

Mobile phone use in Tanzania



Rick van Genuchten
Wouter Haring
Daan van Kassel
Kaoutar Yakubi
VU University Amsterdam
TAN 2012 Market Research

Table of Contents

Introduction..... 3

Tanzania 5

Health policies 5

Mobile services..... 6

Mobile usage compared to other communication tools 7

Interview sample 9

 Geographical dispersion of the respondents 9

 Education level of the respondents10

 Occupation status10

Findings10

 Mobile phones.....10

 Relative spending.....11

 Mobile use.....11

 Languages.....12

 Mhealth13

 Mhealth substitutes14

 Health topics.....15

Conclusion16

 References:17

 Appendix 1: Interview guide.....18

Introduction

Mobile health services create tremendous potential for health improvement. Especially in countries like Tanzania, with a shortage of health workers, limited infrastructure, but a mobile penetration of around 60%. MHealth Alliance (a subsidiary of United Nations Foundation) addresses five major advantages of mobile use in health care in Eastern Africa (Mechael et al, 2010):

- Treatment compliance
- Data collection and disease surveillance
- Health information systems and support tools for health workers
- Health promotion and disease prevention
- Emergency medical response systems

Text to Change anticipates on all five opportunities and offers a full package service including mobile awareness and information dissemination campaigns, database services, software development, content development, data analysis and interpretation, visualization and reporting. This report is the result of a collaboration between VU University Amsterdam and Text to Change to perform an explorative study and gain insight in the potential for mobile health services in Tanzania.

In order to assess the potential, this study focused on three main barriers to mobile health opportunities as addressed by the mHealth Alliance:

- Cost-benefit barriers
- Policy barriers
- Barriers related to technical architecture, data standards and platforms

The presence of these barriers in Tanzania was studied via a brief literature review combined with field research.

The literature review focused on a selection of reports about mhealth: the use of mobile devices and applications to deliver health related services. By reviewing these reports understanding of the current mobile usage, the general use of communication tools and health policies was increased. Furthermore the context of the Tanzanian health sector was studied. The field research consisted of a combination of observations and interviews in Dar es Salaam and Zanzibar in Tanzania. The interview questions were composed to gain insight in the willingness to pay for health related mobile information, but also included various other related topics. Concluding both findings from the literature and field research were combined to create understanding of the current mhealth environment in Tanzania and therewith the potential for Text to Change to offer local services.

The group of students that conducted the study participated in TAN2012, a leadership program offered to Dutch and Tanzanian master students. In total the TAN2012 included 14 Dutch students from the VU University Amsterdam and 15 Tanzanian students from Mzumbe University. The leadership program is an annually offered program and is the result of a cooperation between the Dutch VU University, the Tanzanian Mzumbe University and the Medical Credit Fund, a subsidiary of the Dutch NGO PharmAccess Foundation. After half a year of preparations both groups of students met in Tanzania for two weeks and undertook

Mhealth opportunities in Tanzania

activities and trainings related to cooperation and cultural experience. To bring achieved skills into practice, all students collectively studied a business related problem in the Tanzanian health sector. Expenses for the program were partly covered by the three organizing partners, and via a financial contribution of the Dutch participants. The remainder of the costs was covered via sponsorships and additional assignments which the students were encouraged to attract. This study for Text to Change is such an assignment and is voluntarily conducted by four of the Dutch student from the program in return for a sponsorship from Text to Change.

In the remainder of this report we will first elaborate in the findings from the literature review by briefly introducing Tanzania and its health and telecom sector and our preliminary findings about the mobile usage. Subsequently we will describe the methodology, the interview questions and data sample data sample used. Afterwards we present the findings from these interviews and our own observations. Finally we will highlight the main findings to advice Text to Change about its potential on the Tanzanian mhealth market.

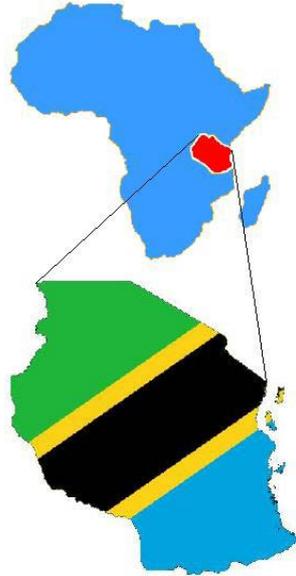


Above: A doctor and nurse using mobile phones in a private health clinic.

Tanzania

The United Republic of Tanzania was formed when the states Tanganyika and Zanzibar united in 1964. Since 2005, Dodoma is the official capital of the united republic, however Dar es Salaam remains its main port and largest city. The country is divided into 26 administrative regions, of which five are located on the semi-autonomous islands of Zanzibar.

Tanzania	
Surface area	945 thousand square kilometers
Population (July 2012)	43.601.796
0-14 years	42%
15-64 years	55.1%
65+	2.9%
Median age	18.5 years
Gross National Income	\$1.440,- ppp
Urbanization	26% of population
Illiteracy (2006)	29%
Life expectancy at birth	55 (68 is the global average in 2010)
Physicians	0.1 per 10.000 population
Nurses and midwives	2.4 per 10.000 population
Maternal mortality ratio	46 per 10.000 live births
Mobile subscribers (2011)	25.827.518
Percentage of population	59.2%



The Tanzanian Health Development Partners Group estimated that in 2007 around 25% of the Tanzanians were living below the poverty line. The incidence of poverty in rural areas was 39% and in Dar es Salaam it was 18%. Tanzania's number of physicians (0.1) and nurses and midwives (2.4) is far below the African averages 2.2 and 9 as estimated by the World Health Organization. Like the regional average, 78% of the deaths are caused by communicable causes. Real life or mobile consultation by a physician might decrease the number of these causes because patients could learn how to protect themselves from transmitting diseases. The current geographical accessibility of the current primary health facilities on Tanzania's mainland is reported to be about 90% of the Tanzanians on the mainland live within five kilometers distance of a health facility. The Tanzanian people are served via a system of 4679 dispensaries, 481 health centers, 55 district hospitals owned by the government, 13 designated district hospitals owned by Faith Based Organizations and 86 other hospitals at a first referral level.

