

**A Social Enterprise, Better Maternal Health Services Through Mobile Messages  
Automated-System, A Pilot Study in AIC Kijabe Hospital, Kiambu County.**

Jacob Chege Gichimu,  
*Kijabe Hospital*  
Mary Adam, Fanice Nyatigo,  
*University of California*  
*jacobchege.kh@gmail.com*

**ABSTRACT**

*There is a tremendous need to increase patient specific approaches to reduce barriers to care and enhance compliance of healthier strategies for pregnant women. Digital innovation is a text messaging platform allowing individually targeted gestation, appropriate health information delivered directly to pregnant women and household level decision-makers. To test technical feasibility and client acceptability; MamaTips was founded in 2016 as free messaging subscription service promoting healthier pregnancy and delivery in a Kenyan context. MamaTips sends health messages through automated-system to enrolled pregnant women in English/Swahili that corresponded to their gestation week for 6 months; educating them on living healthy, pregnancy danger signs and preparedness for safe delivery, leveraged by high mobile phone penetration in Kenya. MamaTips built on work done by Mobile Alliance for Maternal Action (MAMA) adapting and implementing health messaging approach in Kenya targeting women in rural and semi-urban settings. Health-oriented text messages of 160 characters were contextualized by Medical and nutrition experts from Kijabe Hospital and Participants were recruited from outpatient antenatal clinic in Kijabe Hospital. Out of 40 women invited 37 enrolled; 97% participated through the study or until they delivered (N=36), 90% shared messages (47% orally, 21% forwarded and 32% read through recipients' phones). 95% would re-enrol and recommend others. 74% would pay for such services if re-enrolled for average of Ksh 86. Language appropriateness was 100%. The study identified technical problems with 66% receiving all messages each week, but once identified solutions resulted to all messages being delivered. MamaTips successfully delivered individualized gestational appropriate series of health messages this exhibited desirable and potential to develop a financially sustainable platform through subscription service.*

**Keywords:** Automated-system, m-Health, Maternal Health, Digital Innovation, Social Enterprise

**INTRODUCTION**

In a bid to increase awareness among pregnant women on the importance of proper health care practices during pregnancy in Kenya, MamaTips was founded in 2016 as a messaging subscription service that sends them important health information related to pregnancy as recommended by the World Health Organization(WHO). Through an automated system, MamaTips progressively send the enrolled pregnant women weekly messages with tips and information on how to actively lead a healthy life during and after pregnancy for the sake of a safe pregnancy and delivery. The primary target was women in rural or semi-urban settings where mothers may have limited access to information and education. By leveraging on the high mobile phone penetration in Kenya (currently at over 88%), MamaTips is able to reach a large number of women conveniently and

efficiently, giving them information and updates right in their hands. The platform used for the dissemination of this information is an automated system that sends weekly messages that are in line with the mother's gestation stage, educating them on how to live healthy, be aware on danger signs during pregnancy and delivery, and tells them how to best prepare for safe delivery at a hospital or clinic also as part of individual birth plan. MamaTips builds on work done by the Mobile Alliance for Maternal Action (MAMA) and is adapting and implementing this health messaging approach in the Kenyan context.

In the span of six months with a budget of \$2000, MamaTips kicked off its pilot program at the AIC Kijabe Hospital Antenatal Clinic. The feedback received from the women who enrolled from the service and some of the maternal health professionals helping us at Kijabe goes a long way to show that pregnant mothers appreciate information given to them during pregnancy, and that they are willing to go the extra mile in ensuring that they have a healthy pregnancy and consequently a healthy baby.

#### *Background of the study*

Maternal mortality at childbirth and newborn mortality are still occurring at a very high rate in sub-Saharan Africa. In Kenya alone, 6000 to 8000 mothers die during childbirth every year (360 of 100,000 births). Every year 40,000 newborns die within the first month of life (200 per day) and 33,000 newborns die preterm. Kenya is ranked 10<sup>th</sup> as the riskiest places to deliver a baby in. The Kenyan government has adopted the United Nations millennium development goals (MDGs) 4 & 5 as their own and the First Lady from Kenya has spearheaded the Beyond Zero campaign to improve maternal deaths to 122 per 100,000 births.

Access to good healthcare is variable in Kenya, and it is affected by the circumstances a mother finds herself in within her community. Even with free deliveries at health care facilities (since July 2013 by presidential decree), many mothers end up delivering their babies at home with unskilled attendants. When a pregnant woman delivers at a health facility, they are increasing their chances of having a successful delivery with a healthy mother and newborn. In Kenya 40% of women deliver without the help of a skilled birth attendant yet 96% of women have accessed at least one antenatal care visit out of the four ANC clinic recommended by WHO.

Education on pregnancy, fetal development, neonatal care and early childhood development are sadly lacking in the Kenya urban and semi-urban pregnant women. Women who are less aware of potential complications are more likely to deliver at home and less likely to respond promptly to danger signs. A study in rural Tanzania demonstrated that 42% of patients in antenatal care were not informed of danger signs during pregnancy.

The need for women to be informed about their pregnancy, education on how to be healthy during pregnancy, the development of the unborn child, and danger signs presents a tremendous opportunity to support women through their pregnancy using mobile phones. According to the Communications Authority of Kenya, the mobile penetration of Kenya has hit 80.5%, meaning that a vast majority of Kenyan households have at least one phone. This makes mobile phone delivered messages educating women about their pregnancy able to reach thousands of women.

AmmiTips and mMitra are organizations providing these phones based educational services in Pakistan and in India (<https://www.youtube.com/watch?v=HAGrEtVe9YE>). We will be using the

AmmiTips technology and communications system, as well as evidenced based messages developed thru the Mobile Alliance for Maternal Action (MAMA) in the communication of specific messages (<https://www.youtube.com/watch?v=T5NepnL8vFA>). The Mobile Alliance for Maternal Action in conjunction with other partners including Stanford University and BabyCenter have been developing messaging for pregnant women and their children and have developed the evidence base and the scope and sequence of the messages. The academic framework for behavior change was developed by BJ Fogg at Stanford University Persuasive Technology Laboratory <http://captology.stanford.edu/> in conjunction with BabyCenter, a group that has worked in delivering health-care messages to over 24 million parents around the world each month. The MAMA project with the help of its partners and their experience has developed a model that is felt to deliver age- and stage-based messages improve maternal knowledge, and builds an emotional relationship with the parent which creates trust. The MAMA project and others like it Text four baby in the US have demonstrated uptake and feasibility in promoting health messages for women and infants. The project aims were to begin to develop a platform for public private partnerships that will allow adaptation of this idea for sub Saharan Africa.

These text messages were contextually adapted as per the MAMA protocol and recorded and then automatically sent via the AmmiTips automated voice and text messaging platform through Echo mobile. The prototype messages and the automated platform (including maintenance of that platform) are donated to MAMATIPS.

Depending on the stage of pregnancy, the MAMATIPS educational service could regularly text the women who enrolled to Mamatips service at a frequency of about twice every week (the women time were determined by Echo mobile (that acted as service provider or the text dissemination centre).

