
Assessment of an mHealth Initiative to Improve Patient Retention

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Acronyms

Antiretroviral treatment	ART
Community-based organization	CBO
Clinical HIV/AIDS Services Strengthening in Sofala, Manica, and Tete	CHASS SMT
Demographic and Health Surveys	DHS
Provincial Directorate of Health	DPS
Focus group discussions	FGDs
Monitoring and evaluation	M&E
Community Care Program	PCC
U.S. President's Emergency Plan for AIDS	PEPFAR
People living with HIV	PLHIV
U.S. Agency for International Development	USAID

Key Terms

Busca activa: Search system in which community health workers look for patients in the community based on lists generated at the health facility of patients who have failed to return to the health facility for medicine pick-up, lab tests or schedule appointments.

Busca: An individual *busca activa* search done by a community health worker to look for a patient in the community in order to encourage them to return to treatment.

Executive Summary

Background: In Mozambique, *busca activa* or “active search” complements facility care for people living with HIV (PLHIV). When patients in treatment fail to return at appropriate times for consultations and/or resupply of medication, community-based organizations (CBOs) linked with the health facility deploy community workers (known as “*activistas*”) to locate those patients, counsel them and assist them in returning to the facility to recommence treatment.

This *busca activa* system typically requires *activistas* to travel long distances to receive the names of patients in their community, return to their communities to search for the patient, and then once again return back to the health facility to complete the search – a search which often leads to dead-ends or difficulty reaching the patient. To improve the *busca activa* process, Clinical HIV/AIDS Services Strengthening in Sofala, Manica, and Tete (CHASS SMT) and Community Care Program (PCC) collaborated with the technology firm Dimagi on a pilot in Beira, Sofala Province using mobile phones to follow up on patients who have defaulted on their antiretroviral treatment (ART), have missed appointments or lab test dates. The use of such mobile devices as mobile telephones for public health purposes is often referred to as mHealth.

Study Purpose: MEASURE Evaluation aimed to answer the following questions based on stakeholder (i.e., CHASS SMT, PCC, USAID/Mozambique) information needs:

1. What was the process for rolling-out the mobile telephone approach? How was the approach perceived by key informants and how did the process change throughout implementation?
2. How many defaulted patients were searched for and returned to treatment during the pilot? How long did the process take? and
3. What was the overall cost of the pilot? What was the cost per person searched for and per person returned to treatment in the first two months of implementation?

Methodology: In order to answer the questions, MEASURE Evaluation conducted three separate activities:

1. a qualitative time series study of the mHealth roll-out with key stakeholders implementing the mHealth intervention;

2. secondary data analysis of mHealth *busca activa* variables such as the time between when a patient defaults, when a patient is searched for, and when they return to the health facility; and
3. expenditure analysis of the mHealth intervention based on eight months of start-up and implementation.

Findings: Despite delays in implementation due the widespread energy shortages, within four months the pilot was fully up-and-running.

Qualitative time series: The use of mobile phones for *busca activa* was viewed favorably by stakeholders who indicated that it facilitates their ability to reach defaulted patients in a timely manner. Activistas valued use of their phones, particularly for reaching out to patients and hospital-based CBO staff by telephone. They reported that the use of phones helped save them time and allowed for greater client privacy. Activistas utilizing the mobile phones had difficulty adapting to using a smart phone, although most activistas were able to use the phones within the time frame of this study. Respondents indicated the importance of ensuring sustainability of the mHealth activity, given there is no permanent technology expert to manage the database or repair phones, nor any person responsible for analyzing and reporting back on data collected through the system.

Secondary data analysis: Three hundred and eighteen individuals were searched for with mobile phones between March 1, 2014 and July 15, 2014. On average clients were 29 years (sd=9.5) and 79% (n=251) of those searched for were female. Of the 317 searched for, 269 (85%) eventually returned to the health facility after activistas searched for them. The longest delay between a patient defaulting and returning to the health facility lies between the default date and the date the search for the client started. Of the 317 individuals searched for, there was an average of 187 days (sd=176) or 6.2 months, during this timeframe. There was wide variation overall in the amount of time it took from default to the time being search for – with a reduction over time in the proportion of patients who defaulted in 2012 and 2013 throughout the life of the pilot. This means that within the first four-and-a-half months of pilot implementation, the backlog of defaulted patients from 2012 and 2013 were cleared out, so that by July 2014 *activistas* were only searching for patients who have defaulted within the first half of 2014.

Expenditure Analysis: Five months of start-up costs and three months of implementation (from September 2013 to April 2014) was U.S. \$52,346. Costs were concentrated during the start-up phase. The cost per person searched using the mobile phones was U.S. \$35.57, while the cost per person searched for and returned to the health facility by May 31, 2014 was U.S. \$36.51. Comparing the direct cost of the laboratory diagnostics to initiate a patient on treatment in Mozambique at U.S. \$40,¹ one could consider this initiative to be cost saving.

Recommendations:

1. Use simpler, more basic phones for quicker uptake of technology at future sites and to mitigate interruptions due to electricity outages (as batteries on non-smart phones last longer).
2. Determine the procedures and protocols for use of mobile phones to call patients ahead of visit.
3. Expand to a rural site to assess viability in this setting before full scale-up.
4. Consider staffing needs for cleaning files for *busca activa* at other large health facilities.
5. Collect baseline *busca activa* data (i.e., length of time between defaulted and search for) prior to implementation at other sites in order to be able to assess whether more patients are reached with mobile-phone based *busca activa*.
6. Ensure someone – preferably at the CBO level – is trained to fix phones with minor technological problems to ensure sustainability of intervention.
7. Utilize *activistas* and CBO leadership from Munhava to train future sites for cost savings.
8. Ensure program or health facility has capacity to access the CommCare data, assess data quality, and merge/analyze data as needed.
9. Utilize budget tracking template to track mHealth expenditures going forward in order to further develop the body of evidence on mHealth cost work and better understand cost to scale up.
10. Include reasons why patients are defaulting from care in database to collect important information to guide future interventions to improve retention in care.

¹ Internal calculations based on 2012 *Central de Medicamentos e Artigos Médicos* (CMAM) commodity prices.

Background

Effective treatment of chronic conditions such as HIV requires clients to return periodically to a treatment center for resupply of medications as well as for check-ups and laboratory tests. Failure to return at scheduled times compromises treatment effectiveness and in the case of HIV, can even lead to antiretroviral treatment (ART) resistance, lower retention in treatment and increased mortality among patients. Mozambique has one of the highest HIV prevalence rates in sub-Saharan Africa (11.5% for men and women aged 15-49 [AIDS Indicator Survey, 2009], with 21 % of households having a person living with HIV/AIDS [PLHIV] [AIDS Indicator Survey, 2009]).

Busca Activa

In Mozambique, *busca activa* or “active search” complements facility care for PLHIV. When patients in treatment fail to return at appropriate times for consultations and/or resupply of medication, community-based organizations (CBOs) linked with the health facility deploy community workers (known as “*activistas*”) to locate those patients, counsel them and assist them in returning to the facility to recommence treatment. Patients are considered as defaulters on their ART medication if they fail to collect their medicine from between 0 and 59 days, after which they are considered as lost-to-follow-up.

The *busca activa* system remains a fairly ad-hoc system throughout the country – with different processes and procedures depending on the health facility. In the location where this study took place – Munhava Hospital in Beira city, Mozambique – there are two U.S. Agency for International Development (USAID)-funded projects supporting *busca activa* through one CBO called Kugarissica. Clinical HIV/AIDS Services Strengthening in Sofala, Manica, and Tete (CHASS SMT) is a five-year USAID-funded health system strengthening program operating in the central region of Mozambique. At Munhava hospital, it employs four *activistas* whose primary task is to conduct *busca activa* for the hospital, and a community case manager (in Portuguese – *gestor de casos*) who is responsible for assisting the health facility in compiling lists of individuals who have defaulted and are in need of community follow-up (or *busca activa*). The community case manager plays a critical role as the health facility currently does not have the capacity to search through all its files and compile lists of defaulters for the *activistas*.

The Community Care Program or PCC (*Programa de Cuidados Comunitários*) is a five-year USAID-funded program operating at the community level in seven of the country's 11 provinces. It works through CBOs to provide a family-centered, community-based approach to mitigating the impact of the HIV/AIDS epidemic. Specifically, the CBOs involved in implementation provide home-based care to PLHIV and community care to children affected or infected with HIV and pregnant women who are pre/post-partum. They have also taken on *busca activa* as an additional, non-primary component of the workload of the *activistas* working for each CBO. In Munhava the CBO Kugarissica employs 20 *activistas* under the PCC program, all of whom have some *busca activa* clients assigned to them.

Prior to the intervention and study described in this report, the community case manager was working with clinic staff to compile the list of defaulters. That list – which included the name of the patient, address and contact information, the reason for the search – was then copied and distributed to the *activistas* from CHASS SMT and PCC that would visit the clinic. The lists were typically based on where each *activistas*' service provision coverage area was. While CHASS SMT *activistas* were coming to the clinic three times a week to pick up the list of defaulters, PCC *activistas* came less frequently, as this was not their primary duty.

Once an *activista* had the name and information for the patient, their role was to locate the patient if possible and then counsel him/her and provide them with a referral to the health facility. The patient would provide the form to the community case manager who would support and guide them through the steps needed to return to treatment.