Health policies

As stated by the Tanzanian Health Development Partners Group, Tanzania has decentralized many government functions to local government authorities and various health care related government and sub governmental organizations. The Ministry of Health and Social Welfare is Tanzanians highest health care related authority and has a relatively strong position. In

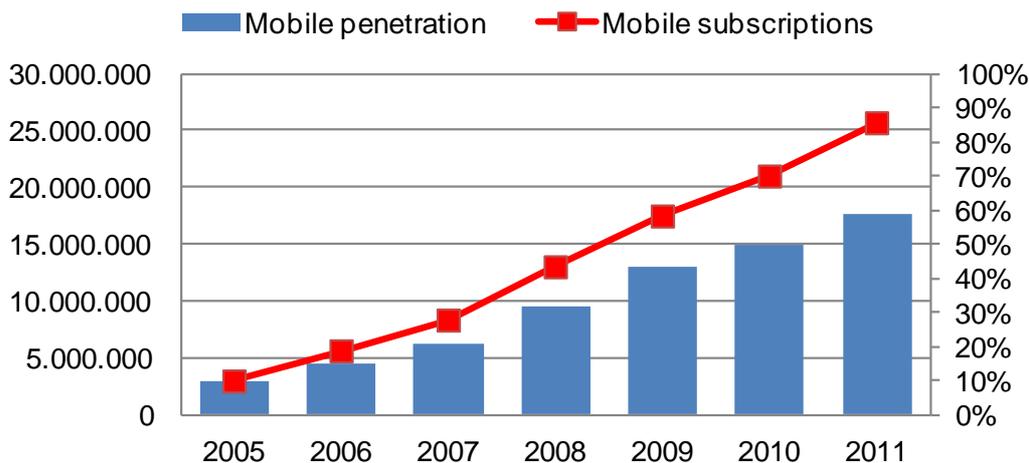
Mhealth opportunities in Tanzania

1998 the central Tanzanian government formulated 'Vision 2025' which identified health care as one of the governmental priorities. 'Access to quality primary health care for all' and 'access to quality reproductive health service for all individuals of appropriate ages' are the first mentioned priorities in Vision 2025. The Ministry of Health and Social Welfare found in 2011 that a long distance to health facilities and lack of transport are mentioned as second and third most important barriers for health care access, only surpassed by a lack of money. This indicates potential for mhealth service providers that could provide improved health access opportunities.

Mobile services

In 2003 the Tanzania Communications Regulatory Authority (2012) was established to license and regulate the postal service, broadcasting services and communications sectors in Tanzania. In 2005 it introduced a licensing framework and the concept of technology neutrality. Over the last five years, the percentage and amount of mobile phones has increased rapidly and this shows no signs of abating. Currently 59% of the Tanzanians is subscribed as user of a mobile phone.

Teledensity in Tanzania



Source: Tanzania Communications Regulatory Authority

We observed the dominating mobile service providers to be Vodacom, Tigo, Zantel and Airtel. Most of the people we came across owned at least a sim card from either one of them, several had a sim card of both. We did not encounter any individual that did not recognize either of the trademarks. To our knowledge all telecommunication providers offer discounts for calls or text messages between members to improve user loyalty. Furthermore users frequently receive discount offers that give them to opportunity to buy larger amounts of credit, calls or text messages at a lower price. In addition to these standard mobile services, all four main providers offer payment services. As was estimated in 2009 by Finscope, by then already 46% of the Tanzanian population had direct or indirect access to these payment services, which we believe to have increased ever since. In 2011 alone, the total volume of mobile phone transactions reached 157.025.351 with a value of 6.75 trillion Tanzanian shilling. These numbers demonstrate the widespread availability, mobile

use knowledge and utilization of mobile phones in Tanzania. As a result we do believe that the network coverage, the availability of mobile device and knowledge about the use of these devices are not a main barriers to the introduction of mhealth technology in Tanzania.

Mobile usage compared to other communication tools

In 2005 radio was the most effective communication tool in Tanzania, and it is also the most favored medium for advertising (Steadman, 2005). However, mobile telephony has been the most visible and fastest growing media technology in Tanzania in recent years compared to radio, television, and newspapers (Cole-Lewis & Kershaw, 2012). Also mobile phones are perceived as a potentially powerful tool for behavioral change because mobile services are widely available, inexpensive, and instant (Muthee & Mhando, 2006). Mobile phones are less inhibited by traditional access barriers that hinder the widespread use of many other communications technologies—including geography, socio-economic status, infrastructure such as electricity, and to some extent language and literacy—mobile phones have attained a leading role in local communications contexts. In addition, mobile telephony is well-suited for the African communications landscape: the relatively low cost of deployment of cellular networks in low-income and rural areas, the advent of affordable prepaid services, the lower skills base required for use in comparison to other technology, and the lack of existing fixed-line infrastructure, resulting in latent demand for communication services (Srivastava, 2008).