Mamatips Pilot study sought to utilize mobile phones and messages to; educate women about healthy pregnancy and delivery, better understand how to improve this mobile phone service to better meet their needs and better understand the cultural and social norms that drive decision making towards health seeking behaviors. This could also allow the project help the health systems to develop effective solutions for the local community.

This project worked as a small-scale FEASIBILITY study using individual phone interviews to follow up the women who receive MAMATIPS messages. In the initial pilot the phone interviews focused on process and if the system worked. In addition, the project wanted to know what mothers learned from the messages.

A small-scale feasibility study aimed at building a platform to develop more extensive public private partnerships, since broad scale roll out and developing the scientific evidence base for the effectiveness is a substantial endeavour and would require collaborating at national and international levels. The MAMA model “is based on the expectation that women’s and families’ increased access to targeted health information will lead to improved knowledge, behaviours and practices, and in turn, those improvements will lead to improved health outcomes. Each of MAMA’s three current country programs; Bangladesh, South Africa and India, has identified intermediate level health outcomes related to change in knowledge, at home preventive behaviours

and seeking of health services that are measurable, relevant and within the realm of influence of each MAMA program.

However, the opportunity to understand the multiplicity of influences that drive judgment and decision-making processes at the community and household level will be incorporated in future steps. The follow up mobile text was to provide a feedback loop for improvement of message content and provide insight into household level maternal health decision-making.

#### *Research Objectives*

The broad objective of this study was to explore and gain a better understanding of the cultural and social norms that drives decision making towards health seeking behaviors, specifically the experiences of women who were using the MAMATIPS messages texting services in order to understand how to improve:-

The educational benefit for these women and their families.

Understand women's and family members (households) perceptions of how to have a healthy pregnancy and what they think of the health care available to them.

Better understand the cultural and social norms that drive health seeking behaviors.

#### *Specific Objectives*

To study on how can we improve the MAMATIPS educational message to benefit the pregnant women and their families?

What are the household members' perceptions on how to have a healthy pregnancy and of their health care options?

What are the cultural and social norms that drive decision making and health seeking behaviors of pregnant mothers?

#### *Assumptions of the study*

The mothers enrolled are representative of all the social groups of mothers countrywide.

The mother enrolled willing to read the text sent and could understand them in the language of their choice that that is English or Swahili.

All the enrolled mothers lived in areas where network coverage was good and could receive all the three text messages on Saturday and Sunday.

All the enrolled mother would not reject the services of text messages

#### *Scope of the study*

This study centre was located in AIC Kijabe in Kiambu County through the MCH/Family Clinic. The program anticipated expansion to enroll women from other sites after the initial pilot evaluation.

## **METHODOLOGY**

The study was prospective whereby women enrolled in the MAMATIPS free messaging service were followed and their feedback was received and noted electronically. The data collection methodology utilized the semi-structured phone interviews. Other approaches included some document review and site visits that examined ease of enrollment of participants by health provider

at their local clinic setting and AIC Kijabe Hospital MCH/Family Clinic.

### *Participants*

Pregnant Mothers of reproductive age (WHO, 15-49 years) who were recruited to the message service during antenatal care visits are the main participants with a Kijabe Maternal and Newborn Community Heal Project (KMNCHP) team that will act as validity assessment team. In the future, women will also be able to sign themselves up if they have a Safaricom card and mobile phone if they are referred by a friend. All women who participate in the MAMATIPS educational messaging service were eligible for interviews to give feedback on how the service if it met their needs. The participants reflected the range of economic and educational sectors in Kenya and therefore represent the diversity present in the Kenya. The initial languages used were English and Kiswahili that were preference to the pregnant mothers enrolled.

### *Study Risks and Limitations*

Lack of cell phone could reduce participation of some women. A cell phone that works was required to receive the messages and to give follow up feedback. In poor households men may have the cell phone but not women. In these cases a woman was required to coordinate with the husband to be present at the day and time the text message was received or be shown the text message. Though the cell phone penetration in Kenya is very high, another potential limitation is that cell service may intermittently have poor reception or other difficulty. This is an area where the feedback would be helpful to see if women were having reception difficulty. Again, in Kenya the areas of cell phone service are expanding. The funding were sufficient project initial pilot to be able to include individuals who subscribed to smaller cell service providers if that proves to be a limitation.

Cultural barriers: Particular views towards research studies may affect the data collection process if not looked into and mitigating measures taken into consideration depending on the areas where the study will be conducted. Since women will be asked if they are in a comfortable place and if they have time to answer some questions on the phone there will be the opportunity for them to either get a call back or move to a more appropriate location to do the feedback call

Integrity issues: Potential respondents may request for financial incentives for them to participate. No financial reimbursements were given to the participants and the personnel's who participated in all processes that included transcribing to recruitment.

### *Implementation*

Active enrollment of mothers took place between May 30<sup>th</sup> and June 2<sup>nd</sup>, 2017, with 37 women and 11 Kijabe testers signing up for the service (See figure 1 in Appendix for the invitation letter used). Messages were sent out beginning the weekend of June 3<sup>rd</sup> until September 28<sup>th</sup>, 2017, at the following times: 1800hrs Saturday, 1500hrs Sunday and 1800-1830hrs Sunday. These times were chosen as the most ideal time when mothers are not as pre-occupied as other times during the week. Two surveys, a feasibility survey and acceptability survey were sent within this period, allowing us to get feedback from the mothers on how they found the service. The pilot phase was officially closed on the 28th of September, after which we reconciled our finances and analyzed our data, as detailed in the following sections.

## **RESULTS**

The findings of Mamatips pilot study was analyzed by calculation of percentages and presenting the same in the tables, pie charts and bar graphs. The table below shows the Percentages of pregnant women enrolled and number invited

Table 1: Percentages of pregnant women enrolled and number invited

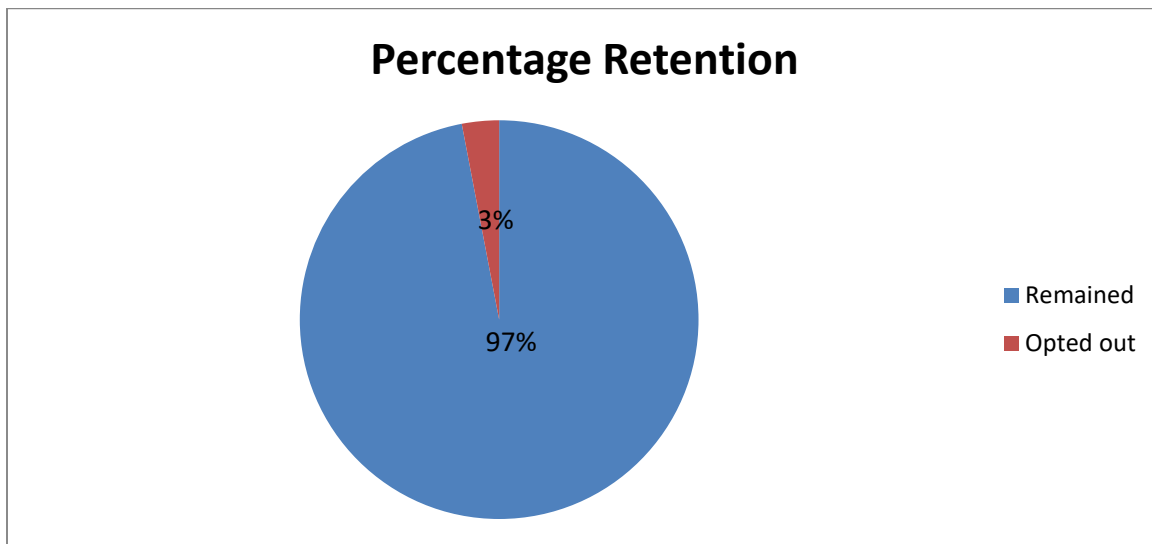
Particulars	Numbers	%
women invited	40	100
women enrolled	37	97

