

USE OF MOBILE HEALTH: AWARENESS OF PREGNANCY DANGER  
SIGNS AMONG WOMEN IN BAGAMOYO DISTRICT, PWANI REGION  
TANZANIA

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**By**  
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A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree  
of Master of Public Health of  
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Muhimbili University of Health and Allied Sciences  
July, 2013

### **CERTIFICATION**

The undersigned certifies that she has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled, **“Use of Mobile Health: Awareness of pregnancy danger signs among women in Bagamoyo District in Pwani Region Tanzania”**, in (partial) fulfillment of the requirements for the degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.

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Dr. Anna Tengia-Kessy

(Supervisor)

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

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I **Gayo Jackson Mhila**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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## LIST OF ABBREVIATIONS

ANC	Antenatal Care
ANOVA	Analysis of Variance
ART	Antiretroviral Treatment
CCA	Community Change Agent
CI	Confidence Interval
C-IMCI	Community Integrated Management of Childhood Illness
DMO	District Medical Officer
Df	Degrees of freedom
D-Tree	Decision Tree
EHealth	Electronic Health
FHI	Family Health International
ICT	Information Communication Technology
IMCI	Integrated Management of Childhood Illness
Jhpiego	Johns Hopkins Program for International Education in Gynecology and Obstetrics
m4RH	Mobile for Reproductive Health
MDGs	Millennium Development Goals
mHealth	Mobile Health
MoHSW	Ministry of Health and Social Welfare
MUHAS	Muhimbili University of Health and Allied Sciences
NGO	Non Governmental Organization
PDA	Personal Digital Assistant
RCH	Reproductive and Child Health Services
SD	Standard Deviation
TDHS	Tanzania Demographic and Health Surveys
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

## **OPERATIONAL DEFINITIONS OF TERMS**

Community health workers: Are members of a community who are chosen by community members or organizations to provide basic health and medical health interventions in their respective communities

Electronic protocol: In the context of the study, it is an electronic guideline following the Ministry of Health standards, running on the mobile phones used by the health providers to ensure delivery of high-quality care to women who come for antenatal and postnatal visits. This protocol is developed in a format that is easy to understand and use including electronic registration, counseling messages and screening of danger signs during follow-up visits. It helps to detect danger signs and provides messages for decision support for referral.

Mobile health: The use of mobile phone or personal digital assistant (PDA) in providing health care service.

Pregnancy danger sign: Any recognizable signs of serious complications during pregnancy, childbirth and postpartum.

## ABSTRACT

**Introduction:** In Tanzania, the maternal mortality ratio is estimated at 454 deaths per 100,000 live births (TDHS 2010). In Sub-Saharan Africa 33% of maternal deaths are due to failure or delay in recognition of danger signs (Galjaart, 2008). Women usually learn about potential danger signs through counseling during antenatal visits through the traditional way, either one to one or in groups. D-Tree International working in collaboration with the Ministry of Health, Jhpiego and UNICEF developed and piloted a phone-based electronic tool (mHealth) to assist health workers to deliver a set of very specific maternal guidelines using electronic decision-support running on mobile phones.

**Objective:** The main objective of this study was to assess whether the use of mobile phone application (mHealth) during antenatal visits that emphasizes a complete maternal assessment and counseling about potential danger signs improves the mothers' awareness of pregnancy danger signs.

**Methodology:** An electronic questionnaire running on the mobile phone was used to assess women's awareness of danger signs from two groups of women in two separate geographical locations in Bagamoyo district, one of the having been exposed to mHealth services. Each group consisted of 164 women attending antenatal or postnatal clinics.

**Results:** All women who received counseling via mHealth were able to mention at least one pregnancy danger sign compared to 149 (90.9%) of women who were not exposed to the intervention. This difference was statistically significant, both in the univariate analysis (Chi-square 16.235, p-value 0.003) as well as in the independent-samples t-test ( $M=3.74$ ,  $SD=1.612$ ) and ( $M=3.35$ ,  $SD=1.882$ ) for mHealth and control group;  $t(326) = 2.017$ ,  $p = 0.045$ .

**Conclusion and recommendations:** Using mHealth increases awareness of pregnancy danger signs and therefore it is recommended that such intervention be scaled up. Further research using larger groups is also recommended in order to explore the potential of mobile phones that have highly penetrated Tanzania, which can be used to deliver health messages.

## CHAPTER ONE:

### 1.0 INTRODUCTION

#### **1.1 Maternal health:**

Approximately 800 women die every day from causes related to pregnancy and childbirth that could be preventable (WHO 2012). Among these deaths, 99% occur in developing countries and those in rural poorer communities are the most affected people (WHO 2012). In 2010, approximately 287000 women died during and following pregnancy and childbirth (Deliver 2008).

Considering the severity of maternal health issues, the world took serious steps to make sure the situation of maternal health is improving by making maternal health as one of the eight Millennium Development Goals (MDGs) adopted by the international community in 2000. Under Millennium Development Goal number five, countries were committed to reduce maternal mortality by three quarters between 1990 and 2015 (Oslo 2011). And since the adoption of this goal by the international community in 2000, there have been progressive initiatives in improving maternal mortality by member countries trying to achieve this particular goal. The results have shown following the MDGs, maternal deaths worldwide dropped by 47% (Deliver 2008). In sub-Saharan Africa, some countries reduced by half their levels of maternal mortality since 1990, while other regions including Asia and North Africa; have made even greater headway (WHO 2012). However, despite the fact that the progress in reducing maternal mortality is promising in other countries, the global maternal mortality ratio declined by only 3.1% per year compared to the required annual decline of 5.5%, targeted to be achieved in MDG5 (WHO 2012).

Tanzania has made great strides in reducing infant and child mortality during the past decade, however similar progress has not been achieved in reducing maternal and neonatal mortality. Despite significant efforts made by the government and stakeholders to improve maternal

health care, the current maternal mortality rate in Tanzania is still high at an estimated 454 deaths per 100,000 live births (TDHS 2010).

While about 96% of pregnant women make at least one antenatal clinic visit, only 15% go for the first visit in the first trimester and only 43% complete the 4 recommended visits (TDHS 2010), this means that they do not receive all the planned interventions. The most alarming part is that even for those who attend antenatal clinic visits the quality of antenatal care provided is not satisfactory. For instance, only 53% receive advice on pregnancy complications (TDHS 2010). Poor quality antenatal care can affect pregnant women's awareness of pregnancy danger signs. In a study testing the awareness of pregnancy danger signs, the percentage of women who knew at least one danger sign during pregnancy was 26%, during delivery 23% and after delivery 40% and very few women knew three or more danger signs (Pembe et al. 2009).

Understanding the challenges facing maternal health care, the Ministry of Health and Social Welfare (MoHSW) with support from Organizations such as United Nations Children's Fund (UNICEF), World Health Organization (WHO), Johns Hopkins Program for International Education in Gynecology and Obstetrics (Jhpiego) and other partners have developed several guidelines aimed at improving quality of care provided to newborns and women during pregnancy, labor, and postpartum (MOHSW 2008). These include focused antenatal care, emergency obstetric care, postnatal care, essential newborn care, community integrated management of childhood illness (c-IMCI) and more recently community maternal and newborn care (MoHSW 2008). These guidelines are paper based and require the health care worker to navigate through the information and determine appropriate care needed.

The Ministry of Health working with partners such as UNICEF and others are seeking ways to improve adherence to the guideline and protocols by health workers, and thereby improve the quality of care they provide. One of the efforts has been trying to take advantage of the availability of mobile phones to run electronic protocols in both urban and rural areas. D-Tree International working in collaboration with the Ministry of Health, JHPIEGO and UNICEF

has developed a phone-based tool to assist health workers deliver a set of very specific maternal protocols that have been developed in Tanzania for use at the community and clinic level. The tool assists health workers to remember to give preventive care and identify maternal problems as they arise and lead the health worker through a step by step process to know exactly what to do and what to say to the client to support a continuum of care. The use of mobile phones in providing health care is known as mobile health (mHealth).

### **1.1.2 Mobile health (mHealth)**

The term mHealth stands for mobile health. According to WHO, mobile health is an area of electronic health (EHealth) and it is the provision of health services and information via mobile technologies such as mobile phones and Personal Digital Assistants (Ryu 2012). The concept has recently become very popular with programs using mobile phones application to provide healthcare services to even the most remote communities.

According to industry estimates, there are more than 506 million mobile phone subscribers in Africa (Perry 2011), compared to only 246 million subscribers in 2008 (Dorothy and Agencies 2010). Tanzania is among the African countries which in recent year's mobile phone subscribers rose by 22% reaching 25.6 million which made communications being the fastest-growing sector in the Country (Thomson 2012)

Taking the potential of the penetration of mobile phones in developing countries, mobile phones technologies have been used within the healthcare community (UN Foundation 2009) by stakeholders including non-governmental organizations, donor agencies, healthcare providers and some government's agencies.

Mobile health is a general term that refers to the use of different electronic applications running on mobile devices aiming at supporting several activities such as interventions designed to improve diagnosis, investigation, treatment, monitoring and management of diseases; interventions to deliver treatment or disease management programs to patients,

health promotion interventions, and interventions designed to improve treatment compliance; and interventions to improve health care processes e.g. appointment attendance, result notification and vaccination reminders (Free et al. 2010).

Mobile health has shown success in health behavior change in different studies. For example, in two randomized controlled trials of mHealth interventions conducted in Kenya, the use of text messages improved patient adherence to anti-retroviral therapy (ART) (Thirumurthy and Lester 2012), and hence prolonged viral suppression. In South Africa the Ministry of Health managed to deliver test results for drug-resistant tuberculosis from central reference laboratories to remote clinics by installing mobile health technology using printers operating on mobile networks (Oslo, 2011). On another study the use of mobile technology using text messages showed a higher satisfaction level among women who received prenatal support than those who didn't receive any messages. The results showed that those who received text messages had their satisfaction level of service significantly higher than those who did not receive the messages both in the antenatal period and during labor (Jareethum et al. 2008). In the text-using group, the confidence level was higher (8.91 vs. 7.79,  $p = 0.001$ ) and the anxiety level was lower (2.78 versus 4.93,  $p = 0.002$ ) than the control group in the antenatal period. In another study mobile health showed to help patients and healthcare workers overcome institutional barriers by reducing the time spent on travelling to consult medical specialists (Barry et al, 2005). In Indonesia, for example, mobile health technology transmitted vital data of suspected cases from avian flu outbreak in various districts to health officials (Noordam, et al, 2011) which enabled a swift feedback mechanism from the central medical authorities. In another review maternal health services were improved through the use of mobile phones, playing a critical role in improving rural maternal healthcare and other essential services. There has been a huge deployment of mHealth that allows community health workers (CHWs) to access reliable health information, and reaches expert medical personnel, hence allowing remote diagnosis and training in major medical resources.