Mobile phones appear particularly well-suited to work in health education, disease prevention, disease treatment, health care, and health support applications, and can potentially be used to overcome some of the traditional barriers to accessing essential information and services, such as geographic isolation, gender, and social stigma (Iluvemi, 2009; Kahn, Yand & Kahn, 2010; McKee, Betrand & Becker-Benton, 2004; Mechael, 2009). Particularly in the African context, communication is essential to combat widespread stigma and misinformation, to facilitate the frequent reliance on non-professional medical personnel for treatment and support, and to provide information, education and communication (IEC) outreach critically needed for preventing infection, encouraging testing, and facilitating access to treatment (Iluvemi, 2009; Bharath-Kumar et al, 2009; Fuller, 2008; Swanepoel & Hoeken, 2008; Van Damme, Kober & Laga, 2006).

Other communication tools as local soap operas on television attract large audiences, but due to its low penetration in rural Tanzania might be less effective in rural areas. Newspapers face the same constraints; the sales and distribution are a huge problem. The physical size of the country makes distribution beyond major cities difficult. All these media technologies communicate persuasive health behavior messages in a top-down fashion (Ford, Odalla & Chorlton, 2003; Lupton, 1994). The unidirectional nature of top-down communication as television and radio lay their emphasis on achieving an effective transmission of messages whose content is determined by the sender. This unidirectional top-down communication has engendered significant criticism.

Mobile phones directly target the general public, engaging them in health-related activities, improving access to quality health information, linking them with health services, and encouraging preventive or health-seeking behaviors. Although mobile phones offer great opportunities due to the high penetration and the different possibilities as interaction, it can

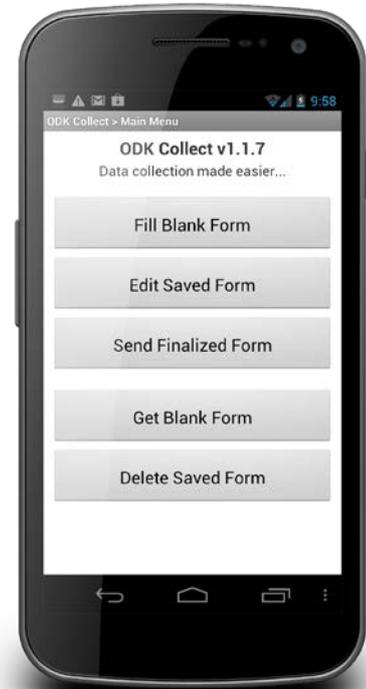
Mhealth opportunities in Tanzania

be suggested that exposure to messages through a variety of media channels is the most effective way to improve knowledge, attitudes, and behavior concerning health topics in Tanzania. The use of multiple media types is expected to reach a larger audience and helps reinforce messages (Piotrow et al. 1997).

Method

For a more detailed understanding of the potential for mhealth services in Tanzania we interviewed 41 Tanzanians. The 41 respondents were asked the same questions, which on forehand were discussed with Text To Change. The interview guide consisted of 13 general questions and questions regarding the respondents personal situation and 18 questions regarding mobile usage and telecommunication.

Interviews were mostly conducted by a team of Dutch and Tanzanian students. They were facilitated by a special interview application (Open Data Kit) which was installed on smart phones by Text To Change. On the right side a print screen of the application is published. Via the 'Fill Blank Form' interviewers were able to start with a form containing all questions from the interview guide and blank spaces to fill the answers to these questions. Once the interview was completed with answers from the respondent, the form was saved and could be edited via 'Edit Saved Form'. In case there was network access, the form could also be send to a server where all interviews were stored in a special online survey database. Via this database we were able to download the collected data and analyze this data with Microsoft Excel and SPSS.



The interview guide which was programmed into the mobile application is included as appendix 1. The questions are divided in demographics and general questions, and questions regarding mobile use and the Tanzanian telecom sector.

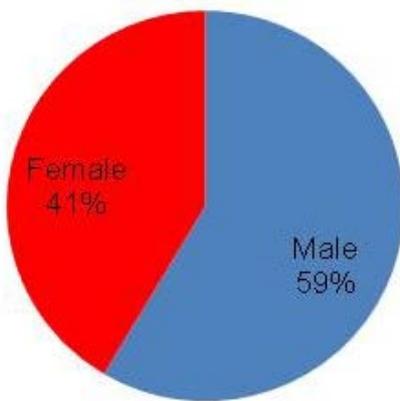
Via random control questions which were not included in the interview guide, the students monitored if respondents indeed understood the questions they answered. It should be noted that nevertheless respondents experienced problems answering some questions. From our own experience we have to note that especially questions regarding a monthly or annual income should be treated with special care, even though we allowed respondents to answer with their daily, weekly or monthly income in Tanzanian Shillings. To investigate the validity, two respondents were interviewed two times by two different teams of students. One of the two respondents, who was temporary employed as a driver, reported to earn approximately €184,62 the first time, but answered to have an annual income of €615.38 four days later. Other questions however were answered with more confidence. In this document we will only present information regarding our sample, and findings of which we believe are still informative for the actual situation in Tanzania.