The table above shows the women invited in comparison to those who enrolled that is 40 and 37 women respectively making 97% of the enrolled women.

The table below shows the Number of women who opted out of the service before they delivered their baby

Table 2: women who opted out of the service before they delivered

Particular	Number	Percentages
Total enrolled	37	100
Remained	36	97
Opted out	1	3



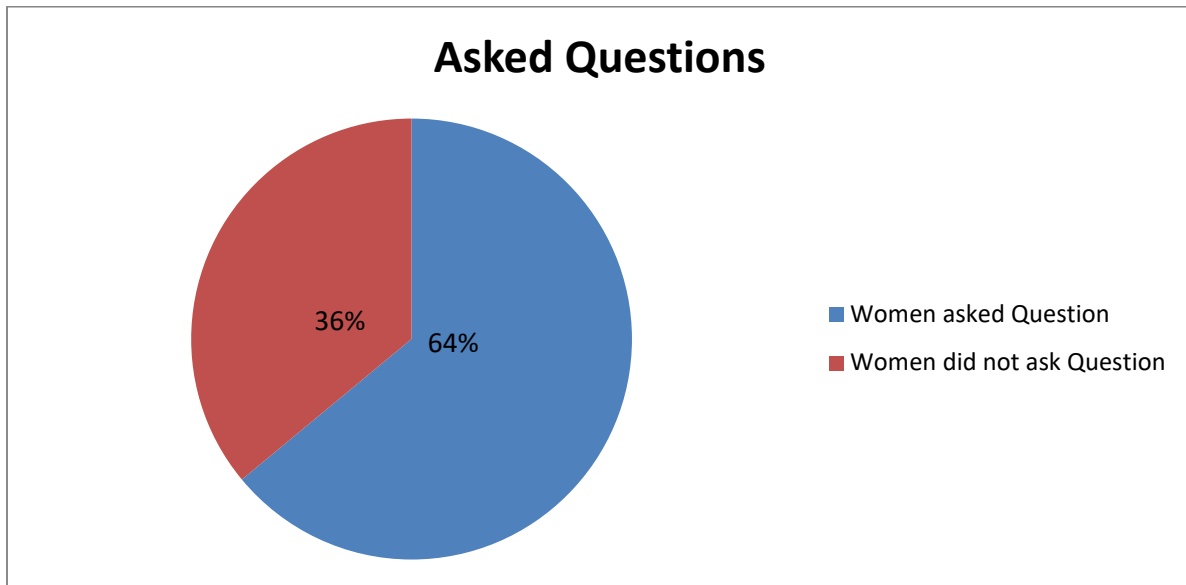
11 testers from the Kijabe team, comprising doctors, nurses and public health professionals, both men and women, were also enrolled to allow them to experience the service and give critique it for improvement. The first survey was sent about four weeks into the pilot to investigate the efficiency of the mobile platform. There was a 98% response rate. The second survey was sent after about 8 weeks into the pilot to investigate the reception of the service by the mothers, and whether they found the platform useful. There was a 45% response rate. (Note: some women had delivered while a few had opted out).

The following survey results reflect the feedback given by both the mothers enrolled and the testers and none of the surveys was mandatory.

The table below shows the Percentage of women who sent questions to MamaTips via text messages, and of those who did, number that was satisfied with the quality and speed of response sent back to them

Table 3: Percentage of women who sent questions to MamaTips via text messages

Particulars	Numbers	Percentages
Asked Question	23	64
Did Not Ask question	13	36

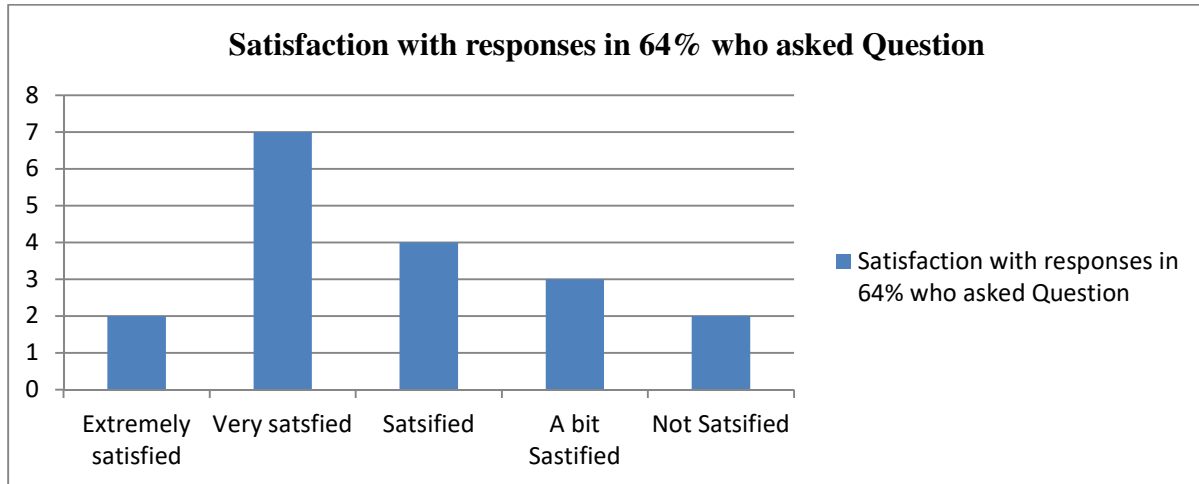


The table below shows the Number of women that was satisfied with the quality and speed of response sent back to them

Table 4: women that was satisfied with the quality and speed of response sent back to them

