Sauti za Wananchi

Collecting national data using mobile phones

Twaweza
ni sisi

Table of Contents

1 INTRODUCTION

1.1 Rationale

In Tanzania timely information on the perspectives, welfare and experiences of citizens is unavailable. What is available are the summary reports from a number of household surveys which collect information on a range of topics: poverty (HBS), labor (LFS), health (DHS), agriculture (Agriculture Census), accountability (Afrobarometer), people's perspectives (VoP), welfare (NPS) and politics (REDET). Each of these surveys is implemented after an extensive planning cycle. A typical survey takes a year in preparation, at least a few months in data collection and then another 6-12 months until analyses are done. For example, the Tanzania Household Budget Survey 2007 collected data in 2007 but was published on 6 May 2009.

As a consequence the data provides excellent descriptive statistics, but they are never very well-timed for evaluation of policies. This limits the ability to monitor change and reduces citizens' ability to hold authorities to account. It also limits the incentives for authorities to adjust their actions in light of survey findings. For example, the 2007 Household Budget Survey (HBS) found that since 2001, poverty had declined very little, suggesting that previous poverty reducing policies were unsuccessful. If in response to this the Government of Tanzania implements a different set of policies and programs and the frequency of household surveys is not increased, it could take another 6 years until the effects of these interventions are known. In such an environment, myopic decision makers, or decision makers who are uncertain about the impact of their interventions, may decide not to change anything at all.

These aspects of the existing data landscape leave two gaps, as there is a desire to:

(i)   Ensure that more data is in the public domain; and
(ii)   Regularly have information on time-sensitive issues, such as drought and food availability, people's opinions about governance, the quality of public service delivery, or citizens' ability to exercise agency.

Such information could be useful to a diverse audience including policy makers and implementers, members of parliament, newspapers, analysts and donors, as well as *Twaweza*[1].

This paper outlines an approach to data gathering that combines the strength of household surveys (representativeness) with possibilities offered by mobile phones (low cost, high frequency feedback). This approach, called Sauti za Wananchi[2], aims to collect data at a fraction of the cost of ordinary household surveys, in a way that is more frequent and more responsive to changing data needs.

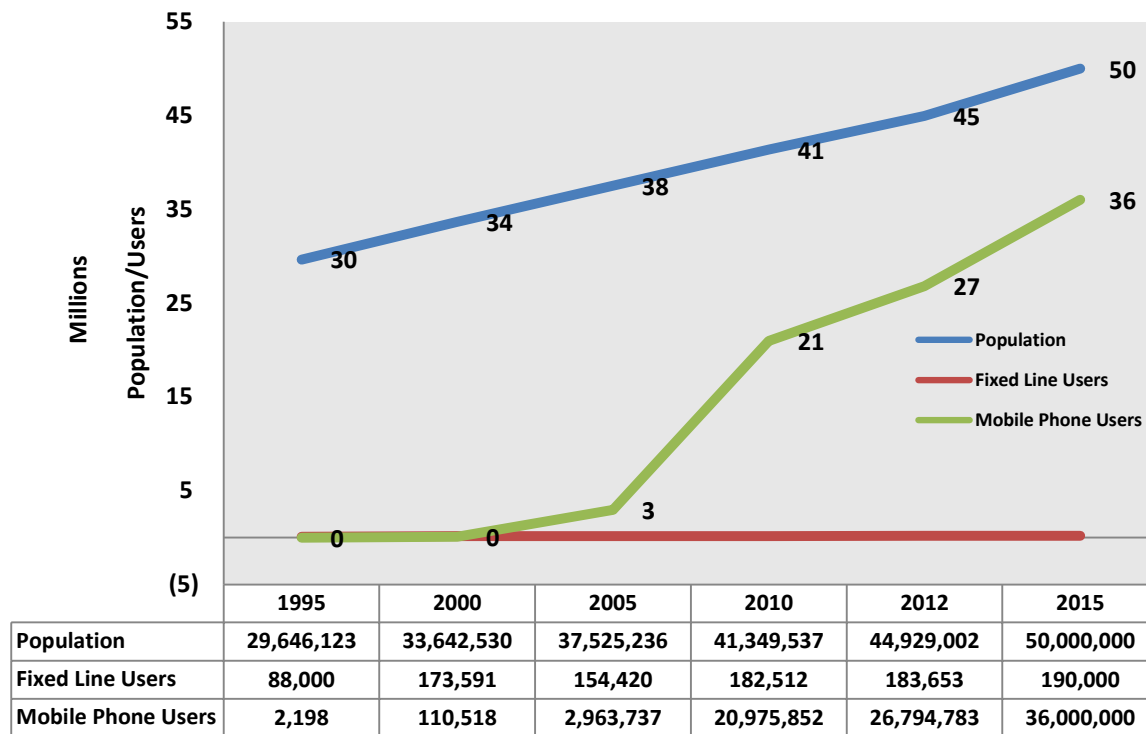[1]Twaweza identifies information as key to making change happen: *"When exposed to ferment of information and ideas, and practical tools or pathways in which to turn these ideas into actions, citizens can become drivers of their own development and act as co-creators of democracy"* (Twaweza 2008: p.18) –italics in the original.
[2] *"Wananchi"* means citizens in Kiswahili.

1.2 Feasibility of mobile phone data collection

In the early 1990's very few people in Tanzania used mobile phones, but over time ownership and use of mobile phones has been growing rapidly in Tanzania. Figure 1 illustrates the growth in population against number of mobile phone & fixed line users from 1995 to 2015 (projection).

Figure 1: Growth in Population and Mobile Phone Users (1995-2015)

	1995	2000	2005	2010	2012	2015
Population	29,646,123	33,642,530	37,525,236	41,349,537	44,929,002	50,000,000
Fixed Line Users	88,000	173,591	154,420	182,512	183,653	190,000
Mobile Phone Users	2,198	110,518	2,963,737	20,975,852	26,794,783	36,000,000

Source: www.nbs.go.tz and www.tcra.go.tz

The explosive growth of mobile phone ownership and use is confirmed by the 2010 DHS, which found that 46% of households owned mobile phones, and the 2010 Uwezo survey which found a similar (48%) of mobile phone ownership. A nationwide study carried out in November 2011 by Intermedia Africa on the use of mobile money in Tanzania indicated that 78% of households in Tanzania have a mobile phone and the study further revealed that 63% of individuals aged 15 years and above own a mobile phone in Tanzania.[3]

Not only is the mobile phone ownership widespread (and expanding rapidly), phones are available at relatively low cost (Tshs. 40,000 or less) while mobile phone network covers most of the population (the areas not covered have low population density; see Figure 2).

