus confirm or refute the hypotheses. It is a quantitative, case-control study where retrospective data were collected from the patients' case files and the hospitals' records. Semi-structured questionnaires were also used to collect data from pregnant women at the antenatal and postnatal hospital visits. More data were further generated from these questionnaires.

The retrospective data gathered included that of patients who attended the health facilities between January 1, 2011 and December 31, 2011. The questionnaires were distributed (and collected back) in the different health facilities between July 2 and 20, 2012.

## **Study Population**

For the data of the antenatal registration, baby deliveries and facility-based prevalence of the 5 major causes of maternal death, all pregnant women who attended the health facilities within the period from January 1st to December 31st 2011 were used as the study population. That is, all pregnant women who utilized the designated health facilities and met the eligibility criteria between these dates in the 2 LGAs of interest (Khat, 1997). From this population, the cases and controls were chosen.

## **Cases**

These were those with the diagnosis of any of the 5 major causes of maternal mortality: haemorrhage (ante-, intra-, or post- partum); maternal sepsis; eclampsia (ante-, intra-, or post- partum); obstructed labour; and complications of unsafe abortion (Chiwuzie et. al., 1995).

## **Control**

These were other pregnant women who did not have any of the above diagnoses.

## **4.4 Selection of Cases and Control**

### **Inclusion Criteria**

Community dwelling pregnant women that did not meet the exclusion criteria mentioned below.

### **Exclusion Criteria**

Women whose records had shown medical conditions that could interfere with understanding and following instructions or significant cognitive impairment, women with severe psychiatric disorders, women with major cardiovascular disease, women with sickle cell disease and other haemoglobinopathies.

## **Grouping into Cases and Controls**

Each member of the study population were grouped into either cases or controls depending on whether they were diagnosed having any of the 5 major causes of maternal mortality: haemorrhage (ante-, intra-, or post- partum); maternal sepsis; eclampsia (ante-, intra-, or post- partum); obstructed labour; and complications of unsafe abortion (Chiwuzie et al., 1995) or not.

Details of those included as cases are as follows:

1. Haemorrhage – Haemorrhage (bleeding) in the form of antepartum, Intrapartum or postpartum haemorrhage that necessitated hospital admission (or referral).
2. Maternal Sepsis – Sepsis (infection) that warranted hospital admission and parenteral antibiotic administration or referred to another centre.
3. Eclampsia – Antepartum, intrapartum or postpartum eclampsia with or without documented preeclampsia necessitating hospital admission (or referred as a result).
4. Obstructed Labour – Obstructed labour resulting from any cause, ensuing onto a caesarean section, with or without a live baby (or referred as a result).
5. Complications of Unsafe Abortion – Unsafe abortion (or its complications) in the guise of criminal abortion, septic abortion, incomplete abortion, admitted into the hospital (or referred). The case files of his group were pulled from the Gynaecology Clinic.

## **4.5 Data Collection**

10 health facilities (research sites) were utilized in the study, 5 in each of the 2 LGAs: the only General Hospitals in each of the LGAs; 4 Comprehensive Health Centres, 2 in each of the

LGAs; and 4 Basic Health Centres, 2 in each of the 2 LGAs. The 2 Comprehensive Health Centres selected in Ifedore LGA were the 2 centres where Abiye programme was on-going, while the 2 centres chosen in Idanre LGA were selected indiscriminately from the list of all the centres in the LGA. The 4 Basic Health Centres used in the study were also indiscriminately picked at random from the list of all the available Basic Health Centres in the LGAs.

Each health facility was visited after the official permission was obtained from the State Ministry of Health and the LGAs.

The data corresponding to the period of time January 1st, 2011 to December 31st, 2011 were collected. These data included the total number of antenatal (pregnancy) registrations, baby deliveries, frequency of occurrence of the 5 major causes of maternal death (severe bleeding, maternal infection, eclampsia, obstructed labour, and unsafe abortion) for each month of the year 2011. The hospitals' records were used with confirmation from the patient's case files in order to validate the cases met the criteria in the study protocol. This was done in all the 10 health facilities in the 2 Local Government Areas.

### **The Questionnaire**

The study questionnaire consisted of series of questions related to the index pregnancy, the Abiye cell phone and Abiye project itself. It was used to assess the benefits of the cell phone in relation to the women's healthcare, its effect on health facility utilization, and the wish for the continuity of the cell phone initiative, among other topics. The questionnaires were in both English and Yoruba (the local language). 250 questionnaires were given out in the selected 5 health facilities in Ifedore LGA and 231 were returned. Out of the returned 231 questionnaires, 7 were poorly or insufficiently filled out.

### **Distribution of Questionnaire**

The study questionnaires were distributed in the health facilities in Ifedore LGA only. This was because the questionnaires were to extract data pertaining to the benefits of the use of the Abiye cell phone (and the cell phones were not in use in the other LGA).

The antenatal days of the health facilities were inquired and the questionnaires distributed on those days at each of the 5 health facilities, this spanned a period of 3 weeks.

Questionnaires were given to all the pregnant women who voluntarily agreed to fill in the questionnaires, and were collected back after completing them.

## **CHAPTER 5: THE RESEARCH FINDINGS**

### **5.1 Analysis of Data from the Questionnaires**

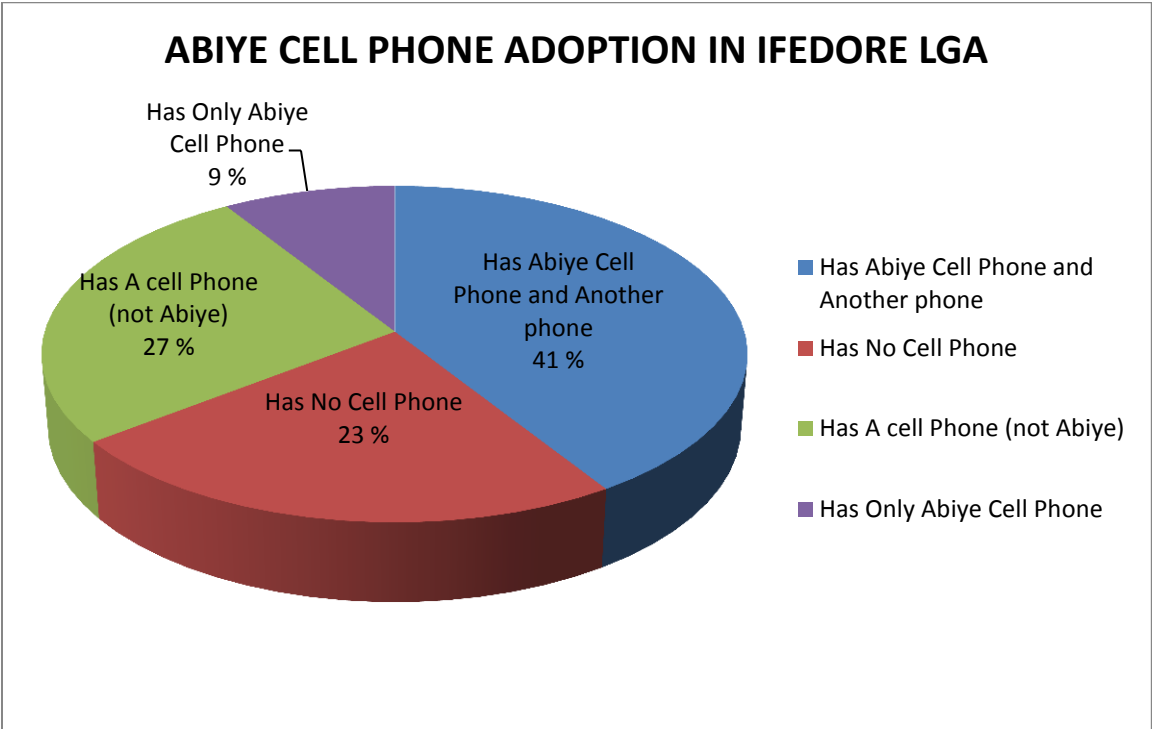
224 questionnaires were used for the analyses out of the 250 distributed. The difference were either not returned or defectively filled-in.

#### **5.1.1 Accessibility to the Cell Phone**

Out of the 224 pregnant women who filled in the questionnaires, 112 of them possessed the Abiye cell phone. This means that access to or the adoption of the cell phone among the pregnant women in Ifedore LGA was 50 percent. All these women admitted to be actively using the phone. However, 82 per cent (of the 112) also had another cell phone aside the Abiye cell phone.

Among the other 112 who did not have the cell phone, 53 percent had a cell phone of their own, whereas 47 percent did not have any cell phone at all. That is 23.5 percent of the total population of the pregnant women interviewed (*questionnaired*) in the LGA did not have any cell phone at all.

Figure 13 Abiye Cell Phone Adoption

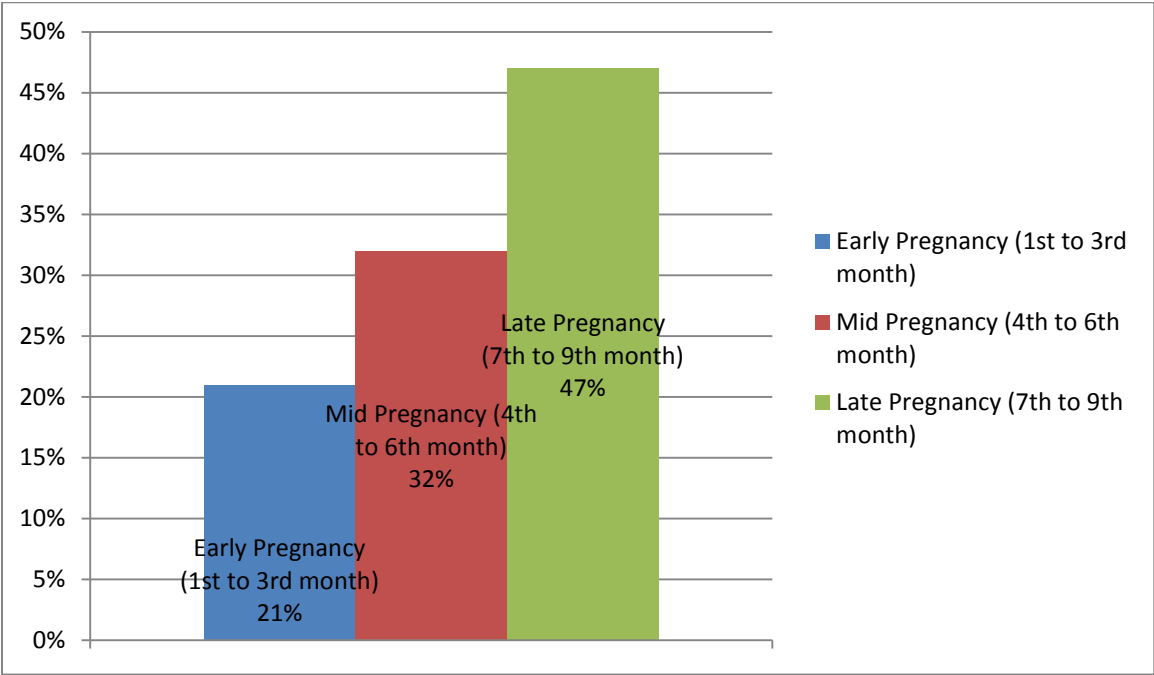


5.1.2 Phone Usage

Out of the population of the pregnant women using the cell phone, more than three-quarters (77 percent) were using it to make calls only, and less than one quarter were using it for both calls and text messages. The calls and text messages were made to the health facilities (and the health workers) 95 percent of the time, and 5 percent of the time to fellow pregnant women.

The study found that the phones were used mostly at the last 3 months of pregnancy. That is, the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> months of pregnancy with 35 percent making more than 20 calls per month.

**Figure 14 Percentages of Women and when they make Most Calls**



**5.2 Acknowledged Benefits of the Cell Phone**

Almost all the pregnant women (98 percent) acknowledged that the number of women dying in pregnancy or shortly after delivery had been reduced drastically, and when asked how they knew this, more than 70 percent stated there was no longer news or information about women’s death in pregnancy in the community since the program commenced.