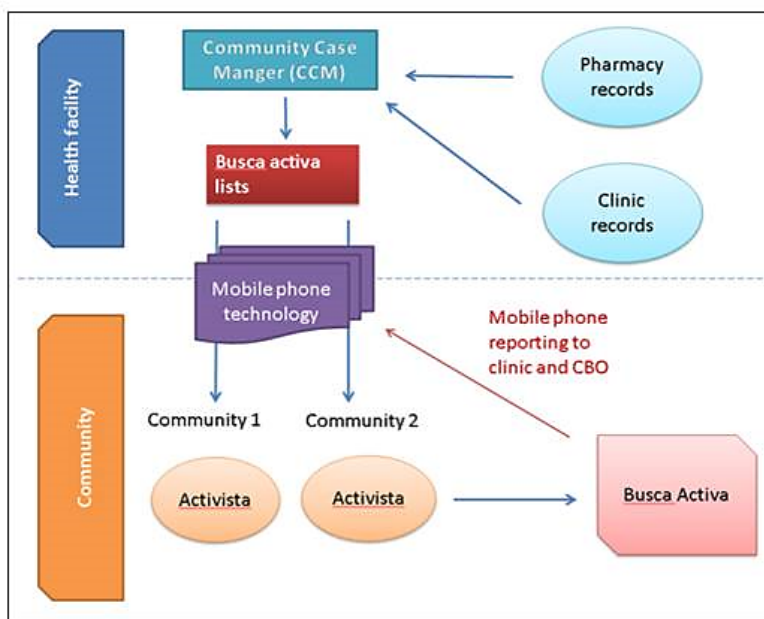
At the end of each month, *activistas* would report on the number of patients for whom they conducted *busca activa*. This information – particularly how many patients had returned to the health facility and their age and sex – was also recorded in health facility registers.

This *busca activa* system required *activistas* to travel long distances to receive the names of patients in their community, return to their communities to search for the patient, and then once again return back to the health facility to complete the search – a search which often led to dead-ends or difficulty reaching the patient. Given this, project staff recognized there was a time lag in when a person was identified as defaulting, when the *activista* arrived at the health facility and

received the name of the patient, and when the person was located in the community and counseled to return to treatment². This delay was wasting valuable time in returning a client to treatment, thus reducing their opportunity of receiving life-saving medication.

The mHealth Activity

To improve the *busca activa* process, CHASS SMT and PCC collaborated with the technology firm Dimagi on a pilot using mobile phones to follow-up on patients who have defaulted on their ART, have missed appointments or lab test dates. The pilot involved the community case manager at the health facility sending confidential messages through a Web-based application called CommCare directly to *activistas* to inform them of the defaulted patients' name, sex, location and contact information, confidant (a person the *activista* can speak to if the patient is not there), reason for the search and number of days since they defaulted (i.e., missed an appointment, missed medication pick-up, or is otherwise non-adherent and in need of a visit to the facility) (figure 1). This pilot enabled *activistas* to follow up with the patient directly, and enable them to do their reporting via phone, rather than with paper.



² Part of MEASURE Evaluation's initial scope was to conduct a baseline to determine the time differences prior to the mHealth intervention in Nhamatanda district, Sofala Province. However, due to political instability, we were unable to implement the baseline.

Figure 1: Busca Activa system with mobile phones.

The pilot uses the CommCare database, which was tailored to track important information for reporting including the name, age, sex, and location of the client, the date the client defaulted, when the client was identified at the health facility (and their information sent to the *activista* in charge of searching for them), when the *activista* “found” the client, and when the patient returned to the facility. The application tracks the user name (*activista* using the phone), the community case manager name, and time stamps for when messages were sent and received. *Activistas* and community case managers both enter information into their phones which is captured in the application.

The Sofala provincial directorate of health (DPS) approved pilot testing the initiative in Nhamatanda district and Munhava hospital, Beira city. However due to violence and political tension in Nhamatanda district, during the time frame of this study the pilot was only rolled out in Munhava Central Hospital, Beira city.

Preparatory Work

Before the launch of the mHealth pilot, MEASURE Evaluation conducted formative research on the future mHealth sites to assist in the development of the mHealth intervention:

1. What is the current practice for identifying and following up with patients who miss appointments (the *busca activa* process)? How well is this system working and how long does it take?
2. What is the existing mobile texting capacity among *activistas*?
3. What are the perceived barriers to using the mHealth package for *activistas*?

Study findings helped guide the development and roll-out of the mHealth initiative, specifically encouraging program implementers to consider how to improve the current system within the health facility for finding patients in need of *busca activa*.³ Improving the paper-based system before layering on an automated, mobile-phone based *busca activa* system would be critical as the

³ See do Nascimento N, de Jesús João F. *Formative Assessment of a Future mHealth Site in Nhamatanda, Mozambique*. Chapel Hill, NC: MEASURE Evaluation; 2013. Available at: <http://www.cpc.unc.edu/measure/publications/wp-13-139>.

mobile application would only be as successful as the paper-based record keeping system within the hospital.

As such, prior to implementation, CHASS SMT ensured that the provincial health ministry and hospital authorities were in agreement to conduct this pilot. CHASS SMT then conducted site visits to Munhava to assist in cleaning out the forms used at the health facility to determine which patients should be returned to treatment. Prior to implementation, three iterations testing the application and its use in the field were conducted (two iterations were in Maputo, one in Beira with the activists). From these iterations, changes were made to the application prior to formal start-up of the intervention. Furthermore, a CHASS SMT staff member leading the mHealth initiative was trained on using the CommCare database.

Study Purpose

MEASURE Evaluation aimed to answer the following questions based on stakeholder (i.e., CHASS SMT, PCC, USAID/Mozambique) information needs:

1. What was the process for rolling-out the mobile telephone approach? How was the approach perceived by key informants and how did the process change throughout implementation?
2. How many defaulted patients were searched for and returned to treatment during the pilot? How long did the process take? and
3. What was the overall cost of the pilot? What was the cost per person searched for and per person returned to treatment in the first two months of implementation?

The study findings serve to: (a) provide information that program implementers and others interested in mHealth technology can use to inform future mHealth initiatives and scale up; (b) provide useful information to decision makers about how the *busca activa* system works and opportunities for improvement; (c) provide budgeting information to make decisions regarding mHealth scale up; and (d) expand the literature on cost of mHealth interventions per outcome area.

Methodology

In order to answer the questions, MEASURE Evaluation conducted three separate activities:

1. a qualitative time series study of the mHealth roll-out;
2. secondary data analysis of mHealth *busca activa* variables such as the time between when a patient defaults, when a patient is searched for, and when they return to the health facility; and
3. expenditure analysis of the mHealth intervention.

The methods for each activity are described by activity below. The overall protocol was submitted to and approved by the Mozambique ethics board (*Comité Nacional de Bioética para a Saúde*) and Health Media Lab in Washington, DC. Before any primary data collection (i.e., interviews or focus groups), informed consent was obtained from participants before continuing with all data collection.

Qualitative Time Series

MEASURE Evaluation conducted a series (Time 1, Time 2, Time 3) of semi-structured interviews lasting approximately 45 minutes with key staff involved in the mHealth roll-out in Manhava. Interviews were conducted with the CHASS SMT community mobilization lead, the Provincial PCC Technical Officer, the Dimagi Officer, community care manager, and CBO supervisor for the CHASS SMT activists. We also conducted focus group discussions with *activistas* using the mobile phones, each lasting approximately two hours.

Interview questions assessed participant perspectives of how the mHealth rollout is working, documentation of key successes, challenges, and course of action needed/taken. Final interviews (Time 3) assessed stakeholders' opinions about the feasibility and scale up of mHealth.

Focus group questions covered initial experiences using the mHealth application, challenges to implementation, and how such challenges were resolved. The final focus group discussions (FGDs) covered how the challenges were addressed during the pilot period, remaining challenges, perceptions of what is working well, and opinions about the feasibility and scale up of mHealth.

Project staff conducted interviews and FGDs in Portuguese (with the exception of two interviews conducted in English at the preference of the study participant) and each were audio recorded (with permission from participants) and transcribed.

Transcripts were reviewed and coded for a-priori themes, relevant to the study objectives, in Microsoft Word. Matrices of responses were organized by participant type to identify patterns and salience of themes. Themes included:

1. progress of pilot implementation (i.e., was implementation on track)
2. capacity of *activistas* to use the mobile phones
3. benefits of mobile phone use (for *activistas*, patients)
4. challenges of mobile phone use (for *activistas*, patients)
5. sustainability and capacity to implement pilot and scale-up

Secondary Quantitative Data Analysis

Secondary data analysis of the CommCare data was guided by the following questions⁴:

1. How many patients were searched for between March 1, 2014⁵ and July 15, 2014? What was the break-down by age and sex?
2. How many of those patients arrived at the health facility (returned to treatment)? Were there differences between age and sex?
3. How much time did it take, on average, from the time the patient:
 - defaulted to the time the *activista* was notified?
 - was identified to the time the patient returned to treatment?
 - defaulted to the time the patient returned to treatment?

Prior to conducting the analyses, a data analyst prepared the dataset by merging relevant data files and selecting only those participants who were searched for (identified) after March 1, 2014 (date when pilot was fully up and running). We then cleaned the data by:

⁴ Please note that the database does not distinguish between type of patient (ie: pre-ART or ART) or reason for follow up – whether it is related to a missed pharmacy visit or missed doctor’s appointment.

⁵ The date when the pilot officially started – it was supposed to start in February, 2014, but there were delays in start-up due to electricity outages.

- eliminating all “test” records;
- excluding observations where the default date was before the search date and where the search date was before the arrival date (n=3);
- keeping the record with the earliest arrival date when there was more than one arrival date (n=4); and
- treating individuals without an arrival date (n=26) as those who did not arrive to the clinic.

We created a new variable for age that corresponds to the Demographic and Health Surveys (DHS) age categories as well as three time variables that present the number of days between: (a) the date when a person defaulted and the date when s/he was searched for; (b) the date when a person was searched for and the date when s/he arrived to the clinic; and (c) the date when a person defaulted and the date when s/he arrived to the clinic.

To answer each of the research questions, using SAS 9.0 (SAS Institute Inc.) we: (a) examined descriptive statistics; (b) conducted cross-tabs and chi square test results; and (c) conducted correlation analysis.