---

[3] See report at
http://audiencescapes.org//sites/default/files/Tanzania%20MM%20Tracker%20Qtr%201%20Report_For%20Public_COLOR_2.pdf

Figure2 : Mobile Phone coverage and population Density

Vodacom Coverage   Population Density
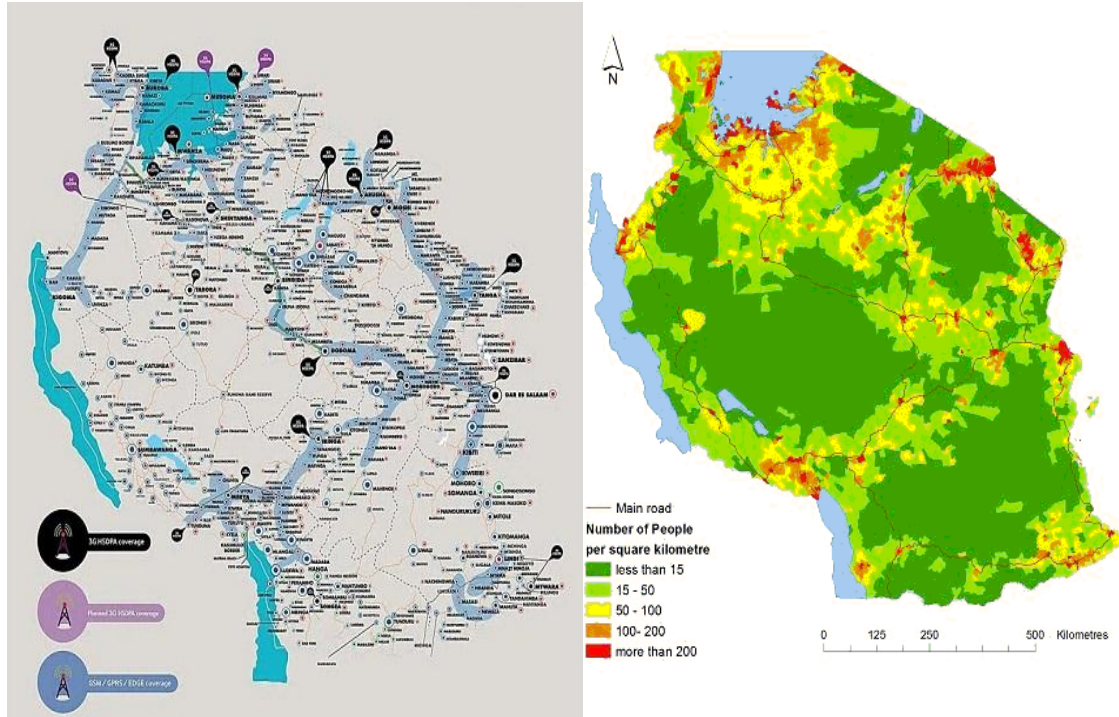
Source Vodacom 2011 & PHDR 2011

The expansion of access to mobile phones and potential to use them to reach the majority of population creates new opportunities for data collection. Through the use of mobile phones, it is now imaginable to collect nationally representative data at the cost of a short phone call to a reasonably sized household panel.

Uwazi at Twaweza chose to pilot this approach in Dar es Salaam, and the success achieved through the pilot study known as Listing to Dar[4] showed that high frequency data collection is possible. Given the success attained in Listing to Dar (LtD), Uwazi at Twaweza decided to scale up the pilot study to a nationally representative panel.

Compared to a traditional pen-and-paper survey there is a non-standard limitation on the sample population: only households that can be interviewed over the phone can be part of a mobile phone panel, i.e. mobile phone network coverage needs to be in place. While this was not an issue in Dar es Salaam this became a necessary first check for EA sample inclusion.

Furthermore, one of the key lessons learnt during the pilot study was that, while survey data indicate a swift increase in mobile phone ownership, it is not universal. A challenge for data collection using mobile phones is that phone ownership is still concentrated among the upper wealth quintiles. For example; according to Uwazi's Dar es Salaam Pilot study to figure XX shows, only 50% of households in the lowest income group in Dar es Salaam own a mobile phone, while 89% of those in the highest income group

---

[4] See detail at http://listeningtodar.org/

own a mobile phone. A further challenge that could affect the response rates of in a mobile phone survey is charging of mobile phones, particularly in remote areas.

Figure 3: Phone ownership by wealth quintile in Dar es Salaam
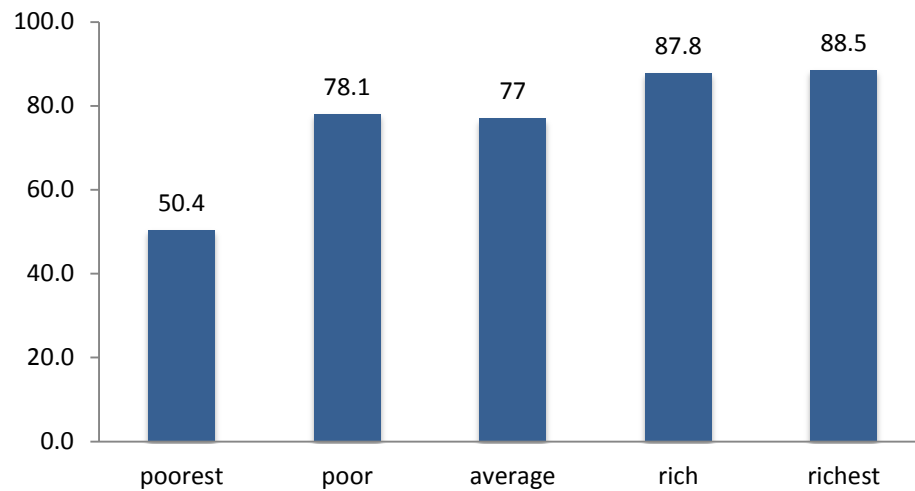
Source: Uwazi, based on Wananchi Survey pilot in Dar es Salaam (2010)

To address these issues the Sauti za Wananchi baseline survey ensured that all respondents recruited for the survey have access to a mobile phone. All selected households were offered a simple mobile phone to enable them to participate in the survey. Moreover, all participating households were offered a solar charger.

2 METHODOLOGY

2.1 Overview

The Sauti za Wananchi survey is divided into 2 major phases:

1. Baseline survey (PAPI)
2. Mobile phone survey (CATI)

The baseline survey was used to randomly select and enlist participating households and respondents; collect baseline household and individual data; and distribute mobile phones and solar chargers. Data collection in the Baseline Survey was done through a traditional household survey using face-to-face pen and paper (PAPI) interviews.

In the second phase, respondents are contacted on their mobile phone in monthly call rounds on topics covered during the baseline as well as current affairs. Data collection in the mobile phone survey will be done by call center agents using so-called CATI (Computer Aided Telephonic Interviews).

2.2 Target population

The target population for Sauti za Wananchi was Tanzanians aged 18 years and above living in Tanzania Mainland. According to the National Bureau of Statistics (www.nbs.go.tz) Population and Housing Census 2012, Tanzania Mainland has a population number of 43,625,434. (The official publication of the 2012 Population and Housing Census will provide the 2012 adult population; according to the 2002 Census projections the 2012 adult population is about 50% of the total population (22, 464,501)[5]. According to census data rural Tanzanians are the majority comprising 70% of the population.

2.3 Sampling

A multi-stage stratified sampling approach was used to achieve a representative sample of the total population of 18 years and older. The sample frame is based on the 2012 Tanzania Population and Housing Census. The various stages of the selection of the sample are discussed below.

2.3.1 Sample size

The baseline sample was designed as a representative cross-section of all adult citizens in Tanzania Mainland. The goal is to give every adult citizen an equal and known chance of selection for interview. This objective was reached by (a) strictly applying random selection at every stage of sampling and (b) applying sampling with probability proportionate to population size at the Enumeration Area (EA) sampling stage.

Sauti za Wananchi used a sample of 2000 households in 200 enumeration areas (EAs) which provided estimates at standard precision levels (EAs will be our Primary Sampling Units or PSUs). Sample size calculations provided in annex 1 show that with 10 households per EA a sample of about 150 EAs would be sufficient for a confidence interval of +/- 5 percentage points. A population of 200 EAs was chosen, both to allow for sub-group analysis and to safeguard precision given that attrition is expected in a phone panel survey.

---

[5]The National Bureau of Statistics conducted a census in 2002. Based on the census data, population projections from 2003 to 2025. For the purposes of this study, projections for the year 2012 were used.