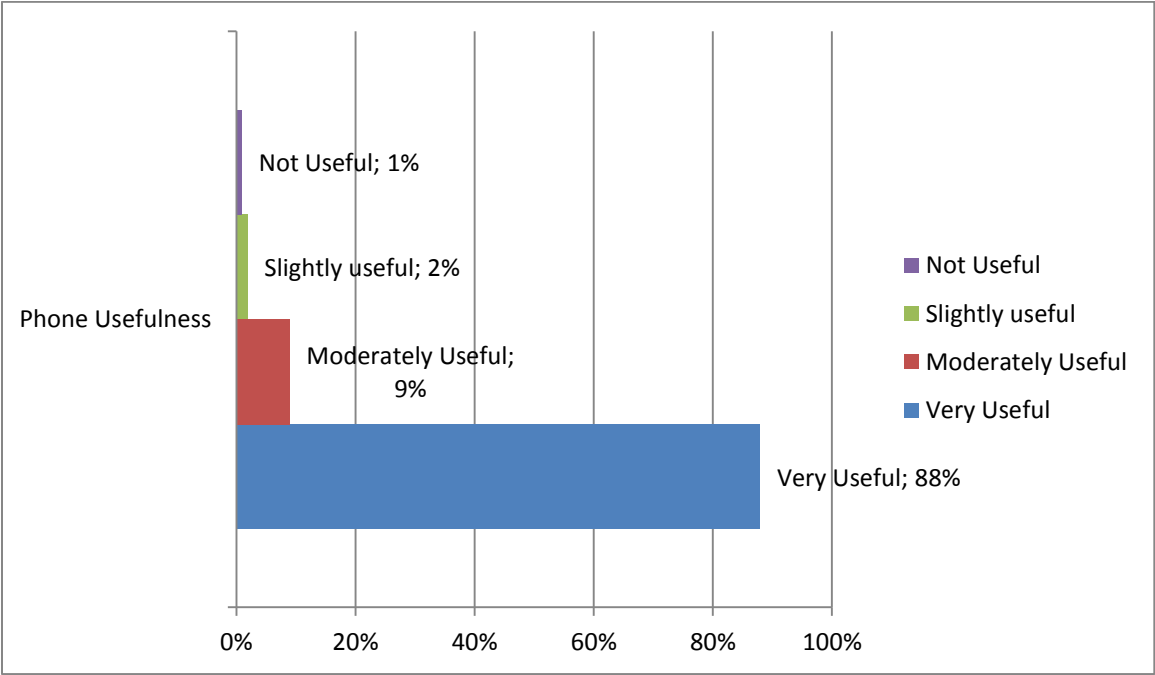
The women disclosed various benefits of the Abiye cell phones. To 59 percent of them, the easy and free communication linkage with the health workers was the most important feature of the cell phone, while 32 percent valued more the prompt response to emergency situations afforded by the cell phone. To 15 percent of the pregnant women, the cell phone had improved their use (utilization) of the health facility. Meanwhile, 7 percent considered the cost saving benefit of the cell phone more important.



**5.2.1 Rating of the Cell Phone Usefulness**

When asked to rate the Abiye cell phone in terms of its usefulness, 81 percent found it was “very useful”, 6 percent stated it was “moderately useful”, while 1 percent opined it was “slightly useful”. None reported it as “not useful”.

**Figure 15 Rating of the Abiye Cell Phone Usefulness by the Pregnant Women**



**5.2.2 Satisfaction**

80 percent of the women were “mostly satisfied” with the response they got each time they called or texted the health workers or the facility, while 20 percent were “sometimes satisfied”. None was “never satisfied”.

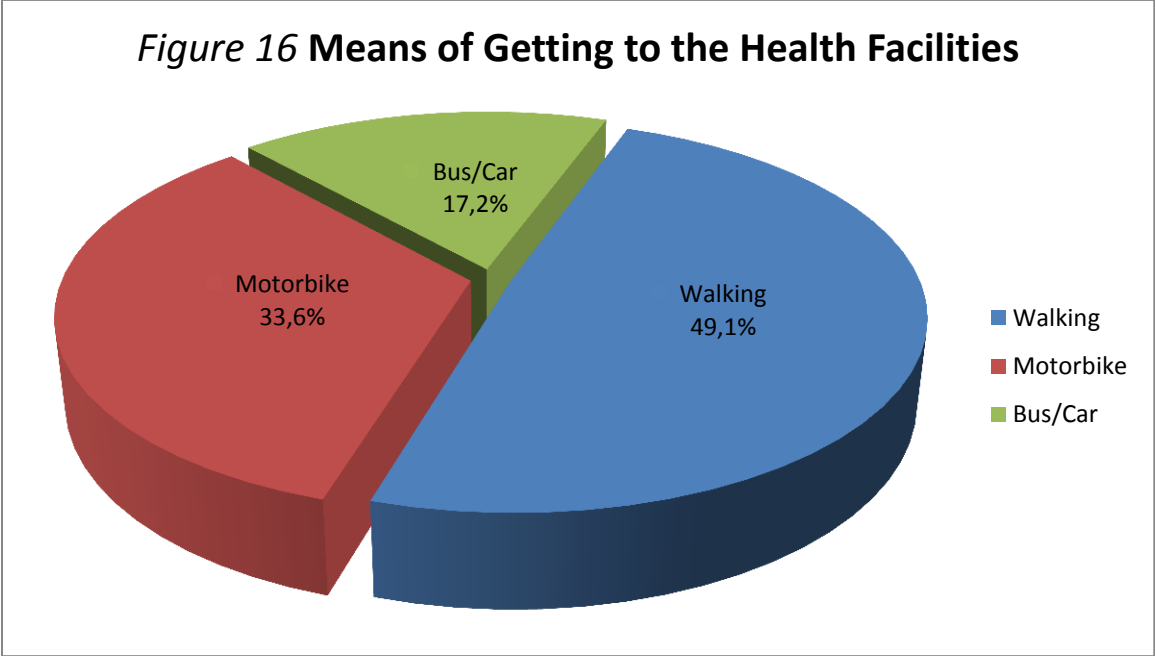
The study found that less than one quarter (23 percent) of the pregnant women were using the cell phone for family planning information.

**5.2.3 Barriers to the Cell Phone Usage**

The reported barriers to the use of Abiye cell phones were especially related to the infrastructure. 36 percent cited electricity (power) to charge the phone as a challenge, whereas 27 percent cited network failure as the major issue. 37 percent did not report any challenges to the use.

**5.2.4 Proximity of the Health Facilities to the Pregnant Women**

The pregnant women get to the healthcare facilities mainly by 3 different means. It was either by walking, by motorbikes, or by car/bus. The study found that 49.1 percent walk to the health facility, 33.6 by motorbike, and 17.2 percent was by car or bus.



## 5.3 Analysis of Data From the Hospital Records And Medical Files

### 5.3.1 Facility Utilization

The facility utilization was determined by the ratio of the number of childbirth (deliveries) in a particular health facility to the number of antenatal clinic registrations in that same facility, within a specified period of time. That is, the ratio of the number of childbirth (deliveries) to the number of antenatal clinic registrations (expressed in percentage).

*Table 1 Facility Utilization from January to December 2011 in Ifedore LGA*

|   | Health Centres     | Para-meters                | JAN                     | FEB                     | MA R                    | APR                    | MA Y                   | JUN                     | JUL                     | AUG                     | SEP                     | OCT                    | NOV                     | DEC                     | TOTAL                     | % F. Util. |
|---|--------------------|----------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|---------------------------|------------|
| 1 | <b>GH, Igbara</b>  | <i>ANC Reg. Deliveries</i> | 100<br>30               | 42<br>15                | 73<br>17                | 51<br>25               | 47<br>9                | 56<br>14                | 52<br>16                | 70<br>24                | 53<br>13                | 48<br>18               | 59<br>18                | 39<br>19                | <b>690</b><br><b>218</b>  | 31.6<br>%  |
| 2 | <b>CHC, Ijare</b>  | <i>ANC Reg. Deliveries</i> | 15<br>4                 | 21<br>2                 | 30<br>9                 | *<br>9                 | 10<br>9                | 29<br>4                 | 20<br>11                | 21<br>13                | 20<br>10                | 25<br>9                | 19<br>14                | 15<br>4                 | <b>225</b><br><b>98</b>   | 43.6<br>%  |
| 3 | <b>CHC, Ilara</b>  | <i>ANC Reg. Deliveries</i> | 35<br>11                | 31<br>3                 | 20<br>12                | 18<br>18               | 19<br>13               | 25<br>8                 | 10<br>13                | 35<br>9                 | 19<br>12                | 6<br>8                 | 10<br>12                | 27<br>11                | <b>255</b><br><b>130</b>  | 51.0<br>%  |
| 4 | <b>BHC, Isarun</b> | <i>ANC Reg. Deliveries</i> | 2<br>0                  | 1<br>0                  | 14<br>4                 | 1<br>0                 | 1<br>3                 | 3<br>3                  | 4<br>3                  | 5<br>1                  | 3<br>1                  | 2<br>1                 | 4<br>2                  | 4<br>2                  | <b>44</b><br><b>20</b>    | 45.5<br>%  |
| 5 | <b>BHC, Molete</b> | <i>ANC Reg. Deliveries</i> | 23<br>11                | 19<br>12                | 33<br>13                | *<br>10                | 15<br>18               | 23<br>15                | 15<br>7                 | 16<br>14                | 18<br>17                | 16<br>10               | 22<br>17                | 15<br>10                | <b>215</b><br><b>154</b>  | 71.6<br>%  |
|   | <b>TOTAL</b>       | <i>ANC Reg. Deliveries</i> | <b>175</b><br><b>56</b> | <b>114</b><br><b>32</b> | <b>170</b><br><b>55</b> | <b>70</b><br><b>62</b> | <b>92</b><br><b>52</b> | <b>136</b><br><b>44</b> | <b>101</b><br><b>50</b> | <b>147</b><br><b>61</b> | <b>113</b><br><b>53</b> | <b>97</b><br><b>46</b> | <b>114</b><br><b>63</b> | <b>100</b><br><b>46</b> | <b>1429</b><br><b>620</b> | 43.4<br>%  |

*Table 2 Facility Utilization from January to December 2011 in Idanre LGA*

|   | Health Centres           | Para-meters                | JAN                     | FEB                     | MA R                    | APR                     | MA Y                    | JUN                     | JUL                     | AUG                     | SEP                     | OCT                     | NOV                     | DEC                    | TOTAL                     | % F. Util. |
|---|--------------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|---------------------------|------------|
| 1 | <b>GH, Idanre</b>        | <i>ANC Reg. Deliveries</i> | 127<br>34               | 108<br>43               | 121<br>49               | 85<br>37                | 80<br>18                | 90<br>36                | 66<br>37                | 88<br>41                | 72<br>39                | 63<br>30                | 113<br>37               | 47<br>32               | <b>1060</b><br><b>433</b> | 40.9<br>%  |
| 2 | <b>CHC, Owena</b>        | <i>ANC Reg. Deliveries</i> | 5<br>1                  | 6<br>0                  | 2<br>3                  | 15<br>3                 | 7<br>0                  | 2<br>4                  | 2<br>3                  | 7<br>2                  | 6<br>1                  | 4<br>0                  | 5<br>2                  | 5<br>2                 | <b>66</b><br><b>21</b>    | 31.8<br>%  |
| 3 | <b>CHC, Ofosu</b>        | <i>ANC Reg. Deliveries</i> | 5<br>0                  | 3<br>2                  | 6<br>3                  | 6<br>1                  | 5<br>0                  | 13<br>3                 | 8<br>1                  | 9<br>0                  | 12<br>4                 | 7<br>3                  | 5<br>3                  | 1<br>1                 | <b>80</b><br><b>21</b>    | 26.3<br>%  |
| 4 | <b>BHC, Ese-Oke</b>      | <i>ANC Reg. Deliveries</i> | 12<br>12                | 8<br>3                  | 10<br>9                 | 28<br>7                 | 40<br>9                 | 60<br>2                 | 30<br>6                 | 19<br>5                 | 24<br>9                 | 24<br>11                | 46<br>2                 | 16<br>6                | <b>317</b><br><b>81</b>   | 25.6<br>%  |
| 5 | <b>BHC, Alade Atosin</b> | <i>ANC Reg. Deliveries</i> | 29<br>8                 | 16<br>4                 | 12<br>9                 | 7<br>14                 | 69<br>5                 | 28<br>7                 | 14<br>10                | 27<br>7                 | 22<br>12                | 26<br>13                | 14<br>7                 | 14<br>8                | <b>278</b><br><b>104</b>  | 37.4<br>%  |
|   | <b>TOTAL</b>             | <i>ANC Reg. Deliveries</i> | <b>178</b><br><b>55</b> | <b>141</b><br><b>52</b> | <b>151</b><br><b>73</b> | <b>141</b><br><b>62</b> | <b>201</b><br><b>32</b> | <b>193</b><br><b>52</b> | <b>120</b><br><b>57</b> | <b>150</b><br><b>55</b> | <b>136</b><br><b>65</b> | <b>124</b><br><b>57</b> | <b>183</b><br><b>51</b> | <b>83</b><br><b>49</b> | <b>1801</b><br><b>660</b> | 36.7<br>%  |

### 5.3.2 Comparison between Healthcare Facility Utilization in the 2 LGAs

We shall look at the facility utilization first in each of the 2 LGAs separately, and then comparing the 2 LGAs especially on the platform of primary and secondary healthcare facility usage.