Expenditure Analysis

For the purposes of this analysis, MEASURE Evaluation considered the start-up phase of the pilot to be from September 9, 2014, based on the contract start-date for Dimagi, which developed the electronic system for mHealth in Mozambique. March 1, 2014, was determined as the start-date for the implementation phase of the mHealth initiative and April 30, 2014, was the end date of expenditure data, as program expenditure reports were not finalized by mid-July 2015 when this analysis was conducted.

Expenditures were categorized as direct costs, such as the technical assistance contracted to develop the electronic system and cell phone procurement; or indirect costs, such as rent and utilities for support offices. Project expenditures were incurred at three levels: the community based organization (CBO); implementing partners’ provincial support; and implementing partners’ national support.

Indirect costs were identified at all three expenditure levels, and represented joint costs, which are shared across multiple interventions supported by the implementing partner. To allocate joint costs, we identified a common unit of output, such as time, at every expenditure level. Based on the community unit of output, we determined the allocation factors (percentage) using questionnaires (appendix B) and programmatic data.

The final cascade of allocation factors are summarized in Table 1. To allocate national level expenditures, for example, all four allocation factors were applied to the value of national-level expenditures. Allocation factors were calculated based on the respective projects.

Table 1: Allocation Factors for Indirect Costs

Expenditure	Percent of Time Supporting the Province	Percent of Time Supporting the CBO	Percent of <i>Activistas'</i> Workload Related to <i>Busca Activa</i>	Percent of <i>Activistas'</i> using mHealth Technology
Implementing partner (national level)	X	X	X	X
Implementing partner (provincial level)		X	X	X
Community-based organization			X	X

The costing study aimed to retrospectively analyze the cost of pilot roll-out. Therefore, the costing data was primarily derived from expenditure data (table 2).

Table 2: Data Sources for Expenditure Data and Key Assumptions

Expenditure Data	Data Source	Allocation Factor for Indirect Costs	Data Source
Implementing partner (national level)	General ledger	<ul style="list-style-type: none"> Percent of time supporting the province 	Questionnaire
Implementing partner (provincial level)	General ledger	<ul style="list-style-type: none"> Percent of time supporting the CBO 	Questionnaire
Community-based organization	Sub-awardee financial report	<ul style="list-style-type: none"> Percent of <i>activistas'</i> workload related to <i>busca activa</i> Percent of <i>activistas'</i> using mHealth technology 	Project reports

MEASURE Evaluation worked in close collaboration with finance staff from the implementing partners to collect expenditures from both projects. The Monthly General Ledger provided the expenditures from national and provincial project offices or “service centers”. Expenditures from the CBO were collected from sub-awardee financial reports, produced monthly and processed at the national level.

To calculate the cost per unit of output, we used the CommCare database findings to determine the number of persons searched for using mHealth technology and the number of those persons who were returned to treatment.

Results

Results are organized by study activity below.

Qualitative Time Series

Interviews and FGDs were conducted in late January, late March and mid-June in 2014 (table 3). Due to delayed start-up in Time 1, the community care managers and *activistas* were not interviewed as they had had limited involvement in the pilot at that time. In Time 3 one CHASS SMT technical officer was on leave and therefore was not available to be interviewed.

Table 3: Interviews and Focus Group Discussions Conducted

Participant Group	Time 1 (January)	Time 2 (March)	Time 3 (June)
PCC Technical Officer	X	X	X
CHASS SMT Technical Officers	X (n=2)	X (n=2)	X
<i>Gestores de casos</i>	-	X (n=2)	X (n=2)
Dimagi Officer	X	X	X
<i>Activistas</i>	-	X (n=10)	X (n=8)

Note: Unless indicated, sample size was one individual.

Round 1

Progress of pilot implementation: Round 1 of data collection was conducted in mid-January 2014 when the pilot was on the verge of being launched. CHASS SMT had worked with government and hospital officials in order to obtain buy-in and engagement from them on the

pilot. CHASS SMT and Dimagi had also already visited the pilot site on two occasions, and CHASS SMT in particular had worked with the CBO and hospital to begin cleaning out the forms used to track defaulted patients so that the system would be more functional by the time the pilot was launched.

The smart phones for the pilot had been purchased and the CommCare application (developed by technology firm Dimagi) for the intervention was developed and installed on the mobile phones. Dimagi had conducted three rounds of “field iterations” (i.e., opportunities to test the application and the phones in the hospital setting in Manhava and in Maputo). Training was scheduled in late January 2014 for 10 activists (six from PCC, four from CHASS SMT) and two community care managers.

Capacity of activists to use the mobile phones: Prior to the pilot, there had been some concerns about the ability of the CBO workers (*activistas* and community care managers) to use the smart phones – given that they were accustomed to using less sophisticated mobile phones that did not have all of the functionality and complexity of the smart phones used for this pilot. Furthermore, the use of the touch screen was foreseen as a potential barrier to using the phones. However, according to the Dimagi officer and CHASS SMT, at this point in the pilot start-up they were pleasantly surprised to see that field iterations showed promise in terms of activists’ utilizing this higher end technology. A technical officer indicated,

“...we were worried about things like the fact they have never seen a cell phone like the one we’re giving them... we thought “Oh no! They will never know, maybe they have never used this”...a few hours later [after the introduction to the cell phones] they were already using them, they knew how to open, close and then later we created fake cases and asked them to create one.”

Aside from the complexity of the cell phones, the lead technical officer had concerns about managing expectations around the pilot – both at the CBO but also from the government and hospital authorities:

“CBOs are very excited ... but they don’t get the volume of work, the demands this will bring upon them.”

Benefits of mobile phone use (for activists, patients): Given that the pilot had not started at this stage there were no benefits yet to report on the mobile phone use.

Challenges of mobile phone use (for *activistas*, patients): Given that the pilot had not started at this stage there were no challenges yet to report on the mobile phone use.

Sustainability and capacity to implement pilot and scale-up: At this early stage, two of the three technical officers raised concerns about how the mHealth activity would be sustained after the pilot. In particular, there were concerns about who would replace Dimagi when their contract was to provide technological support for mobile phone use and use of the CommCare database for data analysis.

Round 2

Progress of pilot implementation: The second round of data collection was completed in late March, two months after the official launch of the pilot. The two-day training for *activistas* and the community care manager had taken place and bi-weekly and sometimes weekly meetings were held between the *activistas* and the technical officers from PCC and/or CHASS SMT. A technical officer also reported excellent collaboration and engagement with the health facility:

“... the whole health facility is informed and supports and even is available for supporting sending the data, so this is a positive thing, we could have had trouble with the health facility [...] but we note that there is collaboration.”

Implementation started more slowly than expected and at the time of the interviews and FGD, *activistas* in the pilot were using a combination of paper-based and mobile-phone based *busca activa* platforms. This was caused, in part, by the serious electrical outages in Sofala province due to a temporary power plant closure – leading to weeks of little or no power. Without electricity *activistas* could not regularly or easily charge their phones, nor regularly access the Internet – which was needed to access the CommCare application.

During the period of the electricity outage, technical officers reported that the community care managers were able to use their phones to conduct *busca activa* on an intermittent basis. Also, some *activistas* whose phones were working were receiving the names from the community care manager, searching and counseling the patient, but not closing the reporting loop on the result of their search using the mobile phone.

Capacity of *activistas* to use the mobile phones: In order to avoid *activistas* using many of the other features on the phone which cost money and are not work-related (camera, downloading music, email), the technology firm had decided together with CHASS SMT leadership to block all functions on the phone other than text messaging, voice calls and the CommCare application. It appeared that the *activistas*, or their children or husbands/wives, had been attempting to utilize the other features on the phone and that in their attempt to open up those features the phone had locked itself – and the codes to unlock it were in Maputo, not Beira. This, of course, also raised privacy concerns around the use of the phone as well.

Four of the 10 phones had serious problems, which resulted in three of the phones being sent to Maputo for repairs by the technology firm. Explanations for the problems with the phones varied, but appeared to be most often associated with the blocking application that had been installed on the phones.

As one technical officer explained, aside from the problems with phones being blocked and the lack of available electricity and Internet due to widespread shortages, there continued to be a good deal of concern about the high-technology nature of the phones and the ability of the *activistas* to use them with ease. This was a common theme in four of the six interviews, as well as in the focus group discussion conducted. As explained by one of the technical officers, there were some frustrations around use of the phones, and suggestions that a simpler phone could work just as well:

“... if it were possible to only have different phones [...] phones that are simpler, I know that there are phones that are simpler that have difficulty with accessing the internet, but there are also phones that Movitel has that use a normal keyboard, which also connect to the internet...”

Technical officers also reported that many of the *activistas* were still having trouble mastering the touch screen of the phone.

Benefits of mobile phone use: Two of the three technical officers explained that they witnessed a great deal of motivation and involvement from the majority of the *activistas*. Further, all three

technical officers reported a high level of engagement from the community care managers to make sure the mHealth pilot is a success.⁶

One of the key benefits reported by *activistas* was being able to use the phones to call patients before meeting with to set up a good time and often, place, to meet. This was seen as a big advantage as *activistas* did not have to travel to a home to set up an appointment. Furthermore, they felt they were better able to reach patients who had privacy/stigma concerns because they could determine a place to meet outside of their home. As one respondent in the focus group discussion explained, this increased privacy was promoting the return of more patients to treatment:

“We can speak directly to him. Sometimes when we go to the house, we can find someone else in the home, and so when we call him we can talk directly with him. He can tell us how he wants to be met. There are some patients that do not want to be identified... so that person doesn’t want to be seen at home.”

Activistas also reported using phones to assist patients on their way to the health facility. In these cases, the *activista* could either meet the patient at the facility or call the community care manager to explain the patient’s case and requesting enhanced privacy/discreteness.