The sample universe for the Sauti za Wananchi included all adult citizens within Tanzania Mainland. That is, we excluded as individual main respondent anyone who has not attained the age of 18 years on the day of the survey. (As a matter of practice, we follow the approach set by the National Bureau of Statistics regarding inclusion of households/individuals residing in institutionalized settings, such as students in dormitories and persons in prisons, army barracks or nursing homes).

2.3.2 Sample Selection

The Sauti za Wananchi Sampling took place in three stages: in the **first stage** EAs were sampled randomly from specified EA strata; in the **second stage** households were sampled randomly from EA household lists; and in the **third stage** one adult household member was selected as respondent randomly from the adult household roster.

Stage 1: Stratification and EA sampling

The aim was to create a sample enabling us to provide precise estimates in two domains: rural and urban. Sample stratification took place according to location (rural/urban). Since we had good reasons to believe many SzW outcomes of interest will be correlated with rural-urban location (e.g. welfare measures, public service delivery indicators) it was statistically sound to stratify on this dimension.

The proportion of the sample in each stratum was the same as the stratum proportion in the national population as indicated by census data. Since the number of EAs to be sampled from each stratum was proportional to the stratum population size we expected proportional representation of the population in the sample.

EAs were selected using probability proportionate to population size (PPPS) using the EA population numbers provided by the National Bureau of Statistics. Once the participating EAs were selected, the corresponding EA maps were obtained from NBS. Since it was expected that some EAs would have to be replaced because of network coverage problems, a reserve EA sample was selected too.

Stage 2: Household sampling

Upon arrival in the selected EAs, a full listing exercise was conducted using the EA maps. This listing exercise gave each household an equal chance of participating in the survey. Once the EA household list was completed, 10 Main Households were randomly selected from the list. The random selection was done in the presence of village or street leaders; this was done mainly because we intended to hand over mobile phones and chargers to the randomly selected households.

In accordance with the standard (NBS) practice we defined a household as individuals living under the same roof and eating together. By this definition, a household did not include persons who are currently living elsewhere for purposes of studies or work. Nor did a household include domestic workers or temporary visitors (even if they eat from the same pot or slept there on the previous night). In multi-household dwelling structures (like blocks of flats, compounds with multiple spouses, or backyard dwellings for renters, relatives, or household workers), each household was treated as a separate sampling unit.

Given that attrition is expected in phone panel surveys, we randomly selected two households from a list of the households in the EA that already owned a mobile phone. The idea is to replace households dropping out of the survey using this set of reserve households.

Stage 3: Individual respondent sampling

When we selected a participating household, we went to the household and sought the consent of the head of households. In the consent form we explained the nature of the project and the approach we used to randomly select his or her household as a participating household. Further to that we explained to the head of household that an adult would be randomly selected from house household to participate in Sauti za Wananchi. Once the head of household had consented to a household member participating in the survey, we used a kish grid (random number table) to randomly select eligible household members.

For practical reasons, we selected our respondent from among persons in the household who will be available for the baseline interview and who are expected to be available for a phone interview. We excluded, at the selection stage, individuals who are likely to move from the household to a place that does not have mobile phone network coverage (e.g. remote farm stations).

2.4 Development and testing of survey instruments

2.4.1 Design of survey instruments

Given that Sauti za Wananchi is a longitudinal mobile phone survey, the number of survey instruments required in Sauti za Wananchi was larger than what is used in a traditional survey design. Uwazi at Twaweza designed the survey instruments and shared them with Ipsos Synovate (a research firm) for review. In several meetings during the initial weeks of the project, the understanding of the methodology was sharpened and resulted in a list of instruments required for the fieldwork. Table 1 below presents the survey instruments used in Sauti za Wananchi and the function of each.

Table 1: Sauti za Wananchi Survey Instruments

No.	Survey Instrument	Functions of the Survey Instrument
1	Listing Form	This form was used in the listing of all the households in the selected EA (Enumeration Area).
2	Respondent - Agreement Form	This is a form that clearly defined the role and ownership of the mobile phone and solar chargers provided to the SzW respondents. The key highlight of this form was that the phone and the solar charger were property of Twaweza, were provided to the respondent to enable participation and they would only belong to the respondent at the end of the survey. Just like the HH consent form this form was filled and signed in duplicate; one form was left with the SzW respondent and the second form was return to the research firm.
3	Household Questionnaire	The HH questionnaire was used to collect household information as well as individual experiences from the respondent. For those HH related questions that the respondent was not well informed about, he or she was allowed to ask for assistance from any other household member who is well informed on the topic / status of the issue asked.
4	Community Questionnaire	The community questionnaire was used to collect basic community data from the community leaders. This questionnaire was generally the first administered in an EA given that it served to establish whether the EA had adequate network coverage.

5	Health Facility Questionnaire	The health questionnaire was used to collect basic health facility data from the health facility that serves the community / EA. The main respondent for this instrument was the head of the health facility or the person in charge of the health facility at the time of data collection.
6	School Questionnaire	The school questionnaire was used to collect basic school data from the school that serves the community / EA. The main respondent for this instrument was the head of the school or the person in charge of the school at the time of data collection.
7	Popular Booklet	It was envisaged that in many EA's / communities visited the SzW survey would raise questions, not least with respect to the distribution of hardware but also with respect to mutual expectations. For this reason we designed a popular booklet (Cartoon story) that could explain the SzW approach and in the process introduce the survey.
8	Respondent Uwezo & MUAC Flyers	The Uwezo flyer clearly elaborated to the respondents how they could administer the Uwezo[6] Test (a literacy and numeracy Assessment) to their children. Similarly, the MUAC (Middle Upper Arm Circumference) flyer explains how the MUAC measurement could be administered.
9	EpiSurveyor – Anchor Variable Form	EpiSurveyor[7] is a mobile phone data collection application, in which you load and upload data in real time to a secure online server that can be accessed by users who have viewing and editing rights. Insights from other mobile phone surveys had indicated that a lot of respondents drop out in the early days because they had a lag period between the baseline survey and the mobile phone survey. Having realized this we wanted to create immediate engagement with the respondents. The Anchor Variable form was used to collect and send key variables to the data center. Once the variables came to the data center they were quality checked and used to contact the respondents as the Baseline survey was on going.
10	EpiSurveyor - Update Form	Just like the Anchor form, the update form was designed using EpiSurveyor. The update form was used to collect data that could monitor the progress of field work.
11	EpiSurveyor- GPS Capturing Form	We created GPS (Global Positioning System) forms on EpiSurveyor to capture GPS coordinates of the center of the EA, water points, health

| | | facilities and schools. |

2.4.2 Translation

After all the survey instruments were reviewed and revised, Ipsos Synovate Tanzania translated the survey instruments from English to Kiswahili given that the survey was going to be administered in Kiswahili.

Two independent professional translators who have experience in translating survey instruments were engaged for the translation process. Two translators independently translated the English survey instruments. The two translators then sat together and compared the translations, once they had done that they came up with final translated survey instruments. Ipsos Synovate's technical team sat with the translators and reviewed and finalized the translations. This process cleared up all discrepancies. Ipsos Synovate Tanzania then submitted the final survey instruments to Twaweza for final review and approval. Once the survey instruments were approved they were redesigned to facilitate data capture.

2.4.3 Pretesting of the Survey

The Sauti za Wananchi Pretest aimed to test just the 4 key questionnaires (HH Questionnaire, School Questionnaire, Health Facility Questionnaire& community Questionnaire). The pretest phase did not pay much attention to other parts of the SzW methodology. The pretest was carried out in 4 EAs - 2 EAs in Dar es Salaam and 2 EAs in Pwani – between the 11[th]and 16th of July 2012.