Tanzania is among the leading countries in setting the stage worldwide for integrating mHealth as a component of the national health system (Friederike 2012). In 2009 the mHealth Community of Practice Group (CoP) was established as an official working group and in 2011, Tanzania began developing a global first – the National mHealth Strategy. A study was conducted in Tanzania to develop and evaluate a mobile health system that guides clinicians in rural dispensaries through the integrated management of childhood illnesses (IMCI) protocols for classifying and treating childhood illnesses. The preliminary results in dispensaries showed clinicians using an electronic version of the IMCI protocol completed 84.7% of steps required compared to 61% of steps observed during conventional practice (Derenzi, B. et al. 2008). Another report shows more people accessing family planning services through the use of mobile health technology provided through clients requesting family planning information by sending a text message with "m4RH" to 15014. Over 19,000 and 40,000 queries for Kenya and Tanzania respectively were made in 2012 (Namirembe E. 2012).

### **1.1.3 Mobile health for maternal care:**

D-Tree International working in collaboration with the Ministry of Health, JHPIEGO and UNICEF has developed a phone-based tool to assist health workers deliver a set of very specific maternal protocols that have been developed in Tanzania for use at the community and clinic level. The tool assists health workers to remember to give preventive care and identify maternal problems as they arise and lead the health worker through a step by step process to know exactly what to do and what to say to the client to support a continuum of care. The intervention of using mobile phone for maternal health has been implemented in two locations of Bagamoyo District in Tanzania from November 2010 to date, where two health facilities are using electronic protocol running on Android phones; nurses screen all pregnant women who come for antenatal visits. While ten community health workers are using a more simplified version running on the Nokia mobile phones to conduct a household visits to screen pregnant women and those who delivered recently. The phone-based tool registers pregnant women either when they are identified by community health workers known as community

change agents (CCAs) or when they come for their first antenatal visit at a health facility. Once registered at either a clinic or by CCA, the tool will prompt CCAs to monitor the progress of these women and encourage them to receive antenatal care at a clinic and go to a health facility when they are due to deliver. During this monitoring process, the tool provides CCAs with a checklist of danger signs for the mother (during pregnancy, labor and postpartum) and newborn, and provides instructions on how to counsel a woman regarding antenatal clinic visits, facility based deliveries, and postnatal clinic visits. At the health facility level, in addition to the registration of women, a protocol for antenatal care has been developed to assist health workers in the antenatal and postnatal assessments of women and newborns. The system expects to increase adherence to Tanzanian standards of care for antenatal and postnatal care by providing step by step instructions to the health workers of needed procedures, counseling and examinations and hence detect danger signs, improve awareness of danger signs and strengthen referrals.

## **1.2 Problem statement**

The current maternal mortality ratio in Tanzania is still high, estimated at 454 deaths per 100,000 live births (TDHS 2010). A recent study estimated that 33% of maternal deaths in Sub-Saharan Africa are due to failure or delay in recognition of danger signs (Galjaart 2008). Failure or delay of recognizing danger signs by pregnant women and their families could result in delay to reach the health facilities in time to access the needed treatment. One way that mothers learn about potential danger signs is through counseling during antenatal visits. Although there is an important opportunity of 96% of women in Tanzania coming for antenatal visit at least once (TDHS 2010), unfortunately, this opportunity to educate the mother about potential danger signs is often missed. Available information suggests that only about half of women (53%) were informed of the signs of pregnancy complications (TDHS 2010). In a study assessing awareness of danger signs of obstetric complications among 1118 women in rural Tanzania, women who knew at least one danger sign during pregnancy were 26%, while the corresponding proportions for women who knew at least one danger sign

during delivery and after delivery were 23% and 40% respectively (Pembe et al. 2009), which indicates poor awareness on maternal danger signs. In recent years, there has been a growing interest and enthusiasm about the use of mHealth to assist health workers increase counseling and raising awareness of pregnancy related danger signs as well as adherence to the standards of care. This is achieved by providing guided step by step procedures in counseling and examinations as they provide antenatal care via software installed in a mobile phone.

This study therefore looked at whether the use of mHealth during antenatal visits that emphasizes complete maternal assessment and counseling about potential danger signs improved the mothers' awareness on these risks, ultimately leading to more timely attendance to the health facility where the problem could be addressed.

### **1.3 Rationale of the study**

Findings from this study will inform policy makers and implementers on the influence of mHealth on the women's awareness of pregnancy danger signs. The findings will further guide appropriate strategies to promote the use of mHealth or modify the way it has been implemented. This will therefore, make the interventions achieve among other intended goals, increased awareness of pregnancy danger signs among pregnant women and the community at large, leading to the reduction of maternal mortality. In addition, the findings are expected to act as a catalyst for more research in the area of mHealth for maternal care and other interventions. Information from the health care providers using mHealth is an important feedback to stakeholders who are planning to scale up the use of such intervention. This is imperative since technology is only useful if it is applicable, acceptable, and makes a difference in the community.

## **1.4 Research question**

What is the influence of the use of mHealth in the awareness of pregnancy danger signs among women in Bagamoyo District?

### **1.4.1 Study hypothesis**

Null study hypothesis: There is no difference on the awareness of pregnancy danger signs among women who received antenatal services using mHealth and those who received care through the conventional way in Bagamoyo district.

## **1.5 Objectives**

### **1.5.1 Broad objective**

To assess the influence of the use of mobile health in the awareness of pregnancy danger signs among women who are pregnant or delivered within the past 18 months in Lugoba and Miono in Bagamoyo district in comparison with those who received regular service using paper based in Ikwiriri and Kibiti in Rufiji district.

### **1.5.2 Specific objectives**

- 1 To compare the socio-demographic and other characteristics of women were exposed to mHealth and those who were not exposed.
- 2 To determine the level of awareness of pregnancy danger signs among women exposed to mHealth and those unexposed.
- 3 To determine the proportion of women who attended health facility care as a result of recognizing pregnancy danger signs among mHealth exposed and unexposed groups.
- 4 To determine the association between awareness of pregnancy danger signs and exposure to counseling on pregnancy danger signs using mHealth.

## CHAPTER TWO:

### 2.0 LITERATURE REVIEW

A wealth of literature studies illustrates that mobile health (mHealth) strengthens the relationship between patients and providers (Mitchell et al. 2013). For example, it increases communication between midwives and pregnant women that allows health providers to monitor patients more closely, and it also helps earlier detection and treatment of health problems (Ryu, 2012). Further literature suggests that, there are impacts of standardized guidelines on improving healthcare quality (Kurtin & Stucky 2009), and the role that information technology through mHealth can play to improve health outcomes. Through adherence of standard guidelines and protocols for obstetrics and neonatal emergencies, a program of Foundations to Enhance Management of Maternal Emergencies (FEMME), that was implemented by CARE and Columbia University's working in partnership with the Ministry of Health in Peru, reduced maternal deaths by 50% in Ayacucho region (Care, 2010).

Findings of a qualitative study of maternal and newborn health done in Ghana, supports the use of the mobile phone by nurse midwives consulting with their peers, supervisors, and other medical colleagues on complicated cases improved communication. Also in the same study mobile health was used to facilitate communication between patients and healthcare workers on an individual basis, avoiding travel and yielding more timely and efficient health service delivery (Mechael 2009)

By using existing mobile phone technology it has been possible to seek ways of improving healthcare delivery by significantly capturing information and giving feedback to community-based healthcare workers thereby improving their efficiency and effectiveness. In Ghana nurses equipped with mobile phones for transmitting healthcare information, they were able to reduce time spent to process paperwork (Macleod et al. 2012). In addition to data collection, it was also used to support capabilities of information feedback via alerts and reminders to

community-based nurses and health information messages as well as personalized reminders to pregnant women and new mothers to increase utilization of health services.

On the other hand some mobile health technology has shown success on knowledge empowerment (Kwatra, 2011), example in India one of the mobile health deployed by installing automatic telephone and text messaging alerts to allow citizen to interact with the system through in-dial option on helpline numbers. Clients are able to gather maternal and child health care information such as due dates, institutional delivery, and the system generates text messages alerts for immunization details and calls for pulse polio campaigns. The system also allows clients to give specific health related complaints. The literature shows great success in improving responsibility and accountability of service providers after knowing that clients have a way of interacting with the system to give their complain. Also it helped to refocus the strategies on preventive care based on the demand provided through client feedback via mobile health. Pregnancy registration increased from 2373 to 2830 within three months. More results showed institutional delivery increased from 79.40% to 92.7% and child immunizations such as diphtheria, pertussis and tetanus increased from 55.98% to 75.80% (Kwatra, 2011).

The use of mobile phone technology has shown the provision of health-related information improves health service satisfaction of clients (Jareethum et al. 2008). On a study that was done in Bangkok, Thailand a randomized control trial in a hospital setting where women were randomized into either a treatment group, which received two text messages per week from 28 weeks of gestation until giving birth, or in a control group, that didn't receive messages the opposite of the treatment group. The findings showed that, pregnant women who received text messages for prenatal support had significantly higher satisfaction levels compared to the one who did not receive support of any text message. The information given to the treatment group through text message involved abnormal complications that may come about during

pregnancy that would require attention of a health care worker, and tailored messages were sent based on each woman's specific gestational age (Toth, 2008).

The use of mobile phones is reported to have shown success not only on different types of disease surveillance (Mitchell et al. 2009) but also can speed up the data collection with very minimum error within a short period of time (Shirima et al. 2007). For example, mobile health technology enabled the collection of data for baseline information on health and survival of young children from 21,600 households with a total of 83,346 individuals in southern Tanzania. Most data were collected within only seven-week period in July-August 2004 with no problems or data loss being encountered and data completeness was over 99% (Shirima et al. 2007).