Challenges of mobile phone use: There was also some turnover of *activistas* during the time frame. Three of the four *activistas* from CHASS SMT were reassigned to work at a new health facility. Three new *activistas* were recruited and trained within the CBO. Two *activistas* and one community care manager reported that they would be more comfortable using paper data collection tools for *busca activa*.

Sustainability and capacity to implement pilot and scale-up: In terms of sustainability, the technical officers again brought up the importance of having someone based in Beira to address technological problems. CHASS SMT and Dimagi began training a PCC M&E Officer to use the CommCare database.

⁶ It should also be noted that one of the community care managers was the supervisor of the *activistas* at the CBO, but decided to serve as a community care manager in order to make sure the implementation was successful during the pilot.

Round 3

Progress of pilot implementation: In mid-June 2014 when the third round of interviews and FGD were conducted, the pilot was successfully up and running without major problems and the contract with Dimagi had ended. All those interviewed reported that the community care managers were sending names of people to be searched for daily to the participating *activistas*, and that *activistas* were searching for these individuals and reporting results through the CommCare system.

The phones also no longer had major technological difficulties. *Activistas* continued to use the voice feature of their phones to do the follow-up and communicate with the community care manager. Finally, a technical officer reported that the files used to track defaulters were far better organized and cleaned than previously – which was an important aspect of ensuring the mHealth pilot would be functional.

In between round two and round three (between late March to mid-June of 2014) the two *activistas* who were not particularly motivated or interested in using mobile phones for *busca activa* were replaced with two other *activistas*, who were quickly trained and started use of the mobile phones without any major difficulties.

The technical officers in Beira also now had the codes which would enable them to unlock blocked phones – doing away with the need to send blocked phones to Maputo to be fixed. Finally, while the M&E PCC officer was trained to use the database, he had been on leave almost since training and unable to regularly check, clean, and report data in the database for use by the *activistas*, community care manager, or program staff.

Capacity of activists to use the mobile phones: *Activistas* reported being far more comfortable using the touch screen on the phone and using the CommCare application, as explained by one individual:

“for me, at the start I had trouble using the telephone, it was only later when my colleagues taught me that I learned how to receive buscas (names of people), and also how to send them...”

Activistas also reported a better understanding of the limited functionality of the phone given that most of the features on the phone are blocked. While some were comfortable not using the functions blocked on the phone, others complained that it was a shame they could not use the camera and other features. The *activistas* also reported that the phone battery dies frequently and needs to be recharged every night given that it uses Internet.

Benefits of mobile phone use: *Activistas* explained that overall the *busca activa* process is more efficient with mobile phones because: a) they can do *busca activa* at any time given that they no longer have to go to the health facility to get the names of patients; and b) they can make appointments with clients using the phones. One of the community care managers described these benefits:

“...the advantage is that even when the activista is at home he can receive the buscas, so that he can decide on his own when he will have time available to enter into the community, even on Sunday, to do buscas. Because me too while I am at home I manage to do buscas that I didn’t do during the week, Saturday and Sunday I also send them, and they receive them, and when they have free time they can do more buscas.”

The *activistas* again reported that the phones provide more privacy for patients. Furthermore, *activistas* had developed strategies to protect privacy concerns that come with the use of mobile phones - including what to do if the phone number of the patient is answered by someone other than the patient (solution: identify a time to call back when he/she is available). *Activistas* also explained that having a cell phone and consulting it for information about the patient, rather than papers, made it less obvious to individuals in the community that they were doing *busca activa* for a patient that had not returned to treatment.

The community care managers appreciated the time they saved from no longer needing to copy down lists of patients by hand for each of the *activistas*. They also reported that mobile phones saved *activistas* time by no longer needing to visit the clinic to get the names of patients. They indicated that in the past when *activistas* came to get the list of names, they were often asked to take on additional, unrelated responsibilities:

“before when they were here [the activistas] they had to work twice as much, the health center took advantage of them [to do other work] [...] things that were not in their job description – yes, yes. So, it was good that this activity with mobile phones arrived, I say, wow, this is welcome

because the activists can stay in the community, they don't lay a foot in here [into the health facility], we only have one day when they have a meeting here on Wednesdays."

These time saving benefits allowed activists and community care managers to search for more patients than before.

"The number of buscas increased, yes, because the gestor de casos is sending them every day."

Challenges of mobile phone use: Despite the fact that *activistas* reported doing more *buscas*, the technology firm officer indicated that the number of *buscas* should be higher, and with data on *busca activa*, they would better be able to identify this gap.

Activistas also mentioned the challenge of calling patients to schedule an appointment or to speak with the patient, but when they call back later the patient switches the phone sim card, making it impossible to reach them

The issue of how much phone credit the *activistas* should get remains a discussion point for many of those interviewed. Activistas currently receive 40 meticaís per month to call people or text, with phone calls within their network free of charge. However, now that activists are using the phones more frequently than planned, *activistas* indicate they need more phone credit.

Sustainability and capacity to implement pilot and scale-up: All of those interviewed agreed that it would be worthwhile to expand the mHealth initiative. One of the technical officers, thinking towards the future and expansion of the pilot, highlighted the importance of retaining the *activistas* trained in the pilot. – and cited the problems of extra work required because three activists were transferred by the CBO to other sites to do *busca activa* elsewhere. Some of the activists and gestores also mentioned that they would like more training around the new system.

Other Considerations

While not directly relevant to our study questions, it is important to note the on-going challenges *activistas* and community care managers cited in conducting *busca activa*. Specifically, they continue to struggle with patients:

- providing false addresses;

- denying that they are the person they are looking for, and hence denying refusing to return to treatment;
- failing to continue their ART regimen because of lack of food;
- renting a home in the area and then moving away later on – without providing a forwarding address or explaining whether or not they were continuing treatment elsewhere;
- moving to a different health facility in the area without informing their original health facility.

One new challenge to doing *busca activa* was the fact that many patients are now refusing to use the referral because they understand that it identifies them as being HIV positive at the health facility.

Secondary Quantitative Data Analysis

Results for the secondary quantitative data analysis are organized by study question.

1. How many patients were searched for between March 1, 2014 and July 15, 2014? How did this differ by sex and age?

Since March 2014, we searched for 317 individuals who had defaulted on their ART medications. Seventy-nine percent of those searched for were female (n=251) and 21% male (n=66). The average age of those searched for was 29 years (sd=9.5; median and mode = 28). Table 4 provides the age break down by DHS categories.

Table 4: Age Distribution of Individuals Being Sought, n=317

Age Category	Frequency	Percent
<15	8	3
15-19	13	4
20-24	72	23
25-29	104	33
30-34	57	18
35-39	31	10
40-44	11	4
45-49	9	3
>49	12	4

Note: Percentages total more than 100% due to rounding.

**2. How many searched for patients arrived at the health facility (returned to treatment)?
Were there differences between age and sex?**

Eight-five percent (269) of the 317 patients searched for returned to the health facility. There were no differences between the proportion of those returned to the health facility by sex (approximately 84% for male and female). There were some differences by age group, but due to insufficient sample size, we were unable to determine if these differences were statistically significant (table 5).

Table 5: Age Distribution of Individuals arrived, n=269

Age Category	Frequency	Percent
<15	7	3
15-19	12	4
20-24	64	24
25-29	85	32
30-34	43	16
35-39	28	10
40-44	11	4
45-49	10	3
>49	9	4

3. How much time did it take, on average, from the time the patient:

- defaulted to the time the patient was searched for?
- was searched for to the time the patient returned to treatment?
- defaulted to the time the patient returned to treatment?

On average, it took 6.2 months between the time the patient defaulted to when they were searched for (table 6). Once they were searched for, it took on average 19 days to return the patient to treatment. From the time the patient defaulted to when they returned to treatment took seven months.

There were no differences in the amount of time it took by sex; however, there was a positive correlation between age and time between date defaulted and date searched, meaning the older a patient was, the greater number of days between date defaulted and date searched (correlation coefficient 0.15, $p < .01$). There was also a positive correlation between age and time between date defaulted and date returned to treatment (correlation coefficient = 0.14, $p < .05$).

Table 6: Time Difference between Defaulted, Searched for, and Returned to Treatment for All Searched for Listed in the Database (January 2012 Was the Earliest Default Date)

Time Difference between ...	N	Mean	Standard Deviation
defaulted and searched for	317	187 days	176 days
searched for and returned to treatment	269	19 days	13 days
defaulted and returned to treatment	269	210 days	173 days

There was wide variation overall in the amount of time it took from default to the time being search for – with a reduction over time in the proportion of patients who defaulted in 2012 and 2013 throughout the life of the pilot (table 7). For example, in March 2014 84% of patients defaulted in either 2012 or 2013, compared to 72% in May 2014 and none in July 2014. The converse of this finding is that initially, 16% of those searched for in March 2014 defaulted in 2014, compared to 28% in May 2014 and 100% in July 2014. This means that within the first four-and-a-half months of pilot implementation, the backlog of defaulted patients from 2012 and 2013 were cleared, so that by July 2014 *activistas* were only searching for patients who have defaulted within the first half of 2014.

Table 7: Number and Percent of Patients Searched for during the Pilot, by Year of Default and Month Searched for (n=317)

Month of Search	Year of Default Date				Total
	2012/2013		2014		
	n	%	n	%	
March	69	84%	34	16%	82
April	22	65%	64	35%	34
May	46	72%	105	28%	64
June	7	7%	32	93%	105
July	0	0%	32	100%	32

Expenditure Analysis

Total Cost: The total cost of the start-up phase (September 9, 2013 to March 1, 2014) and implementation phase of the mHealth initiative (March 1, 2014 to April 30, 2014) was U.S. \$ 52,346. Figure 2 illustrates the distribution of cost over time. Start-up costs are concentrated in

September and October 2013 when the cell phones for *activistas* were procured, and technical assistance in program configuration, field testing, and database set up were completed by Dimagi. As a result, the cost over September and October 2013 represents two-thirds of the total cost through April 2014.