Objectives of the Pretest Exercise

1. Establish the questionnaire length
2. Test if the questionnaire is understood by respondents
3. Test if the questions have terminologies that are not understood by interviewers or respondents
4. Test the flow of the questionnaire
5. Test translations of the questionnaire
6. Test completeness of the questions and pre-codes
7. Test the skip routine and interviewer instructions
8. Assess challenges that interviewers are likely to face
9. Assess the appropriateness and relevance of questions
10. Assess interviewee bias through deliberate falsification of data

In order to get a rounded review of the questionnaire we opted to use a more detailed approach in pre-testing the questionnaires.

The questionnaires were evaluated in the stages described below:

Stage1: This was the interviewer evaluation of questionnaire by interviewer during interview
Stage 2: A short interview with the respondent to obtain both prompted and unprompted opinions from the respondent. This also included clarification of observed behavior during interview and double checking questions that we had considered problematic.

Each interviewer was required to make their own notes to share with the team members. Pretest debrief adopted a group approach. The team from each EA discussed their feedback in a group discussion for 1 day and compiled a group report.

Based on these comments the project management team from both Ipsos Synovate and Twaweza evaluated the pretest outcomes and established a way forward in addressing the comments.

2.4.4 Piloting of Sauti za Wananchi

The Pilot exercise was a mirror of the actual Sauti za Wananchi survey. The exercise was conducted in 6 enumeration areas as outlined in the table 2 below. Selection of pilot EAs was to distribute the exercise in different zones in Tanzania. Pretest had focused on Dar es Salaam and Pwani as a result of that we did not pick a pilot EA from these regions.

Table 2: Distribution of pilot EAs

Enumeration Area	Ward	District	Region	Setting
Kimandulo	Kimandulo	Arusha Urban	Arusha	Urban
Chapakazi	UtenguleUsongwe	MbeyaRura	Mbeya	Rural
Makulubu/Chang'ombe	Bugiri	Dodoma Rural	Dodoma	Rural
Katungura-Ujamaa	Usiya	Urambo	Tabora	Rural
Moma	Ziwani	Mtwara Rural	Mtwara	Rural
Nyasenga	Tabaruka	Sengerema	Mwanza	Rural

Each EA was visited by two interviewers, one supervisor and an observer either from Ipsos or Twaweza. All the interviewers who participated in pre-test exercises were incorporated in the pilot. The pilot activity took place between the 29th July and the 3rd of August 2012. Each team took about 3-4 working days to complete the activities of one EA.

Objectives of Pilot Exercise

1. Establish the number of days required to complete the exercise in one EA.
2. Establish practicability of linking the pen and paper interviews with the computer aided interviews
3. Test the listing and random selection exercise
4. Test the strategies put in place to manage attrition
   a. Distribution of mobile phones and sim cards as a tool of data collection
   b. Registration process of new sim cards
   c. Use of solar chargers to facilitate phones being on air
   d. Putting respondents in groups
   e. Use of group leaders and partners in groups
5. Assess the attrition of pilot respondents in preliminary wave 1
6. Assess use and management of reserve respondents
7. Establish any field challenges in the baseline survey that need to be addressed during the training and while implementing baseline survey.

We distributed mobile phones to our 48 randomly selected pilot respondents. To date we use these 48 respondents as our pilot respondents in the mobile phone surveys waves of Sauti za Wananchi.

3 DATA COLLECTION

This chapter outlines the data collection procedure: the training of the data collectors, field work, field work challenges, field work quality checks and preliminary data collection using mobile phones.

3.1 Training of the Data Collection Teams

3.1.1 Recruitment of the enumerators

Twaweza in collaboration with our partners Ipsos Synovate defined and prepared job descriptions before recruiting and training the data collection teams. We used the following criteria in the selection of the data collection teams from the Ipsos Synovate data base criteria:

- Experience in collecting data in studies that were similar to Sauti za Wananchi
- The ability of data collectors to interact with citizens from different social classes
- The ability of the data collectors to create a rapport with the respondents
- Track record of performance in past research initiatives
- Has attained Advanced-level Secondary education and above
- Understanding of at least one of the study regions
- Ability to work well with rural communities

For the Call Center data collectors we used the following extra selection criteria:
- Availability for the next 24 months, mainly because we want the callers to create a rapport with the respondents
- Good phone etiquette
- Ability to comprehend
- Basic computer skills

To enhance acceptability of the baseline team in the regions the data collectors were allocated regions that they are more familiar with. The matching of data collectors to regions enhances their acceptability and addresses the issue of differences in cultures.

3.1.2 Training of the Field Team

The training was carried out by the Ipsos Synovate project team in collaboration with Twaweza's team. All the trainers were experienced researchers who had taken part in the pretesting of the survey instruments as well at the Pilot exercise. The trainers developed a comprehensive training manual prior to the training. The training manual contained all the project details and at the same time outlined all the lessons we had learned during the pretesting of the survey instruments as well as the piloting of the survey

The training programmes were highly participatory with strong emphasis on action learning based on interviewers' experiences. A combination of short presentations, question to question review, discussions / exercises, demonstrations, case studies, role play, and pilot field work were used in an integrated training approach to enhance learning and encourage participation. The training was carried out in Kiswahili.

Based on the pilot training experience, we opted to have a centralized Sauti za Wananchi training in Dar es Salaam. To enhance effective learning, after every session we divided the data collection team into small groups. The training programme took a period of 7 days, that is, from the 3rd of September 2012 to 10th of December 2012. The Sauti za Wananchi training had the following 4 sessions; the core training,

the supervisor/coordinator training, the quality control training and call centre data collection team training. The coding team attended the questionnaires training session mainly to facilitate their understanding of the questionnaires.

3.1.3 Evaluation of the trainees
Evaluation of the training was carried out every day through short tests and any unclear issues were clarified before proceeding with the following day's training. The facilitators were in charge of evaluating the team that participated in this project. In addition to the daily test each member went through 2 other evaluations namely the midterm evaluation and final evaluation.

The **Midterm evaluation** was conducted at the end of day 3; during the midterm evaluation each interviewer conducted an interview in role play. The criteria of evaluating interviewers included the following:
- Ability to do household, respondent selection
- Ability to understand the questionnaires
- Following interviewer instructions
- Ability to ask the questions in an audible manner
- Ability to manage time without jeopardizing the flow of the questionnaires

The **Final evaluation** was a practical exam based on pilot interviews with other interviewers (dummy interviews). Evaluation was based on the following criteria:
- Accuracy in asking questions and recording responses
- Understanding of the skip routines
- Ability to identify the correct household and respondent
- Efficiency in conducting the interviews: Amount of time taken to conduct the interview without compromising quality
- Ability to handle non-response

The last stage of the training was a pilot exercise with the actual respondents. The only drawback to this exercise was that we did not hand over mobile phones to the respondents. All in all once the data collectors returned from the pilot we held a pilot debrief session to address the challenges that they had faced during the pilot. We used the pilot as a platform for the enumerators to share their experience relevant to carrying out the study and how they handled them. After we evaluated the data collectors we selected the Sauti za Wananchi data collection team.

3.2 Field Work

3.2.1 Field Work Preparations
In order to collect data at the household level, institutions are supposed to apply for data collection permits. Given that our partners Ipsos Synovate Tanzania applied for a research permit from the regional commissioner's office in each region across mainland Tanzania. By the time we were done with the Sauti za Wananchi training we had obtained research permits for most of the regions in Tanzania Mainland.

The final field work team comprised of 60 interviewers and 20 supervisors. The teams were organized around the old regional boundaries and the team composition was 1 supervisor and 3 data collectors. In addition to the supervisors and interviewers we had 3 coordinators and 6 back checkers. The

coordinators were in charge of two zones each, while the back checkers were overseeing the quality control of the survey.