Interview sample

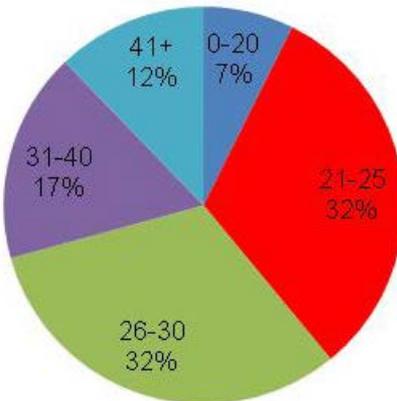
The sample included respondents from different geographical locations, with different backgrounds. Although not a completely representative sample for the Tanzanian population, we believe the sample to be sufficiently indicative for an exploration of the market potential. Below a brief overview of the sample population's distribution.

Sample information	
Respondents	41
Average Age	31
Gender	24 Male 17 Female

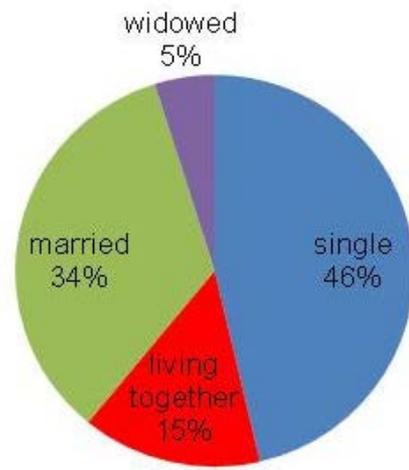
Gender



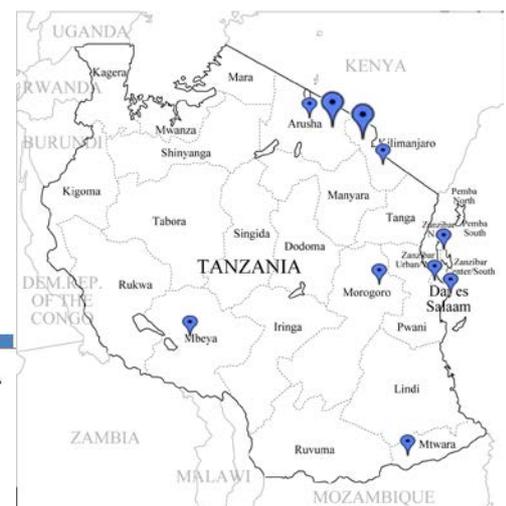
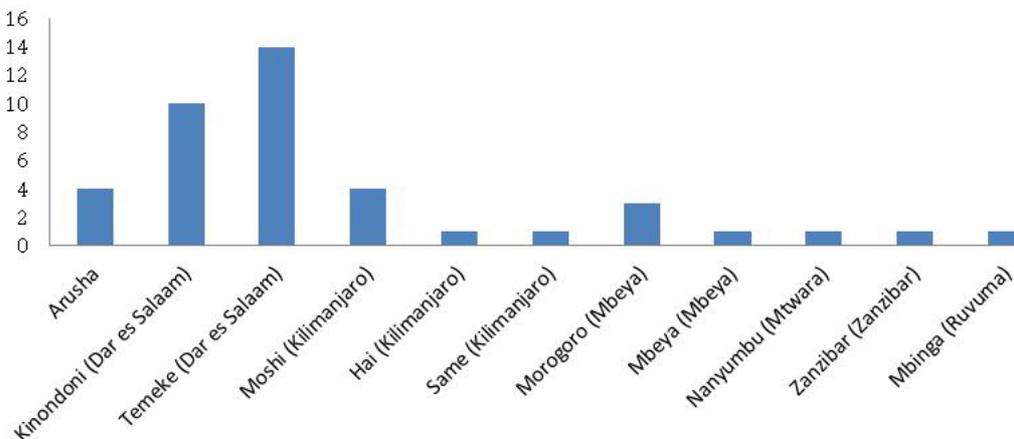
Age distribution



Marital status



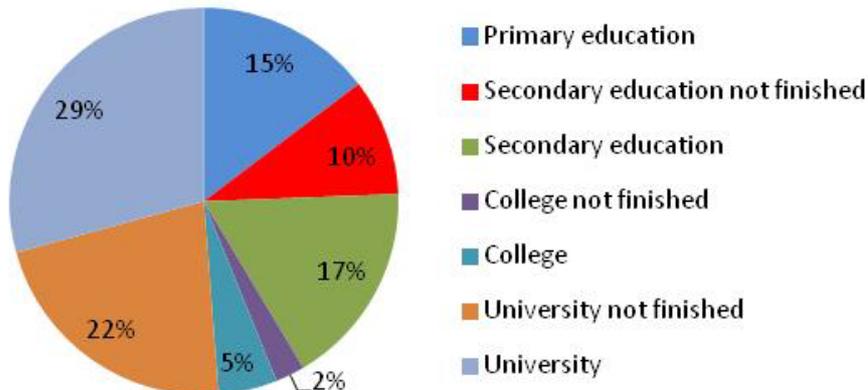
Geographical dispersion of the respondents



Mhealth opportunities in Tanzania

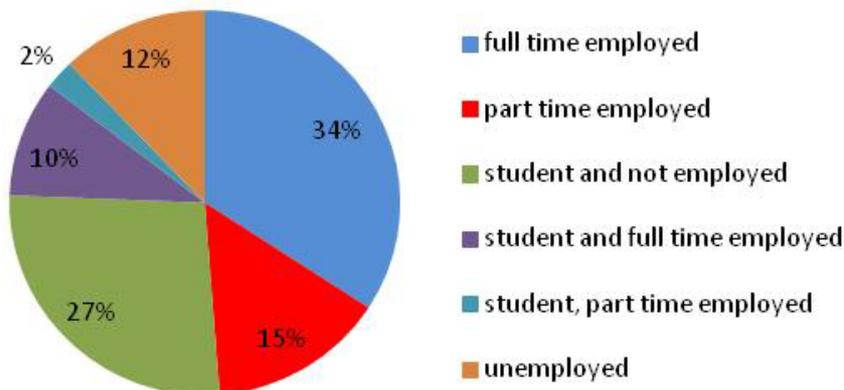
Education level of the respondents

The 41 respondents had different education levels. All finished primary education. Several of the respondents did not finish the education they started.