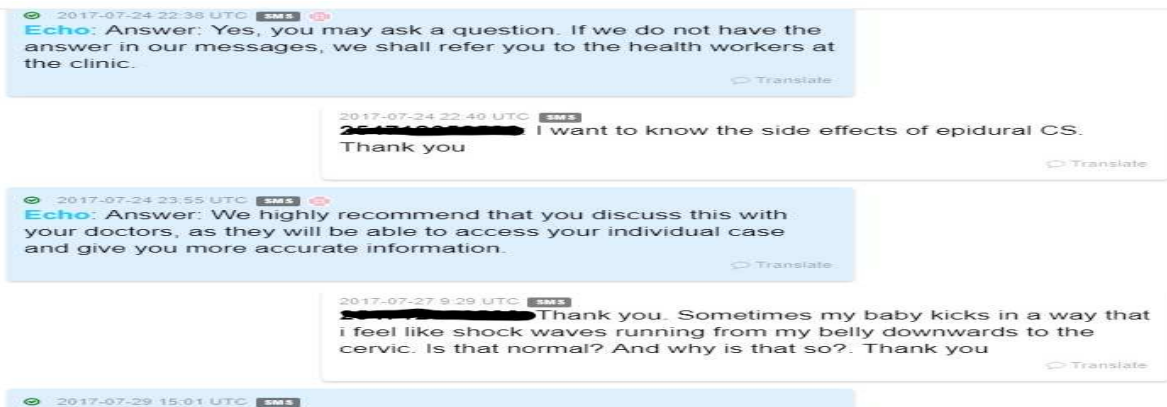
satisfied	Numbers
Extremely	2
Very	7
Satisfied	4
A bit	3
Not	2





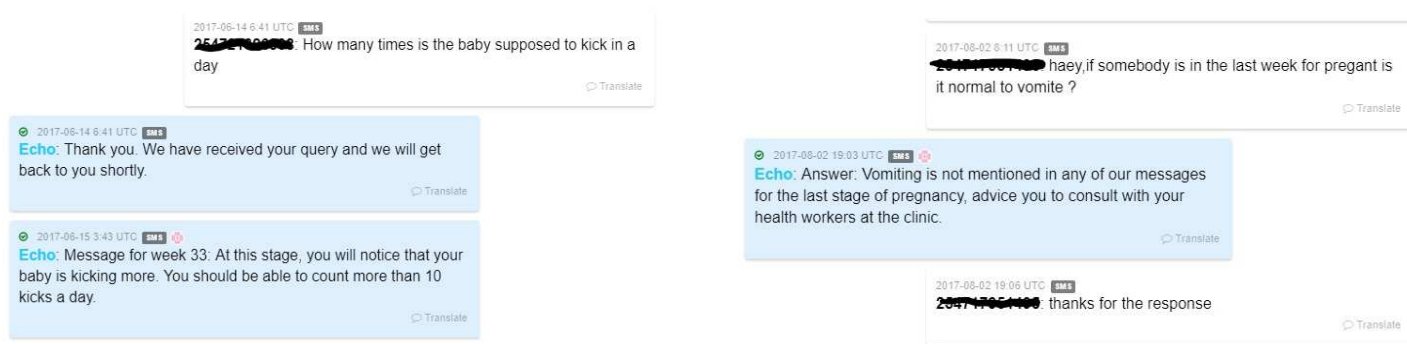
The answers given were strictly from the information we had in our messages, as these were already reviewed by medical professionals. Questions asked about any topic we did not have information on in our messages would be referred to the health workers in the clinic. The length of the response was, unfortunately, limited to 160 characters which is the standard for SMS. Most times, the lag between receiving a question and answering it was anywhere between 1- 3 days, as the platform was monitored by one person only, so we encouraged mothers not to contact us for urgent matters. Examples of question-answer sessions with background on reason for asking question (phone numbers redacted for customer privacy):

*Mother's curiosity:*

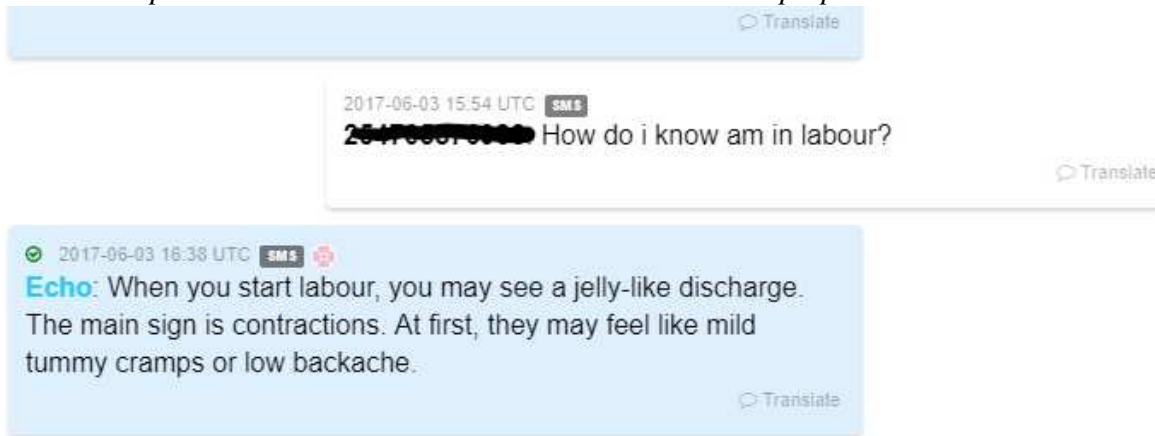


*Mother wants to know what is normal during pregnancy:*





*Mother anticipates certain occurrences and wants to be better prepared:*



*Mother seeks information about her pregnancy (some women initially assumed that we were directly linked to their clinical records)*



*Mother wants to get more information after receiving a message from MamaTips:*

2017-07-23 15:15 UTC SMS  
**Echo:** Smoking harms you and your baby. If you smoke, your baby could be born weak and catch infections easily. Stop smoking and avoid smoky places.

Translate

2017-07-23 15:17 UTC SMS  
2570000000: what about perfume?

2017-07-24 22:46 UTC SMS  
**Echo:** Answer: We apologize, we do not have any messages regarding perfumes. Please consult with your health worker at the clinic who will be able to answer your question

Translate

*Some women, after delivering their baby, would ask for information on how to best raise their baby:*

2017-07-09 14:52 UTC SMS  
2570000000: Give me tips on how to take care of my baby

Translate

2017-07-09 17:21 UTC SMS  
**Echo:** We have not rolled out our baby messages yet. We refer you to [www.babycenter.com](http://www.babycenter.com) where you can subscribe to emails on how to take care of your newborn. Thanks.