## CHAPTER THREE:

### 3.0 METHODOLOGY

#### 3.1 Study design

The study design was a retrospective cohort. This study design was chosen because investigator formulated ideas about possible associations between mHealth and women's awareness of pregnancy danger signs at the time when the intervention of mHealth had already taken place and most women who were interviewed had received maternal services on previous antenatal visits up to the past eighteen months.

#### 3.2 Study area

The Pwani (Coast) region of Tanzania is estimated to have a population of 889,154 (National Bureau of Statistics 2002). The region is located on the eastern side of the country and is bordered by Tanga region to the north, Dar es Salaam region and the Indian Ocean to the east, Lindi and Morogoro regions to the south and west respectively. This study was conducted in two districts, namely Bagamoyo and Rufiji districts within Pwani region. These study sites are located far apart, with Bagamoyo district being on the far north. Bagamoyo consists of 16 wards with an estimated population of 228,967 people. The other district, Rufiji, is located on the southern side of the region and according to the 2002 Tanzania national population census in 2002 the population of this district was 202,102.

#### 3.3 Study populations

##### 3.3.1 mHealth exposed group

This group comprised of all women who were pregnant during the interview or those who delivered within 18 months prior to data collection residing in the villages where mHealth

intervention took place. These women were screened using a mobile health technology at least once during their antenatal visits.

### 3.3.2 Non exposed group

This arm of the study comprised of all women who were pregnant during the interview or those who delivered within 18 months prior to data collection and had made at least one antenatal visit during pregnancy. These women attended the traditional or regular antenatal services and had never been screened using mobile health technology for maternal health.

### 3.4 Sample size

The sample size was calculated by using Epi info sampling model with the following characteristics; two-sided confidence level = 95, desired power = 80% as shown on the equation below:

$$N = \{z_{\alpha} \sqrt{2P(1-p)} + z_{\beta} \sqrt{[p_1(1-p_1) + p_2(1-p_2)]}\}^2 / \delta^2$$

Where  $p_1$  and  $p_2$  are the proportions exposed and controls, respectively

$$P = (p_1 + p_2) / 2; p_1 = 0.26 \text{ and } p_2 = 0.5$$

For 80% power,  $Z_{\beta} = 0.84$

Significance level,  $Z_{\alpha} = 1.96$ .

$$N = \{1.96 \sqrt{2 \times 0.058(1-0.058)} + 0.84 \sqrt{[0.26(1-0.26) + 0.5(1-0.5)]}\}^2 / 0.0094$$

Therefore the minimum sample size calculated was 155 respondents for each group. To cover for non respondents, the final sample size was taken to be 165 respondents for the mHealth exposed group and 165 for control group. However one respondent from the un-exposed group dropped out during the interview and this necessitated matching them with 164 from the exposed group.

### 3.5 Sampling procedure

The study focused in an area where there had been an intervention using electronic application running on the mobile phone (mHealth) to screen pregnant women during antenatal visits at health facilities. Nurses at the reproductive and child health sections in these health facilities used the application running on the mobile phone to provide counselling and screening for pregnant danger signs among women who came for antenatal visits. Such intervention was implemented in the health centres of Miono and Lugoba in Bagamoyo district, Pwani region. Therefore pregnant women who attended services in these two facilities during the intervention period comprised the mHealth exposed group.

On the other hand, Kibiti and Ikwiriri health centres both in Rufiji district in the same region but geographically very far from the mHealth intervention sites were matched for the control group. Hence women who attended antenatal visits in these two facilities formed the comparison group. Kibiti and Ikwiriri health centres in Rufiji district were purposely selected for the control group to avoid possibilities of contamination as they are the furthest same-level facilities and located in the same region. The other advantage of using these health centres for the non-exposed group was the likelihood of similarities in various aspects such as literacy levels, health seeking behavior, media exposures and socio-economic status of the residents which could have otherwise acted as major confounders.

The other factors considered in the matching of the two groups were the intensity of the antenatal visits. For example, one of the health centres (Miono) in the exposed group had an average of 107 antenatal visits per month and this was matched with Ikwiriri health centre which has more or less same average of monthly attendance. On the other hand, Lugoba health centre (exposed group) was matched with Kibiti health centre as they both have monthly estimated average of antenatal visits of 147.

In each of the intervention and control health facilities, a schedule of clinic days for both antenatal and postnatal mothers was obtained to allow the researcher to visit the sites in those days in order to get eligible women for the study.

From the mHealth exposed group (Lugoba and Miono) all women who were pregnant or delivered within 18 months and had received antenatal service through mHealth intervention at the health facility at least once were selected for the interview. Similarly in the control group in Kibiti and Ikwiriri health centres, every woman who was pregnant or delivered within 18 months and attended antenatal services at least once at that particular health facility was selected for the interview.

All women who came for the clinic visits during the period of data collection and met the criteria were recruited to the study until the sample size (164 respondents for each group) was reached. For the postnatal mothers, the reproductive and child health card (RCH1) of the child was reviewed to determine date of delivery to ensure the respondent had delivered within 18 months. The electronic questionnaire was programmed with restrictions to support the research to only interview targeted respondents. For example, for the date of delivery if the delivery happened more than 18 months, there was a reminder to say this person doesn't qualify for the study hence it wouldn't continue to the next question.

### **3.6 Data collection**

#### **3.6.1 Recruitment and training**

Three research assistants who had medical background and also conversant with the use of various softwares on mobile phones were deployed. They were oriented and trained regarding the study procedures and how to handle the electronic questionnaire, including navigating, filling in data, and submitting the data to the server. The research assistants were blinded to the main goal of the study, the key variables and how data was to be analyzed to ensure genuine keying of information collected, avoiding possible influences.

### **3.6.2 Data collection tool**

An electronic questionnaire was used to obtain all the required information. This questionnaire was initially prepared in English and later on translated in Kiswahili, the national medium of communication. It was then programmed into electronic form using a software platform called CommCare to run on Nokia and Hit The Cell (HTC) android mobile phones. The questions were designed to allow respondents to express various issues related to awareness of pregnancy danger signs.

### **3.6.3 Pre-testing**

The questionnaire was pre-tested with 35 clients in Gairo reproductive and child health clinic where mHealth is operational and Chanika to represent a control group. Both two places, used for the pretest were not part of the study areas. The purpose of the pretest was to make sure the questions reflected the intended message in terms of layout and content and also to allow verification of the applicability of the electronic questionnaire as part of refinement phase. This pretesting exercise was done using the recruited research assistants as part of training and familiarization with the tool. Slight modifications were made on the final version.

### **3.6.4 Data checkup, submission and database**

The electronic questionnaire was programmed in a smart way including a checklist to make it easy to use and avoid the not applicable or impossible values. There were also some restrictions to avoid unnecessary skipping of questions and ensure completeness in filling the questions.

Data from each respondent were submitted to the database in real time from the interviews whenever there was mobile network coverage but at times of network outage, it was stored on the phone and submitted later. The database was located and hosted at the University of Dar es

Salaam Computing Center (UCC). A simple domain was created on the existing database to allow storage of data submitted from the field sites.

### **3.7 Study variables**

#### **3.7.1 Dependent variable**

The dependent variable was awareness of pregnancy danger signs.

#### **3.7.2 Independent variables**

The independent variables included having been screened by the use of mHealth, age, highest level of education, marital status, gravidity, number of antenatal visits, frequency of personal experience of pregnancy danger signs, number of household visits made by community health workers for antenatal service, distance from home to health facilities, place of delivery and, number of visits to a health facility due to recognizing pregnancy danger signs.

### **3.8 Data management and analysis.**

#### **3.8.1 Data processing**

Regular review of data was done every time before it was submitted from the phone to ensure the recorded answers were what the respondents had given. Also there was a second review of data every day to detect any emerging issues that needed clarification from the research assistants. The data running on the mobile phones were then submitted to the database at the UCC through general radio package services (GPRS). These data were subsequently exported to an excel spreadsheet for cleaning after which it was exported to the Statistical Package for Social Sciences (SPSS) computer software that was used for the data analysis.

### **3.8.2 Data analysis**

Frequencies and descriptive statistics using cross tabulations were performed to determine the distribution of respondents by proportions, chi-square and p-values where appropriate. Further analysis was performed to make comparisons between variables to determine the associations between independent and dependent variables. The means for each variable were calculated. Since the dependent variable, number of pregnancy danger signs is a continuous variable; an independent samples t-test was therefore performed for the dichotomous independent variables against the dependent variable. For the analysis of the categorical independent variables against the dependent variable, the means were calculated using one way ANOVA.

An independent-sample t-test was conducted to compare the awareness of pregnancy danger signs among women in the two groups according to the number of pregnancy danger signs each woman had mentioned. Significant differences in the scores were determined between the two groups to test the null hypothesis.

## CHAPTER FOUR

## 4.0 RESULTS

The results presented in this chapter cover interviews from a total of 328 respondents, 164 from the group of mHealth exposed antenatal and post natal mothers and an equal number of a control group (not exposed to mHealth). This makes an addition of 18 respondents on the calculated total sample size of 310.

#### 4.1 Distribution of respondents according to socio-demographic and other characteristics

Table 1: Distribution of study respondents by exposure status and health facilities.

Exposure status	Facility name	Number of respondents (%)	Total (%)
mHealth exposed group	Lugoba	103 (62.8)	164 (100)
	Miono	61 (37.2)	
Unexposed group (control group)	Kibiti	103 (62.8)	164 (100)
	Ikwiriri	61 (37.2)	
Total			328

The mHealth intervention group comprised of a total of 164 respondents from Lugoba and Miono health centers, whereas an equal number of matching control group was from Kibiti and Ikwiriri health centers. Lugoba and Kibiti each contributed 103 (62.8%) whereas 61(37.2%) respondents came from the other two health facilities as it is shown on Table 1.