Occupation status

Relatively a large amount of students were interviewed. Of these students 69% was not employed, 25% was full time employed and 6% was part time employed.

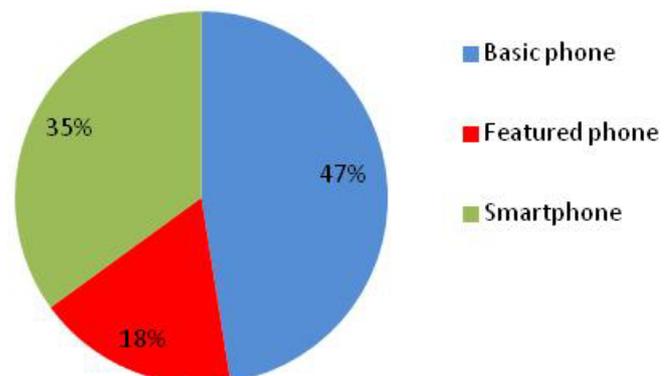


Findings

Mobile phones

Of the 41 respondents only one respondent, 2.5% of the respondents, did not own a mobile phone. This 28 year old married woman had her own fruit stall in the relatively poor Temeke district of Dar es Salaam. She makes use of other people's phones, because she cannot afford to buy one.

Of the remaining 40 respondents most phone owners had a phone with basic features. Eighteen percent of the phone owners had a phone with some additional features for example a colored screen. 35% owned a smart phone. The findings illustrate that at least an upper layer of the Tanzanian population owns a smart phone. As a result there might be a market for mhealth services offered via mobile applications or via mobile internet.



Relative spending

Throughout this report a conversion rate of of 1 Euro to 1950 Tanzanian Shilling is used so that respondents could answer in their own currency. Questions regarding income and spending however still have to be treated with special care. Several respondents expressed difficulties when they were asked about their income or spending because they either were uncertain about their income and spending or perceived these details as private information which they did not want to share. Still all respondents were asked about both income and spending and 68% responded to both questions. Only 16 respondents, thus 39% of our sample responded with answers that we believe could be somewhat close to their true financial situation. Thirty seven of the respondents in contrast (92.5% of the mobile phone owners) gave an answer indicative of their monthly spending on mobile communication. On average the respondents spent 31.571 Tanzanian shillings (approximately €16,19) per month on their mobile phone. For the 16 respondents that reported both income and mobile spending, the mobile spending amounted on average for 20.4% of their monthly income.

Percentage of monthly income	Amount of respondents	Percentage of the respondents
0 - 5 %	2	12,50%
6 - 10%	4	25,00%
11- 15%	2	12,50%
16- 20 %	2	12,50%
21 - 25 %	1	6,25%
26 + %	5	31,25%
Total reporting respondents	16	100%

Mobile use

The majority of the mobile phone owners (70%) owned at least two sim cards. This has implications for mhealth companies, who often buy databases from mobile service providers and thus should note that different databases might include the same details.

Another interesting finding is that several respondents used more sim cards than they owned themselves. Even respondents that owned more than one sim card themselves declared to use sim cards of other people. This indicates that for instance informative health services might reach more people than information was sent to.

Mobile sim cards owned			Mobile sim cards used		
Amount	Respondents	Percentage	Amount	Respondents	Percentage
1	15	37,50%	1	12	30%
2	20	50%	2	18	45%
3	4	10%	3	8	20%
4	1	2.5%	4	2	5%

The number of text messages respondents received from third parties varied per respondent. For the TAN2012 course we bought 15 Vodacom sim cards ourselves. Five of the sim cards were used in a smartphone and were combined with prepaid internet time. For these sim cards we registered ourselves and we signed a contract. The other ten sim cards were used in basic phones and were used without registration. We received more third

Mhealth opportunities in Tanzania

party messages on the smart phones than on the basic phones, but also in our sample the number of messages varied. On one smart phone we received over 200 messages in one day, while the record for one of the other smart phones did not exceed 5 messages. Most of the basic phones received between 2 and 5 messages a week. Most messages we received contained special offers from Vodacom or advertisements from their own mobile payment service m-pesa.