Before the teams travelled to various regions to implement Sauti za Wananchi, the following procedures were implemented to ensure successful management of fieldwork:
1. A logistical plan for fieldwork detailing transport, subsistence, safety and security concerns and precautions implemented
2. Fieldwork manual, spelling out field work procedures and substitution rules in line with the methodology
3. Quality control measures
4. Daily progress reports including completion of required number of interviews and status of quality control status
5. Progress reports to a technical committee at various stages of fieldwork

Given the size of Sauti za Wananchi as well as the importance of being able to check and learn from implementation practice among the data collection teams in Sauti za Wananchi, the study was not rolled out across the country all at once. It was rolled out in the following phases:

1. Dar es Salaam Field Roll Out- In 14 Dar es Salaam EA's
2. Mwanza Field Roll out- In 6 Mwanza EA's
3. Nationwide Field Roll out

After the Dar es Salaam and Mwanza field roll outs the technical teams from Twaweza and Ipsos Synovate held a debrief with the teams and addressed all the challenges experienced during the process.

3.2.2 Field Work Activities
Below is a sequential list of all the activities that took place in each EA we visited in the survey as well as the outcomes of some of the activities:

1. **Teams travel to the target EA**- Each of the data collection team had a list of the EA's they were going to collect data in. For efficiency and effectiveness the teams developed route plans which were reviewed and approved by Ipsos Synovate's technical team. The route plans indicated their movement from one EA to another.

2. **Contacting the area leaders and conducting the community interview**- Once a team arrived in the EA (Enumeration Area) they went straight to the community leaders to present their research permits as well as to seek permission and support in rolling out Sauti za Wananchi. At the same time they conducted the community questionnaire, which also measured the mobile phone network reception in EA.

3. **Checking the EA borders and verifying network reception in the EA**- Once the teams were given permission to carry out data collection in the EA they gave the community leaders the EA map and explained to them that the EA map indicates the area in which they want to work. The team was then taken around the EA and shown the boundaries of the EA at the same time the team accessed network reception in the EA. In the event that area lacked network coverage or had a poor network signal the team would report the case and we would arrange for the substitution of the EA. For areas with network coverage we proceeded.

Figure 4: Proportion of EA's without network reception

12%

■ No Network

■ Areas with Network

88%
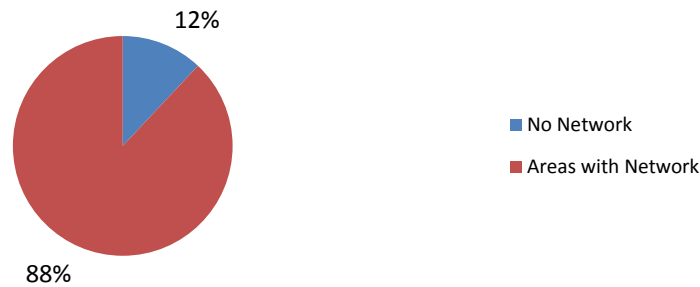
A total of 24 out of 200 EAs (12%) sampled had to be replaced because of insufficient network reception as shown on figure 4.

4. **Listing all the households in the Enumeration Area-** Once the team inspected the boundaries they listed all the households in a listing form. The listing form captured the name of the household, number of people who live in that household and whether the household has a member who owns a mobile phone.

5. **Selecting the Participating Households-** Once the team had listed all the households in the Enumeration Area they would take time to explain to the community leader the random selection of participating households. For the selection process to be free and fair the team would then involve the community leader in the random selection of participating households. They started by randomly selecting the 10 Main Households from the full EA list and then they randomly selected 2 reserve households from a list of households that had a mobile phone owner, these household were backup households for any dropouts.

6. **Selecting Participating respondents within selected households-** Once the team arrived at the household they first and foremost sought the consent of the head of household to randomly select one of the household members to participate in the exercise. In the event that they were allowed to continue they would list all household members aged 18 years and above and randomly select one of the adult household members to participate.

7. **Administering the Household Questionnaire**- Once we had identified our randomly selected adult respondent, we went ahead to interview the identified respondent. The questionnaire had several sections and for those household related sections the respondent was allowed to ask for assistance from one of the household members.

8. **Distribution of Mobile Phones to respondents**- At the end of the interview we distributed mobile phone to the 2000 respondents and a startup package of Tshs. 1,000. Mobile phones were distributed to all the respondents, those that had a mobile phone and those who did not have a mobile phone. This ensure representativeness of the sample in households with a low income.

9. **Connecting the household respondents to the SzW Call Centre**- Immediately after the distribution of mobile phone, we called the SzW call center and created the 1st mobile phone

connection with the respondents. This was a double check on the network reception at the household as well as a mechanism of introducing the respondents to the call center. This exercise was a success in all the 2000 households, an indication that we could contact all the households from the call center.

10. **Sending Anchor variable data using EpiSurveyo**r**-** Other mobile phone surveys as well as our pilot mobile phone survey showed that during the time between the baseline survey and the start of the mobile phone surveys, there is a high possibility of losing respondents. Based on this observation we were interested in creating an "overlap" between the baseline and mobile phone survey. That is, we aimed to establish a connection between the call center and respondents during or immediately after the household visit and to keep contacting the respondents during baseline phase in so-called preliminary call back waves. We had identified anchor variables that could help us in the merging of the baseline data to the mobile phone data. The anchor variables that we identified were:
    - Name of the respondents
    - Telephone number
    - Household ID
    - Unique EA ID
    - Questionnaire field serial number

Once the interview was completed the interviewers sent anchor variables to a data point from which the data was downloaded and used in the scripting of the preliminary mobile data collection rounds.

11. **Handing out of the Sauti za Wananchi Popular Booklets-** We had learned from our the SzW pilot that mobile phone panels and the distribution of mobile phone among the respondents was new and it raised question regarding the approach. For this reason we developed a popular cartoon booklet named Sauti za Wananchi, with the intention to answer many potential questions. We distributed the booklet at the household as well as in neighboring households.

12. **Administering the Health Facility and School Questionnaires-** This exercise was performed by the head of the field team (supervisor). It was carried out throughout the data collection time in the enumeration area. The facility interviews took place in a facility which was inside or nearest to the enumeration area.

13. **Respondents convene for Group Meeting in the EA-**The success of a mobile phone survey mainly depends on the ability to continuously communicate with the respondents. As result of that we developed the group meeting as a strategy which could promote the tracing of respondents in the 200 EA's we visited in Sauti za Wananchi. Below is a list of the objectives of the group meeting;
    - Explaining the Sauti za Wananchi approach to the respondents
    - Responding to questions
    - Creating an environment in which the respondents could familiarize with each other
    - Selection of the SzW Group Facilitator / Leader who would help us in the tracing of respondents as well as to help us in any other SzW activities within the EA.
    - Identification & paring of neighboring respondents in the EA, this was done in order to help us in the tracing of respondents through their neighbors.
    - Distribution of mobile phone solar chargers

14. **Sending update forms-** Once the team had completed all the above activities the team would use EpiSurveyor (a mobile phone data collection application) to send their update report. This form helped us in tracking the teams as well as the progress of field work across the country.

3.2.3 Field Work Quality control

A number of quality control procedures were implemented to ensure successful fieldwork.
Each supervisor was responsible for questionnaire checking. Any issues that needed clarification were corrected by returning to the respondent who was interviewed. Questionnaires were checked within the same day of interview and before moving onto the next village. In addition, coordinators and supervisors accompanied 10% of the interviews per interviewer to ensure that they did not lead the respondent by the way they were asking questions.