Table 2: Distribution of respondents by socio-demographic characteristics

<b>Variables</b>	<b>mHealth Group</b> <b>n =164 (%)</b>	<b>Control Group</b> <b>n =164 (%)</b>	<b>Chi-square</b>	<b>P-Value</b>
<b>Age</b>			3.510	0.173
Less than 20 years	19 (11.6)	30 (18.3)		
20-34 years	118 (72.0)	104 (63.4)		
35 and above years	27 (16.5)	30 (18.3)		
<b>Marital status</b>			36.858	0.001
Never married	15 (9.1)	28 (17.1)		
Married	102 (62.2)	128 (78.1)		
Divorced/widowed	8 (4.8)	4 (2.4)		
Cohabiting	39 (23.8)	4 (2.4)		
<b>Occupation</b>			19.620	0.001
Domestic service	15 (9.1)	43 (26.2)		
Peasantry	109 (66.5)	98 (59.8)		
Small business	26 (15.9)	12 (7.3)		
Other activities	14 (8.5)	11 (6.7)		
<b>Walking distance from facility</b>			0.053	0.817
Within one hour	105 (64.0)	107 (65.2)		
More than one hour	59 (36.0)	57 (34.8)		
<b>Education level</b>			4.563	0.102
No formal education	50 (30.5)	67 (40.9)		
Primary school	106 (64.6)	87 (53.0)		
Secondary school +	8 (4.9)	10 (6.1)		

As shown on Table 2, the majority of these women were between the ages of 20 to 34 years (118, 72.0% and 104, 63.4% from exposed and control groups respectively). Equal proportions for the two arms were seen among the younger and older age categories and the age difference between the two groups was not statistically significant (chi-square 3.510, *p-value* 0.173)

Regarding marital status, most of the mothers in the two groups were married, (102, 62.2% and 128, 78.1% from the exposed and control group respectively), whereas single women were 9.1% and 17.1% respectively in the two groups and these proportions were statistically significantly different (chi-square 36.858, *p*-value 0.001). Most of the women who were involved in this survey were peasants (109, 66.5% and 98, 59.8% respectively for the exposed and non-exposed groups). On the other hand, almost a tenth of the exposed and slightly over a quarter of the non exposed women reported to have no any income generating activity other than doing household chores, while more women from the exposed group were comparably more involved in small businesses. The distribution of the respondents in the various occupational categories was significantly different among the two study arms (Chi-square 19.620, *p*-value 0.001).

Respondents who reported to be walking for more than an hour to reach the nearest health facility providing reproductive and child health services were 59 (36%) and 57 (34.8%) respectively from the exposed and control groups. However, this difference in walking time between the two groups is not statistically significant (chi-square 0.053, *p*-value 0.817).

Table 3: Distribution of respondents by maternal health variables

<b>Variables</b>	<b>mHealth group n =164 (%)</b>	<b>Control group n =164 (%)</b>	<b>Chi-square</b>	<b>P-Value</b>
<b>Total number of pregnancies</b>			3.134	0.371
One	33 (20.1)	43 (26.2)		
Two	35 (21.3)	37 (22.6)		
Three	40 (24.4)	29 (17.7)		
Four or more	56 (34.1)	55 (33.5)		
<b>Number of clinic visits (current or last pregnancy)</b>			1.414	0.702
Once	7 (4.3)	12 (7.3)		
Twice	43 (26.2)	42 (25.6)		
Three	54 (32.9)	53 (32.3)		
Four	60 (36.6)	57 (34.8)		
<b>Experience of pregnancy danger signs</b>			0.446	0.504
No experience of danger signs	89 (54.3)	95 (57.9)		
Experience of pregnancy danger signs	75 (45.7)	69 (42.1)		

From Table 3, a fifth, 33 (20.1%) and slightly above a quarter, 42 (26.2%) respectively of women in the exposed and control groups were having their first pregnancy at the time of data collection. Respondents who had been pregnant four or more times in the mhealth exposed

group were 56, (34.1%) and among the control group were 55, (33.5%). The distribution of respondents by antenatal clinic visits was almost similar for those who made four or more visits on their last pregnancy among the two groups of women (60, 36.6% and 57, 34.8% from exposed group compared to those who were not exposed to mHealth group.

Data also shows that slightly higher proportion of women in the mHealth exposed group experienced danger signs (75, 45.7%) compared to their colleagues in the control group (69, 42.1%). These proportions were however not statistically different (chi-square 0.446, p-value 0.504).

**Table 4:** Association between socio-demographic characteristics and awareness of pregnancy danger signs

<b>Variables</b>	<b>mHealth group</b>		<b>Control group</b>		<b>P-Value</b>
	<b>n=164 (Mean)</b>	<b>SD</b>	<b>n =164 (Mean)</b>	<b>SD</b>	
<b>Age</b>					
Less than 20 years	1.74	0.65	1.70	0.988	0.886
20-34 years	2.17	0.830	1.96	1.061	0.103
35 and above years	2.11	0.892	2.03	0.850	0.737
<b>Marital status</b>					
Never married	1.93	0.884	1.89	1.066	0.901
Married	2.04	0.783	1.91	1.027	0.310
Divorced/widow	2.40	1.342	2.33	0.577	0.939
Cohabiting	2.31	0.832	2.25	0.500	0.893
<b>Education level</b>					
No formal education	1.94	0.793	1.75	1.078	0.286
Primary school	2.16	0.841	2.00	0.928	0.210
Secondary school	2.50	0.756	2.50	1.080	1.000
<b>Occupation</b>					
Domestic service	2.33	0.900	1.63	0.976	0.057
Peasantry	2.09	0.823	2.03	0.968	0.624
Small business	2.19	0.849	2.08	1.311	0.760
Other activities	4.77	0.725	4.78	1.093	0.983
<b>Number of pregnancies</b>					
One	1.85	0.755	1.98	0.963	0.530
Two	2.14	0.879	1.68	1.132	0.055
Three	2.08	0.859	2.17	1.037	0.672
Four or more	2.27	0.798	1.93	0.940	0.052
<b>Number of clinic visits</b>					
One	2.14	0.900	2.17	0.835	0.954
Two	2.19	0.958	1.83	0.908	0.085
Three	2.06	0.856	1.98	1.065	0.691
Four or more	2.10	0.706	1.89	1.080	0.224

As displayed on Table 4, a one-way analysis of variance obtained a main effect for marital status with women who were divorced having the highest score from both the mHealth exposed group ( $M = 2.04$ ,  $SD = 1.342$ ) and those not exposed to mHealth ( $M = 2.33$ ,  $SD = 0.577$ ) with,  $p=0.939$ . The difference between the two groups was however, not statistically significant. On the other hand, the education level of respondents had an interesting effect with the highest mean being the women who attained secondary school or higher education in both groups. Similarly, the occupation of the respondents did not have a significant influence on the awareness of pregnancy danger signs ( $M = 2.50$ ,  $SD = 0.756$ ) among the mHealth group and the contro group ( $M = 2.50$ ,  $SD = 1.080$ ), with  $p=1.000$ . Therefore although Table 2, showed there was a statistical significant difference in marital status and occupation among the distribution of respondents between the two groups but the analysis on Table 4, showed these two variables do not have statistical significant influence to women's awareness of pregnancy danger signs.

#### 4.2 Comparison of women's awareness of pregnancy danger signs

Table 5: Number of mentioned danger signs by respondents

	<b>mHealth group</b>	<b>Control group</b>		
Variable	n =164 (%)	n =164 (%)	Chi-square	P-Value
Number of pregnancy danger signs mentioned spontaneously			16.235	0.003
None	0 (0.0%)	15 (9.1)		
1 to 2	41 (25.0)	39 (23.8)		
3 to 4	70 (43.3)	59 (36.0)		
5 to 6	45 (27.4)	45 (27.4)		
7 to 9	7 (4.3)	6 (3.7)		

The pregnancy danger signs were collected and coded in a continuous variable and later on categorized as shown on Table 5 to determine the level of awareness among the two groups. All respondents from the mHealth exposed group were able to mention at least one danger sign of pregnancy whereas close to a tenth of the women in the control group (15, 9.1%) could not mention even a single danger sign. On the other hand, 71 respondents (43.3%) and 59 (36.0%) from the exposed and non exposed groups respectively mentioned 3 to 4 danger signs. In general, women who had received services via mHealth compared to those who were not exposed to such intervention were comparatively more likely to mention pregnancy danger signs and this difference was statistically significant (chi-square 16.235,  $p$ -value 0.003).

Table 6: The awareness of pregnancy danger signs between two groups

Variables	mHealth group		Control group		Df	t	P-Value
	n=164 (Mean)	SD	n =164 (Mean)	SD			
List of mentioned danger signs	3.7	1.612	3.3	1.88	2.02	326	0.045

*SD=standard deviation, n=number of respondents, t=independent t test, p-value=2 tailed*

An independent-sample t-test was conducted to compare the general score of awareness of pregnancy danger signs between women who received antenatal care using mHealth and those who received antenatal care using the regular paper system (control group). As shown on Table 6, women who were exposed to the intervention were more aware of pregnancy danger signs compared to those who were on the control group. The difference between respondents the two groups was a statistically significant whereas mHealth group ( $M=3.7$ ,  $SD=1.61$ ) and the unexposed group ( $M=3.3$ ,  $SD=1.88$ ,  $p = 0.045$ ). The results indicate that women who were in the intervention group were more aware on pregnancy danger signs, therefore negating the null hypothesis in this study that there is no difference in awareness of pregnancy danger signs between the two groups.

### 4.3 Utilization of health facility services in case of pregnancy complications

Table 7: Seeking health care services after experiencing pregnancy danger signs

	mHealth group	Control group	
	<b>n =75 (%)</b>	<b>n =69 (%)</b>	<b>P-Value</b>
<b>Action taken after experience pregnancy danger signs</b>			0.466
Visited health facility	69 (92.0%)	61 (88.4)	
Other actions	6 (8.0%)	8 (11.6)	

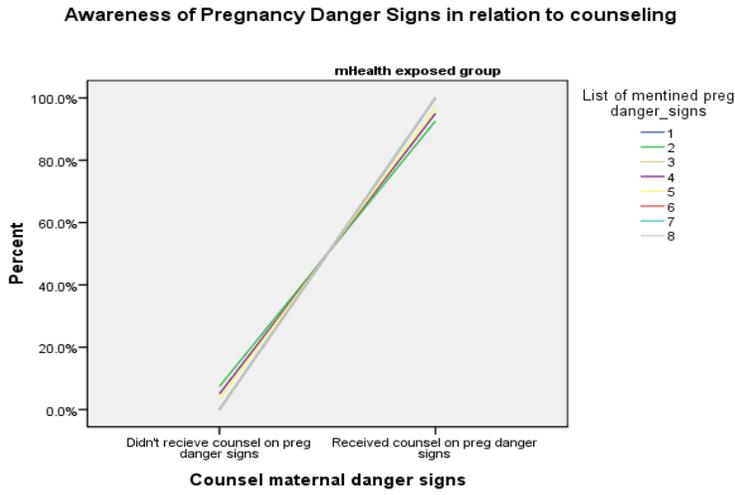
From Table 7, respondents from the mHealth group 75 (45.7%) and 69 (42.1%) from the control group reported experiencing pregnancy danger signs at some point. Out of those who reported to have experienced such signs, 69 (92%) from mHealth and 61 (88.4%) from control group said they sought care at a health facility. Although women who were exposed to the mHealth intervention were more likely to seek health care at a facility compared to women in the control group, this tendency was not statistically significant ( $p = 0.466$ ).