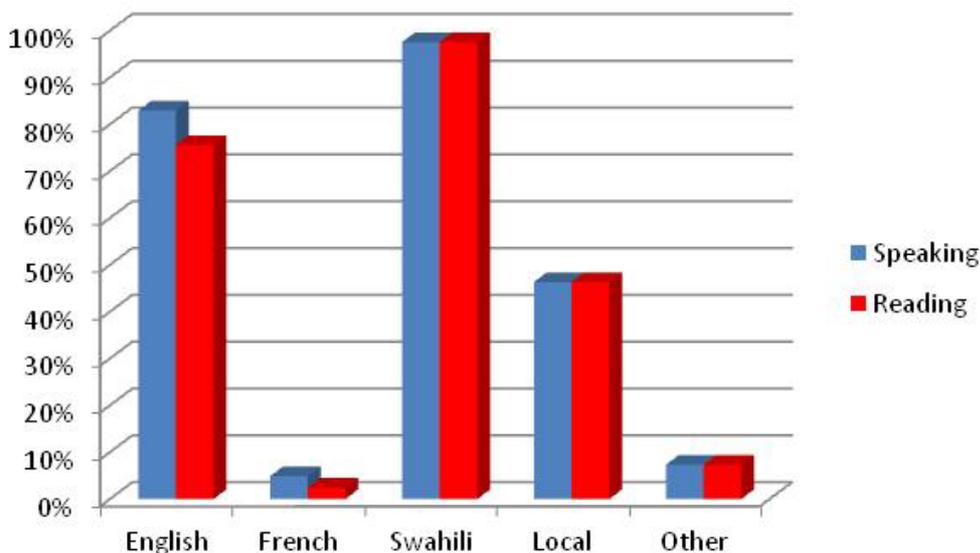
The respondents we asked about messages from third parties were used to frequently receive messages from third parties, but did not always perceive them as SPAM, even though they did not subscribe. As a result some respondents declared that they found it hard to estimate the average amount of third party messages per week. This might have biased the reported average amount of weekly received messages from third parties, which showed large fluctuations. On average the 40 mobile phone owners that we interviewed received 34 third party messages a week.

Languages

Of the 41 respondents, 34 reported to be able to speak English and 31 said also to be able to speak English. All but one respondent were able to speak and understand Swahili. Other languages were less practiced amongst our group of respondents.

Although most respondents reported to be able to speak English, we observed that their English is not as good as they say. During the TAN2012 project we also have been interviewing doctors from local health clinics, they are educated but in most of the times they could not speak and understand English.

As concerning the local language, this is a language used by different tribes. We learned from Mzumbe university students that each tribe has its own language, and only the tribe members speak this language with each other. So Tanzanian people in most cases have two languages, the tribe language which is only used within the tribe, Swahili which is the common language for Tanzania, and some educated speak and understand English.

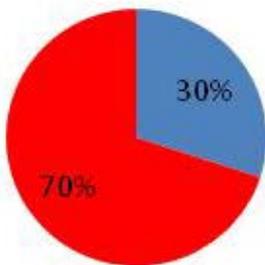


Mhealth

We believe that most of our respondents did understand the questions regarding mhealth, and health topics. This is confirmed by the high percentage of respondents that was able to answer the question: 'About what health topic would you be willing to learn more through your mobile?'. Thirty six out of the forty mobile owners (87.8%) answered this open question with a health related topic. Below the findings regarding our mhealth related questions:

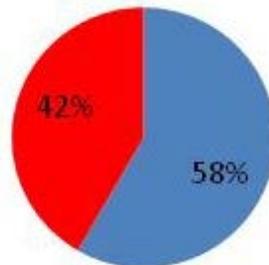
Have you ever received messages related to health or health prevention?

■ Yes ■ No



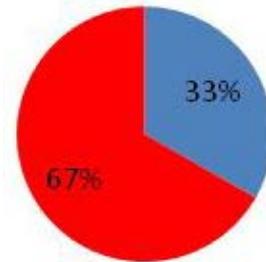
If yes, did you do something with these text messages?

■ Yes ■ No



If yes, did you have to pay for these messages?

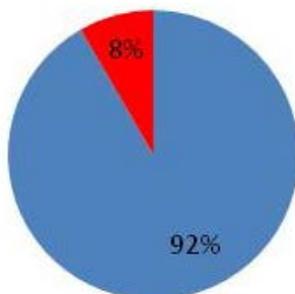
■ Yes ■ No



It is important to note that the question regarding the reception of health related messages was asked to all 40 respondents with a mobile phone. The subsequent two questions were only asked to 12 respondents that reported to have received messages related to health or health prevention. These 12 respondents also were asked about the content of the messages they received.

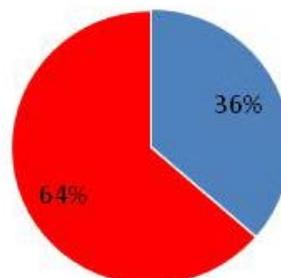
Did you learn something from these messages?

■ Yes ■ No



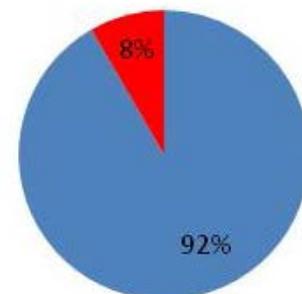
Did these messages contain enough information to start protecting from the mentioned diseases?

■ Yes ■ No



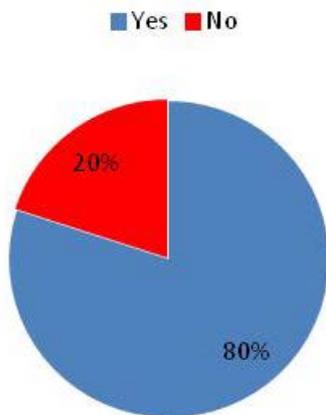
Would you like to receive information about different diseases through text messaging?

■ Yes ■ No

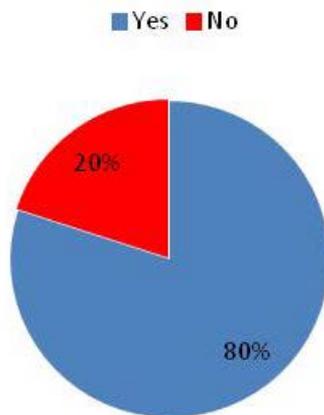


Other questions were used to indicate the potential for mhealth services and therefore were asked to all 40 mobile phone owners. Eight of the forty respondents would not visit a clinic based on a text message and would neither pay for it. The other 32 respondents give a positive reaction on both questions. The majority of the respondents had been receiving health information via other means of communication. Still seven respondents declared never to have received information about health related topics.