#### Ifedore LGA

In Ifedore LGA, the facility utilization of the primary health care centres, as represented by the Basic and Comprehensive Health facilities were found to be 43.6, 51.0, 45.5 and 71.6 per cents. When all these 4 centres were combined, the percentage utilization was 54.4. That of the secondary healthcare facility as represented by the General Hospital was 31.6 percent. A two-sample t-test was performed between the percentage utilizations of the primary and the secondary healthcare facilities. The t-statistic was significant at the 0.05 critical alpha level,  $t(1427) = 8.690$ ,  $p < 0.001$ . Therefore, the difference between the percentage facility utilizations of the primary (54.4 percent) and the secondary (31.6 percent) healthcare centres in Ifedore LGA was statistically significant.

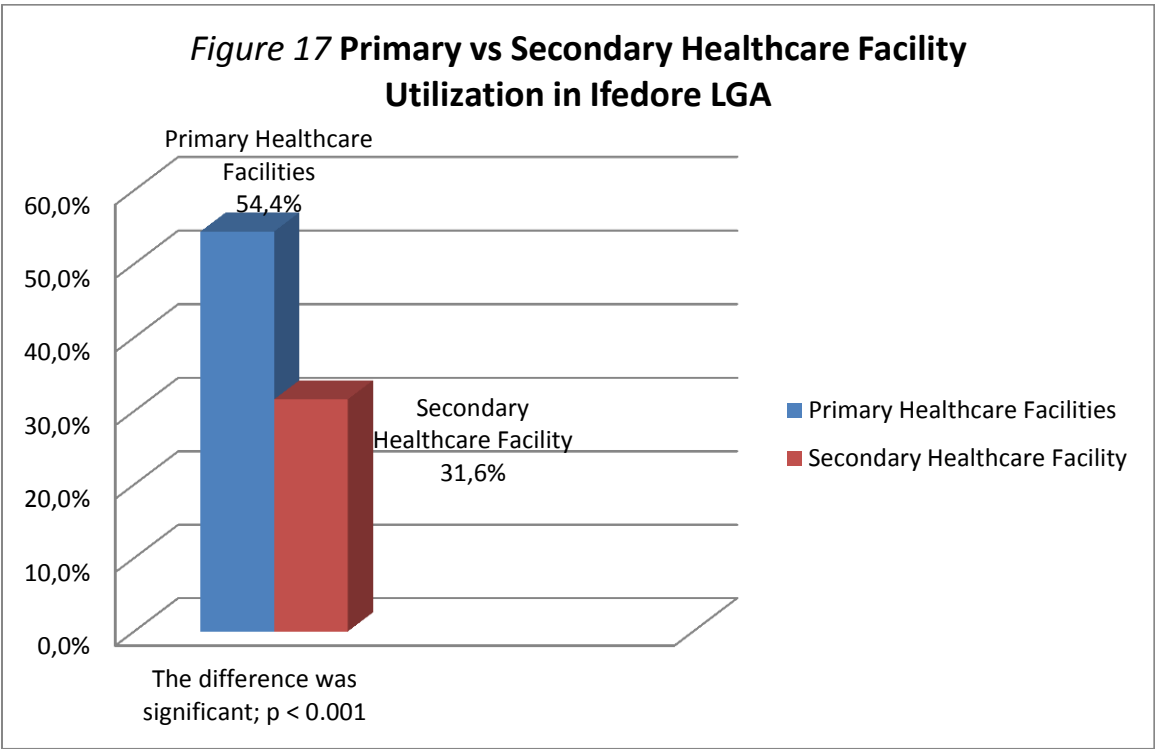
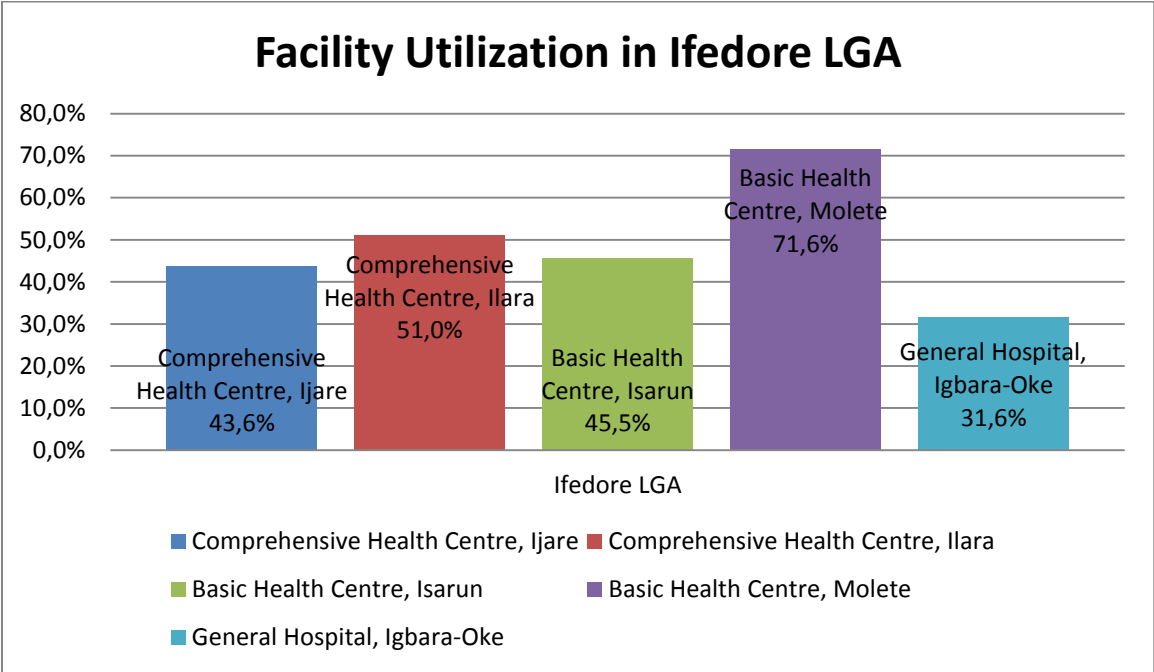


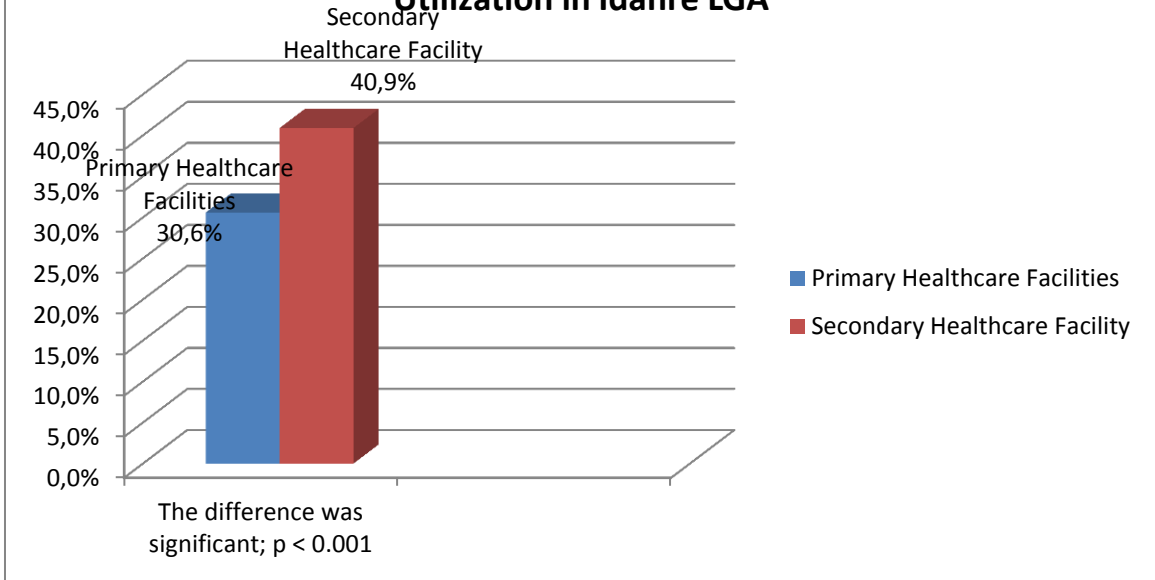
Figure 18 Individual Facility Utilization in Ifedore LGA



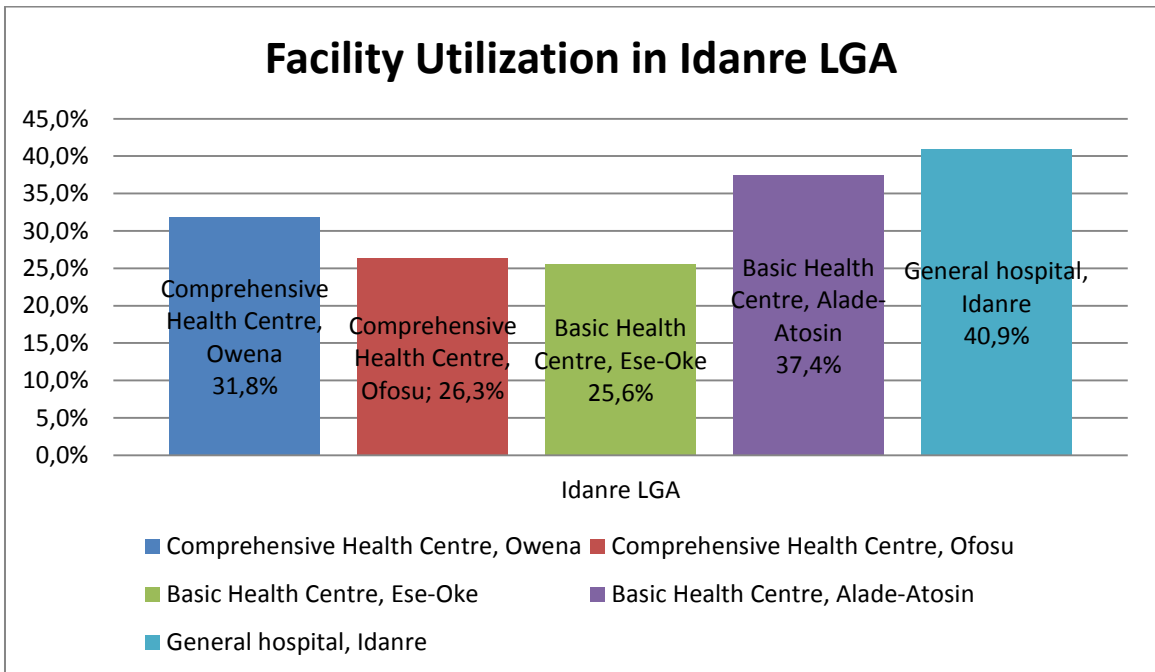
**Idanre LGA**

In Idanre LGA, the percentages of facility utilization of the primary healthcare facilities were 31.8, 26.3, 25.6 and 37.4. The percentage utilization of all the 4 centres combined was 30.6. That of the secondary healthcare facility was 40.9. The same statistical evaluation was performed as above and the t-test yielded  $t(1799) = 4.464, p < 0.001$ . The difference in use between Primary (30.6 percent) and Secondary (40.9 percent) facilities utilization was also found to be statistically significant.