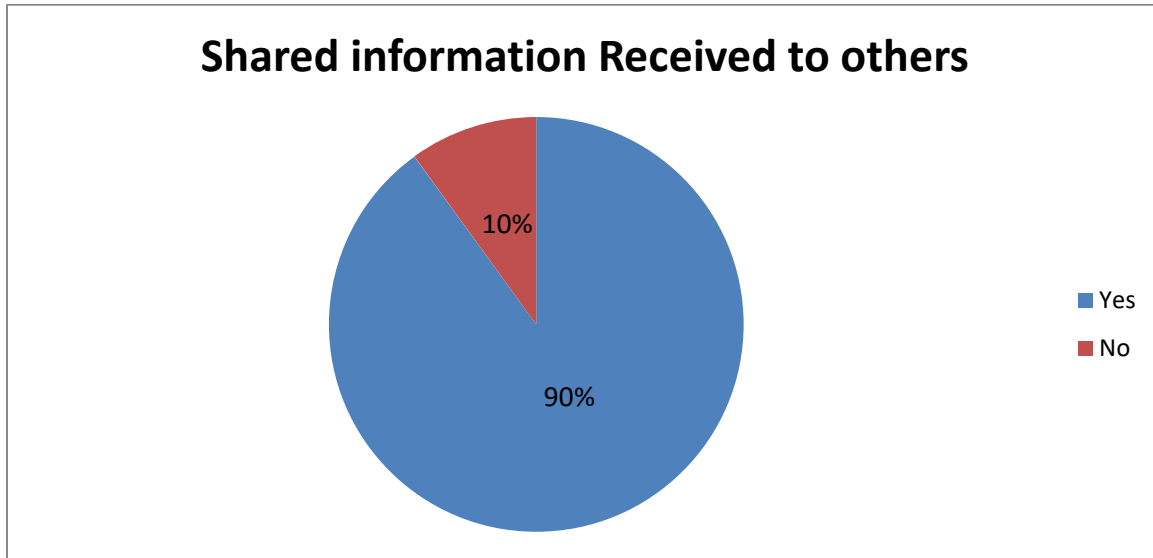
Translate

While MamaTips already has messages for raising newborns, they were not part of the plans for the pilot phase, and so had not been proof-read by any health professional. They therefore could not be sent out to the general population.

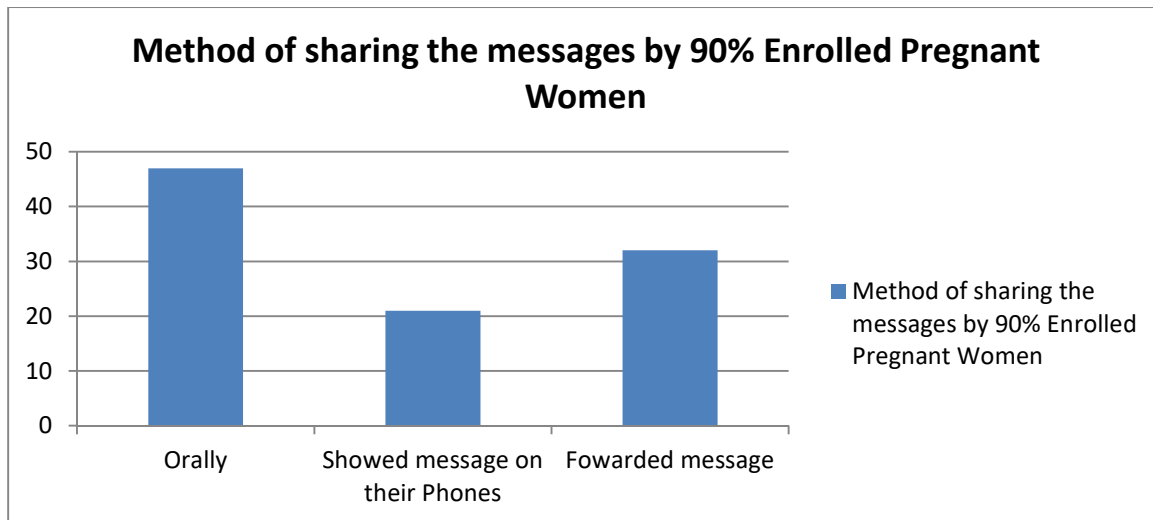
The table below shows the Percentage of women that shared information they received with others, and of those who did, the method of sharing used.

Table 6: women that shared information they received

Particulars	Numbers	Percentages
Shared information	32	90
Did Not share information	4	10



The figure below shows the Percentage of women that shared information they receive and the method of sharing used.

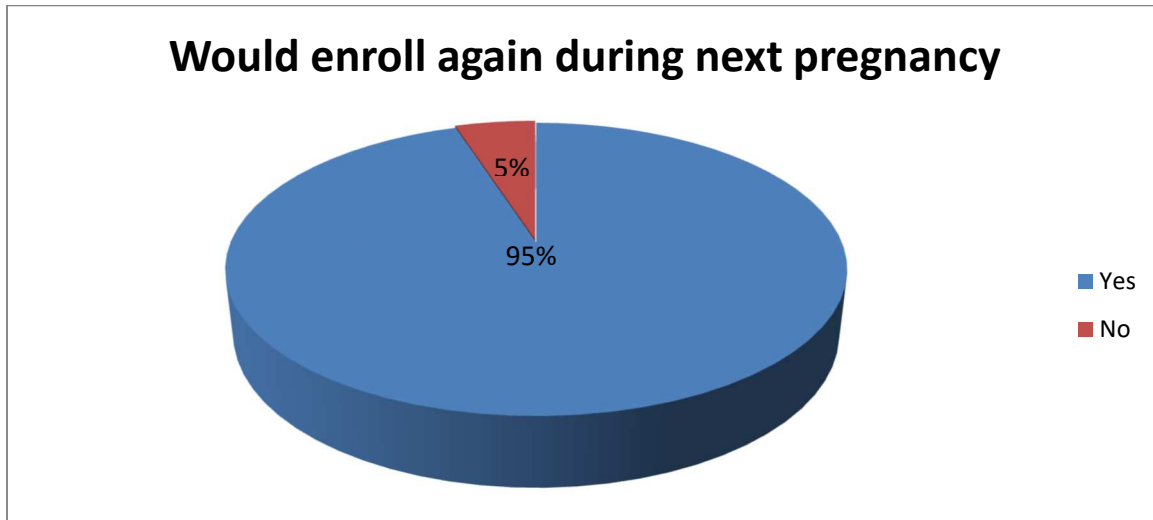


The high percentage of mothers who shared information received indicates that they found the messages from MamaTips to be useful. This also confirms that it would be helpful to set up the Accountability partner program where the mother would choose someone close to them, such as a spouse, sister or friend, to be receiving the same messages as them. This would help those around the mother to understand pregnancy more and so be better positioned to support her.