Aside from the supervisors, the project had a quality control team comprising of back-checkers and a Project Manager. The quality control team operated independently of the field team. The quality control team conducted a 9% back-check of each interviewer's work. Back checkers verified that the interview took place and obtained an estimated length of interview.

3.3 Data Collection using Mobile Phones

### 3.3.1 Preliminary Mobile Data collection

Data from the Listening to Dar mobile phone survey and the Southern Sudan mobile phone survey as shown in figure **5 and 6** respectively showed that response rates in these surveys was around 70 percent during the first mobile phone call wave.

Figure 5: Listening to Dar
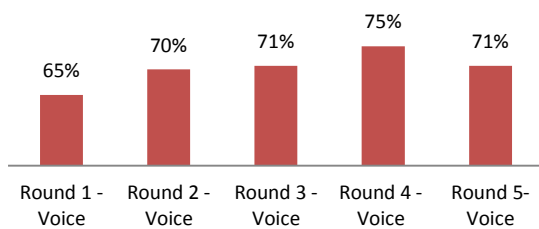
Source: Listening to Dar

Figure 6: S. Sudan Mobile Phone Survey
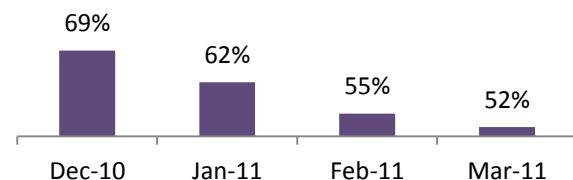
source: South Sudan Experimental Phone Survey

One of the possible reasons for the non-response in the first call round after the baseline is the lag time between the baseline survey and mobile phone survey. To engage with respondents using the phone at an early stage it was decided to start calling respondents already during the baseline survey. Between the baseline interview and the first "real" call wave (planned for end of February 2013) four phone calls were planned for each respondent. The first call, "CATI 0", was done at the moment the enumerator was still in the household or very shortly thereafter: this was merely to establish first contact between call center and respondent (see point 9 in Section 3.2.2). Beyond this first contact three so-called "preliminary waves" were scheduled. The questions for these preliminary waves came from three sections which were removed from the baseline questionnaire.

Ipsos Synovate used the CATI (Computer Aided Telephonic Interview) application to collect data at their call center. Computer Aided Telephone Interviewing (CATI) technique is an interactive front-end computer system that aids interviewers to ask questions over the telephone. The answers are then keyed into the computer system immediately by the interviewer. CATI was picked because it enhances efficiency and data quality at the call center.

- Allows the interviewers to perform multiple tasks of interviewing, data entry and simple coding simultaneously.
- The interviewers key the information directly into the computer system. As a result, data entry as a separate process is no longer necessary.
- Most of the questions are in multiple-choice format, so that the CATI interviewer needs only to point and click on the right answer. The answer is then translated directly into a code by the CATI system and updated in the database

Advantages of using CATI at the Call Centre
- Automatically controlling questionnaire branching
- Conducting on- line editing for reconciliation directly with respondent, scheduling future calls
- Standardized sampling and call-back procedures
- Computer-controlled
- In-process data cleaning and validation
- Tabulations and the data is available sooner
- Improve operations during the interviewing process
- Full control during interviewing
- Automatic quota counting
- Maintain control throughout the interviewing process
- Automatic record-keeping

The first preliminary wave was carried out as field work was ongoing, while the second and third waves were carried out after baseline data collection was complete. Figure 7 below indicates that the response rate in the first 3 preliminary waves has been above 90%.

Figure 7 : Response rate in Sauti za Wananchi
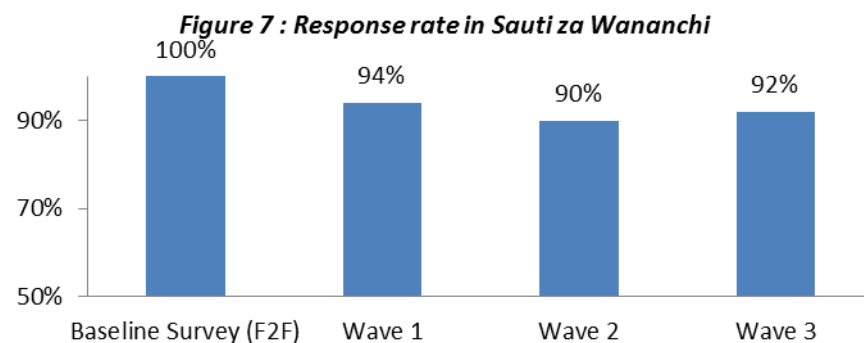
4 DATA CAPTURE AND PROCESSING

This chapter will outline the how the data was processed, analysed and how it will be reported.

4.1 Data Processing

The baseline questionnaires were coded by the research firm. The code list was extensively reviewed by a multilingual research specialist to ensure that the translations into English were accurate and that no meaning was lost during interpretation. In addition any re-coding instructions and were compiled and shared with the data analyst to implement during data preparation.

Baseline data capture was processed using optic ink character recognition technology (scanners). This technology offers remarkable accuracy and speed in data capture. The questionnaires were designed in a formic program to make them compatible with this technology. Baseline data capture was done by the research house. Prior to baseline data capture, the physical baseline questionnaires were received by the research's scanning supervisor who checked and verified that they were in good order before logging them in a questionnaire log book, located in the scanning room. To ensure that data was correctly captured, 15% of the questionnaires were re-scanned and 10% were physically checked for inconsistencies.

Before the baseline survey started the data analyst compiled a data cleaning program using the SzW pilot data. Once baseline data capture (scanning) was completed and all the verifications done, the data was exported using the formic export module into SPSS (Statistical Package for the Social Sciences). During cleaning, all errors identified were discussed and resolved with the project manager and field manager. All decisions made by the data analyst were documented in the baseline data error report that came together with the data.

After data cleaning the frequencies were checked to ensure that the sample was achieved. After data validation the data analyst sent the data to the project manager who reviewed the data before sharing it with the Uwazi at Twaweza team for validation.

Data quality at Uwazi is extremely important. If data collected from Sauti za Wananchi is meant to inform policy then accuracy is a priority. Once the data is received by the Uwazi team, it is exported from SPSS to STATA. After that we randomly selected serial numbers of 0.5 % of the observations (Baseline Questionnaires) and checked if the raw data was consistent with the actual data. After that we checked the quality of data section by section and where needed sought clarification from the research firm.

4.2 Reporting

Once the data has been quality checked and validated by *Uwazi*, they will use the information to prepare brief reports (2-4 pages), which will be put out for use by journalists, parliamentarians, decisions makers, researchers, and other interested parties. Hence, if through mobile surveys information was collected on (i) which water source people usually use, (ii) whether this source was functional last week and (iii) what the combined waiting and travel time was to collect water, then a report will be produced presenting:

- Information (%) on type of water sources, whether sources are functional and average travel and waiting time for rural and urban areas;
- Percent changes in these variables since the *baseline (or revisit) survey*

- Information on these variables broken down by levels of education of the head of household, household wealth or distance of the village to e.g. the district center.

The information would be presented in an accessible format (graphics; maps) and may be complemented with information from secondary sources on e.g. public spending on water; relation between water-borne diseases and access to clean water or changes in water tariffs. Case studies presenting information collected by having a longer phone conversation with selected respondents could also be reported.

All statistics published are produced using sampling weights that "translate" our estimates from the SzW sample to the whole relevant population. That is, the estimates are for the population of Tanzania Mainland.

4.2.1 Data access

Sauti za Wananchi will ensure that the respondent identity is kept anonymous. Otherwise data are made available to the public through the *Twaweza* website[8] where the data can be downloaded in raw form for further analysis. Furthermore cross tabs and graphs based on baseline survey data and the mobile phone data collection waves will be presented.