**Figure 19 Primary vs Secondary Healthcare Facility Utilization in Idanre LGA**

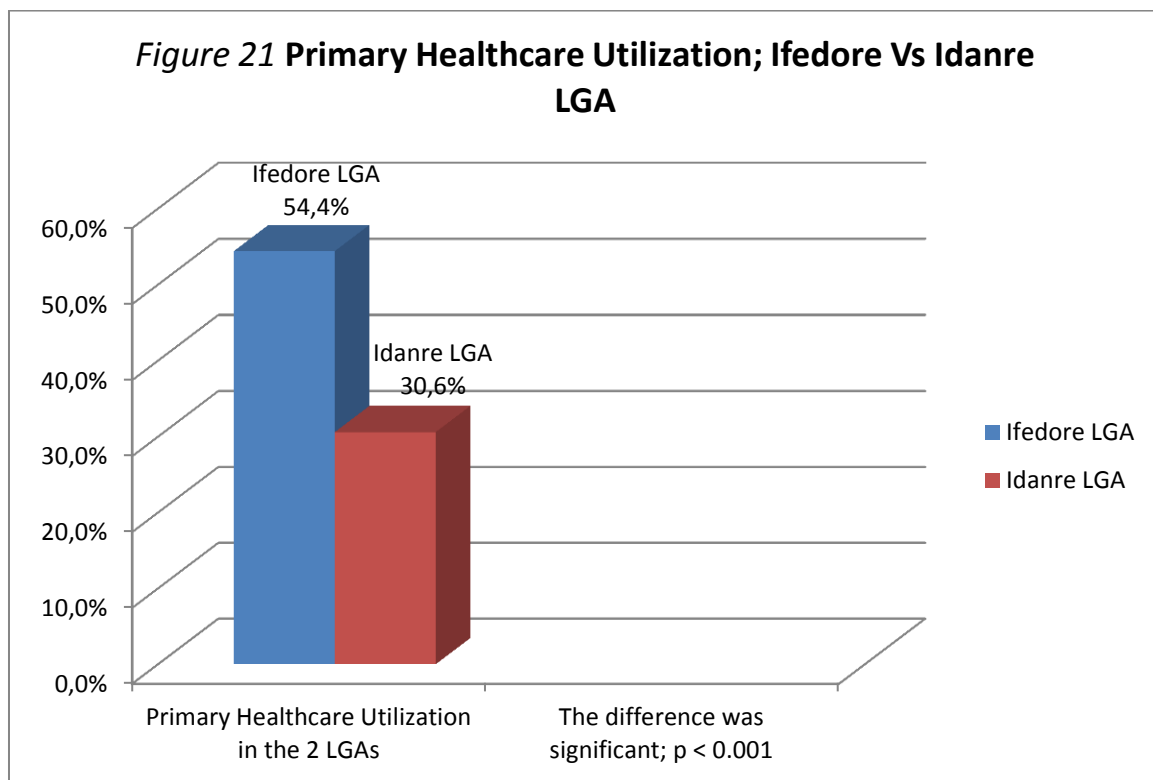


**Figure 20 Comparing Facility Utilization in Idanre LGA**

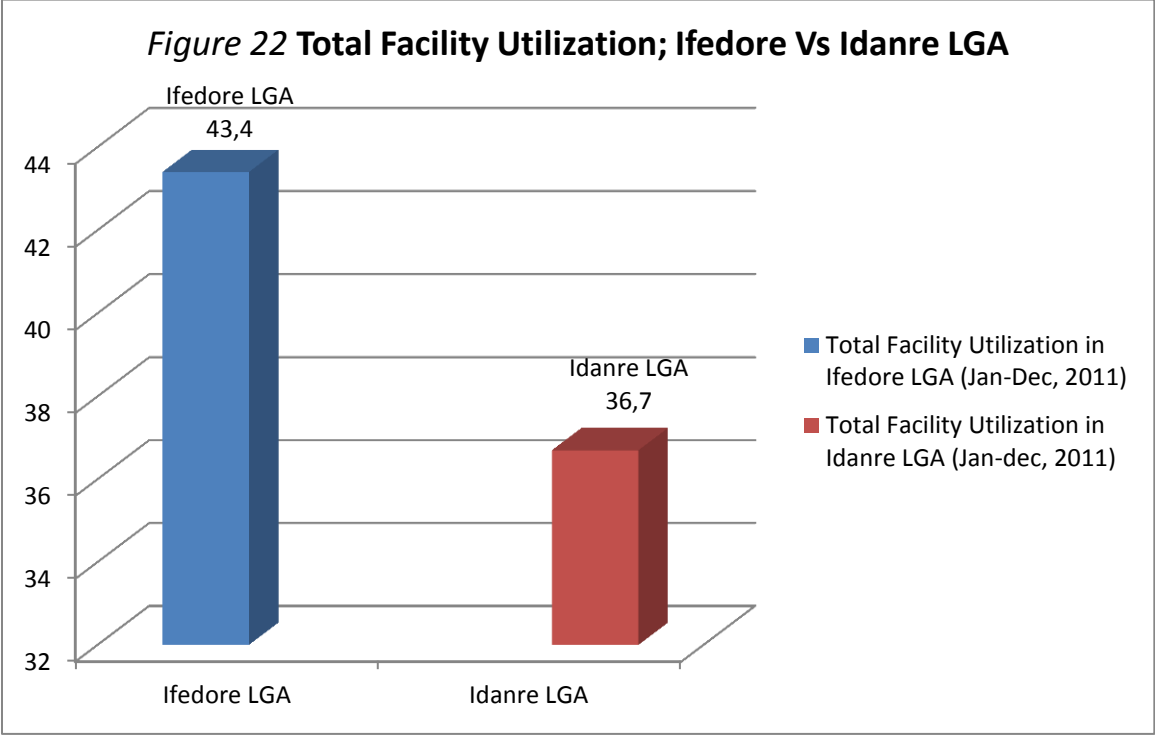


### 5.3.3 Comparison of Primary Healthcare Facilities Utilization in the 2 LGAs

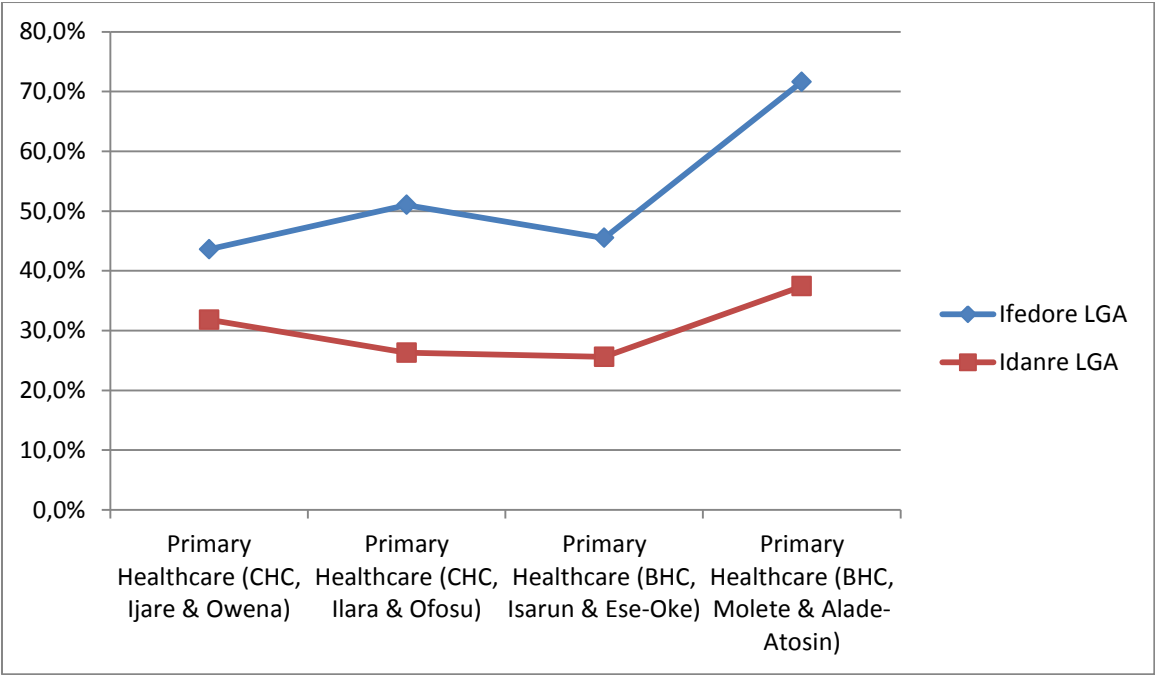
The facility utilization of the primary health care centres, as represented by the Basic and Comprehensive Health facilities in Ifedore LGA was 54.4 percent, while that of Idanre LGA was 30.6 percent. A t-test performed was significant at 0.05 critical alpha level,  $t(1478) = 9.261$ ,  $p < 0.001$ . The difference was statistically significant.



Lastly, the total facility utilization of the pregnant women of the 5 health facilities in Ifedore LGA over the period of the one year (January to December, 2011) was 43.4 percent, while that of Idanre LGA was found to be 36.7 percent. A two-sample t-test between the proportions was performed to determine whether there was a significant difference between the 2 LGAs with respect to the percentage utilization. The t-statistic was significant at the 0.05 critical alpha level,  $t(3228) = 3.866$ ,  $p = 0.0001$ . Therefore, the difference in the percentage facility utilization between the 2 LGAs was significant.



**Figure 23 Comparison of Primary Healthcare Facilities Utilization in the 2 LGAs**

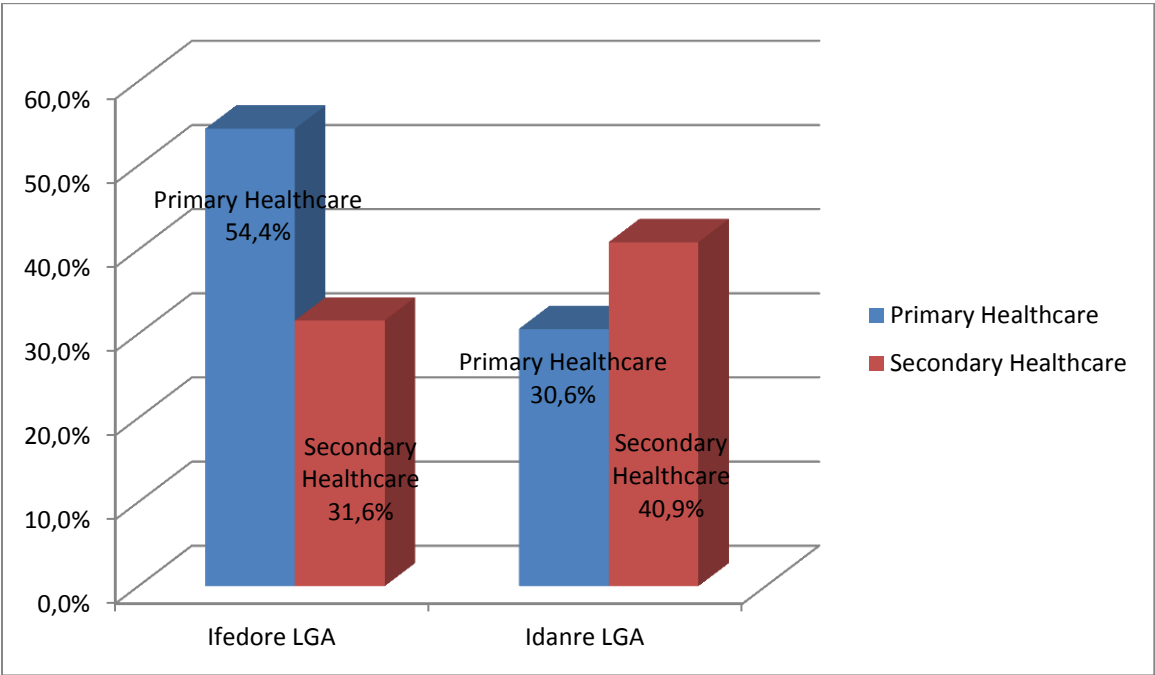




**5.3.4 Comparison of the 2 LGAs on Primary and Secondary Healthcare Facilities Utilization**

Looking at each LGA separately, out the 5 health facilities studied in Ifedore LGA, the secondary healthcare (General Hospital, Igbara-Oke) had the lowest percentage of facility utilization at 31.6 percent, compared to the primary healthcare facilities (Basic and Comprehensive Health Centres) in the LGA (see table 1 above). The exact opposite was the case in Idanre LGA where the secondary healthcare facility in the LGA (General Hospital, Idanre) had the highest percentage of facility utilization (40.9 percent) compared to the primary healthcare facilities (Basic and Comprehensive Health Centres) in the LGA.

**Figure 24 Facility Utilization of the Primary and Secondary Healthcare in the 2 LGAs (In Percentages)**



**5.3.5 Facility-Based Prevalence of the 5 Major Causes of Maternal Death**

Tables 3 & 4 present the antenatal clinic registration and the combined occurrence of the 5 major causes of maternal death in each of the health facilities studied in the 2 LGAs. These

major causes of deaths include: haemorrhage (bleeding); maternal sepsis (infection); eclampsia (high blood pressure with fits); obstructed labour; and complications of unsafe abortion (Chiwuzie et al., 1995). It was noted that there was no cases of complications of unsafe abortion recorded in the 2 LGAs for the period of 1 year under study.