The table below shows the Percentage of women that would re-enroll for the MamaTips service in a second pregnancy

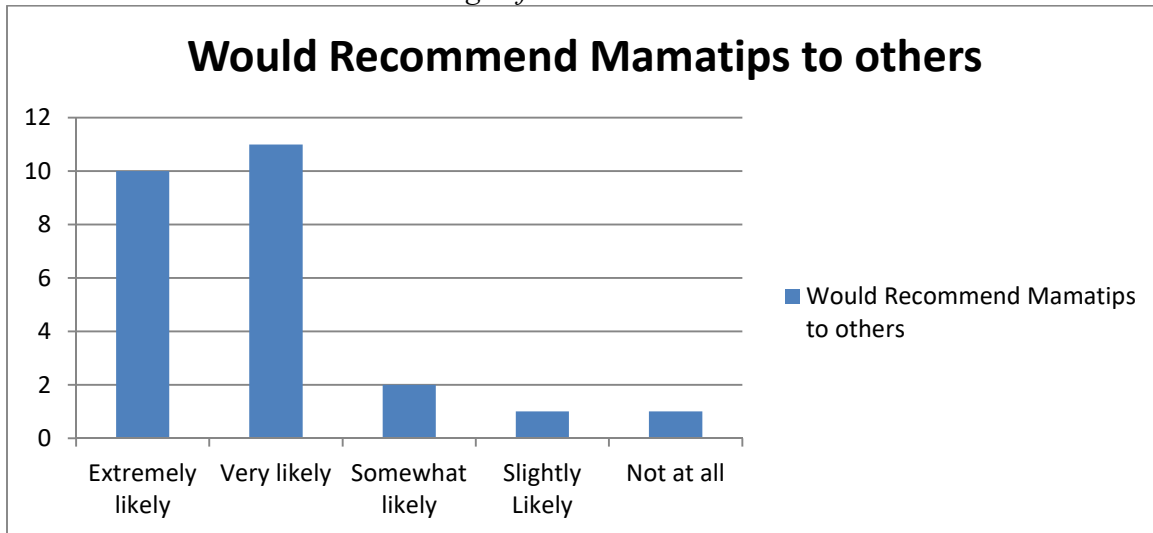
Table 7: women that would re-enroll for the MamaTips service

Particulars	Numbers	Percentages
Would enroll Again During Next Pregnancy	34	95
Would not enroll Again During Next Pregnancy	2	5



We would encourage mothers to enroll to the service even if it is not their first pregnancy, because each pregnancy is different and comes with its own ups and downs.

*The table below shows the Percentage of women that would recommend the service to others*

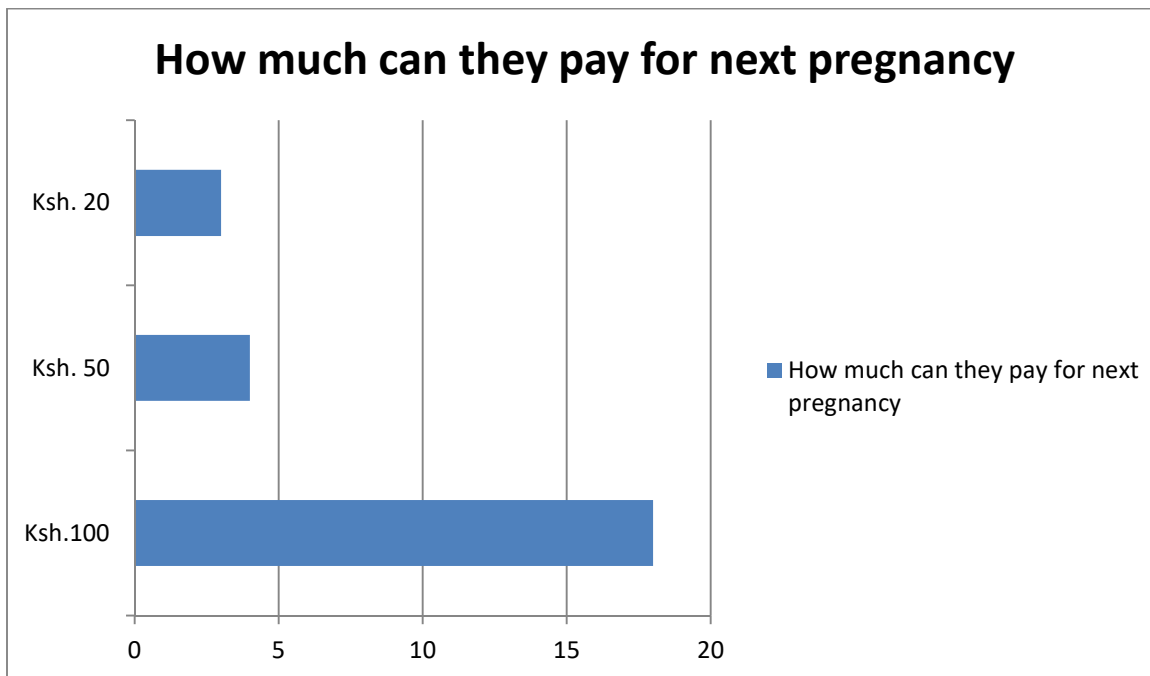
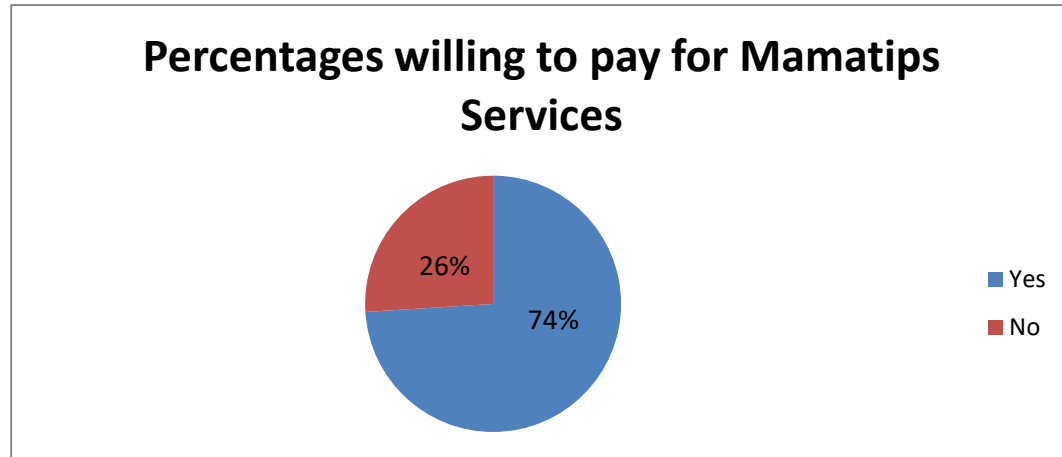


Both the high percentages that would re-enroll into the service and would recommend the service to others shows that the mothers did indeed find the service helpful.