### 4.4 Awareness of pregnancy danger signs in relation to counseling

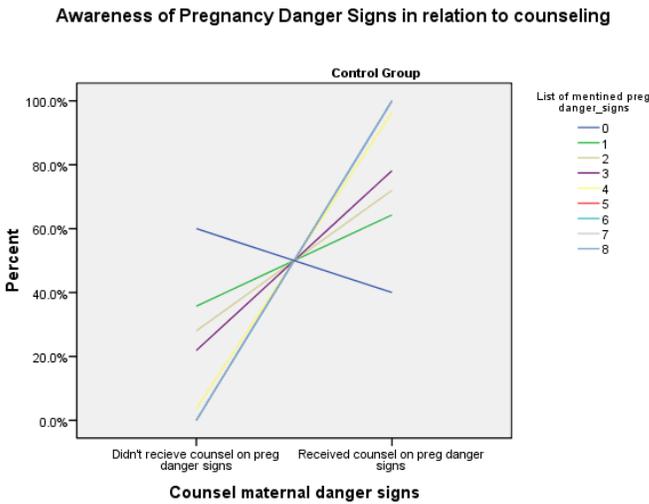
The most interesting part of this study is the statistically significant difference in the proportions of women from the two groups who reported receiving counseling about pregnancy danger signs during their antenatal clinic visits (Chi-square 18.90,  $p$ -value=0.003). From the mHealth group, 159 (97.0%) received counseling at a health facility while pregnant compared to 135 (82.3%) from the control group. Further analysis to compare the number of pregnancy danger signs that were mentioned by women from the two groups in relation to receiving counseling also suggests that more women in the exposed group who received

counseling were more aware of pregnancy danger signs than their colleagues on the control group. However, this difference was not statistically significant between women exposed to mhealth (M=1.0, SD=0.21) and their colleagues in the control group (M=0.8, SD=0.38).

**Figure 1:** Awareness of pregnancy danger signs in relation to counseling on mHealth exposure



**Figure 2:** Awareness of pregnancy danger signs in relation to counseling on control group



## CHAPTER FIVE

### 5.0 DISCUSSION

The findings from this study showed that a higher proportion of women in the intervention area received counseling on pregnancy danger signs compared to women in the control group, 97% and 82.3% respectively. The findings also revealed that 45.7% of all participants had experienced at least one danger sign during their last pregnancy and about 92% of those who experienced pregnancy danger signs reported to have sought health care at a health facility. Furthermore, study results showed high awareness of pregnancy danger signs with 75% of respondents in the intervention group being able to mention at least three of such signs. In addition, all respondents in the mHealth intervention sites were able to mention at least one danger sign during the interview.

#### 5.1 Socio-demographic and other characteristics among the two groups

Majority of participants (72%) in this study were between the ages of 20 to 34 years and 30.5% of them reported to have never attended a formal education. This illiteracy level among women is slightly lower than that reported in a study done in Islamabad which was 69% (Alam et al. 2004). Similarly, the proportion is less than what was documented in another study in which only 46% of women who were interviewed on awareness of maternal dangers had completed primary school education (Pembe, et al, 2009). Similar low literacy level among women has been revealed in another study on reproductive health among refugees in Guinea whereby only 29% of women interviewed had formal education (Howard et al. 2011). The difference in literacy levels could be due to the sample size, considering the total of 1118 (Pembe, et al, 2009), and 444 respondents (Howard et al. 2011) compared to this study where the sample size was 328 for both study arms.. Another plausible explanation for the difference of illiteracy level in the Guinea study could be due to the respondents being at the refugees' camp where the chance of getting formal education could be limited. In this mHealth study, 62.2% respondents were married while 66.5% were peasants, findings which closely relate to other studies in which 72% and 77% of women were respectively married and peasants

(Howard et al. 2011). However, in a study done in Islamabad, majority of women (81%) reported to be housewives (Alam et al. 2004). This difference could be due to the location of the study area whereas this study was done in rural areas with women while the Islamabad study was done in an urban area where peasantry is not the norm. None of these studies reported here documented any statistically significant relationship between socio-demographic characteristics and awareness of pregnancy danger signs.

## **5.2 Awareness of pregnancy danger signs**

The emphasis of women to be aware on pregnancy danger signs has been a critical point of maternal care by both the Ministry of Health and Social Welfare and other stakeholders to make sure women are aware of most of maternal danger signs. And because of this importance, standard guidelines have been developed to guide health workers to educate women on maternal danger signs. Due to the sensitivity of the mater, different innovations and job aids have been created to ensure standard of maternal care in order to increase awareness of maternal danger signs to women.

The findings from this study revealed 75% of respondents in the intervention group were able to mention at least three pregnancy danger signs. Whereas only about a tenth of respondents in the control group could not mention a single pregnancy danger sign, all respondents in the intervention group were aware of at least one danger sign. On the other hand the findings were slightly higher than literatures from some studies where 51% of respondents mentioned at least one obstetric danger sign (Pembe, et al. 2009). The difference in the study findings could be due to the sample sizes, whereas the later study recruited a total of 1118 women. The difference could also be attributed to variations in the study settings as the current study interviewed clinic attendees while respondents in the study by Pembe were community clusters, including some women who had not attended antenatal visits even once. Clinic attendees had the advantage of accessing health facilities and hence higher chance of being counseled on maternal danger signs. On the other hand this study was done at the area of

intervention where electronic guideline running on a mobile phone which enforces a health care provider to provide counseling of maternal danger signs to all women without skipping any question. Such exposure provides a higher chance getting information about pregnant danger signs as well as on other medical procedures as shown in a study by (Derenzi et al. 2008).

### **5.3 Attendance to health facilities due to recognizing danger signs**

All pregnant women are encouraged to visit the health facilities regularly for antenatal services and also any time when any pregnant danger sign or complication occurs. Findings from this study revealed an overall positive perception by respondents towards health seeking behavior at health care facilities for those who experienced pregnancy danger signs on their last pregnancy. In the intervention area, 40% of women experienced pregnancy danger signs during their last pregnancy and 92% of these attended the health facilities for medical checkup and treatment. Similarly observations have been documented elsewhere where 95% of pregnant women said they would seek health care in a facility if they experienced any danger sign (Howard et al. 2011). The use of mHealth does not only save lives of mothers but also neonates. Findings from a study in Sub Saharan Africa revealed that 33% of women die due failure to recognize maternal danger signs (Galjaart 2008). In Ghana, early diagnosis of pregnancy complications was documented to reduce early neonatal death by 40%; and therefore an intervention was done using mobile health to improve referral and guidance incase women experienced pregnancy complications. In this case, pregnant women or their husbands contacted the midwife and clinicians through mobile phone short messages to receive instructions and description regarding a particular complication (Mechael 2009).

### **5.4 Association between awareness of pregnancy danger signs and counseling.**

It has been documented in various studies that lack of counseling of women on pregnancy danger signs is one of the sources of women not being aware of these fatal signs. Some literatures have shown there are several interventions that have been implemented including

health provider reporting to provide counseling and education on maternal complications through phone calls and text messages (Mechael 2009). Other literatures also suggested 75.5% use of antenatal clinics and in areas where accessibility to antenatal care facilities is a problem, community health workers and lady health workers should provide antenatal counseling at the door-step of woman (Alam et al. 2004). Further studies have recommended improving the quality of counseling on maternal danger signs and utilization of health services, and the need of appropriate training modalities for health workers (Pembe, et al, 2009) and some innovations of using mobile technology have been deployed to improve the quality of counseling on reproductive and family planning (Toth, 2008). In relation to the implementation of mHealth for improvement of counseling, literature reveals that the use of electronic algorithm running on mobile phones provided correct treatment and counseling on integrated management for childhood illnesses (Mitchell et al. 2013). In Tanzania, although about 96% of women attended antenatal visits at least once, only about half of them (53%) were informed of the signs of pregnancy complications (TDHS 2010). Findings from the current study showed that 97% of women from the mHealth intervention received counseling during their antenatal visits, whereas the corresponding proportion in the control group was 82%. These findings are way higher than what has been documented in the recent nation-wide survey (TDHS 2010). The difference could be due to the small sample size used in this mHealth survey that was drawn from a narrow geographical setting.

## CHAPTER SIX:

### 6.0 CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion.

The mobile health (mHealth) intervention increased the chance of women receiving counseling on pregnancy danger signs as more women in this group received counseling compared to those in the control group. The results also revealed that more women who received antenatal services using mHealth did seek health care at the health facilities as a result of recognizing pregnancy danger signs. Furthermore, there was a statistically significant difference in awareness of pregnancy danger signs between the women in the intervention and the control groups.

#### 6.2 Recommendations.

Based on the study findings, the following are major recommendations:

1. The various stakeholders of maternal health, guided by the Ministry of Health and Social Welfare should consider scaling up the use of technological innovations such as mHealth that have been documented to increase awareness of pregnancy danger signs among women and the community at large.
2. There should be targeted efforts to explore and coordinate such emerging innovations for use in health care delivery from the ministerial level to allow adapting such technologies especially in this era of globalization.
3. Further research using larger sample groups are important in order to explore other potentials of mobile phones that have highly penetrated in Tanzania.

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## 7.0 Appendices

### 7.1 Appendix 1: Questionnaire (English Version)

#### MUHUMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

#### USE OF MOBILE HEALTH: AWARENESS OF PREGNANCY DANGER SIGNS AMONG WOMEN.

Date of interview \_\_\_/\_\_\_/ 2012: Interviewer's initials \_\_\_\_\_:

Name of the clinic \_\_\_\_\_: Respondent's serial no. \_\_\_\_\_:

(At the intervention area); Have you ever received care from a provider using mobile phone when asking questions? Yes/No

#### SECTION 1: SOCIO – DEMOGRAPHIC INFORMATION

##### A. Mother's information

1. How old are you? (Age in years).....

2. What is your marital status?

- 1) Married
- 2) Single
- 3) Cohabiting
- 4) Divorced
- 5) Widowed

3. What is your main occupation?

- 1) Employed
- 2) Peasant
- 3) Petty business
- 4) None
- 5) Others specify.....