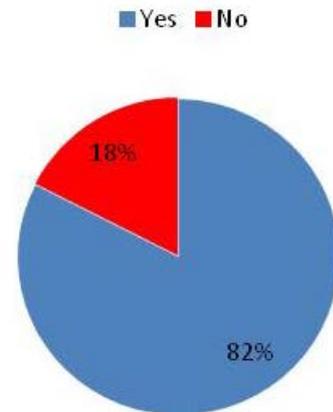
Would you visit a clinic based on recommendations through a text message?



Would you be willing to pay for text messages related to health or the prevention of health?



Can you remember receiving information through other means of communication related to health?

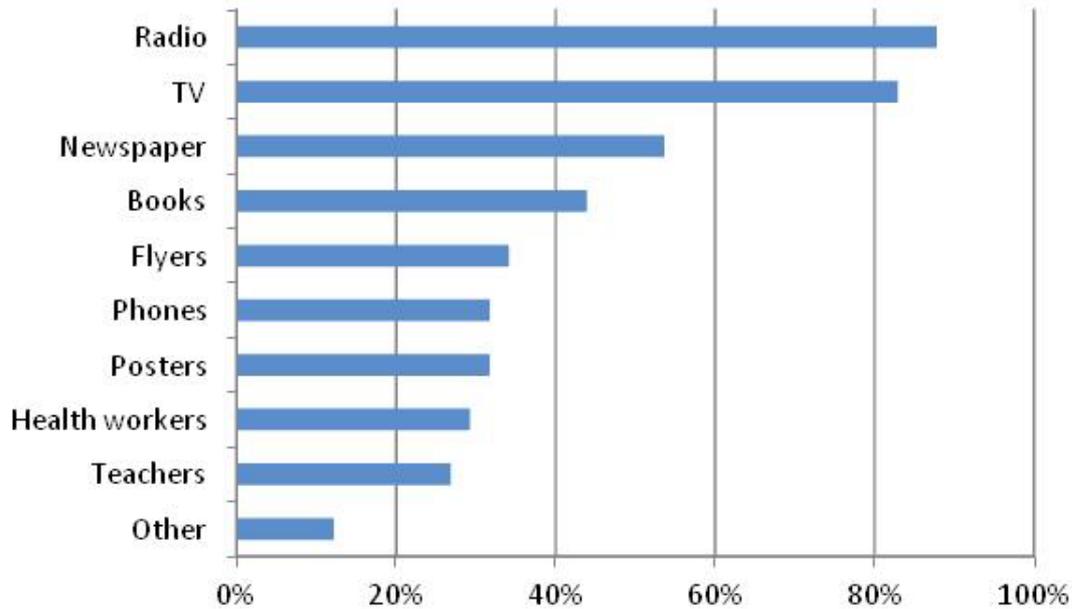


Mhealth substitutes

In disregard of their mobile activity, most respondents did not address mobile text messages as mean of telecommunication by which they would be most affected. The option 'Phones', which included text messages, was mentioned by just 13 of the 41 respondents. This number however might be biased since the top 6 choices of the respondents is exactly equal to the sequence in which the options were mentioned by the interviewing students in case the respondent could not come up with any 'means of communication' themselves.

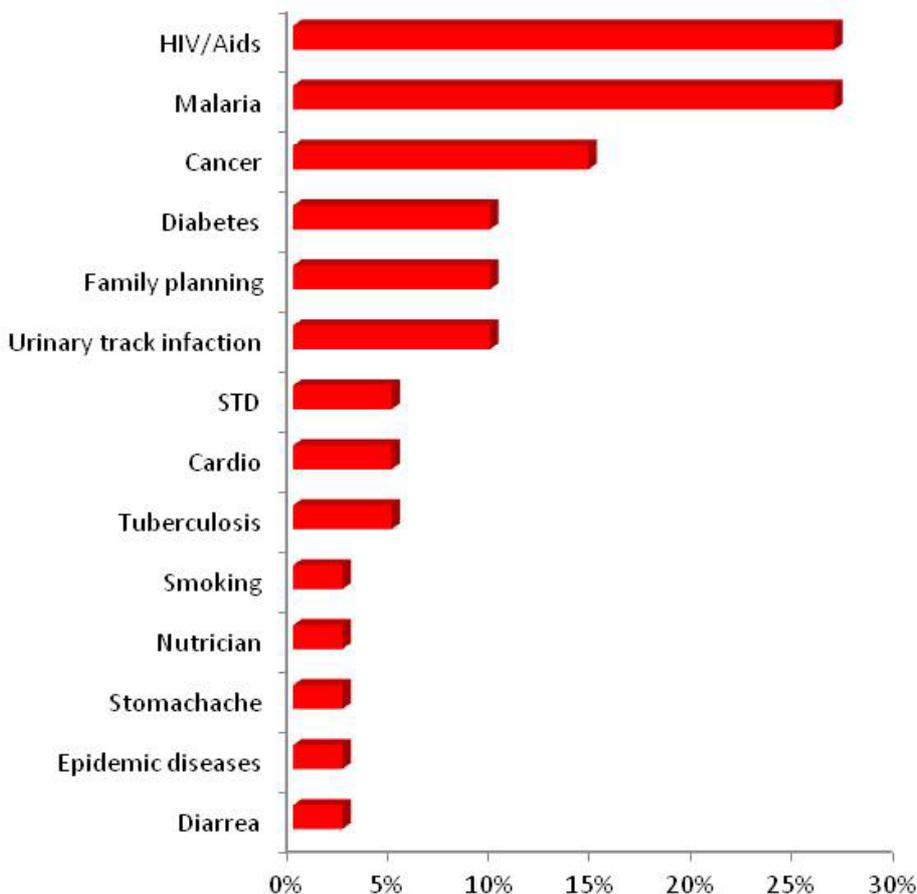
During the interviews we noticed that it is hard for the respondents to imagine by which media they would be most affected. As noticed earlier Radio is most popular and well known because of the low costs of owning one. In every area we have been in the Temeke district they had a Radio. So the respondents in most times answered something they knew. The Telephone as media is unknown for respondents, and asks for a lot of imagination from the respondents. How would someone know if he would be affected more by a mobile phone, if that person does not recognizes it as a tool by which you could be affected.