**Table 3 The 5 Major Causes of Maternal Death (combined as “Cases”) in Ifedore LGA**

|   | Health Centres | Parameters       | Jan                    | Feb                    | Mar                    | Apr                   | May                   | Jun                    | Jul                    | Aug                    | Sep                    | Oct                   | Nov                    | Dec                    | Total                    |
|---|----------------|------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|--------------------------|
| 1 | GH, Igbara     | ANC Reg. “Cases” | 100<br>1               | 42<br>1                | 73<br>1                | 51<br>3               | 47<br>-               | 56<br>-                | 52<br>2                | 70<br>-                | 53<br>2                | 48<br>-               | 59<br>-                | 39<br>2                | <b>690</b><br><b>12</b>  |
| 2 | CHC, Ijare     | ANC Reg. “Cases” | 15<br>3                | 21<br>-                | 30<br>-                | *<br>-                | 10<br>-               | 29<br>1                | 20<br>-                | 21<br>1                | 20<br>1                | 25<br>-               | 19<br>-                | 15<br>-                | <b>225</b><br><b>6</b>   |
| 3 | CHC, Ilara     | ANC Reg. “Cases” | 35<br>1                | 31<br>2                | 20<br>-                | 18<br>-               | 19<br>-               | 25<br>-                | 10<br>-                | 35<br>-                | 19<br>2                | 6<br>-                | 10<br>-                | 27<br>-                | <b>255</b><br><b>5</b>   |
| 4 | BHC, Molete    | ANC Reg. “Cases” | 23<br>-                | 19<br>-                | 33<br>-                | *<br>-                | 15<br>-               | 23<br>-                | 15<br>-                | 16<br>-                | 18<br>-                | 16<br>-               | 22<br>-                | 15<br>-                | <b>215</b><br><b>0</b>   |
| 5 | BHC, Isarun    | ANC Reg. “Cases” | 2<br>-                 | 1<br>-                 | 14<br>-                | 1<br>-                | 1<br>-                | 3<br>-                 | 4<br>-                 | 5<br>-                 | 3<br>-                 | 2<br>-                | 4<br>-                 | 4<br>-                 | <b>44</b><br><b>0</b>    |
|   | Total          | ANC Reg. “Cases” | <b>175</b><br><b>5</b> | <b>114</b><br><b>3</b> | <b>170</b><br><b>1</b> | <b>70</b><br><b>3</b> | <b>92</b><br><b>-</b> | <b>136</b><br><b>1</b> | <b>101</b><br><b>2</b> | <b>147</b><br><b>1</b> | <b>113</b><br><b>5</b> | <b>97</b><br><b>-</b> | <b>114</b><br><b>-</b> | <b>100</b><br><b>2</b> | <b>1429</b><br><b>23</b> |

**Table 4 The 5 Major Causes of Maternal Death (combined as “Cases”) in Idanre LGA**

|   | Health Centres    | Parameters         | Jan                    | Feb                    | Mar                    | Apr                    | May                    | Jun                    | Jul                    | Aug                    | Sep                    | Oct                    | Nov                    | Dec                   | Total                    |
|---|-------------------|--------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|--------------------------|
| 1 | GH, Idanre        | ANC Reg.: “Cases”: | 127<br>-               | 108<br>1               | 121<br>4               | 85<br>1                | 80<br>1                | 90<br>2                | 66<br>1                | 88<br>2                | 72<br>2                | 63<br>1                | 113<br>2               | 47<br>1               | <b>1060</b><br><b>18</b> |
| 2 | CHC, Owena        | ANC Reg.: “Cases”: | 5<br>-                 | 6<br>-                 | 2<br>-                 | 15<br>-                | 7<br>-                 | 2<br>1                 | 2<br>-                 | 7<br>-                 | 6<br>2                 | 4<br>1                 | 5<br>-                 | 5<br>-                | <b>66</b><br><b>4</b>    |
| 3 | CHC, Ofosu        | ANC Reg.: “Cases”: | 5<br>-                 | 3<br>-                 | 6<br>1                 | 6<br>-                 | 5<br>-                 | 13<br>-                | 8<br>2                 | 9<br>-                 | 12<br>1                | 7<br>-                 | 5<br>-                 | 1<br>-                | <b>80</b><br><b>4</b>    |
| 4 | BHC, Ese-Oke      | ANC Reg.: “Cases”: | 12<br>-                | 8<br>-                 | 10<br>-                | 28<br>1                | 40<br>1                | 60<br>-                | 30<br>-                | 19<br>-                | 24<br>-                | 24<br>-                | 46<br>-                | 16<br>-               | <b>317</b><br><b>2</b>   |
| 5 | BHC, Alade Atosin | ANC Reg.: “Cases”: | 29<br>-                | 16<br>-                | 12<br>-                | 7<br>-                 | 69<br>-                | 28<br>1                | 14<br>-                | 27<br>-                | 22<br>-                | 26<br>-                | 14<br>-                | 14<br>-               | <b>278</b><br><b>1</b>   |
|   | Total             | ANC Reg.: “Cases”: | <b>178</b><br><b>-</b> | <b>141</b><br><b>1</b> | <b>151</b><br><b>5</b> | <b>141</b><br><b>2</b> | <b>201</b><br><b>2</b> | <b>193</b><br><b>4</b> | <b>120</b><br><b>3</b> | <b>150</b><br><b>2</b> | <b>136</b><br><b>5</b> | <b>124</b><br><b>2</b> | <b>183</b><br><b>2</b> | <b>83</b><br><b>1</b> | <b>1801</b><br><b>29</b> |

Figure 25 Ifedore LGA: "Cases" in Relation to ANC Registration

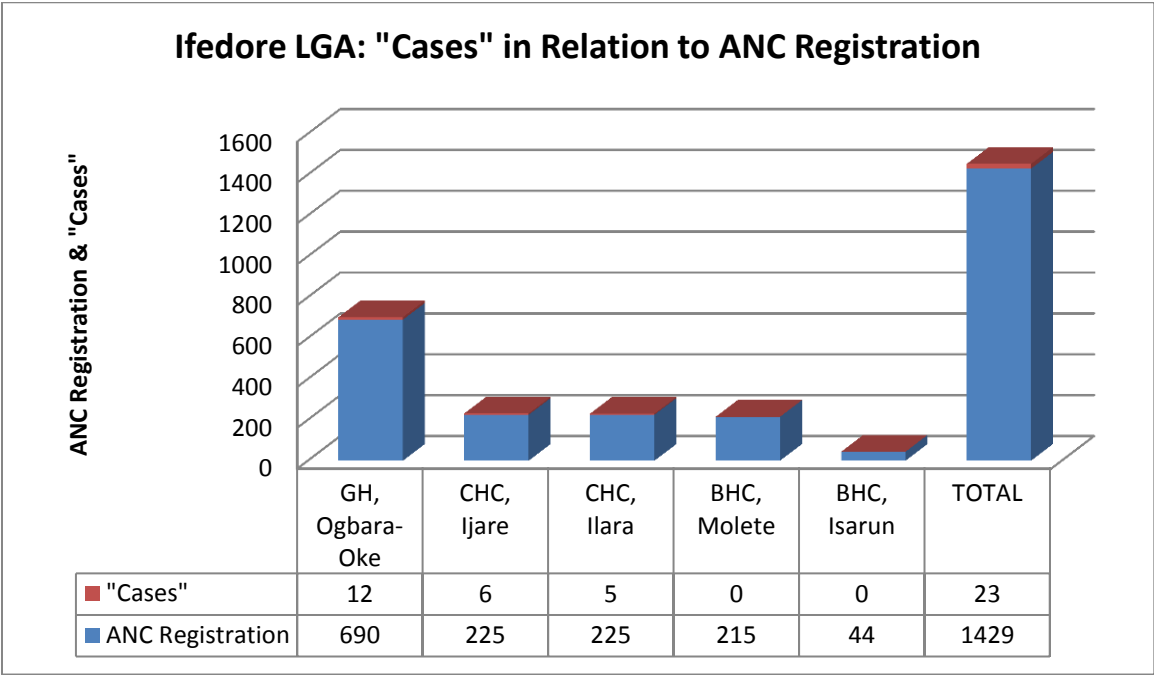
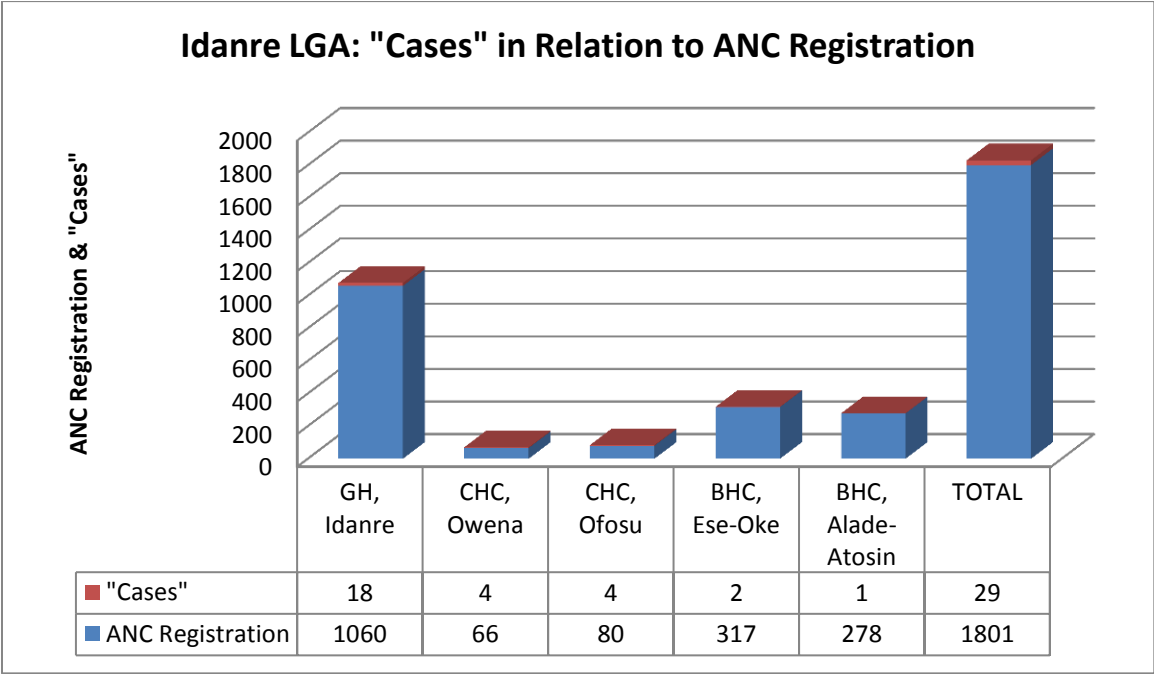


Figure 26 Idanre LGA: "Cases" in Relation to ANC Registration



**Distribution of Cases and Non-cases by Exposure Status to Abiye Cell Phone Program**

| Exposure to Abiye Cell Phone Program | Cases | Non-Cases (Controls) | Total |
|--------------------------------------|-------|----------------------|-------|
| YES (Ifedore LGA)                    | 23    | 1406                 | 1429  |
| NO (Idanre LGA)                      | 29    | 1772                 | 1801  |
| <b>Total</b>                         | 62    | 3178                 | 3230  |

$$\begin{aligned}
 \text{Odd Ratio} &= (23 \times 1772) / (1406 \times 29) \\
 &= 40756 / 40774 \\
 &= 1.0
 \end{aligned}$$

Comparing the 5 health facilities in each of the 2 LGAs, the odd ratio of the facility-based “cases” was 1.0. This translates to the odds of the major causes of maternal deaths in either of the 2 LGAs was statistically same.



## CHAPTER 6: DISCUSSION

The current findings in this study have generally advanced our knowledge of the relationship between cell phone usage and its effects on the pregnant women, their facility utilization, primary healthcare utilization and the effects on the causes of maternal deaths.

The successful introduction of an appliance, such as the cell phone, into the public health domain of reducing maternal deaths requires the consideration of some important factors. One of these important factors is the appliance to be seen as beneficial by the stakeholders (Obstelder et. al., 2007). In the case of the Abiye cell phones, the pregnant women saw and accepted it as beneficial and useful. This was demonstrated by the findings that 100 percent of the pregnant women who had the cell phone admitted to be using it, and 92 percent of them declared Abiye cell phone to be “*very useful*”.

The study found that the Abiye cell phone adoption was 50 percent among the pregnant women in Ifedore LGA. It should be noted that this is not a voluntary adoption, but a function of government provision. The cell phones were made available in phases from time to time by the state government. However, it appeared that the rate at which government was supplying the cell phones could not keep up with the rate at which pregnant women were coming forward to register at the health facilities. Once the phones were exhausted, any pregnant woman coming thereafter to register has to wait until the phones were made available again. This was almost like supplying cell phones to all women within the child-bearing age in the LGA. So, the adoption appeared to be a direct function of government’s provision, and at the time of the study, the ‘adoption’ was 50 percent. Nevertheless, if the number of pregnant women having personal cell phones was added, the percentage of women having phones goes up to 77 percent (see *Figure 1*). But these personal phones were not toll free, and the owners would have to pay to make calls or send text messages to the health facilities. So, if toll free numbers were provided instead, this set of women would enjoy the same advantages and services of Abiye cell phones. Alternatively, special sim cards could be made available which would link them with the Abiye close-users’-group. Either of these would reduce the financial burden on the state government.

The most valued benefit as confirmed by more than half (52 percent) of the pregnant mothers studied in Ifedore LGA was the easy and free accessibility gained through the cell phone to the health workers. This translates to the recognition of the cell phone as an important communication linkage to the healthcare system at all times, especially in emergency situations. Other benefits acknowledged by the pregnant women included promoting antenatal registration, attendance and delivery at the health facilities which further confirmed the usefulness of the phone to them, and hence satisfying this important factor as expounded by Obstelder et. al., (2007).