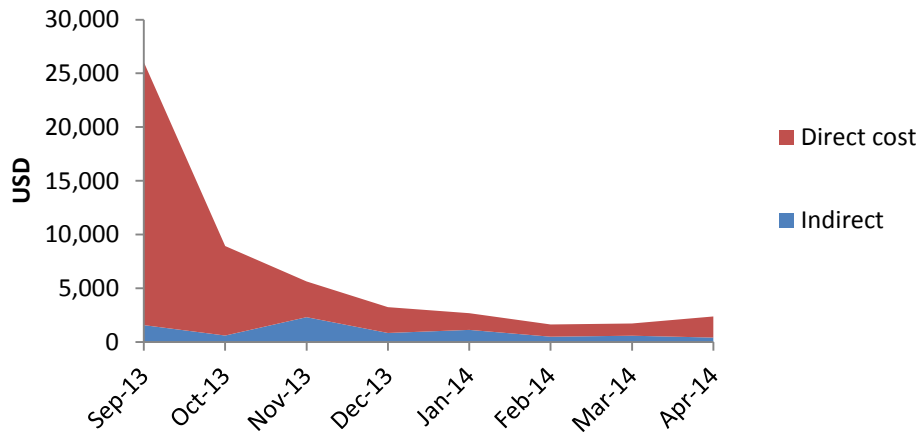


Figure 3: Monthly mHealth Pilot cost September 2013-April 2014.

Cost per Output: To calculate the cost per output, we compared the outputs achieved and cost incurred over March-April 2014. The cost per person searched for using the mHealth technology is U.S. \$35.57, while the cost per person searched for using the mHealth technology and returned to treatment is U.S. \$49.12 (Figure 4).

Alternatively, the outputs achieved over this time period could be compared to total cost September 2013-April 2014. However, doing this comparison would distort the expectation of the unit cost under full roll-out. As such, we recommend comparing outputs to the total cost of the pilot inclusive of the start-up phase only after one year of implementation.

However, not all those persons who were searched for using mHealth technology over March-April 2014 returned to the health facility by April 30, 2014. Comparing the expenditures over March-April 2014 to the total number of persons who were searched for using mHealth technology and returned to treatment by May 31, 2014, the unit cost falls to U.S. \$36.51.

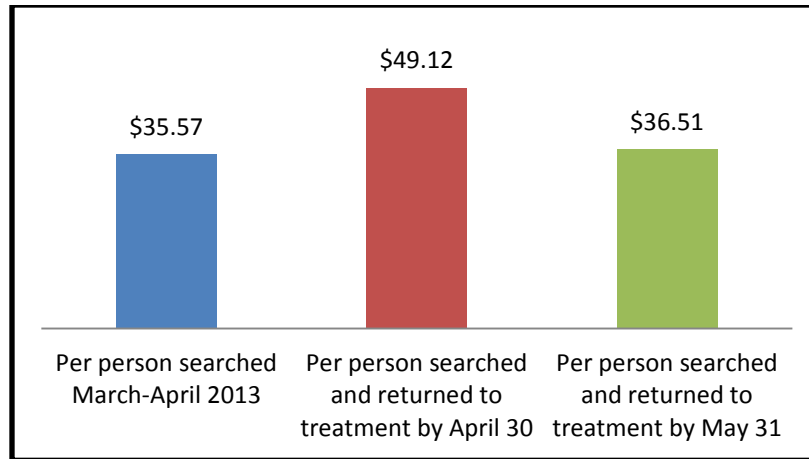


Figure 4: Unit cost comparison, based on March-April 2014 expenditures.

One Year Cost Projection: We also projected the unit cost per person searched for after one year of implementation, inclusive of the start-up phase. The projected number of persons searched was based on the monthly average in the first four and a half months of implementation (March 1 – July 15, 2014) – 70 persons per month – while the projected monthly cost was based on the average monthly cost of implementation over April-May 2014, U.S. \$2,026 per month. April-May 2014 expenditures largely represent recurrent expenditures, with the exception of refresher training.

Given these assumptions, the unit cost per person searched for using mHealth technology, inclusive of the start-up cost, would fall from U.S. \$451 as of April 30, 2014, to U.S. \$88.26 as of February 28, 2015 (table 8). This is a conservative estimate, as anticipated changes to the implementation approach could cause the cumulative unit cost to fall even further. For example, it is possible that the training, which was previously conducted by central staff traveling to the CBO, would be conducted by provincial staff traveling to the CBO.

Table 7: Projected mHealth Unit Cost Rollout

Numerator	Denominator	Cumulative Unit Cost (Inclusive of Start-up Phase)
<u>Actual</u> cost September 2013-April 2014	<u>Actual</u> persons reached March-April 2014	\$451
<u>Actual</u> + <u>projected</u> cost September 2013-February 2015	<u>Actual</u> + <u>projected</u> persons reached March 2014-February 2015	\$88

Contextualizing Findings: The body of literature on mHealth cost analysis is still quite nascent – therefore there is no recognized threshold for cost effectiveness of an mHealth intervention, particularly of this nature. As such, in order to contextualize the analysis we conducted, we considered the foregone cost of the alternative to the mHealth approach.

If substantial time passes, a patient formerly on ART needs to be treated clinically as a new patient initiating ART. If less time passes, patients do not have to be treated clinically as a new patient when they return to a health facility after defaulting. Given the hypothesis of the mHealth initiative that it will essentially reduce the time between when a patient defaults and when he or she is returned to treatment; and given the findings of our secondary quantitative data analysis that show that the mean number of days between a patient defaulting and being searched for before and after the mHealth intervention has decreased dramatically (from 263 days to 55 days), we make the assumption that prior to the mHealth initiative, many patients who returned to the health facility after defaulting had to re-initiate ART.

Therefore, we used the cost of patient initiation on ART as a cost data point for comparison. In Mozambique, the direct cost of the laboratory diagnostics to initiate a patient on treatment is about U.S. \$40.⁷ Comparing this with the cost per person searched and returned to treatment by May 31, 2014 (U.S. \$35-U.S. \$36), we can consider the mHealth intervention to be cost-saving.

Limitations

MEASURE Evaluation's scope of work evolved as the mHealth intervention was repeatedly modified and delayed for various reasons (security, electric outages, and delays in implementation). Due to such delays, we had limited time to study the overall implementation. Ideally a longer period of time to study the pilot would have strengthened study findings and conclusions.

Given that this pilot location was purposively selected, there is potential bias that may have resulted in higher performance from this CBO and hospital than might be expected at other sites.

⁷ Internal calculations based on 2012 *Central de Medicamentos e Artigos Médicos* (CMAM) commodity prices.

While we ran logic checks on date variables and duplicates in the CommCare database (e.g., did the default date occur before the search date), we were not able to verify the age, sex, and dates that were listed in the data file were indeed correct. It is possible that there were data entry errors in the data set, as the program does not automatically check dates are entered in sequence.

Discussion

The results of our analysis from both our qualitative work and secondary analysis of data demonstrate that despite the challenges related to slow start-up due to electricity black-outs, as well as the challenges around *activistas'* use of smart phone technology, within five months the pilot was operational. This appears to demonstrate that it is in fact feasible to implement a mobile-phone based *busca activa* system. Furthermore, the intervention is highly valued by the users of the new system.

The mHealth pilot appears to have led to the cleaning/updating of the files used to identify defaulters which was a major concern at the start of this activity. In order for *busca activa* to work well, the paper-based system requires regular updating and reviewing of file records which becomes more complicated and tedious depending on the size of the health facility. Munhava, for instance, has a patient volume of over 6,000 (CHASS SMT representative comments on July 23, 2014), with a high record-keeping burden. While cleaning the files was successful in Munhava, to have such improvements in other facilities would require commitment and resources from the CBO.

While steps were taken to train an M&E officer at the provincial level to use and report regularly on the results from the CommCare online database, the M&E officer was unable to practice these skills, given he was on leave for much of the pilot. Going forward, it would be worthwhile to ensure the M&E officer is fully engaged including ensuring data are cleaned and analyzed, and reporting back to the *activistas* and community care managers on the results generated from the database. Without this additional technical support, data quality may be compromised and of limited use for decision making and reporting purposes.

Many, if not all, of the *busca activa* challenges remain related to retention in treatment. Study participants note that patients fail to continue treatment due to lack of food, stigma and an

understanding that once they feel better they can stop treatment. Furthermore, the *activistas* and community care managers continue to be frustrated by the false addresses and lack of follow up from patients when they move to new facilities. These problems fall outside of the scope of the mHealth initiative, but are important to note as they will continue to be a challenge going forward.

Finally, it is important to note that our analysis shows the mHealth pilot to be cost-saving when compared with cost to initiate a patient on treatment, even within the first three months of implementation. This may be an important data point when considering whether or not using mobile phones will be viable for *busca activa* within the health system going forward.

Conclusions

Over the last 11 months, USAID, CHASS SMT, PCC and Dimagi sought to test whether or not community health workers could use mobile phones to more efficiently reach patients who have defaulted on their ART. The intervention was highly valued at the CBO (among the *activistas* and *gestores de casos*) and seen as a more efficient and effective means of conducting searches for defaulters within the community. It also received strong buy-in from health facility staff, which was critical to successful pilot implementation.

One of the most notable results was the comparison between the amount of time to reach a defaulted patient before and after the pilot was implemented. It is clear that the great effort made to clean and organize the files that are the source for lists of defaulters was paramount in pilot implementation success. Further, the use of mobile phones for *busca activa* is cost saving per patient – up to U.S. \$4 per patient – when comparing cost per person searched for and returned to treatment and cost to re-initiate a patient on ART.