It is envisaged that immediately after *Uwazi* has analyzed and published, the data is put in the public domain and made accessible free of charge. *Uwazi* is committed to putting its data in the public domain within several weeks of collection.

---

[8] http://www.twaweza.org/sauti

5 CHALLENGES AND LESSONS LEARNED

This chapter outlines some of the challenges encountered and the lessons we learned during the pilot and implementation phases of Sauti za Wananchi.

5.1 Pre-test and pilot phases

1. **Pilot Training**

   The Sauti za Wananchi approach comprises a lot of activities during the EA visit in comparison to other household surveys. Training activities need to be distributed to avoid many activities being trained on the last day. Trainings for a mobile phone survey that will use an approach similar to Sauti za Wananchi have to plan for more training days, between 7 to 10 days depending on the background of enumerators.

2. **Selecting Participating Households**
   - It was noted that once the community leaders identified that mobile phones were distributed they tried as much as possible to ensure that the selection goes to their favour. It is advised to inform them as well as to involve them in the random selection of participating households.
   - Data collectors have to double check network reception at the household level. It is advisable to have stable mobile phone signal in households because it is the only place we are assured the respondents will visit during the day. If the teams opt to have reserve respondents they ought to identify households with a mobile phone owner using the listing form.

3. **Making the initial call to the Call Center**
   - During training, the callers and interviewers must be trained together except for training days that will focus on questionnaires. CATI procedures will be given a dedicated session to ensure that this is done. Data collectors at the call center have to understand the methodology because the questions they are asked are related to the methodology.
   - The call center supervisor to be drawn from the pilot team. This will ensure that he or she understands the whole survey procedure and can be able to connect the baseline survey and to the mobile phone survey.

4. **Distribution of Mobile Phones, Solar Chargers and Sim Cards**
   - Distribution of mobile phones without the consent of the head of household may cause a conflict of interest between the head of household and respondent. At times it caused gender based violence against some of the female respondents.
   - The distribution of mobile phones can lead to the team being associated with groups that are perceived to be evil in society. This is brought about by the respondents not believing in free things.
   - Registration of sim cards cannot be done on the ground because you are not assured to be back to town in time for the actual registration and some respondents don't have ID cards as well as pictures required for one to be registered.
   - Some of the respondents get suspicious when they are registered with the help of our team. They preferred to do it on their own.
   - Mobile phone solar chargers are crucial in rural areas because of the low electricity penetration.
   - It took the respondents some time to figure out how they would use the solar chargers. As a result of that we considered to use demonstration while training the respondents and at the same time we also identified a respondent who understood the process better, so we used them to explain to the rest of the respondents.

- Some of the respondents are illiterate and as a result they cannot sign agreement forms. One should consider reading the agreement forms to the respondents and thereafter they can use their finger prints.

5. **Group Meeting**
   - The group meeting at the end of the EA visit was found to be an important element for a number of reasons: 1) an EA group facilitator was chosen from among the respondents by voting; thus a point of contact between the survey and the respondents was established – this would prove very useful when tracing respondents; 2) solar chargers could be distributed and use demonstrated; 3) any questions on the SzW survey and use of hardware could be raised.
   - The data collection team has to have a well-defined agenda/ program for the group meeting to avoid any form of confusion.
   - The group meeting should not take a long time and it should be participatory.
   - Carefully select the group meeting hours and venues to reduce low turn outs.
   - Given the questions we were asked, the group meetings should spend a lot of time addressing the following informational gaps;
     - Phone and Solar charger handling
     - Carrying the phone in the event of respondent travel
     - Use of the phone for personal activities
     - How many times the respondents will be called
     - How long the mobile phone interviews will last
     - Review of issues covered in agreement form
     - At what point they may be required to carry out certain tasks
     - Frequency of receiving incentives in form of airtime
     - Respondent to inform the people whom they have given as alternative numbers

6. **Pilot Preliminary Mobile Phone Waves**
   - Mobile Phone waves are supposed to be broken into two; Intensive calling and three days for tracing the respondents who have not responded.
   - The role of the group leader in respondent tracing is a large one and as a result of that there is need to consider an incentive for group leaders. They are using their time and money (mostly airtime) to trace the respondents who cannot be traced. This will keep their morale high.
   - The calling time should start at 7.00am and end at 9.00pm. This will help to capture respondents who can only be traced early in the morning and late in the evening.
   - For effective management of the call centre, we noted that the alternative numbers are very important and thus they should be easily accessible to the callers. As a result of that, we are supposed to create templates that contain all these details.
   - Before the team call in preliminary waves or in the actual rounds, there is need to harmonize the initial call data and the mobile phone (EpiSurveyor) data. Thereafter the callers should attempt to call the respondents through their preferred number.

5.2 Challenges & Lessons learned during the Baseline Survey

1. Association of the survey with Freemasons

During field work period there was information going round about Free Masons. There was also a radio program that featured a discussion on the Freemason movement. There are a lot of debate about what Free Masons is and what it is not. Religious leaders have strongly condemned the movement and advised their members to avoid anything associated with it. There is a lot of negative associations towards the movement; death of children, sucking blood; instant wealth and death of members. This has created fear in the community nationally towards anything that is associated with Free Masons.

Collecting data through mobile phones is new to the community. Community members have very little understanding about this methodology. The little time that team was on ground was not adequate to educate everyone. Therefore, they focused only on the participants. As a result after exiting the survey, there was a lot of pressure on participants by immediate family members and other community members to leave the survey on suspicions of Free Masons Activity. These are some regions where we experienced this challenge; Dodoma, Singida, Arusha, Kigoma, Mtwara and Geita.

As field work was on going, the number of cases kept growing. After realizing this opted to discuss the issue opening during the group meeting as well as to prepare stickers that would show that the phones were distributed by Twaweza. This strategy was successful in minimizing the impact of this association.

2. Gender norms and phone ownership

Mobile phone is a valued asset especially in the bottom market. Initially the head of household was briefly explained to the survey to allow his household to participate but there was no detailed consent form. The survey tool incorporated respondent consent form only. In Dar es Salaam (first region to collect data), there were three cases of domestic violence because the female respondents had agreed to use the phone before approval by spouse. There were also ten drop out cases in Dar es Salaam because the partner had forced the respondent to withdraw. The following strategies were applied and succeeded to minimize attrition.

- After evaluating the situation, we noticed that we needed an physical assurance that the head of household had accepted consented to the participation of a household member. That led to the development of head of household consent, which ensured that the head of household was informed and has consented.
- For all female respondents after giving the respondent the phone the interviewer talked with the head of the household where possible

3. Network problem.

For the success of a mobile phone survey network reception is at the heart of the survey. As a result of that we had decided not to include EA's with network problems. We had to replace 24 EA's out of the 200 randomly drawn EA's.

4. Effect of stronger network in neighboring countries

The data collection teams noticed network interruptions in EA's that are close to national borders. This was experienced in Kilimanjaro and Mara. In these EA's the network of the neighboring countries is

stronger and as a result of that the network frequently switches from the local network to the foreign network.

5. Minimal role of group leaders and partners in urban areas
During group meeting, it was noted that there were challenges in making partners bond in urban areas. They did not know each other. This attrition strategy may not be very effective in urban areas.

6. Poor comprehension of mobile phone surveys by the community
Group meetings noted that a lot of questions from respondents were around the approach of collecting data using mobile phone survey. This being a new concept has not been fully understood. There is a lot of concern around confidentiality and type of questions. This pointed to the fact that the respondent may change their sim cards. Attrition management strategy must bear this in mind.