The last trimester (and the first few weeks after delivery) appears to be the period when most maternal deaths do occur (Ronsmans and Graham, 2006). This period corresponds to the same time when the pregnant women in Ifedore LGA make the most phone calls to the health facilities. This might not be unconnected to the challenges of this period as expressed by Ronsmans and Graham (2006). This could further mean that the cell phones not only gave them the opportunity to call, but enhanced their capacity to handle the emergency situations that may arise at this period of time as portrayed by the more calls made by the pregnant women specifically at this stage of the pregnancy (see Figure 2). Just as some calls might be life-saving, some may be as a result of anxiety, and this may offer the health workers the opportunity to also use the phone as knowledge generator as they educate the pregnant women. This is also in agreement with the adapted theoretical framework of *cell-phone-for-reducing-maternal-death* model earlier discussed under the literature review of this work.

In the relatively rural communities and towns, having free cell phone linkages to the health workers was a solution to both political and medical challenges (Obstfelder et. al., 2007). It was a solution to political issues because the government was fulfilling a political responsibility to the citizenry by providing toll free cell phones to the pregnant mothers. Some women termed this as giving them a “sense of belonging”, and meanwhile, this was also a solution to medical challenges as the state government could view it as a useful

appliance in achieving the much desired maternal health policy objective of the 5<sup>th</sup> Millennium Development Goal.

## **6.1 Facility Utilization**

The pattern and trend of the facility utilization in the 2 LGAs were quite revealing. The percentage facility utilization was assessed by the ratio of the number of deliveries (childbirth) to the number of antenatal registration. The study showed that facility utilization was higher at the LGA where cell phones were in use (Ifedore) compared to where they were not (Idanre). Let us look at the 2 LGAs separately, and later use the platform of primary and secondary healthcare system to compare them.

At Ifedore LGA, the facility utilizations of the primary healthcare facilities were found be much higher compared to that of the secondary healthcare in same LGA. The percentage facility utilization in the primary healthcare facilities were 43.6, 51.0, 45.5 and 71.6 per cents, with 54.4 percent when combined. That of the secondary healthcare facility was 31.6 percent. The difference in the two was found to be statistically significant ( $p < 0.001$ ). This may not be surprising because the Primary Healthcare facilities (Basic and Comprehensive Health Centres) were more in numbers and hence closer to the pregnant women. This, coupled with the assess offered by the cell phone may explain why the utilization of the PHC facilities was better in Ifedore LGA.

In Idanre LGA, the reverse was the case. The facility utilization of the secondary healthcare facility was found to be higher than that of the primary healthcare. The percentage of utilization of the secondary healthcare facility was 40.9, while that of the primary healthcare facilities were 31.8, 26.3, 25.6 and 37.4 with 30.6 as the combined utilization percentage. The difference between the secondary (40.9 percent) and the primary (30.6 percent) was also found to be statistically significant ( $p < 0.001$ ). Consequently, the general hospital in Ifedore LGA may be more focused on the specialized care of a secondary healthcare facility than that of Idanre LGA which may be congested from cases manageable at the primary healthcare levels.



The cell phone may have allowed the pregnant women to a better assessment of the competence of the PHC facilities in Ifedore LGA and found it adequate. This may further explain the higher percentage utilization found in Ifedore with a value of 54.4 percent while that of Idanre was 30.6 percent. The difference in these 2 percentages was also found to be statistically significant ( $p < 0.001$ ).

Lastly, by comparing the total facility utilization in the 2 LGAs, Ifedore had the higher percentage of 43.4 percent while Idanre LGA had 36.7 percent. The difference was very significant with the p value of 0.0001. This may be the overall effect of better access to facilities as a result of cell phone linkage between the pregnant women and the health facility in Ifedore LGA, and by extension reducing the inequality of accessibility to the healthcare delivery system.

Summarily, these may point to the inference that there was better facility utilization in Ifedore LGA which was found to be statistically significant in all comparisons to Idanre LGA. More importantly, the difference comes exclusively from the primary healthcare facilities in Ifedore LGA.

The implication of this is that the Abiye cell phones may have strengthened the primary healthcare system in the LGA and reduce inequalities in accessibility to healthcare facilities, and by extension, cell phone usage may be said to be a strengthening factor in primary healthcare delivery system. This may be very important from the point of view of the World Health Organization (WHO) as regards the Alma Ata Declaration of 1978. The Alma Ata Declaration which followed the International Conference on Primary Health Care, conveyed the need to protect and promote the health of all and sundry. The primary healthcare system was expressly and explicitly declared as the key to attaining this goal. This is because the primary health care is the first level of contact of individuals, (including the pregnant women), the family and the community with the health system, thus bringing health care as close as possible to where people live and work (Alma Ata Declaration, 1978; Cueto M., 2004). A strengthened primary healthcare system, with reduced inequalities of accessibility by cell phone may therefore reduce the phases of delay in seeking care by the pregnant women because of its physical (location) closeness to the people and community. This

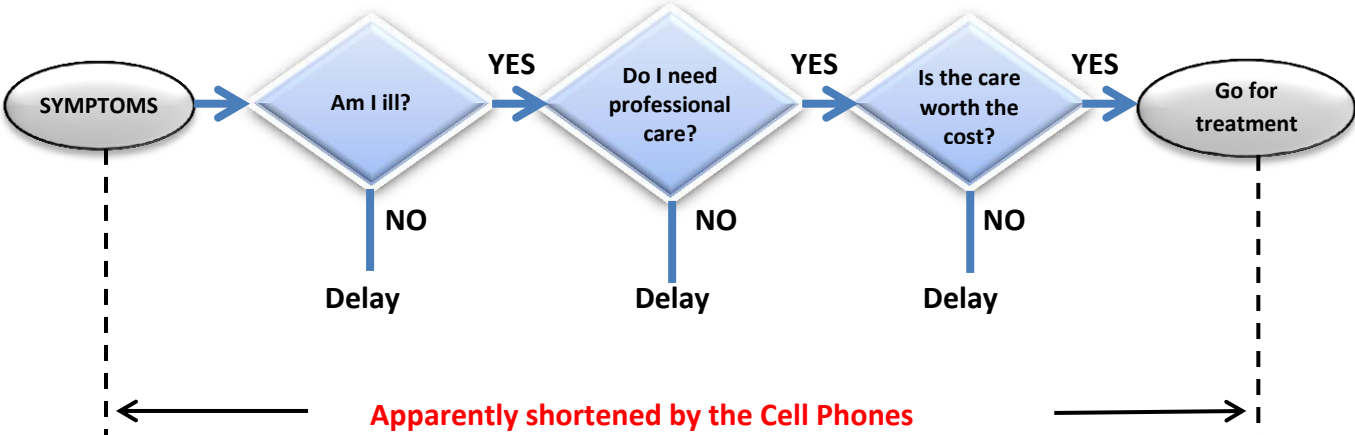
relative closeness in the locations of the health facilities may be why about half (49.1 percent) of the pregnant women in Ifedore LGA walk to health facilities.

## 6.2 The Abiye Cell Phones and the 4 Conceptual Phases of Delay in Ifedore LGA

### Phase I Delay

This phase involves the delay in seeking healthcare by the pregnant women. It is a decision making period that may positively be influenced by the cell phones with which she could call her Health Ranger or health facility to seek for information that could help her appraise herself properly. This achieves similar results as the “wired mothers” initiated in Zanzibar, Tanzania where the wired mothers were empowered through cell phones and encouraged to make contact with healthcare services (Lunds, 2010). In this current study, 92 percent of the pregnant women confirmed that “nothing” would stop them from seeking the services of the health facility to deliver their babies.

Figure 27 Phase I Delay may be shortened by Health Ranger



### **Phase II Delay**

This is the phase of reaching the healthcare facility. The Abiye cell phone could be used to call the Health Ranger or/and nurse in the health facility who could also use the phone to summon the ambulance. This is similar to the project carried out in Bo district of Sierra Leone as published by Samai and Sengeh (1997). The pregnant women in Ifedore LGA have cell phones connected to a close-by Basic or Comprehensive Health Centre (primary healthcare). Therefore, the travel (or walk) distance is short and relatively easy to get to the health facilities. In this study, about half (49.1 percent) of the pregnant women in Ifedore LGA gets to the health facility by walking, a third (33.6 percent) by motor bikes, while the rest (17.2 percent) was by bus/car. In an interview conducted in rural Kenya where out of all those wanted to deliver their babies in the hospital, only 36 percent of them could, while 64 percent of them simply could not reach the health facility due to phase II delay (Voorhoeve et. al., 1984).

### **Phase III Delay**

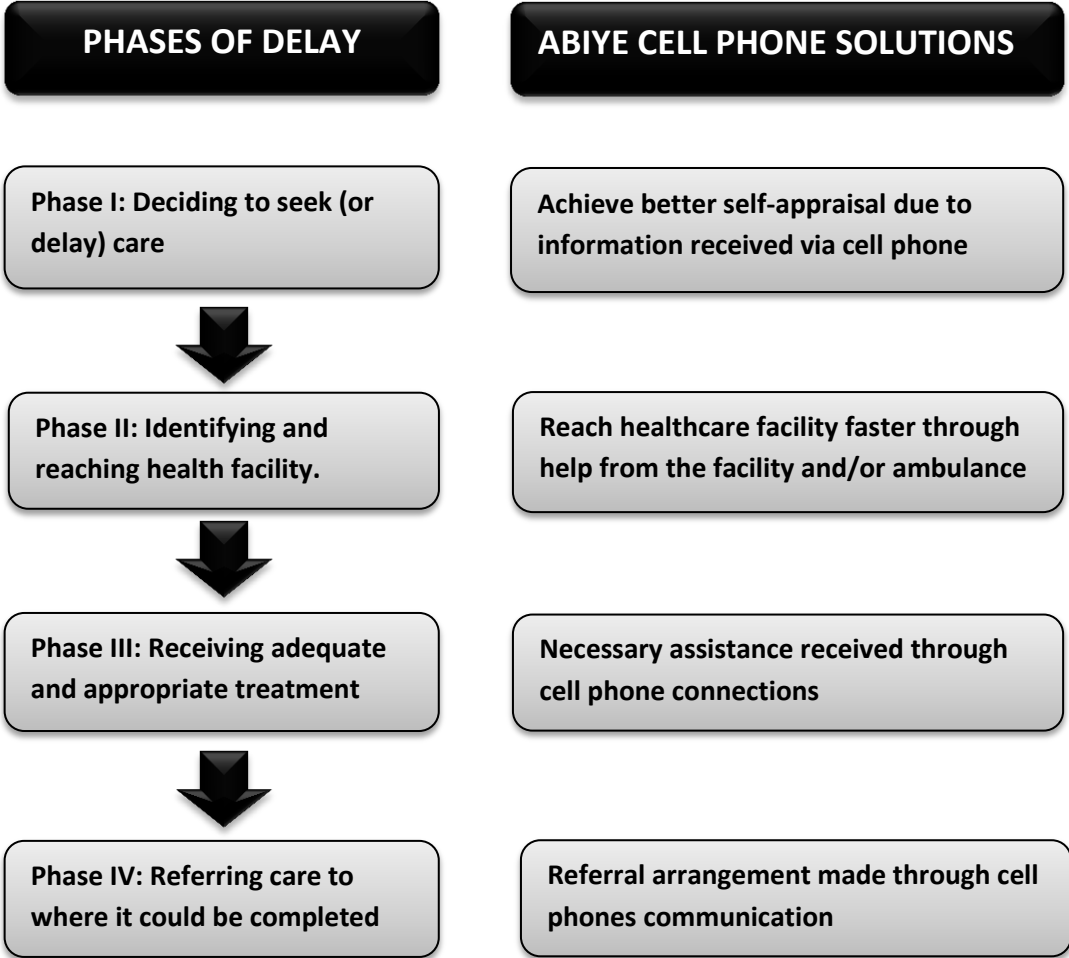
This phase involves receiving adequate care when the pregnant women get to the health facility. The cell phones were useful in the management of obstetric cases and timely response (Krasovec, 2004; Michael, 2005). The primary healthcare facilities (BHC and CHC) were linked with the secondary healthcare facility (GH), and the lesser trained (in the BHC and CHC) with the experts (in the GH). This could be the reason why relatively more deliveries (or more facility utilization) were seen in the primary healthcare facilities in Ifedore LGA compared to Idanre LGA. The same reason may also account for the higher facility utilization of the primary healthcare centres as compared to the secondary healthcare in Ifedore LGA. Furthermore, it may be why exact opposite was the case in Idanre LGA where there was no cell phone usage for the pregnant women.

### **Phase IV Delay**

This phase was reported in Ondo-State as the delay in referring care from where it is initiated to where it could be completed. The use of cell phone in the primary health care system which was linked with the secondary health system offers succour to the medical

staff at the primary healthcare facilities. The cell phone linkages assist in knowing which obstetric case to refer and the appropriate point for timely referral to where care could be completed. The phone helps to summon the ambulance and also inform the receiving facilities of the patient *en-route*.