The table below shows the Percentage of women who are willing and able to pay for the service  
**Table 9: women who are willing and able to pay for the service**

Particulars	Numbers	Percentages
-------------	---------	-------------

Would Pay for Mamatips Services	27	74
Would not Pay for Mamatips Services	9	26



The average amount that the women are willing to pay is Ksh. 86 (0.86 USD). While this would be enough to sustain a shared short code plan with echo mobile, it would not allow for two-way communication, so mothers would not be able to send messages or ask questions to MamaTips. The table below shows the Number of women who received messages in the language chosen at enrollment

Table 10: women who received messages in the language chosen at enrollment

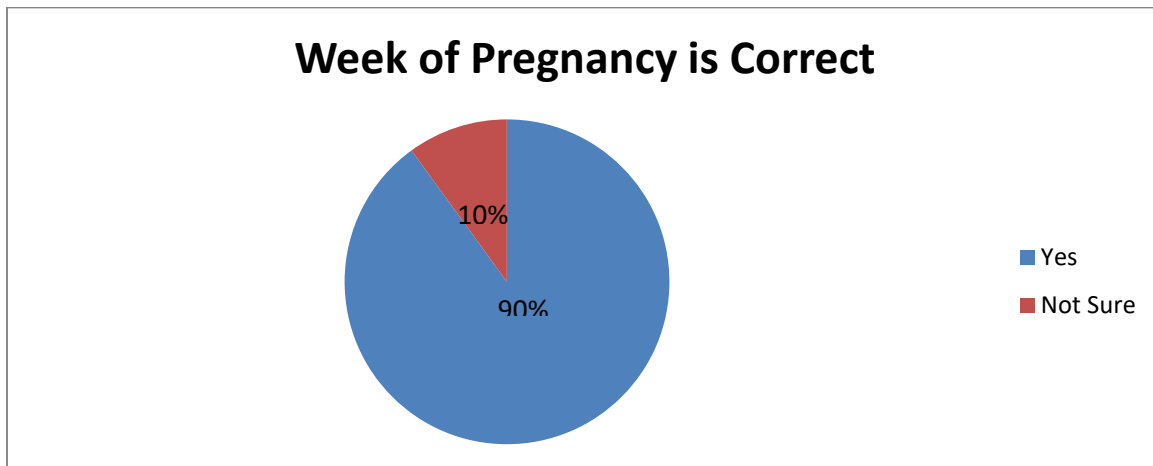
Particulars	Numbers	Percentages
Language was correct	36	100
Language was Not correct	0	0



All women reported that the messages sent to them were indeed in the language chosen at enrollment (English or Swahili).

*The table below shows the Number of women whose messages were correctly aligned to their gestation stage (week of pregnancy)*

Particulars	Numbers	Percentages
Week of Pregnancy was correct	32	90
Week of pregnancy was not correct	4	10

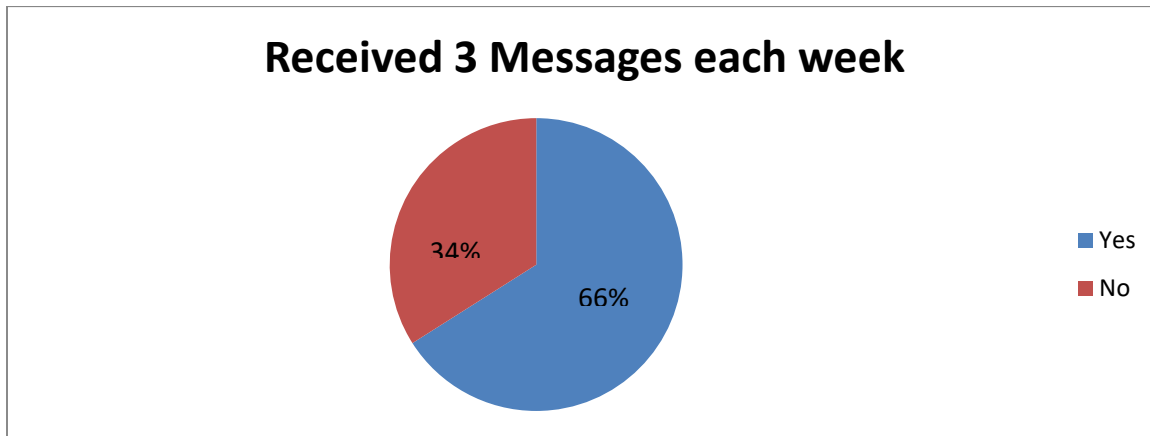


Due to a limit in the number of characters that can be contained in a single text message (160), the

week of pregnancy is not explicitly stated in the text messages, which explains why some of the women were unsure. This should not be a problem with voice calls as the week of pregnancy is explicitly stated at the beginning of every message.

*The table below shows the Number of women who received all the three messages from MamaTips each week*

Particulars	Numbers	Percentages
Received 3 Text messages	24	66
Did not Receive 3 Text messages	12	34

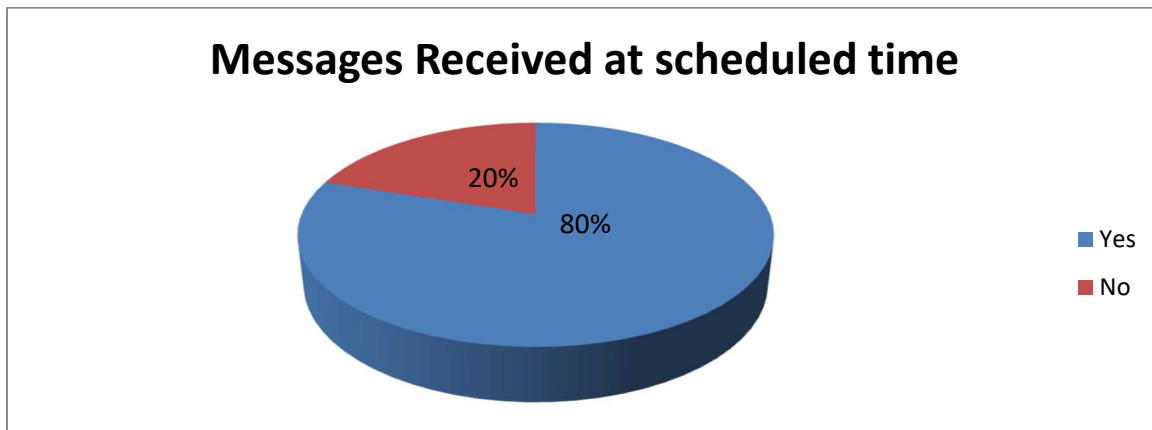


Problems were encountered with the echo mobile platform where, once we increased the number of people enrolled to above 20; the platform as was set then could not be able to handle the large volume of messages being sent out at once. Some women received more than three messages in a week, while others received less. The support team at echo mobile suggested changes which, once effected eliminated the aforementioned problem.

*The table below shows the Number of women who received messages at the agreed times during enrollment (Saturday 6 PM, Sunday 3 PM and Sunday 6 PM)*

Particulars	Numbers	Percentages
Received 3 Text messages at scheduled time	29	80
Did not Receive 3 Text messages at scheduled times	7	20





The discrepancy here is due to the aforementioned problem with the echo mobile platform, which was later solved.