While implementation has shown great promise, going forward, a gap remains in terms of analysis and sharing of data collected through CommCare. Addressing this gap will be crucial to ensuring implementation success going forward.

Recommendations

Based on our findings from our qualitative data analysis, quantitative data analysis and expenditure analysis, in addition to discussions with the key stakeholders involved in this intervention, we recommend the following, based on the assumption that there will be further implementation and scale-up of the activity, as well as ongoing *busca activa* activities in-country.

1. Use simpler, more basic phones for quicker uptake of technology at future sites and to mitigate interruptions due to electricity outages (as batteries on non-smart phones last longer).
2. Determine the procedures and protocols for use of mobile phones to call patients ahead of visit, as currently *activistas* have developed only *ad hoc* methods of doing so.
3. Expand to a rural site to assess viability in this setting before full scale-up.
4. Collect baseline *busca activa* data (i.e., length of time between defaulted and search for) prior to implementation at other sites in order to be able to assess whether more patients are reached with mobile-phone based *busca activa*.
5. Consider staffing needs for cleaning files for *busca activa* at other large health facilities.
6. Ensure someone – preferably at the CBO level – is trained to fix phones with minor technological problems to ensure sustainability of intervention.
7. Utilize *activistas* and CBO leadership from Munhava to train future sites for cost savings.
8. Ensure program or health facility has capacity to access the CommCare data, assess data quality, and merge/analyze data as needed.
9. Utilize budget tracking template to track mHealth expenditures going forward in order to further develop the body of evidence on mHealth cost work and better understand what it will cost to scale up.
10. Include reasons why patients are defaulting from care in database to collect important information to guide future interventions to improve retention in care.

Appendix A. Qualitative Time Series Instruments

Interview Guide 1– CHASS SMT/PCC Technical Director (note: shaded questions are those to be asked at Time 3, final interviews)

Date of Interview:	Start Time:	End Time:
Interviewer:		
Position Title of Person Being Interviewed:		

Informed Consent Form

Project Title and name, contact and institutional linkages of investigator: Futures Group/MEASURE Evaluation is conducting a study called “Avaliação de uma Iniciativa Saúde Móvel para Melhorar a Adesão dos Pacientes”. My name is Filomena João, I will be conducting this interview with you today.

Should you have any questions or queries at a later stage in relation to this study, please do not hesitate to contact me through the following numbers: 82 59 94 520, 84 40 97 916 or 86 33 26 800. Alternatively, you could also contact FHI360’s Provincial Coordinator, Dr. Fernando Chenene through the following number: 82 74 48 820.

Purpose and general information on the project: The Clinical HIV/AIDS Services Strengthening in Sofala, Manica and Tete (CHASS-SMT - *Projecto de Reforço aos Serviços Clínicos de HIV/SIDA*) is working with the Community Care Project (PCC – *Projecto de Cuidados Comunitários*) implementing a pilot intervention using mobile phones to facilitate communication between community activists and health facilities regarding tracking patients who have been lost to follow up or dropped out of ART treatment (*busca activa*).

We are in the process of collecting information to better understand and document how the mHealth initiative worked in Sofala Province, specifically in the district of Nhamatanda.

The information obtained through this interview will be used to support the program and other stakeholders, such as the government and other partners to understand the importance of the mHealth initiative and the type of improvements that could be introduced in future initiatives.

Methodological procedures: This interview will take approximately 45 minutes. I would like to ask you a few questions in relation to your recent experience with the mHealth initiative.

This study will include other interviews with individuals like yourself, in order to understand what participants think about the initiative. Interviews will also be conducted with the technology firm implementing this activity and *Associação Kupedzana*. We will also be conducting Focus Group Discussions (FGDs) with Kupedzana activists. Interviews will be carried out in series (Time 1, Time 2, Time 3) during the implementation of mHealth activities with all participants.

Anonymity and confidentiality: All the information that you will provide is of confidential nature. Your name will not be associated to the responses you provide; your name will not be referred to in any presentation or report.

Risks and benefits: Studies are carried out to benefit society with the generation of knowledge; in this light I would like to thus clarify that you will not receive any direct benefit for participating in this study (material or financial).

Freedom to participate: Your participation in this interview is completely voluntary. You can choose not to answer any of the questions asked, should this be your preference. If you feel that any of the questions are sensitive, and you feel uncomfortable responding, you do not need to respond. You can also choose not to respond to some of the questions posed. If you decide not to continue with this interview, please know that this will have no consequences on your job. I would like to thank you for your availability to honestly and openly answer the questions included in this interview. Please know that there is no such a thing as a correct or incorrect answer.

Audio Recording: In addition I would also like to have your permission to record our conversation today, so that I can ensure that I remember all of the information that you provide. Please know that the recording will only be accessible to the person responsible for transcribing the interview. The transcription will be destroyed after that.

Questions: Do you have any questions so far?

I confirm having read the information presented above and that I agree to participate in this interview. You will not need to sign this consent form if you do not agree with its content.

Signature: _____ Date: _____

Interviewer: THE PERSON INTERVIEWED AGREES TO PARTICIPATE

_____ (signature, date)

THE PERSON INTERVIEWED DOES NOT AGREE TO PARTICIPATE

_____ (signature, date)

Interview

Opening/Rapport-building Questions

1. Please tell me how you have been involved in the mHealth roll-out to date (*Time 2, Time 3 - since the last time we spoke*)?
2. I'd like to hear from you how the following aspects of the mHealth application are going (*Time 2, Time 3 – since the last time we spoke*)...would you say they are going very well, somewhat well, or not well. Why? Why not? If an aspect does not apply to you, you may skip it.
 - a. Training of the activistas
 - b. Training of the Gestor de Casos and any others at the clinic
 - c. Stakeholder involvement/buy-in [activistas, clinic staff, pharmacy, CHASS SMT staff, PCC staff, gestor de casos, CBO leadership, technology firm, community leaders, government authorities]
 - d. Rolling additional activistas into using the mHealth application?
 - e. Activistas using the technology correctly – entering in the right information at the right time, receiving the busca activa names in a timely manner, charging cell phones, getting signal etc.?
 - f. Gestor de casos entering data into database
 - g. Communication between the activistas, CBO, and Gestor de Casos?
3. What are some of the challenges that have been experienced so far in the implementation that have not already been mentioned? What is contributing to those challenges?
4. What are some of the things that are working well so far that have not already been mentioned? Why do you think they are working well?
5. Do you think mHealth has given activistas more work than they had before/the same amount of work than they had before/less work than they had before? Please explain your response.
6. What have been the overall benefits to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the benefits for:
 - a. Clients
 - b. Activistas
 - c. Gestor de Casos
 - d. CBO
 - e. PCC
 - f. CHASS SMT

7. What have been the challenges to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the challenges for:

- a. Clients
- b. Activistas
- c. Gestor de Casos
- d. CBO
- e. PCC
- f. CHASS SMT

8. Would you recommend the mHealth application be used by other activistas for the *Busca Activa* process? Why? Why not?

9. Please describe any changes you would recommend to the mHealth approach in the future.

10. Is there anything else you would like to share?

Thank you for your time and willingness to participate in this study. You can contact me at 825994520 if you have any questions or comments at a later date.

Interview Guide 2– Technology Firm (note: shaded questions are those to be asked at Time 3, final interviews)

Date of Interview:	Start Time:	End Time:
Interviewer:		
Position Title of Person Being Interviewed:		

Consent Form

Project Title and name, contact and institutional linkages of investigator: Futures Group/MEASURE Evaluation is conducting a study called “Avaliação de uma Iniciativa Saúde Móvel para Melhorar a Adesão dos Pacientes”. My name is Filomena João, I will be conducting this interview with you today.

Should you have any questions or queries at a later stage in relation to this study, please do not hesitate to contact me through the following numbers: 82 59 94 520, 84 40 97 916 or 86 33 26 800. Alternatively, you could also contact FHI360’s Provincial Coordinator, Dr. Fernando Chenene through the following number: 82 74 48 820.

Purpose and general information on the project: The Clinical HIV/AIDS Services Strengthening in Sofala, Manica and Tete (CHASS-SMT - *Projecto de Reforço aos Serviços Clínicos de HIV/SIDA*) is working with the Community Care Project (PCC – *Projecto de Cuidados Comunitários*) implementing a pilot intervention using mobile phones to facilitate communication between community activists and health facilities regarding tracking patients who have been lost to follow up or dropped out of ART treatment (*busca activa*).

We are in the process of collecting information to better understand and document how the mHealth initiative worked in Sofala Province, specifically in the district of Nhamatanda.

The information obtained through this interview will be used to support the program and other stakeholders, such as the government and other partners to understand the importance of the mHealth initiative and the type of improvements that could be introduced in future initiatives.

Methodological procedures: This interview will take approximately 45 minutes. I would like to ask you a few questions in relation to your recent experience with the mHealth initiative.

This study will include other interviews with individuals like yourself, in order to understand what participants think about the initiative. Interviews will also be conducted with the technology firm implementing this activity and *Associação Kupedzana*. We will also be conducting Focus Group Discussions (FGDs) with Kupedzana activists. Interviews will be carried out in series (Time 1, Time 2, Time 3) during the implementation of mHealth activities with all participants.

Anonymity and confidentiality: All the information that you will provide is of confidential nature. Your name will not be associated to the responses you provide; your name will not be referred to in any presentation or report.

Risks and benefits: Studies are carried out to benefit society with the generation of knowledge; in this light I would like to thus clarify that you will not receive any direct benefit for participating in this study (material or financial).

Freedom to participate: Your participation in this interview is completely voluntary. You can choose not to answer any of the questions asked, should this be your preference. If you feel that any of the questions are sensitive, and you feel uncomfortable responding, you do not need to respond. You can also choose not to respond to some of the questions posed. If you decide not to continue with this interview, please know that this will have no consequences on your job. I would like to thank you for your availability to honestly and openly answer the questions included in this interview. Please know that there is no such a thing as a correct or incorrect answer.