Figure 28 PHASES OF DELAY AND ABIYE CELL PHONE



It would be noted that this cell phone use arrangement was anchored in the already established healthcare system in the LGA. This could be a positive sign of success in the implementation of appliances for telemedicine use (Obstfelder et. al., 2007).

### **6.3 Facility-Based Prevalence of the 5 Major Causes of Maternal Deaths in the 2 LGAs**

The odds of facility-based occurrence of the 5 major causes of maternal death from January to December, 2011 appeared not to have been affected (*yet*) by the Abiye cell phone program, judging from the results in this study. The odds ratio of the 5 major causes (added together) of maternal deaths in the 2 LGAs was approximately 1, which means that there was about equal odds for these causes of deaths in either of the 2 LGAs. Even though it was expected that the odds ratio would be lower than 1, because an odds ratio value significantly lower than 1 would have been in favour of a 'protective' effect of the Abiye program.

Various reasons could be responsible for this. The Abiye program started in October 2009, and the data used in this part of the study was that of the January to December 2011, that was about 1 year after the program started. This was probably still early to see the effect on the prevalence of the causes of maternal deaths. In safe motherhood programs, some indicators such as this may take a considerable time lag before changes become statistically significantly measurable (Filippi, Graham and Ronsmans, 1997). Thus, relatively early assessment may be responsible for the value of the odds ratio obtained in this part of the study. Another reason could be that of the sample size. However, there was limit to this size because it was a pilot program in relatively rural communities. With a large number of "cases", this indicator (5 major causes of maternal death) may reflect changes within less period of time, but this may not be feasible in a facility-based study of a relatively rural communities.

A conceptual line of reasoning exists which relate to placing more emphasis on the improvement of positive maternal health as reflected indirectly by the increase in the facility utilization, rather than paying all the attention to the reduction in the life-threatening morbidities (or mortality) as "deaths averted does not translate directly into improved maternal health" (Graham, Filippi and Ronsmans, 1996; Filippi, Graham and Ronsmans, 1997). Although, the reduction in the severe morbidity (and mortality) is desirable, but focus should also be on improving positive maternal health as reflected by increase in facility utilization. The comparative increase in favour of Ifedore LGA where the cell phone was in

use may have indirectly demonstrated improvement of positive maternal health, while the demonstration of a change in severe maternal morbidity (as in the 5 major causes of maternal death) may need more time and program sustenance to become statistically measurable. All these are in relation (reference) to the control LGA where cell phones were not in use.

It could be noted that the occurrence of these 5 causes of maternal death does not automatically translate to death. It is the delay in seeking, reaching or receiving timely care at the critical moments (Maine, 1994; WHO, 1986; Krasovec, 2004) that may result to maternal demise, and it lies within the action framework of this safe motherhood program as enabled by the use of the cell phones.

#### **6.4 Challenges to the Use of Abiye Cell Phones**

The study revealed that the barrier faced by some of the pregnant women as regards the use of the cell phone is that of infrastructure. 17.9 percent reported no adequate power (electricity) to charge the phone, while 13.4 percent reported network failure as the challenge they faced. However, a majority of the pregnant women, 68.8 percent, admitted there were no barriers to their use of the cell phones. This reflected that despite the relative rural settings, most pregnant women had no barrier to the use of the cell phones.

#### **6.5 Confounder**

Multiple antenatal registrations by the pregnant women were suspected in the LGAs but there was no means of eliminating them. Multiple antenatal registration is a situation whereby the pregnant women register in 2 or more health facilities for the same pregnancy. This was sometimes because she wanted to enjoy the luxury of choice or multiple incentives from the government or sometimes just to guard against strike actions by some health facilities or by government health workers. In this case, they also register in privately owned hospitals. The pregnant women can of course only deliver her baby in one facility. This could

have effects on the results of the findings. This may account for the high numbers of antenatal registrations and low numbers of deliveries observed in the study. Nevertheless, it was assumed that this multiple registrations practice would be similar the same in the 2 LGAs studied.

## **6.6 Confidential Enquiry into Maternal Deaths**

The government enacted a law in 2010 to make provision for the confidential enquiry into maternal deaths in the state and for connected purposes (*see appendix 5*). It became unlawful to conceal the death of a woman in pregnancy or within 42 days of termination of pregnancy (pueperium). This makes it mandatory to report all maternal deaths within a specified period of time to the appropriate authority. Failure to do so attracts penalties such as fine or/and imprisonment.

Even though this was a reporting issue, it may have some influence on the outcome of some diagnosis as regards referral of some cases such as the ones used in this study. The medical staffs who may want to avoid maternal death reporting, when faced with any cases remotely similar to the major causes of maternal deaths may refer such cases immediately. This scenario may play out comparatively more often in the LGA where there was no cell phone use for assistance. Consequently, recording low occurrence of causes of maternal death relative to the LGA where cell phone was in use. This may also confound the study.

## **6.7 Limitations**

It may not be absolutely correct that the pregnant women in the Idanre LGA were completely not using cell phones to call the health facilities. Some pregnant women may have personal cell phones, and with familiar inter-relationships between them (pregnant women) and the health workers make calls to the health facilities (health workers). Therefore, the benefits enjoyed may be similar to that of the Abiye cell phones. This

“contamination” may somewhat reduce the validity of the research design as regards referring to Idanre LGA as “no cell phone use”.

Moreover, changes in the intervention population from the control population (or vice versa) due to the proximity of the 2 LGAs were also a possibility which could result in “spill-over effect” and thus affect the results of the study.

A part of this study was based on data from the hospital case files and records. Any imperfection common to paper-based record therein would also reflect in the analysis made from them. A situation whereby there were no cases of complications of unsafe abortions within the period of one year in the 2 LGAs was suspicious.





## CHAPTER 7: CONCLUSION

The death of a woman during or shortly after pregnancy is always a tragic disaster. The effects are far-reaching on the family, most especially the children left behind. The tragic event becomes even more painful if the cause of death is preventable. So, painful it is for the major causes of maternal deaths in the sub-Saharan Africa because they are preventable.

This study addressed this crucial challenge of public health importance, and the findings demonstrate that use of cell phones brought about various acknowledged benefits to the pregnant women in Ifedore LGA. Most importantly, it revealed a higher use of the primary healthcare system represented by the Basic and Comprehensive Health Centres in the intervention LGA where cell phones were in use compared to the control LGA where cell phones were not in use. The difference in the usage of the primary healthcare was found to be highly statistically significant. This confirmed the **first hypothesis** that cell phone increases primary healthcare facility utilization of pregnant women.

A strategic mechanism leading to a better and consistent facility utilization of pregnant women may invariably reduce maternal deaths. Therefore, the use of cell phones by pregnant mothers was expected to also reduce causes of maternal deaths, as these causes are more likely to be averted. However, the odds of occurrence of the causes of maternal death were found to be the same in the 2 LGAs assessed. Consequently, the **second hypothesis** that cell phone use reduces the odds of occurrence of causes of maternal deaths fell, or required re-assessment at a later date.

The primary healthcare facilities are more available and closer to the community dwellers, with about half of the pregnant women in this study walking to the health facilities study, therefore, phases of delay could effectively be reduced and potentiated by access provided by the cell phones.

These findings were suggestive of a new interpretation and insight with a broader implication that in the long run, the use of cell phones could strengthen the primary healthcare system and reduce inequality in access to healthcare. This is an important public

health implication, especially in the rural parts of sub-Saharan African in need of reinforcement of the primary healthcare system.

### **7.1 Suggestions for Future Research**

There exists a disparity between those who benefit from a project and those who must do additional work to support it (Johansen et. al., 2008; Gruding, 1988). In the case of the Abiye cell phone program, the pregnant women benefit, the state government gets all the accolades, while the health workers get virtually nothing. They still earn the same wage, saddled with more work and more intense working hours, with apparently no extra benefits (Chib et. al., 2008). Health workers are basically motivated in 3 ways: concern for the patient's care; concern for the social good or interest of the society; and self-interest such as financial or income benefit (Eisenberg, 1986). It is doubtful if the first two motivations (which are intrinsic) would be enough to sustain the program. If not, then the morale of the health workers may go down with time, and this may later affect the outcome quality and sustainability of the program. Employing more staff may be a solution. Future research work could explore the benefits and challenges of the health workers in the use of cell phones in maternal services.

It is recommended that the new insights from this study as relates to the use of cell phones in strengthening primary healthcare systems should be explored more. This may potentially produce future policy implications, especially in the areas of primary healthcare system.

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# APPENDICES

## Appendix 1:

### *Research Permission obtained from the local Health Research Ethics Committee*



## FEDERAL MEDICAL CENTRE, OWO.

Michael Adekunle Ajasin Road,  
P.M.B. 1053, Owo,  
Ondo State.  
Tel: 08035094545, 08062077773

Our Ref: FMC/OW/380/VOL.X/136

**27<sup>th</sup> March, 2012**

Your Ref: \_\_\_\_\_

Date: \_\_\_\_\_

**Dr. S. O. Oyeyemi**  
**State Specialist Hospital**  
**Akure**

### **RE: APPLICATION FOR ETHICAL CLEARANCE**

I am directed refer to your application dated 21<sup>st</sup> March, 2012 on the above subject matter.

I am to inform you that your research proposai titled "**Impact of the Use of Cell Phone in Reducing Maternal Mortality: The Abiye Project**" has been considered and approved by the Health Research Ethics Committee.

In the light of the above, you are hereby permitted by the Health Research Ethics Committee to carry out the research since it is ethically acceptable.

I am to add that you are to please submit a copy of your final research work to the Management after publication.

Thank you.

**D. O. Olatigbe**  
**For: Medical Director**

## Appendix 2:

### North Norway Regional Committees for Medical and Health Research Ethics



---

|                            |                       |                 |                                  |   |
|----------------------------|-----------------------|-----------------|----------------------------------|---|
| <b>Region:</b><br>REK nord | <b>Saksbehandler:</b> | <b>Telefon:</b> | <b>Vår dato:</b><br>29.06.2012   | <b>Vår referanse:</b><br>2012/1002/REK nord |
|                            |                       |                 | <b>Deres dato:</b><br>22.05.2012 | <b>Deres referanse:</b>                     |

Vår referanse må oppgis ved alle henvendelser

Rolf Wynn  
Rus og spesialpsykiatrisk klinikk

#### 2012/1002 Effekt av bruk av mobiltelefon i reduksjon av sykkelighet hos gravide: Abiye-prosjektet

**Forskningsansvarlig institusjon:** Universitetet i Tromsø ved Svein Ivar Mellgren  
**Prosjektleder:** Rolf Wynn

Vi viser til søknad om forhåndsgodkjenning av ovennevnte forskningsprosjekt. Søknaden ble behandlet av Regional komité for medisinsk og helsefaglig forskningsetikk (REK nord) i møtet 21.06.2012.

#### Prosjektleders prosjekttale

*More than half a million women die in pregnancy and childbirth yearly, and over 95% of these deaths occur in Africa and Asia. The majority of the deaths are preventable. Cell phone is a technology which has penetrated the African community thereby presenting a distinctive opportunity to markedly alter the way in which health challenges are tackled. Set against this backdrop is the aim of reducing maternal morbidity, with a pilot project in Ifedore Local Government Area of Ondo-State, Nigeria through the use of cell phone. The project, termed Abiye Project, involves giving out access-free cell phones to registered pregnant women in the LGA. Through the phones, the pregnant women communicate freely with the health facility. The purpose of this study is to find out the impact the use of the cell phone on several health outcomes.*

#### Studie i utlandet

Komiteen har ingen innvendinger til prosjektet. Studien er godkjent av Federal Medical Centre, OWO i Nigeria.

#### Vedtak

*Med hjemmel i helseforskningsloven § 10 og forskningsetikkloven § 4 godkjennes prosjektet.*

#### Sluttmelding og søknad om prosjektendring

Prosjektleder skal sende sluttmelding til REK nord på eget skjema senest 01.12.2013. Prosjektleder skal sende søknad om prosjektendring til REK nord dersom det skal gjøres vesentlige endringer i forhold til de opplysninger som er gitt i søknaden, jf. helseforskningsloven § 11.

#### Klageadgang

Du kan klage på komiteens vedtak, jf. forvaltningslovens § 28 flg. Klagen sendes til REK nord. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK nord, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag for endelig vurdering.

---

**Besøksadresse:**  
TANN-bygget Universitetet i  
Tromsø 9037 Tromsø

**Telefon:** 77646140  
**E-post:** rek-nord@fagmed.uit.no  
**Web:** <http://helseforskning.etikkom.no/>

All post og e-post som inngår i saksbehandlingen, bes adressert til REK nord og ikke til enkelte personer

Kindly address all mail and e-mails to the Regional Ethics Committee, REK nord, not to individual staff

Vi ber om at tilbakemeldinger til komiteen og prosjektendringer sendes inn på skjema via vår saksportal:  
<http://helseforskning.etikkom.no>. Øvrige henvendelser sendes på e-post til [post@helseforskning.etikkom.no](mailto:post@helseforskning.etikkom.no).