4. What is your highest level of education?

- 1) No formal education
- 2) Primary school
- 3) Secondary school

4) College and above

5. How long does it take for you to travel from your home to this Health Center?

- 1) Within one hour
- 2) More than one hour

B. MATERNAL HISTORY: (Circle correct answer or fill answers in the provided space)

6. Are you currently pregnant?

- 1) Yes
2. No

7. How many times have you been pregnant?

- 1) Once
- 2) Twice
- 3) Three times
- 4) Four times or more

8. If not pregnant when was your last delivery? \_\_\_\_\_Month\_\_\_\_\_Year

(Record the age of the baby from the clinic card of the under five)

Date\_\_\_Month\_\_\_Year\_\_\_\_\_

9. For currently pregnant women: how many times have you been to the clinic?

- 1) Once
- 2) Twice
- 3) Three times
- 4) Four times or more

10. For postnatal mothers: how many times did you attend clinic on your last pregnancy?

- 1) Once
- 2) Twice
- 3) Three times
- 4) Four times or more

11. When you attend/attended antenatal clinic, do you remember being counseled on maternal danger signs by the health provider? Yes/No

12. Have you ever experienced any complication or illness during pregnancy? Yes/No

13. If Yes, Please mention all the complications \_\_\_\_\_(check against the danger signs checklist on the software questionnaire).

14. What action did you take after experiencing the complication or problem in Q 13?
- 1) Visited health facilities
  - 2) Visited traditional birth attendants/community health workers
  - 3) Self medication
  - 4) Did nothing
  - 5) Other: Specify .....

C: Assessment of awareness of pregnancy danger signs

15. Have you ever heard about maternal danger signs? Yes/No  
If yes where did you hear about it?
- 1) Reading newspaper/books/school/radio/TV,
  - 2) Relative/partner/friends
  - 3) Health providers
  - 4) Community health workers
  - 5) Other: Specify .....

16. Please mention all signs or symptoms which when occur to you during pregnancy, you would seek attention from a health care provider?

Probe, by asking, is there anything else, until the respondents is unable to mention more items.

(Select from the checklist any mentioned items that relates to pregnancy danger signs on the software questionnaire).

List of danger signs as they will appear on the software on the mobile phone. If something mentioned which is not listed select 'others' then specify by writing what has been mentioned.

No	Danger sign (English)	Check any mentioned item
1	Severe abdominal pain	
2	Vaginal bleeding	
3	Respiratory difficulty, fatigue, lethargy	
4	Fever, chills, vomiting	
5	Severe headache/blurred vision	
6	loss of consciousness/ convulsions	
7	Foul smelling vaginal discharge	
8	Dizziness	
9	Swelling of hands, feet or face	
10	Others	

D: Thank you for mentioning the danger signs on the above list, now for the following questions select 'YES' for the item that during pregnancy if happen you would require attention from a health care provider. Select NO for items that don't need attention and DON'T KNOW if you are not sure.

17. For each question cycle or check 'YES' or 'NO' or 'DON'T KNOW'.

No	Danger sign (English)	Score
1	Would you consider a danger sign that needs attention if you experience severe abdominal pain?	1. DON'T KNOW 2. NO 3. YES
2	Would you consider a danger sign that need attention if you experience Nausea?	1. DON'T KNOW 2. NO 3. YES
3	Would you consider a danger sign that need attention if you experience vaginal bleeding?	1. DON'T KNOW 2. NO 3. YES
4	Would you consider a danger sign that need attention if you experience vomiting?	1. DON'T KNOW 2. NO 3. YES
5	Would you consider a danger sign that need attention if you experience Respiratory difficulty, fatigue, lethargy?	1. DON'T KNOW 2. NO 3. YES
6	Would you consider a danger sign that need attention if you experience <i>excessive sweating</i> ?	1. DON'T KNOW 2. NO 3. YES
7	Would you consider a danger sign which need attention if you experience Fever, chills, vomiting?	1. DON'T KNOW 2. NO 3. YES
8	Would you consider a danger sign that need attention if you experience <i>want to sleep during the day</i> ?	1. DON'T KNOW 2. NO 3. YES
9	Would you consider a danger sign which need attention if you experience severe headache/blurred vision?	1. DON'T KNOW 2. NO 3. YES
10	Would you consider a danger sign that need attention if you like to <i>eat soil</i> ?	1. DON'T KNOW 2. NO 3. YES
11	Would you consider a danger sign that need attention if you experience loss of consciousness	1. DON'T KNOW 2. NO 3. YES
12	Would you consider a danger sign that need	1. DON'T KNOW

	attention if you <i>dislike some of the food items during pregnancy?</i>	2. NO 3. YES
13	Would you consider a danger sign that need attention if you experience Foul smelling vaginal discharge?	1. DON'T KNOW 2. NO 3. YES
14	Would you consider a danger sign that need attention if you experience <i>excessive fetal movement?</i>	1. DON'T KNOW 2. NO 3. YES
15	Would you consider as a danger sign which need attention if you experience Dizziness?	1. DON'T KNOW 2. NO 3. YES
16	Is swelling of hands, feet or face a danger sign during pregnancy?	1. DON'T KNOW 2. NO 3. YES

Thank you

## 7.2 Appendix 2: Questionnaire in Swahili

CHUO KIKUU CHA AFYA –MUHIMBILI

DODOSO KWA AJILI YA UTAFITI WA: MATUMIZI YA SIMU: UELEWA WA DALILI  
ZA VIDOKEZO VYA HATARI KIPINDI CHA UJAUZITO

Tarehe ya mahojiano \_\_\_/\_\_\_/ 2012: Kifupi cha jina la anayehoji \_\_\_\_\_:

Jina la Kituo cha Afya \_\_\_\_\_: Nambari ya orodha ya mhojiwa \_\_\_\_\_:

(Kwa walio katika eneo la huduma kwa njia ya simu); Je uliwahi kupata huduma ya kliniki na mtoa huduma aliyekuwa akiuliza maswali kutoka kwenye huduma ya simu ya mkononi? Ndiyo/Hapana

KIPENGELE CHA 1: TAARIFA BINAFSI

SEHEMU A: TAARIFA ZA MAMA

1. Umri wako ni miaka mingapi \_\_\_\_\_ (Andika miaka kamili)
2. Je hali yako ya ndoa kwa sasa ikoje?
  - A) Nimeolewa
  - B) Sijaolewa
  - C) Nimeachika
  - D) Tumetengana
  - E) Naishi na mwenza
  - F) Mjane

3. Nini shughuli yako muhimu au Unafanya kazi gani?
  - 1) Nimeajiriwa
  - 2) Mkulima
  - 3) Biashara ndogondogo
  - 4) Sifanyi shughuli yeyote
  - 5) Mengiyo (taja)\_\_\_\_\_
4. Umefikia kiwango gani cha elimu?
  - 1) Sijasoma
  - 2) Elimu ya msingi
  - 3) Elimu ya sekondari
  - 4) Chuo
5. Inakuchukua muda gani kutoka nyumbani unapoishi mpaka kuja kwenye Kituo cha Afya?
  - 1) Ndani ya saa moja
  - 2) Zaidi ya saa moja

**B. HISTORIA YA UJAUZITO: (Zungushia au jaza nafasi iliyowazi)**

6. Je unaujuzito kwa sasa?
  - 1) Ndiyo
  2. Hapana
7. Je umeshabeba ujauzito mara ngapi?
  - 1) Mara moja
  - 2) Mara mbili
  - 3) Mara tatu
  - 4) Mara nne au zaidi

8. Ikiwa wewe si mjamzito je ulijifungua lini kwa mara ya mwisho?

\_\_\_\_\_Mwezi\_\_\_\_\_Mwaka

(Angalia tarehe ya kuzaliwa kutoka kwenye kadi la mtoto)

Tarehe\_\_\_Mwezi\_\_\_Mwaka\_\_\_\_\_

9. Kwa mama aliyemjamzito uliza: Ni mara ngapi umehudhuria kliniki katika ujauzito huu?

1) Moja

2) Mbili

3) Tatu

4) Nne au zaidi

10. Kwa maam mwenye mtoto: Ulihudhuria kliniki mara ngapi katika kipindi cha ujauzito wako wa mwisho?

1) Sikuhudhuria kabisa

2) Moja

3) Mbili

4) Tatu

5) Nne au zaidi

11. Ulipohudhuria au unapohudhuria kliniki kipindi cha ujauzito, je unakumbuka kama ulipewa ushauri na muhudumu wako wa afya kuhusu dalili za vidokezo vya hatari wakati wa ujauzito? Ndiyo/Hapana

12. Je ulishawahi kupata matatizo/shida yeyote au homa kipindi cha ujauzito? Ndiyo/Hapana

13. Kama Ndiyo, tafadhali taja shida au matatizo yote uliyowahi kuyapata kipindi cha ujauzito \_\_\_\_\_(Tiki kuonyesha matatizo anayotaja mama ukilinganisha na orodha ya vidokezo vya hatari kwenye dodoso lililopo kwenye simu).

14. Ulipopata shida au matatizo uliyotaja kwenye swali hapo juu, je ulichukua hatua gani?

- 1) Kwenda kituo cha afya
- 2) Kwenda kwa mkunga wa jadi/mtoa huduma wa kujitolea kwenye jamii
- 3) Nilitafuta dawa mwenyewe
- 4) Sikuchukua hatua yeyote
- 5) Mengineyo: ainisha .....

C: Kuchunguza uelewa wa vihatarisho vya ujauzito

15. Je, umeshawahi kusikia kuhusu vidokezo vya hatari kwa wajawazito? Ndiyo/Hapana

Kama Ndiyo, je ulisikia kutoka wapi?

- 1) Kusoma magazeti/vitabu/Radio/TV
- 2) Ndugu/mwenzera/rafiki
- 3) Muhudumu wa kituo cha afya
- 4) Mtoa huduma wa kujitolea kwa jamii
- 5) Mengineyo: Ainisha .....

16. Tafadhali taja dalili au viashiria vya vidokezo vya hatari ambavyo vikitokea wakati wa ujauzito, unahitaji kupata msaada kutoka kwa muhudumu wa Kituo cha Afya?