Audio Recording: In addition I would also like to have your permission to record our conversation today, so that I can ensure that I remember all of the information that you provide. Please know that the recording will only be accessible to the person responsible for transcribing the interview. The transcription will be destroyed after that.

Questions: Do you have any questions so far?

I confirm having read the information presented above and that I agree to participate in this interview. You will not need to sign this consent form if you do not agree with its content.

Signature: _____ Date: _____

Interviewer: THE PERSON INTERVIEWED AGREES TO PARTICIPATE

_____ (signature, date)

THE PERSON INTERVIEWED DOES NOT AGREE TO PARTICIPATE

_____ (signature, date)

Interview

Opening/Rapport-building Questions

1. I'd like to hear from you how the following aspects of the mHealth application are going (*Time 2, Time 3 – since the last time we spoke*)...would you say they are going very well, somewhat well, or not well. Why? Why not? If an aspect does not apply to you, you may skip it.
 - a. Training of the activistas
 - b. Training of the Gestor de Casos and any others at the clinic
 - c. Stakeholder involvement/buy-in [activistas, clinic staff, pharmacy, CHASS SMT staff, PCC staff, gestor de casos, CBO leadership, community leaders, government authorities]
 - d. Rolling additional activistas into using the mHealth application? [Are you on track? Delayed? Any resistance to getting people to join?]
 - e. Activistas using the technology correctly – entering in the right information at the right time, receiving the busca activa names in a timely manner, charging cell phones, getting signal etc.?
 - f. Gestor de casos entering data into database
 - g. Communication between the activistas, CBO, and Gestor de Casos?
2. What are some of the challenges that have been experienced so far in the implementation that have not already been mentioned? What is contributing to those challenges?
3. What are some of the things that are working well so far that have not already been mentioned? Why do you think they are working well?
4. Do you think mHealth has given activistas more work than they had before/the same amount of work than they had before/less work than they had before? Please explain your response.
5. What have been the overall benefits to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the benefits for:
 - a. Clients
 - b. Activistas
 - c. Gestor de Casos
 - d. CBO
 - e. PCC
 - f. CHASS SMT
6. What have been the challenges to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the challenges for:

- a. Clients
- b. Activistas
- c. Gestor de Casos
- d. CBO
- e. PCC
- f. CHASS SMT

7. Would you recommend the mHealth application be used by other activistas for the *Busca Activa* process? Why? Why not?

8. Please describe any changes you would recommend to the mHealth approach in the future.

9. Is there anything else you would like to share?

Thank you for your time and willingness to participate in this study. You can contact me at 825994520 if you have any questions or comments at a later date.

Interview Guide 3– Gestor de Casos (note: shaded questions are those to be asked at Time 3, final interviews)

Date of Interview:	Start Time:	End Time:
Interviewer:		
Position Title of Person Being Interviewed:		

Informed Consent Form

Project Title and name, contact and institutional linkages of investigator: Futures Group/MEASURE Evaluation is conducting a study called “Avaliação de uma Iniciativa Saúde Móvel para Melhorar a Adesão dos Pacientes”. My name is Filomena João, I will be conducting this interview with you today.

Should you have any questions or queries at a later stage in relation to this study, please do not hesitate to contact me through the following numbers: 82 59 94 520, 84 40 97 916 or 86 33 26 800. Alternatively, you could also contact FHI360’s Provincial Coordinator, Dr. Fernando Chenene through the following number: 82 74 48 820.

Purpose and general information on the project: The Clinical HIV/AIDS Services Strengthening in Sofala, Manica and Tete (CHASS-SMT - *Projecto de Reforço aos Serviços Clínicos de HIV/SIDA*) is working with the Community Care Project (PCC – *Projecto de Cuidados Comunitários*) implementing a pilot intervention using mobile phones to facilitate communication between community activists and health facilities regarding tracking patients who have been lost to follow up or dropped out of ART treatment (*busca activa*).

We are in the process of collecting information to better understand and document how the mHealth initiative worked in Sofala Province, specifically in the district of Nhamatanda.

The information obtained through this interview will be used to support the program and other stakeholders, such as the government and other partners to understand the importance of the mHealth initiative and the type of improvements that could be introduced in future initiatives.

Methodological procedures: This interview will take approximately 45 minutes. I would like to ask you a few questions in relation to your recent experience with the mHealth initiative.

This study will include other interviews with individuals like yourself, in order to understand what participants think about the initiative. Interviews will also be conducted with the technology firm implementing this activity and *Associação Kapedzana*. We will also be conducting Focus Group Discussions (FGDs) with Kapedzana activists. Interviews will be carried out in series (Time 1, Time 2, Time 3) during the implementation of mHealth activities with all participants.

Anonymity and confidentiality: All the information that you will provide is of confidential nature. Your name will not be associated to the responses you provide; your name will not be referred to in any presentation or report.

Risks and benefits: Studies are carried out to benefit society with the generation of knowledge; in this light I would like to thus clarify that you will not receive any direct benefit for participating in this study (material or financial).

Freedom to participate: Your participation in this interview is completely voluntary. You can choose not to answer any of the questions asked, should this be your preference. If you feel that any of the questions are sensitive, and you feel uncomfortable responding, you do not need to respond. You can also choose not to respond to some of the questions posed. If you decide not to continue with this interview, please know that this will have no consequences on your job. I would like to thank you for your availability to honestly and openly answer the questions included in this interview. Please know that there is no such a thing as a correct or incorrect answer.

Audio Recording: In addition I would also like to have your permission to record our conversation today, so that I can ensure that I remember all of the information that you provide. Please know that the recording will only be accessible to the person responsible for transcribing the interview. The transcription will be destroyed after that.

Questions: Do you have any questions so far?

I confirm having read the information presented above and that I agree to participate in this interview. You will not need to sign this consent form if you do not agree with its content.

Signature: _____ Date: _____

Interviewer: THE PERSON INTERVIEWED AGREES TO PARTICIPATE

_____ (signature, date)

THE PERSON INTERVIEWED DOES NOT AGREE TO PARTICIPATE

_____ (signature, date)

Interview

Opening/Rapport-building Questions

1. I'd like to hear from you how the following aspects of the mHealth application are going (*Time 2, Time 3 – since the last time we spoke*)...would you say they are going very well, somewhat well, or not well. Why? Why not? If an aspect does not apply to you, you may skip it.
 - a. Training for you and any others at the clinic
 - b. Stakeholder involvement/buy-in [activistas, clinic staff, pharmacy, CHASS SMT staff, PCC staff, CBO leadership, community leaders, government authorities]
 - c. Activistas using the technology correctly – entering in the right information at the right time, receiving the busca activa names in a timely manner, charging cell phones, getting signal etc.?
 - d. Your ability to enter data into the database
 - e. Communication between you, the activistas, and CBO
2. What are some of the challenges that have been experienced so far in the implementation that have not already been mentioned? What is contributing to those challenges?
3. What are some of the things that are working well so far that have not already been mentioned? Why do you think they are working well?
4. Do you think mHealth has given you more work than you had before/the same amount of work than you had before/less work than you had before? Please explain your response.
5. What have been the overall benefits to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the benefits for:
 - a. Clients
 - b. Activistas
 - c. You
 - d. CBO
6. What have been the challenges to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the challenges for:
 - a. Clients
 - b. Activistas
 - c. You
 - d. CBO

7. Would you recommend the mHealth application be used by others for the *Busca Activa* process?
Why? Why not?
8. Please describe any changes you would recommend to the mHealth approach in the future.
9. Is there anything else you would like to share?

Thank you for your time and willingness to participate in this study. Again you can contact me at 825994520 if you have any questions or comments at a later date.

Interview Guide 4– CBO Activista Supervisor (note: shaded questions are those to be asked at Time 3, final interviews)

Date of Interview:	Start Time:	End Time:
Interviewer:		
Position Title of Person Being Interviewed:		

Informed Consent Form

Project Title and name, contact and institutional linkages of investigator: Futures Group/MEASURE Evaluation is conducting a study called “Avaliação de uma Iniciativa Saúde Móvel para Melhorar a Adesão dos Pacientes”. My name is Filomena João, I will be conducting this interview with you today.

Should you have any questions or queries at a later stage in relation to this study, please do not hesitate to contact me through the following numbers: 82 59 94 520, 84 40 97 916 or 86 33 26 800. Alternatively, you could also contact FHI360’s Provincial Coordinator, Dr. Fernando Chenene through the following number: 82 74 48 820.

Purpose and general information on the project: The Clinical HIV/AIDS Services Strengthening in Sofala, Manica and Tete (CHASS-SMT - *Projecto de Reforço aos Serviços Clínicos de HIV/SIDA*) is working with the Community Care Project (PCC – *Projecto de Cuidados Comunitários*) implementing a pilot intervention using mobile phones to facilitate communication between community activists and health facilities regarding tracking patients who have been lost to follow up or dropped out of ART treatment (*busca activa*) .

We are in the process of collecting information to better understand and document how the mHealth initiative worked in Sofala Province, specifically in the district of Nhamatanda.

The information obtained through this interview will be used to support the program and other stakeholders, such as the government and other partners to understand the importance of the mHealth initiative and the type of improvements that could be introduced in future initiatives.

Methodological procedures: This interview will take approximately 45 minutes. I would like to ask you a few questions in relation to your recent experience with the mHealth initiative.

This study will include other interviews with individuals like yourself, in order to understand what participants think about the initiative. Interviews will also be conducted with the technology firm implementing this activity and *Associação Kupedzana*. We will also be conducting Focus Group Discussions (FGDs) with Kupedzana activists. Interviews will be carried out in series (Time 1, Time 2, Time 3) during the implementation of mHealth activities with all participants.