Med vennlig hilsen

May Britt Rossvoll  
sekretariatsleder

Monika Rydland Gaare  
seniorkonsulent

**Kopi til:** [svein.ivar.mellgren@uit.no](mailto:svein.ivar.mellgren@uit.no); [postmottak@uit.no](mailto:postmottak@uit.no)



## Appendix 3:

### *Questionnaire used for part of the Study*

1

#### QUESTIONNAIRE



**Department of Telemedicine and eHealth  
Institute of Clinical Medicine  
Faculty of Health Sciences  
University of Tromsø  
Norway**

Dear Responder,

This questionnaire is aimed at gaining better understanding, and the usefulness of the Abiye Program Cell Phones. Kindly answer the questions truthfully and to the best of your knowledge.

Participation in this survey is entirely voluntary.

All responses will be treated anonymous and in confidence. Information will not be traceable back to the respondent. The survey results will be analysed and may be disseminated through relevant seminars, conferences and/or published in relevant journals.

Thank you very much for taking your time in filling out our survey. Completion of this questionnaire will take less than 7 minutes of your time.

Thank you.

**OYEWEMI, S. Oluwafemi (Dr)**

=====

1. Age .....
2. Local Government Area of Residence/Town ...../.....
3. What do you do for a living (Occupation)? .....
4. Husband's Occupation? .....
5. Distance of your house to the nearest Health Facility (estimate in km) .....
6. Distance of your house to this Facility (estimate in km) .....
7. How do you get to this Health Facility? WALK..... BY BIKE..... BY BUS/CAR.....
8. Your Age at first Pregnancy.....
9. Parity (alive/dead) ...../.....

**PREGNANCY**

10. How old was this/last pregnancy when you booked (registered at the hospital)?.....
11. Were you attending Antenatal Clinic after your booking? YES ..... NO .....
12. Were there any health problems during the pregnancy? YES ..... NO .....
13. When and Where did you deliver your last baby? ...../.....
14. Were there any problems during labour? YES ..... NO .....
15. How long did you spend in the hospital after the delivery? .....
16. What can prevent you from delivering your baby at the Health Facility? .....

**ABIYE CELL PHONES**

17. Do you have the Abiye Cell Phone? YES ..... NO .....
- (If NO, skip questions 16 to 23)
18. Were you using the Phone? YES ..... NO .....
19. To make... CALLS ..... SMS ..... CALLS & SMS ..... Not Using the Phone .....
20. Who do you text and /or call with the Phone?  
Hospital ..... Nurse ..... Friends .....
21. When did you use the phone most?  
Early Pregnancy ..... Mid Pregnancy ..... Late pregnancy .....
22. How many times do you use the phone in a month?  
Less than 5 times ..... 6-10 times ..... 11-20 times ..... More than 20 times .....
23. Were you satisfied each time your call/text the Hospital or Nurse?  
Mostly Satisfied..... Sometimes Satisfied..... Never Satisfied.....
24. Any issue/challenges with the Abiye Phone?  
No Electricity to charge Phone..... Network failures ..... Call/SMS not answered .....  
Husband collected the Phone ..... Others (specify) .....
25. Do you use the phone for family planning information? YES ..... NO .....
26. Do you have another phone aside the Abiye phone? YES ..... NO .....

**ABIYE PROGRAM**

**27. Has the numbers of women dying in pregnancy reduced since the Abiye Program commenced?** YES ..... NO .....

**28. How do you know? or Why do you say that?** .....  
.....

**29. Do you wish the Abiye Cell Phone Program to continue?** YES ..... NO .....

Give your reasons

1. ....
2. ....
3. ....

**30. How useful is the Abiye Cell Phone?**

Very useful ..... Moderately useful .....  
Slightly useful ..... Not useful (useless) .....

**31. What makes the Abiye Phone useful? (Specify)** .....

**32. Any other comments** .....  
.....  
.....

**Thank you for your time.**



## Appendix 5:

### *Bill on Confidential Enquiry into Maternal Death*

#### A BILL FOR

#### A LAW TO MAKE PROVISION FOR THE CONFIDENTIAL ENQUIRY INTO MATERNAL DEATHS IN ONDO STATE AND FOR CONNECTED PURPOSES

COMMENCEMENT [ ]

THE ONDO STATE House of Assembly Enacts as Follows:

#### PART I - INTRODUCTORY

- |  |    |   |
|--|----|---|
| Citation                               | 1. | This Law may be cited as the Confidential Enquiry into Maternal Deaths in Ondo State Law, 2010.   |
| Concealment of maternal death unlawful | 2. | (1) It shall be unlawful for any person, body or facility to conceal the death of a woman:<br><br>(a) woman in pregnancy; or<br><br>(b) woman who dies within the puerperium.   |
| Interpretation                         | 3. | In this Law unless the context otherwise requires:<br><br>"care providers" includes but are not limited to health workers;<br><br>"CEMDOS" means Committee on Enquiry into Maternal Deaths In Ondo State;<br><br>"Commissioner" means the Commissioner for Health;<br><br>"due notice" means a 7 days written notice;<br><br>"Governor" means the Governor of Ondo State;<br><br>"facility" means any institution where maternal health are being given;<br><br>"MDNF" means Maternal death notification form;<br><br>"Ministry" means the Ministry of Health;<br><br>"MMR" means maternal mortality ratio; |

“pueperium” means 42 days of termination of pregnancy;

“State” means Ondo State of Nigeria.

## **PART II - CONSTITUTION, MEETINGS AND FUNDS OF THE COMMITTEE**

- |  |    |   |
|--|----|---|
| Constitution<br>of the<br>Committee                | 3. | There is hereby constituted in Ondo State a Committee to be known as Committee on Maternal Deaths in Ondo State (hereinafter referred to as “the Committee).  |
| Appointment<br>and consti-<br>tution of<br>members | 4. | <p>The Committee shall consist of 7 members who shall be appointed by the Governor on the recommendation of the Commissioner except the ex-officio members and shall comprise:</p> <ul style="list-style-type: none"><li>(a) the Chairman who shall be an Obstetrician/Gynecologists ;</li><li>(b) a public health specialist from the :<ul style="list-style-type: none"><li>(i) Ministry of Health;</li><li>(ii) Local Government Service Commission;</li></ul></li><li>(c) a representative of the Ministry of Justice not below the rank of a Deputy Director;</li><li>(d) a representative of the Department of Medical Records of the Health Management Board;</li><li>(e) the Secretary shall be the Director Planning, Research and Statistics of the Ministry of Health.</li></ul> |
| Tenure and<br>remunera-<br>members                 | 5. | <ul style="list-style-type: none"><li>(1) The Chairman and members, excluding ex-officio members, shall<ul style="list-style-type: none"><li>(a) hold office for a period of 2 years in the first instance and shall be renewable for another 2 years.</li><li>(b) shall be paid such emoluments, allowances and benefits as the Governor may determine from time to time.</li></ul></li></ul>  |
| Meetings<br>of the<br>Committee                    | 6. | <ul style="list-style-type: none"><li>(1) The Committee shall meet periodic basis to carry out their duties and it shall be held at such place and time as the Committee may determine.</li><li>(2) The Chairman shall preside over all meetings of the Committee</li></ul>   |

and in his absence members may elect one of the members to preside.

- (3) The quorum of the Committee shall be four members including the Chairman or member presiding in the absence of the Chairman .
- (4) Subject to the foregoing provisions of this section, the Committee shall have the power to regulate its proceedings

- Regulations 7.
- (1) The Committee may, with the approval of the Commissioner make regulations for carrying out of the provisions of this Law.
  - (2) All regulations made under subsection (1) of this section shall be laid before the State Executive Council as directed by the Commissioner.

- Functions 8.
- (1) The Committee shall:
    - (a) be responsible for the confidential enquiry into maternal deaths in the State ;
    - (b) ensure mandatory reporting of the death of a woman in pregnancy or puerperium irrespective of the cause or where the death occurred;
    - (c) make recommendations based on the analysis from data collected to:
      - (i) lay the foundation for the accurate measurement of MMR in the State;
      - (ii) determine the common causes and complication associated with MMR;
      - (iii) determine the geographical distribution of maternal deaths in the State; and
      - (iv) determine the common factors contributing to maternal death.

- Power of the Committee 9.
- In carrying out its functions the Committee shall have powers to:
- (1) make an inquiry into any maternal death and request the appearance of any person, after due notice:

**PROVIDED** it is for the purpose of carrying out their functions under this Law.

- (2) enter into any facility or premises which is under suspicious of a contravention of this Law
- (3) order the closure of any facility which is suspected to have contravened this Law.

- Funds of the Committee 10. The funds and resources of the Committee shall consist of:
- (a) such sums as may from time to time be made available to the Committee by way of grant by the State Government;
  - (b) any sums or property which may in any manner become payable to or vest in the Committee in respect of the performance of its functions;
  - (c) such gifts in cash or in kind as may be given by the State, Federal or International bodies.
- Liability of members 11. No member of the Committee shall be personally liable for any act or default of the Committee done or omitted to be done in good faith in the course of the operations of the Committee.

### **PART III – REPORTING OF MATERNAL DEATHS**

- Process for reporting 12. Where a maternal death, in or outside a facility occurs, it shall be reported by the relatives or care providers within 48 hours of death to:
- (1) A designated collecting officer at the ward or community level who shall:
    - (a) verify information received;
    - (b) complete a Maternal Death Notification Form in triplicate;
    - (c) submit within 7 days two copies of the MDNF; at the Disease Surveillance Section at the Local Government Area Headquarters.
- Sch. I



(2) The Officer at the Disease Surveillance section shall submit every two weeks the original copy to the State Central Office in the Directorate of Planning, Research and Statistics in the Ministry.

(3) The State Central Office shall:

- (i) collect;
- (ii) collate;
- (iii) analyse;

all data received, monthly, and shall forward the data and their findings to the Committee.

Direct reporting 13.

Any relative or care provider may also report directly to the:

- (a) Disease Surveillance Section of the Local Government;
- (b) State Central Office; or

Sch.II

(c) all centers enumerated in Schedule II to this Law.

Protection of informants and information. 14.

The identity of any person who volunteers any information which may be useful in enquiry of maternal deaths in the state shall be protected and such information volunteered shall be treated as confidential.

Failure to report 15.

(1) A person or facility who:

- (a) fails to report all deaths of women that occur in pregnancy or puerperium; or
- (b) willfully obstructs the Committee or any authorized officer or person in the exercise of any of the powers conferred on the Committee by this Law; or
- (c) fails to comply with any lawful enquiry or requirements made by any authorized officer or person in accordance with the provisions of this Law;

Commits an offence and is liable to imprisonment for a term not exceeding six months or to a fine of thirty thousand naira or both, for individuals. While a facility shall be liable to a fine of

N100,000.00 and/or closure..

s

- |   |     |   |
|---|-----|---|
| Accessory<br>after the fact<br>to conceal-<br>ment of a<br>maternal death | 16. | Any person who becomes an accessory after the fact to concealment of a maternal death and keeps such secret, refuses or neglects to disclose such fact commits an offence and is liable on conviction to imprisonment of three months or to a fine of <del>N=20,000.00</del> N100,000.00 or both. |
| Power of<br>arrest  | 17. | Any member of the Nigeria Police or any law enforcement agency authorized by the Committee to enforce the provisions of this Law may arrest any person who in commits an offence under this Law   |
| Trial of<br>offences  | 18. | A Magistrate Court shall have original jurisdiction to try offences created by this Law.  |

**Dated this.....day of.....2010.**

## Appendix 6:

### Abiye Safe Motherhood Brochure

Ondo STATE  
ISE LOOGUN ISE  
ONDO STATE GOVERNMENT OF NIGERIA

# aBiye

SAFE MOTHERHOOD PROGRAMME...

- that pregnancy may no longer be a death sentence

SAFE MOTHERHOOD (ABIYE) PROGRAMME...

...that pregnancy may no longer be a death sentence.

### MOVING FORWARD...

**Journey so far**

- Out of 3817 pregnant women registered since the commencement of the project, 892 babies have been delivered safely
- Unfortunately there was one prenatal mortality
- Hospital utilization has improved to 2600 new registrations
- Programme has received international recognition

**Scaling up to other LGAs**

- Commence sensitization and advocacy visits to community members and stake holders in new LGAs.
- Conduct baseline survey for other LGAs
- Implement Abiye plus

**Sustainability of the programme**

- Success of the programme will determine its sustainability
- Introduce Community based health insurance

**Conclusion**

- The 'Abiye' package is structured to pragmatically address the impediments militating against ensuring that pregnancy is not a death sentence in Ondo state
- We, the stakeholders in the health sector intend to leverage on the tremendous political will of Dr. Olusegun Mimiko to make this project a success

We call on our partners to join this most noble history making project to the benefit of all.

...that pregnancy may no longer be a death sentence.