Dadisi, kwa kuuliza, je kuna dalili nyingine, mpaka mama anayejibu atakaposhindwa kutaja zaidi.

(Wakati mama anataja weka tiki kwenye orodha ya vidokezo vya hatari ukilinganisha kila atakachotaja kilichopo kwenye orodha inayoonekana kwenye dodoso lililopo kwenye simu ya maswali. Endapo atataja kitu ambacho hakipo basi chagua Mengineyo halafu andika kile alichotaja mbali ya vilivyopo kwenye orodha).

*Orodha ya vidokezo vya hatari kwa wajawazito vitakavyoonekana kwenye maswali yatakayokuwa kwenye dodoso lililopo kwenye simu wakati wa mahojiano. Endapo kitatajwa kitu ambacho hakipo kwenye orodha basi chagua Mengineyo halafu orodhesha.*

No	Vidokezo vya hatari	Weka alama ya tiki kwa kila kitakachotajwa na mama
1	Maumivu makali ya tumbo	
2	Kutoka damu ukeni	
3	Kupumua kwa shida, kuchoka, kulegea	
4	Homa, Kutetemeka, kutapika	
5	Kichwa kuuma sana/kuona kwa shida	
6	Kupoteza ufahamu, mtukotiko mwili	
7	Kutoa harufu mbaya ukeni	
8	Kizunguzungu	
9	Kujaa mikono, miguu au uso	
10	Mengineyo	

D: Asante sana kwa kutaja vidokezo vya hatari hapo juu, sasa kwenye orodha ya maswali yafuatayo naomba chagua jibu moja katika kila swali endapo kuna ulazima wa kumuona muhudumu wa afya chagua NDIYO, kama maelezo ya swali halihitaji kumuona muhudumu wa afya chagua HAPANA na chagua SIJUI kama huna uhakika na jibu kutokana na maelezo ya swali juu ya ulazima wa uhitaji wa muhudumu wa Afya.

17. Kwa kila swali chagua jibu kati ya 'NDIYO' au 'HAPANA' au 'SIJUI'.

NA	Maelezo	Chagua jibu
1	Je maumivu makali ya tumbo ni dalili ya hatari inayohitaji kumuona muhudumu wa Afya?	1. SIJUI 2. HAPANA 3. NDIYO
2	Ukiwa na hali ya kuumwa mafua je hiyo ni dalili ya hatari inayohitaji kumuona muhudumu wa afya?	1. SIJUI 2. HAPANA 3. NDIYO
3	Je kutokwa na damu ukeni kipindi cha ujauzito ni dalili ya hatari yenye utahitaji wa kumuona muhudumu wa Afya?	1. SIJUI 2. HAPANA 3. NDIYO
4	Je ukiwa unatapika kipindi cha ujauzito je hiyo ni dalili ya hatari kwa mama mjauzito?	1. SIJUI 2. HAPANA 3. NDIYO
5	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utakuwa unapumua kwa shida, unachoka au kulegea	1. SIJUI 2. HAPANA 3. NDIYO
6	Ikiwa unatokwa jasho katika kipindi cha ujauzito je hiyo ni dalili ya hatari itakayohitaji umuone muhudumu wa afya?	1. SIJUI 2. HAPANA 3. NDIYO
7	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utakuwa na homa, kutetemeka, kutapika?	1. SIJUI 2. HAPANA 3. NDIYO
8	Ikiwa unapenda kulala kipindi cha mchana je hiyo ni dalili ya hatari kipindi cha ujauzito?	1. SIJUI 2. HAPANA 3. NDIYO
9	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya	1. SIJUI

	endapo kichwa kitauma sana/kuona kwa shida?	2. HAPANA 3. NDIYO
10	Je ukiwa mjamzito unatamani kula udongo hiyo ni dalili ya hatari inayohitaji kumuona muhudumu wa afya?	1. SIJUI 2. HAPANA 3. NDIYO
11	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utapoteza ufahamu, au kupata mtukotiko wa mwili?	1. SIJUI 2. HAPANA 3. NDIYO
12	Je ukiwa hupendi baadhi ya vyakula kipindi cha ujauzito hiyo ni dalili ya hatari inayohitaji kumuona muhudumu wa afya?	1. SIJUI 2. HAPANA 3. NDIYO
13	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utasikia harufu mbaya ikitoka ukenu?	1. SIJUI 2. HAPANA 3. NDIYO
14	Je ikiwa mtoto anacheza sana tumboni, hiyo ni dalili ya hatari inayohitaji umuone muhudumu wa afya?	1. SIJUI 2. HAPANA 3. NDIYO
15	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utapatwa na kizunguzungu?	1. SIJUI 2. HAPANA 3. NDIYO
16	Je ukiwa mjamzito utahitaji kumuona muhudumu wa Afya endapo utaona mikono, miguu au uso unajaa?	1. SIJUI 2. HAPANA 3. NDIYO

Asante sana

### 7.3 Appendix 3: Informed consent English version

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS**

#### **CONSENT FORM**

**ID-NO**           

#### **Consent to participate in a study**

USE OF MOBILE HEALTH: AWARENESS OF PREGNANCY DANGER SIGNS AMONG WOMEN

Principal Investigator: Gayo Jackson Mhila

#### **Introduction**

This Consent Form contains information about the research named above. In order to be sure that you are informed about being in this research, we are asking you to read (or have read to you) this Consent Form. You will also be asked to sign it (or make a statement of whether you agree or not in front of a witness). This consent form might contain some words that are unfamiliar to you. Please ask us to explain anything you may not understand.

#### **Purpose of the study,**

General purpose of the study, to assess the awareness of pregnancy danger signs and determine factors that influence awareness of maternal danger signs to women who are currently pregnant or those who delivered within the past 18 months and have attended the antenatal care at least once on their last pregnancy.

#### **What involves in participation**

Your Part in the Research, If you agree to participate in this study, you will be required to answer a series of question that have been prepared for the study through interview in order to obtain the intended information. You will be interview for 10-30 minutes.

### **Confidentiality**

We will protect information about you and you're taking part in this research to the best of our ability. Your identifiable particulars such as names, phone numbers and your address will not be taken and you will not be named in any reports.

### **Risks**

We do not expect any harm to happen to you because of participating in this study apart from you spending at maximum of 30 minutes answering the questions.

### **Right to withdraw and alternatives**

Taking part in this study is completely voluntary. You can also stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled. If you decide not to be in the Research your decision will not affect the health care you would normally receive.

### **Benefits**

You will not be paid for participating in this study and will receive no other form of compensation however the findings from your participation will further knowledge of improving maternal health services in your Country and across the World.

### **Who to contact**

This research has been reviewed and approved by IRB of Muhimbili University of Health and Allied Sciences. An IRB is a committee that reviews research studies in order to help protect participants. If you have any questions about your rights as a research participant you may

contact Prof. Mushi M, Chairperson (Research and Publications Committee, MUHAS IRB, P.O.Box 65001, Dar es salaam, telephone number 022-2150302-6.

### **Agreement**

The above document describing the benefits, risks and procedures for the research titled (USE OF MOBILE HEALTH: AWARENESS OF PREGNANCY DANGER SIGNS AMONG WOMEN) has been read and explained to me. I have been given an opportunity to ask any questions about the research and they have been answered to my satisfaction. I agree to participate as a volunteer.

Signature (or thumb print) of Participant \_\_\_\_\_

Signature of witness (if participant cannot read) \_\_\_\_\_

Signature of research assistant. \_\_\_\_\_

Date of signed consent. \_\_\_\_\_

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

#### 7.4 Appendix 4: consent (Kiswahili Version)

### CHUO KIKUU CHA AFYA NA SAYANSI YA TIBA MUHIMBILI

#### KURUGENZI YA UTAFITI NA UCHAPISHAJI

Namba ya utambulisho

#### Ridhaa ya kushiriki kwenye utafiti

Mtafiti Mkuu: Gayo Jackson Mhila

#### Utangulizi

Fomu hii ya ridhaa ina taarifa zinazohusiana na utafiti wa jina lililotajwa hapo juu. Ilikuhakikisha kuwa unaelewa juu ya utafiti huu, tunakuomba kusoma (au kusikiliza wakati ukisomewa) fomu hii. Utaombwa kuweka saini (au kuweka alama ya kukubali au hukubali mbele ya shahidi). Ikiwa fomu hii ya ridhaa inaweza kuwa na maneno mengine ambayo huyaelewi, tafadhali uliza iliupewa ufafanuzi na maelekezo.

#### Malengo ya Utafiti

Utafiti huu unalenga kufahamu juu ya kuainisha masuala yahasuyo uelewa wa mama juu ya dalili za hatari kipindi cha ujauzito. Tunalenga kuwauliza maswali kinamama ambao ni wajawazito kwa kipindi hiki na wale ambao walijifungua ndani ya kipindi cha miezi 18 na ambao walihudhuria kliniki angalau mara moja katika kipindi cha ujauzito wa mara ya mwisho.

#### Nini kinahitajika ili kushiriki

Kwa upande wako katika utafiti huu, kama unakubali kushiri, utahijika kujibu maswali yaliyoandaliwa kwa ajili ya utafiti huu. Maswali hayo yanategemewa kuchukua kipindi cha dakika 10-30.

**Usiri**

Taarifa zitakazokusanywa kutoka kwako kupitia dodoso la utafiti huu kutakuwa na usiri kadiri tunavyoweza. Pia hatutaandika taarifa za utamburisho binafsi kama vila jina, nambari ya simu na hata anuani yako na pia jina lako halitatajwa kwenye ripoti ya utafiti huu.

**Madhara**

Hakuna madhara yoyote yatakayojitokeza kwa wewe kushiriki kwenye utafiti huu mbali na wewe kutoa muda wako wakati wa kujibu maswali kwa kipindi cha takribani dakika 10 hadi 30.

**Haki ya kujittoa au vinginevyo**

Ushiriki katika utafiti huu ni wa hiari. Kutoshiriki au kujittoa kutoka kwenye utafiti hakutakuwa na adhabu yoyote na hutapoteza stahili zako endapo utaona ni vyema kufanya hivyo. Unauhuru wa kuamua endapo unapenda kushiriki au la na uamuzi wako hautaathiri huduma ya afya ambayo huwa unaipata.