## CONCLUSION

Mamatips Project pilot study findings gives us future hope that it is possible to use such platform to ensure pregnant mothers understands what is happening in their pregnancy lives as well as to ensure that they have safe delivery. The higher percentage of 74% willing to pay marks it as enterprise point. The 90% of the enrolled mothers' willingness to re-enroll is a good sign that the pilot study shows future for such project. 36 enrolled mothers were reached by text messages at a cost of roughly USD 2000; this was in absentia of human resource that was free and voluntarily. If the same project pilot study is to be done by voice messages then roughly USD 1560. For a project that is meant to meet payment of human resources to send text messages and Voice messages approximately USD 8940 is to be used for about 200 enrolled women, some in voice and other texts messages. This also would include translating the content into local languages. Say Somali speakers where an average of 200 pregnant women can be reached, the cost would be fair and worthwhile depending with the coverage and the need of that area. It is practically ideal to state that Mamatips program has secondary effects as the text messages can be sent to the second person and in a manageable cost, the number of characters were limited to 160 which the Safaricom cost of sending was as low as Ksh 2. The total messages for each enrolled mothers were 72 texts that if sent to one secondary recipient would cost each mother Ksh 144 for 6 months. Therefore, a total of 126 texts (42 weeks), 3 texts each week will cost around Ksh 252 for a single secondary recipient which is a reasonable cost.

Through some of the responses received when the enrolled mothers were asked for additional comments it was clear that they had trusted the service offered, some of many comment they gave included; Keep it up, Try to reach all pregnant women coz the programme is very helpful, Can you translate the same information in local languages? Not really coz I'm satisfied, Send a more comprehensive text, "*Muendelelee kuelimisha wamama*" (translates to Continue educating women), Wish their messages were more detailed.

As a learning lesson, it is clear that Mamatips cheap preventive measures for danger signs during pregnancy as well as away to detect early signs of complications that has led to maternal and neonatal mortality. Though the cohort was not in a uniform gestational weeks, those that delivered

in the period of the study did not stop the texts messages, reason could be they did not find the study being a bother to them.

## **RECOMMENDATIONS**

MamaTips explored various avenues for expansion, dependent on availability of funds including, but not limited to:

Further customization of messages- we have a further 3 years' worth of messages covering the period from delivery up to when the child is 3 years. Multiple women from the pilot program, particularly first-time mothers, requested for messages to help them raise their babies. We also have messages specific to pregnant women who are HIV-positive, and thus require extra care. We received a few requests from mothers to send them messages on new born babies. While we have these messages given to us by MAMA, they have not yet been reviewed by medical professionals nor customized to the Kenyan setting yet. This provides a good opportunity for expansion.

Receiving the messages via text (basic SMS) or as a pre-recorded voice message- while text messages are a more convenient method of communication, a majority of the women in rural places are illiterate. Voice calls are also proved to yield higher retention rates.

Accountability Partners- The mothers will have the option of choosing someone they trust, such as their spouse, sister, friend or mother, to enroll in our service so that they may be receiving the same messages as the mother and act as an accountability partner.

Expansion to needier areas- the Kijabe Hospital has connections that would facilitate smooth implementation in the following counties: Garissa, Nyandarua, Nakuru, Kiambu, Nairobi (Dandora and Penda Health) -

Translation of the messages into more vernacular languages- our priority target vernacular language for expansion is Somali. This would allow us to spread the service to the North-Eastern area of Kenya, where the service is most needed given the high maternal mortality rate.

Flexibility in call/text times- a woman gets to choose the day and time when she would want to receive the messages/calls. This is particularly helpful in households where only one member of the family, the husband for example, has a phone.

Incorporation of Medic Mobile- to facilitate communication between nurses at the health clinic in the hospital, community health workers on the field and the mothers, we will be using a software toolkit developed by Medic Mobile (an mHealth company based in San Francisco with offices in Nairobi) that is specifically designed for the provision of maternal health services in low resource settings. It runs offline (internet connection will not be an issue) and allows direct communication between the nurse's computer, a community health worker's phone (where they are available), and the pregnant mother's phone. Through this platform, mothers will get reminders from the clinic for when they are supposed to go for an antenatal care visit. The community health workers get the same notification, allowing them to follow up with the mothers to ensure they attend these visits.

By integrating the Medic Mobile platform into MamaTips, and by including the accountability partners, we will not only be equipping mothers with information to safeguard their health and that of their unborn baby, but will also provide them with the necessary support system to see them

through their pregnancy.

## REFERENCES

- Anya SE, Hydera A, Jaiteh LE (2008) Antenatal care in The Gambia: missed opportunity for information, education and communication. *BMC Pregnancy & Childbirth* 8: 9.
- Bhutta, Z. A., Das, J. K., Bahl, R., et al. (2014). Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *The Lancet Every Newborn Interventions Review Group and The Lancet Every Newborn Study Group*. Published online May 20, 2014. [http://dx.doi.org/10.1016/S0140-6736\(14\)60792-3](http://dx.doi.org/10.1016/S0140-6736(14)60792-3).
- Cole-Lewis H, Kershaw T (2010) Text Messaging as a Tool for Behavior Change in Disease Prevention and Management. *Epidemiologic Reviews* 32: 56-69.
- Kumar, V., Kumar, A. & Darmstadt, G. L. (2010). Behavior change for newborn survival in resource-poor community settings: Bridging the gap between evidence and impact. *Seminars in Perinatology*, 34, 446-461.
- Kumar, V., Kumar, A., Ghosh, A. K., Samphel, R., Yadav, R., Yeung, D., & Darmstadt, G. L. (2015). Enculturating science: Community-centric design of behavior change interactions for accelerating health impact. *Seminars in Perinatology*.  
<http://doi.org/10.1053/j.semperi.2015.06.010>
- Lawn JE, Blencowe H, Oza S, You D, Lee AC, et al. (2014) Every Newborn: progress, priorities, and potential beyond survival. *Lancet* 384: 189-205.
- Lund S, Nielsen BB, Hemed M, Boas IM, Said A, et al. (2014) Mobile phones improve antenatal care attendance in Zanzibar: a cluster randomized controlled trial. *BMC Pregnancy & Childbirth* 14: 29.
- Lund S, Rasch V, Hemed M, Boas IM, Said A, et al. (2014) Mobile phone intervention reduces perinatal mortality in zanzibar: secondary outcomes of a cluster randomized controlled trial. *JMIR MHealth and UHealth* 2: e15.
- Mobile Alliance for Maternal Action <http://www.mobilemamaalliance.org/>
- Napier, D., Ancarno, C., Butler, B., Calabrese, J., Chater, A., Chatterjee, H., Guesnet, F., Horne, R., Jacyna, S., Jadhav, S., McDonald, A., Neuendorf, U., Parkhurst, A., Reynolds, R., Scambler, G., Shamdasani, S., Smith, S., Stougaard-Nielsen, J., Thomson, L., Tyler, N., Volkmann, A., Walker, T., Watson, J., Williams, A., Willott, C., Wilson, J. & Woolf, K. (2014). Culture and health. *Lancet*, 384, 1607-1639.
- Pembe AB, Carlstedt A, Urassa DP, Lindmark G, Nystrom L, et al. (2010) Quality of antenatal care in rural Tanzania: counselling on pregnancy danger signs. *BMC Pregnancy & Childbirth* 10: 35.
- Tong, A., Sainsbury, P. & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interview and focus groups. *International Journal for Quality in Health Care*, 19(6), 349-357.  
<https://www.youtube.com/watch?v=HAGrEtVe9YE>  
<https://www.youtube.com/watch?v=T5NepnL8vFA>