Anonymity and confidentiality: All the information that you will provide is of confidential nature. Your name will not be associated to the responses you provide; your name will not be referred to in any presentation or report.

Risks and benefits: Studies are carried out to benefit society with the generation of knowledge; in this light I would like to thus clarify that you will not receive any direct benefit for participating in this study (material or financial).

Freedom to participate: Your participation in this interview is completely voluntary. You can choose not to answer any of the questions asked, should this be your preference. If you feel that any of the questions are sensitive, and you feel uncomfortable responding, you do not need to respond. You can also choose not to respond to some of the questions posed. If you decide not to continue with this interview, please know that this will have no consequences on your job. I would like to thank you for your availability to honestly and openly answer the questions included in this interview. Please know that there is no such a thing as a correct or incorrect answer.

Audio Recording: In addition I would also like to have your permission to record our conversation today, so that I can ensure that I remember all of the information that you provide. Please know that the recording will only be accessible to the person responsible for transcribing the interview. The transcription will be destroyed after that.

Questions: Do you have any questions so far?

I confirm having read the information presented above and that I agree to participate in this interview. You will not need to sign this consent form if you do not agree with its content.

Signature: _____ Date: _____

Interviewer: THE PERSON INTERVIEWED AGREES TO PARTICIPATE

_____ (signature, date)

THE PERSON INTERVIEWED DOES NOT AGREE TO PARTICIPATE

_____ (signature, date)

Interview

Opening/Rapport-building Questions

1. I'd like to hear from you how the following aspects of the mHealth application are going (*Time 2, Time 3 – since the last time we spoke*)...would you say they are going very well, somewhat well, or not well. Why? Why not? If an aspect does not apply to you, you may skip it.
 - a. Training for the activistas
 - b. Training for the Gestor de Casos
 - c. Stakeholder involvement/buy-in [activistas, clinic staff including the Gestor de Casos, pharmacy, CHASS SMT staff, PCC staff, CBO leadership, community leaders, government authorities]
 - d. Activistas using the technology correctly – entering in the right information at the right time, receiving the busca activa names in a timely manner, charging cell phones, getting signal etc.?
 - e. Communication between the activistas, CBO, and the Gestor de Casos.
2. What are some of the challenges that have been experienced so far in the implementation that have not already been mentioned? What is contributing to those challenges?
3. What are some of the things that are working well so far that have not already been mentioned? Why do you think they are working well?
4. Do you think mHealth has given the activistas more work than they had before/the same amount of work than they had before/less work than they had before? Please explain your response.
5. What have been the overall benefits to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the benefits for:
 - a. Clients
 - b. Activistas
 - c. Gestor de Casos
 - d. CBO
6. What have been the challenges to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the challenges for:
 - a. Clients
 - b. Activistas
 - c. Gestor de Casos
 - d. CBO

7. Would you recommend the mHealth application be used by other activists for the *Busca Activa* process? Why? Why not?
8. Please describe any changes you would recommend to the mHealth approach in the future.
9. Is there anything else you would like to share?

Thank you for your time and willingness to participate in this study. You can contact me at 825994520 if you have any questions or comments at a later date.

Focus Group Discussion Guide: Activistas (note: shaded questions are those to be asked at Time 3, final interviews)

Informed Consent form

Project Title and name, contact and institutional linkages of investigator: Futures Group/MEASURE Evaluation is conducting a study called “Avaliação de uma Iniciativa Saúde Móvel para Melhorar a Adesão dos Pacientes”. My name is Filomena João, I will be moderating the focus group discussion with you today.

Should you have any questions or queries at a later stage in relation to this study, please do not hesitate to contact me through the following numbers: 82 59 94 520, 84 40 97 916 or 86 33 26 800. Alternatively, you could also contact FHI360’s Provincial Coordinator, Dr. Fernando Chenene through the following number: 82 74 48 820.

Purpose and general information on the project: The Clinical HIV/AIDS Services Strengthening in Sofala, Manica and Tete (CHASS-SMT - *Projecto de Reforço aos Serviços Clínicos de HIV/SIDA*) is working with the Community Care Project (PCC – *Projecto de Cuidados Comunitários*) implementing a pilot intervention using mobile phones to facilitate communication between community activists and health facilities regarding tracking patients who have been lost to follow up or dropped out of ART treatment (*busca activa*).

We are in the process of collecting information to better understand and document how the mHealth initiative worked in Sofala Province, specifically in the district of Nhamatanda.

The information obtained through this interview will be used to support the program and other stakeholders, such as the government and other partners to understand the importance of the mHealth initiative and the type of improvements that could be introduced in future initiatives.

Methodological procedures: The conduction of this focus group discussion will take approximately two hours. I would like to ask you a few questions about your recent experience with the mHealth initiative (number of months). We would like to hear what you all have to say, both on the issues that you are in agreement on and those in which you are not. None of the responses will be considered as correct or incorrect.

We would like to invite you to actively participate in this discussion, both in the issues that you agree on and those in which you do not.

This study will include other interviews with other actors like yourself, in order to understand what participants think about the initiative. Interviews will be conducted with the Technical Directors of CHASS SMT in Sofala Province, the technology firm implementing this activity, with the Community Based Organization *Kupedzana* and Focus Group Discussions (FGDs) with *Kupedzana* activists. Interviews will be carried out in series (Time 1, Time 2, Time 3) during the implementation of mHealth activities with all participants.

Anonymity and confidentiality: All the information that you will provide is of confidential nature. Your name will not be associated to the responses you provide; your name will not be referred to in any presentation or report.

Risks and benefits: Studies are carried out to benefit society with the generation of knowledge; in this light I would like to thus clarify that you will not receive any direct benefit for participating in this study (material or financial).

Freedom to participate: Your participation in this interview is completely voluntary. You can choose not to answer any of the questions asked, should this be your preference. If you feel that you are being presented with sensitive questions, please feel free to restrain from responding if you feel uncomfortable. You can also choose not to respond to some of the questions posed. If you decide not to continue with this interview, please do know that this will have no consequences on your job. I would like to thank you for your availability to honestly and openly answer the questions included in this interview. Please know that there is not such a thing as a correct or incorrect answer.

Audio Recording: In addition I would also like to have your permission to record our discussion today, so that I can ensure that I remember all of the information that you provide. Please know that the recording will only be accessible to the person responsible for transcribing the interview. The transcription will be destroyed after that.

Questions: Do you have any questions so far?

I confirm having read the information presented above and that I agree to participate in this interview. You will not need to sign this consent form if you do not agree with its content.

Signature/Date: _____

Interviewer: THE PERSON INTERVIEWED AGREES TO PARTICIPATE

_____ (signature, date)

THE PERSON INTERVIEWED DOES NOT AGREE TO PARTICIPATE

_____ (signature, date)

Date of FGD:	Start Time:	End Time:
FGD Moderator: FGD Note taker (note taker should track responses by individual – for example, assign code for each participant and put response after that code): List codes here: 		
Total Number of Activistas (there should be no more than 10 in the FGD): _____		

1. When did you begin using the mHealth application? [*Record length of time each activista started using the application*]
2. What were some of the challenges when you **first** started using the application? [cell phone coverage, recharging, reaching the Gestor de Casos]
3. Were those challenges resolved? If so, how were they resolved? Who helped resolve those challenges? [technology firm, CHASS SMT, PCC supervisor, Gestor de Casos]
4. You have told me about the challenges when you first started using the application. How is your experience using the mhealth application now? [Probe: was it easier or harder? Why?]
5. What challenges, if any, still exist in using the mHealth application? [cell phone coverage, recharging, reaching the Gestor de Casos]
6. Would you say that using the mHealth application has made your job easier, the same, or more difficult than without the mHealth application? Why? What made it easier or more difficult?
7. Please describe the overall benefits of using the mHealth application for *Busca Activa*. Probe: what are the benefits for:
 - a. Clients
 - b. Activistas
8. What have been the challenges to using the mHealth application for the *Busca Activa* process? Are they what you/others expected they would be? Why/why not? Probe: what are the challenges for:
 - a. Clients
 - b. Activistas

- c. Gestor de casos
- d. CBO leaders

9. Would you say, that the mHealth application:

- a. Saved you time in getting the list of *Busca Activa* clients? Why? Why not?
- b. Decreased the amount of time it took to find a *Busca Activa* client? Why? Why not?
- c. Decreased the amount of time it took to return a client to treatment? Why? Why not?

10. Besides the *Busca Activa* process, what other benefits did the mobile phone have? Did you use it for other purposes? If so, which ones?

11. Would you recommend the mobile phone application be used by other activistas for the *Busca Activa* process? Why? Why not?

12. Please describe any changes you would recommend to using the mobile phone application for *Busca Activa* in the future.

Those are the questions we have for today. Is there anything else you would like to discuss related to your use of mHealth for the *Busca Activa* process?

Appendix B. Expenditure Analysis Instruments

Expenditure Analysis Questionnaire – Implementing Partners National Level

Date:

Respondent(s):

Please indicate what percentage of your work supported each province during the month of February in the table below.

Total must sum to 100.

Percentage (%) of Total Work								
Maputo	Manica	Sofala	Tete	Zambezia	Niassa	Inhambane	Cabo Delgado	Nampula

OR

Please indicate what how many hours of work supported each province during the month of February in the table below.

Number of hours								
Maputo	Manica	Sofala	Tete	Zambezia	Niassa	Inhambane	Cabo Delgado	Nampula

Expenditure Analysis Questionnaire – Implementing Partners Provincial Level

January 2014

Informant Name(s): _____

Question 1: In the last month, what percentage of your work involved supporting the CBO Kugarissica?

Question 2: In the last month, what percentage of your time in this building/office supported the CBO Kugarissica?