**Faida**

Ushiriki wako katika utafiti huu ni wa kujitolea, hivyo hakuna malipo ya fedha au fidia yeyote, lakini matokeo ya utafiti huu utapanua uelewa na kutoa fursa ya kuboresha huduma za mama na mtoto kwa kuinua uelewa wa vidokezo vya hatari kwa wajawazito katika nchi hii na duniani kote.

**Nani wa kuwasiliana naye.**

Utafiti huu unapitiwa na kupata rishaa ya ruhusa ya utafiti (IRB) ya Chuo cha Muhimbili. Kama una maswali kuhusiana na utafiti huu tafadhali wasiliana na msimamizi mkuu wa utafiti wa Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S.L.P 65001, Dar es Salaam. Kama una swali kuhusu stahili zako kama mshiriki unaweza kuwasiliana na **PROF. MAINEN**

**MOSHI** Mwenyekiti wa kamati ya utafiti na uchapishaji, S.L.P 65001, Dar es Salaam, simu 2150302-6

**Makubaliano ya Hiari**

Nyaraka hii inaelezea juu ya faida, madhara, na taratibu za utafiti wenye kichwa cha habari (MATUMIZI YA SIMU KWA HUDUMA ZA AFYA: UELEWA WA KIMAMAMA JUU YA VIDOKEZO VYA HATARI KWA WAJAWAZITO). Nimesoma na kueleza na nimepewa nafasi ya kutosha kuuliza maswali na nimepewa majibu ya kuridhisha. Nakubali kushiriki kwa hiari.

Sahihi (au alama ya dole gumba) ya Mshiriki \_\_\_\_\_

Sahihi ya shahidi (kama mshiriki hawezi kusoma) \_\_\_\_\_

Sahihi ya msaidizi wa mtafiti \_\_\_\_\_

Tarehe makubaliano yaliposainiwa \_\_\_\_\_

Nakubaliana kwamba taratibu na madhumuni, faida za msingi, na changamoto au hasara zinazoweza kutokea kwa kushiriki kwenye utafiti huu zimeelezwa kwa ufasaha kwa mshiriki hapo juu.

## 7.5 Appendix 5: Screen shorts of electronic questionnaire

### 7.5.1 Mobile application

CommCare ODK > mph-survey

CommCare ODK

CommCare

CommCare

Get Started

Form Records

Incomplete (4)

Saved

Sync with Server

You last synced with the server: Apr 13, 2013

CommCare ODK, version "2.5.1"(11126). App v37. CommCare Version 2.5. Build 11126, built on: April-15-2013

Log In

Log out of CommCare

CommCare ODK > MPH survey

CommCare ODK > MPH survey

**Chagua Jina la Kituo cha Afya-unafanya udahiri**

Lugoba

Miono

Kibiti

Ikwiriri

**Weka alama ya vema kwenye kiboxi kwa kila dalili anayotaja na endelea kudadisi, kwa kuuliza, je kuna dalili nyingine, mpaka mama anayejibu atakaposhindwa kutaja dalili zaidi.**

Maumivu makali ya tumbo

Kutoka damu ukeni

Kupumua kwa shida, kuchoka, kulegea

Homa, Kutetemeka, kutapika.

Kichwa kuuma sana/kuona kwa shida.

## 7.5.2 Screen shot for the dashboard

The screenshot shows the CommCare HQ dashboard for the 'mph-survey' application. The browser address bar displays the URL: [https://www.commcarehq.org/a/mph-survey/reports/excel\\_export\\_data/?ufilter=0&group=&startdate=2013-02-01&enddate=2013-05-12](https://www.commcarehq.org/a/mph-survey/reports/excel_export_data/?ufilter=0&group=&startdate=2013-02-01&enddate=2013-05-12).

The dashboard is divided into several sections:

- INSPECT DATA:** Submit History, Case List.
- RAW DATA:** Export Submissions to Excel (highlighted), Export Cases, Referrals, & Users, De-Identified Export.
- MANAGE DEPLOYMENTS:** Application Status, Raw Forms, Errors & Duplicates, Errors & Warnings Summary, Device Log Details.
- COMMCONNECT:** SMS Usage, Message Log, Call Log, Expected Callbacks.

The main content area features three sections:

- Saved Custom Exports:** A table with columns: Name, Preview, Edit, Download, Add to Custom Bulk Export (Select: all, none), and Delete. One entry is shown: 'mph-survey > questionnaire > MPH survey; 2013-04-06' with a 'Delete' button.
- Export full forms:** A table with columns: Application, Module, Form, Custom Export, Download, Total Submissions, and Add to Bulk Export (Select: all, none). Two entries are shown: 'mph-survey' (questionnaire, MPH survey, 331 submissions) and 'other forms' (Mobile Device Report, 49 submissions).
- Export all Forms' Metadata:** A section with a text box stating 'Export basic data for all forms in this domain. Note that this export does not support the filters above.' and a 'Download' button.

The taskbar at the bottom shows the system time as 11:07 PM on 12/May/2013.

The screenshot shows the 'Applications - CommCare' settings page for the 'mph-survey' application. The browser address bar displays the URL: <https://www.commcarehq.org/a/mph-survey/apps/view/3d044971cfe76f227287bb39a18ed681/>.

The page header includes navigation links: Reports, Manage Data, Applications (selected), CloudCare, Messages, Settings & Users, and Exchange. The user is logged in as 'Gayo Mhila (Admin)'.

The main content area is titled 'mph-survey' and includes a 'Deploy' button and a 'Settings' sidebar with options: Multimedia, Languages, questionnaire, MPH survey, Form, and Module. The 'Settings' section is expanded to show:

- Basic:** Name (mph-survey), Case Sharing (checked), CloudCare (checked).
- General Settings**
- Java Phone General Settings**
- Java Phone User Interface Settings**
- Advanced (Logging)**

The footer of the page includes the Dimagi logo, copyright information (© 2013 Dimagi, Inc.), and a 'Report an Issue' button. The system time at the bottom is 10:59 PM on 12/May/2013.

## 7.6 Appendix 6: Scanned copy of ethical clearance and letters approval

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
DIRECTORATE OF POSTGRADUATE STUDIES**

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TEL: (255-022)-2150302-6 Ext. 207  
Direct line: 2151378

Ref. No. MU/PGS/SAEC/Vol. VI/

29<sup>th</sup> November, 2012

Mr. Gayo, Jackson Mhila  
MPH  
**MUHAS.**

**RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED "USE OF MOBILE HEALTH: AWARENESS OF PREGNANCY DANGER SIGNS AMONG WOMEN IN BAGAMOYO DISTRICT 2012"**

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study.

Thus ethical clearance is granted and you may proceed with the planned study.

**Prof. O. Ngassapa**  
**DIRECTOR, POSTGRADUATE STUDIES**

/emm

c.c. Vice Chancellor, MUHAS  
c.c. Deputy Vice Chancellor – ARC, MUHAS  
c.c. Dean, School of Public Health and Social Sciences - MUHAS

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Ref. No. HD/MUH/T.87/2009

6th December, 2012

District Medical officer,  
 Bagamoyo District,  
 P.O. Box 29,  
 BAGAMOYO,  
**PWANI.**

**Re: INTRODUCTION LETTER**

The bearer of this letter Mr. Gayo, Jackson Mhila is a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing in MPH.

As part of his studies he intends to do a study titled: ***"Use of Mobile Health: Awareness of Pregnancy Danger signs among women in Pwani Region, 2012"***.

The research has been approved by the Chairman of MUHAS Research Ethical Committee.

Kindly provide him the necessary assistance for his to conduct the research.

We thank you for your cooperation.

Tija Ukondwa  
**For: DIRECTOR, POSTGRADUATE STUDIES**

/emm

cc: Mr. Gayo, Jackson Mhila  
 cc: Dean, School of Public Health and Social Sciences

**HALMASHAURI YA WILAYA YA RUFJI**

MKOA WA PWANI:  
SIMU: 023 2010304  
FAX: 023 2010317  
Email: [dedrufiji@gmail.com](mailto:dedrufiji@gmail.com)  
(Barua zote zianikwe kwa Mkurugenzi Mtendaji (W))

OFISI YA MGANGA MKUU (W)  
S.L.P. 28,  
UTETE/RUFIJI.

*Unapojibu tafadhali taja:*

KUMB. NA. RDC/AFYA/RDC/W.3/1/7

20 Machi, 2013

Waganga Wakuu wa Vituo  
Kituo cha Afya Ikwiriri na Kibiti,  
RUFJI.

**YAH: KUMTAMBULISHA KWENU MR. GAYO MHILA**

Mtajwa hapo juu ni mwanafunzi wa Shahada ya Udhamili (Masters of Public Health) katika Chuo Kikuu cha Muhimbili.

Kwa sasa yupo katika hatua ya kufanya utafiti ili akamilishe masomo yake. Utafiti anaoufanya ni kuangalia uelewa wa dalili za hatari za ujauzito kwa kina mama wajawazito katika vitengo vya RCH, wodini baada ya kujifungua na PNC area.

Tundaomba apewe ushirikiano ili aweze kukamilisha malengo yake.

Dr. Ipyana Frank  
Kaimu MGANGA MKUU (W)  
RUFJI  
MGANGA MKUU (W)  
UTETE/RUFJI

## HALMASHAURI YA WILAYA YA BAGAMOYO

Tel. 023 2440008  
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OFISI YA MGANGA MKUU  
(W)  
S. L.P. 29  
BAGAMOYO

13/02/2013

Waganga Wakuu wa Vituo vya  
Afya Lugoba na Miono  
BAGAMOYO

**YAH: KUMTAMBULISHA KWENU MR. GAYO MHILA**

Mtajwa hapo juu ni mwanafunzi wa shahada ya udhamili (Masters of Public Health) katika chuo kikuu cha Muhimbili.

Kwa sasa yupo katika hatua ya kufanya utafiti ili akamilishe masomo yake. Utafiti anaoufanya ni kuangalia uelawa wa dalili za hatari za ujauzito kwa kina mama wajaawazitokatika vitengo vya RCH, wodini baada ya kujifungua na PNC area.

Tunaomba apewe ushirikiano ili aweze kukamilisha malengo yake.

*Mastidia Rutaihua*  
Dr. Mastidia Rutaihua  
Kaimu Mganga Mkuu (W)  
BAGAMOYO  
S. L.P. 29  
BAGAMOYO