Although the results do not describe the potential of mobile phones, they do indicate the current media by which most Tanzanian would be affected. As indicated previously by the mHealth alliance, mobile phones have the potential but they that potential also has to be recognized by the users.



Health topics

When asked about what topic the respondent would like to learn more, most respondents addressed more than one health topic. Of the 41 respondents five did not address any health topic. Below the percentages of respondents per health topic, calculated as the amount of times the health topic was mentioned, divided by the total amount of respondents (41):



Conclusion

Although this study was conducted with a very small number of respondents, we believe it is still informative to the potential for mhealth services in Tanzania. The main barriers as addressed by the mHealth Alliance seem not to limit mhealth services in Tanzania. Although the policies regarding mobile usage were very briefly studied, the priority of healthcare development seems to favor mhealth services. Furthermore the technical architecture does not appear to be restrictive, and the lack of knowledge about the use of mobile functions to a decreasing extent. The amount of Tanzanians with a mobile phone is growing fast and we observed the Tanzanians who already have a phone to make use of many of the available functions. The importance Tanzanians address to mobile activity is confirmed by the relatively high spending for mobile services we found. The increasing mobile use and mobile awareness is combined with a demand for health information. Many of the respondents expressed a lack of information about health related topics. Thirty two of the forty respondents even noted they would be willing to pay for health related information via mobile text messaging and would also visit a clinic based on a recommendation via SMS. Even though additional and more detailed market research is advisable, we do believe that mhealth service providers and Tanzanian citizens both could benefit from the presence of mhealth service providers at the Tanzanian market.

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Appendix 1: Interview guide

Demographics & general questions	Question	Answers
1. Name	What is your name?	
2. Date	What is today's date?	__ - __ - ____
3. Age	What is your age?	
4. Gender		Male Female
5. Level of education	What is your highest level of education?	None Part primary education Completed primary education Part secondary education Completed secondary education Part college education (not university) Completed college education (not university) Part university education Completed university education Doctoral title
6. Level of income	What is your annual income (in \$)?	
7. Marital status	What is your marital status?	Single Living together with partner, not married Married Divorced / Separated Widowed
8. Occupation	What is your occupation status?	Employed fulltime (works more than 32 hours per week) Employed part time (works less than 32 hours per week) Unemployed, searching for a job Unemployed, not looking for work Student and fulltime employed Student and part time employed Student, unemployed
9. Occupation	If employed, what is your occupation?	
10. Language(s) spoken	What language(s) do you speak?	English French German Portugese Spanish Swahili

		Local dialect Other
11. Language(s) read	What language(s) are you able to read?	English French German Portugese Spanish Swahili Local dialect Other
12. Region the person lives in	What region do you live?	
13. District the person lives in	What district do you live?	

Mobile use & telecom related questions	Question	Answers
1. Mobile phone ownership	Do you have a mobile phone?	Yes / No
2. Type of phone	What kind of phone do you have?	Basic phone (like simple Nokia) Feature phone (more advanced phone, has colour screen?) Smartphone (for example iPhone, Samsung Galaxy or Blackberry)
3. Spending on phone	How much money do you spend for your mobile on a monthly basis?	
4. Mobile provider usage	How many SIM-cards do you use?	
5. Mobile provider usage	How many SIM-cards do you have?	
6. Mobile usage	Which mobile service do they use the most (call, sms, other)?	Call SMS / Text Messaging Other
7. SPAM	How often do you receive text messages from third parties?	
8. Mhealth	Can you remember receiving information through other means of communication related to health?	Yes / No
9. Mhealth	If yes, did you do something with these text messages?	Yes / No
10. Mhealth	If yes, did you pay for	Yes / No

	these text messages?	
11. Mhealth	If yes, did you learn something from these messages?	Yes / No
12. Mhealth	Did these messages contain enough information to start protecting from the mentioned diseases?	Yes / No
13. Mhealth	Would you like to receive information about different diseases through text messaging?	Yes / No
14. Mhealth	About what health topic would you be willing to learn more through your mobile?	
15. Mhealth	Would you visit a clinic based on recommendations through a text message?	Yes / No
16. Mhealth	Would you be willing to pay for text messages related to health or the prevention of health?	Yes / No
17. Mhealth	Can you remember receiving information through other means of communication related to health?	Yes / No
18. Mhealth substitutes	Which means of communication would affect you the most?	Radio TV Newspaper Posters Flyers Mobile phones (text or calls) Books Information from health workers in clinics Information from health workers in the field Teachers in schools