7. Possibility of diversion of the phone
Respondents were persistent on what would happen if a phone got lost. The team insisted that there shall be no replacement of the phone. For lost phone an evidence of the loss will be required. They also took the respondent through the agreement form the second time.   Respondents were encouraged to take care of the phone as ownership will be transferred at the end of the survey.

5.3 Preliminary Mobile Phone waves

1. Time taken in tracing respondents
The interviews move very fast first three days of interviews (after achieving about 50-60%). Thereafter, interviews slow down because of the time the call center interviewers have to take tracing the respondents. Our analysis of the first 2 waves have led to the identification of respondents who are hard to trace. There are respondents who have been found to be difficult to reach in each wave.
In the future we intend to set aside a team which will be tracing this from the being of each round resulting in a quick turnaround.

2. Respondents changing telephone lines
About 15 respondents have changed mobile phone lines/ numbers. This contributes to non-response because in most cases they don't report the change of mobile phone lines/numbers. The respondents do this mainly because they are worried that their mobile phones are being tapped.

The call center team use all the tracing strategies put on the ground to trace this respondents and we have reassured them that we are not tapping their phones and moving forward we will call them through their new numbers.

3. Low education levels
The call center interviewers are having a hard time interviewing very old respondents as well as respondents who are not educate. The respondents take a lot of time to comprehend a questions and most of the time they require additional information before they can respond to a question. The respondents ask questions such as" *why are you asking details about my children?".* This increases the interview length but the Interviewers have been taught to be patient with respondents.

4. Poor understanding of the survey

The call center team has realized that many respondent lack a clear understanding of the survey. Some of this cases have been discovered among respondents in Mbeya and Ruvuma. For instance, one of the EA's all respondents switched off the phones. In the process of trying to trace the respondents we contact a day time contact person and he brought to our attention at the respondents were not sure of what was happening and they did not know what the study is all about. Fortunately the person understood us and he then explained to the respondents what the study was all about and they returned to the panel.

5. Freemason beliefs

The study was associated with negative activities that the Free Mason movement is perceived to be doing. The study faced a lot of this challenges during the baseline data collection and it reoccurred a lot in the first mobile phone wave. It was more difficult because it was a education module that sort to understand the participation of parents on education. Some of the parents thought that we had a negative scheme against their children.

Once the call center interviewers took time to make it clear that the study was about collecting data and that the study has nothing to do with the free mason movement the problem has declined. It was also noted that the fear is being driven by those who did not receive the phone. For those who had dropped because of this fear some went back for their phones.

6. Drop out of respondents

To date 75 respondents (3.75% of the sample) have dropped out of the Mobile Phone Survey. Majority of those dropping out are female. 38 respondents (1.92% of the sample) have been replaced using the reserve, although the call center team is facing challenges in tracing reserve respondent. We are experiencing more problems in urban areas, this is because people in urban areas live an independent life and it is very difficult for some of the group leaders to locate reserve respondents. The call center team is aggressively tracing the respondents through the alternative numbers they gave and once they are traced they will be linked with the group leader.

7. Death of respondents

Two respondents (one female and one male) have passed away. The female respondent from Kilimanjaro withdrew from the survey and returned the phone to the group leader, one week before she passed on.

The other respondent was the group leader in one of the Rukwa EA's. He had also participated in preliminary wave 1.

8. Confiscation of phone by spouse

In Kagera, the husband of one female respondent has taken over the phone. He has denied the call center team to interview his wife. Every time the call center call the number, he insists that he should be interviewed and not the wife. However, according to baseline it is the wife who participated in the survey. Other respondent in the area has expressed that he is stubborn.

9. Poor Network

We experiencing network issues one EA in each of the following regions
- Geita
- Kigoma
- Geita

To address this problem the call center interviewers use the few respondents who are reachable to trace the rest for interviewing. This causes a lot of fatigue for the respondents who are tracing the rest.

10. Lack of cooperation in attrition management
Urban EAs especially in Dar es Salaam have a problem in tracing respondents through partners or group leaders. In these cases interviewers have to keep trying until they get the respondent. In of the Manyara EA's 5 respondents have not been reached preliminary wave 1. The others who can be reached are not cooperative with the call center team in tracing them. We are also experiencing the same problem in Rukwa but unfortunately the group leader died.

11. Lack of cooperation by respondent
Some respondents are reluctant to respond to call center interviewers. This case has been experienced with one respondent in Mbeya and another one in Rukwa. We are also having a hard time with one other respondent in Manyara, who once we call her she hands the phone to someone else to respond. We have considered replacing them through the group leader.

12. Replacement of respondents by group leaders
In 7 different cases the group leaders have replaced respondents on their own without consulting us. Fortunately in the 5 cases they replaced the respondents with reserve respondents but in 2 cases they gave the phones to their friends and as a result of that we don't have baseline data for those respondents. We are reverting the decision in those 2 cases and have sent word to the group leaders that they should not replace respondents without consulting us.

13. Inability to use Mobile Phone Solar charger
Although the respondents were educated on how to use the mobile phone solar chargers during the baseline, there is a persistent problem of inability to use the solar charger in many EAs, mainly rural Ea's. As a result of that some of the respondents are not reachable because their phones are switched off.
In such cases the call center interviewers educate the respondents on phone how to use the mobile phone solar charger. Some of the respondents are able to understand over the phone and in some cases we are forced to use the group leaders to explain it to them.

14. Language barrier
Some respondents in the lake region prefer to speak in vernacular (Kisukuma), even though they know Kiswahili, the respondent prefers to speak in vernacular. The breaking of ice for such respondent becomes very difficult for CATI interviewers who cannot share in their language.
Since the respondents are spread across EAs, where an interviewer experiences such a challenge there is an interviewer who is competent in Kisukuma. She breaks the ice using vernacular. Once rapport is established they switch to Kiswahili.

15. Lost / Sold out phones
In total 5 respondents have been reported loss of phones, 3 have sold, 1 gave to the husband and 1 confiscated by the husband . This constitutes 0.05% of the sample. These are from different EAs. Only one respondent out of the 5 respondents has another phone. The others don't have phones and have to be reached through group leaders. One respondent confessed that she had problems and that is why she sold the phone to get money. Another respondent in Mtwara used it as collateral to get a loan and is unable to redeem the phone.

Annex 1: Sample Size Calculation

We use clustered sampling of households. Assume a discrete indicator (e.g. household used bed net for child yesterday : yes/no), with a binomial distribution.

 Formula: var(p) = p*(1-p) D / n [without fpc] where D is design effect.

**NB : D = 1 + (b -1)*roh where b is nr of hhs interviewed per cluster and roh is "rate of homogeneity". Value of roh will be higher for variables that have high spatial correlation such as access to public infrastructure. High means 0.3 or 0.4; low is 0.1 or lower, eg for mortality, marital status, preferences.

Basis for the calculation is a set of parameters: 1) the required precision is a confidence interval (CI) of 0.05, that is plus/minus 5 percentage point; 2) 10 households interviewed per cluster; 3) rate of homogeneity of 0.3 or design effect of 3.7; 4) p set at 0.5, the value that maximizes variance. Solving for number of clusters: c = p*(1-p)*D / (var(p)*b) = 148.

		base case
Set nr of hh per cluster = b =	b	10
Assume roh = 0.3 (high) =>	roh	0.3
Design effect D is then :	D	3.7
* set required CI (precision) at	percent interval	0.05
* confidence interval = 1.96*s.e. => required s.e. ~ 0.05 / 2 =	required s.e. (s)	0.025
i.e. required var(p) =	var(p)	0.000625
* set p at max value		
P		0.5
1-p		0.5
* solve for nr of clusters c : c = p*(1-p)*D / (var(p)*b)		148