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# A Randomized Impact Evaluation of the Introduction of Mobile Banking in Mozambique

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## Key Message

The recent introduction of mobile banking services in rural areas of Mozambique created the opportunity to undertake a randomized impact evaluation of the introduction of this technology in rural and traditionally unbanked areas. Aware of the importance of urban-rural remittances to previous successful cases in similar contexts (namely M-PESA in Kenya), this project focuses on assessing the impact of the mobile banking technology on the level of urban-rural transfers within households and consequent household economic behaviour.

Our work focuses in the rural areas of the Gaza, Inhambane and Maputo southern provinces of Mozambique. The data collected so far presents evidence supportive of a great potential for the adoption of mKesh (the only existing Mozambican mobile banking service to date) by the rural populations. Indeed, there is a large incidence of rural-urban migration from the southern Mozambican provinces to Maputo city, and urban-rural remittances are sent most commonly using bus drivers, which charge high remittance fees and are not generally perceived as safe. The alternative of using the bank as a remittance channel, despite its general level of safety, may involve some unexpected hidden costs due to the special characteristics of the rural areas. In communities where few individuals hold a bank account, bank transfers may involve a compensation to the account holder and (perhaps most importantly) a loss in confidentiality of the transfer. Furthermore, we find high objective money and time costs related to travelling to and using the closest bank branch. But, most importantly, the lack of financial literacy seems to be the major constraint to the usage of financial services.

An additional objective of the survey we designed was to accurately measure the determinants of mobile banking adoption, namely trust in the different remittance channels. The evidence collected shows both a high level of trust on banking transfers in general and in the mobile phone service provider, *mCel*, which grounds our expectation of a high level of trust towards the mobile banking service, *mKesh*. In addition, in terms of the agents that will deliver the service in the communities, we found that although shopkeepers in general do not inspire high levels of trust, the *mKesh* agents for our study were recruited according to the exact characteristics that inspire the highest levels of trust from the community members.

Looking forward, we expect to observe enough take-up and usage of the *mKesh* service as to promote financial literacy, via not only our intervention, but mainly the learning that results from direct usage of the *mKesh* service. This improved financial literacy should contribute to intensifying demand for traditional banking services, as is the objective of the Central Bank. This rise in demand may promote additional investment by the traditional financial sector in rural areas in a way that facilitates economic growth in these areas.

### **Motivation for Research**

The use of cell phones has been dramatically changing the African landscape by making various types of information reach sections of the population that not long ago were completely isolated. Indeed, the take-up rate in this region increased by 550 percent in the five years up to 2009 (UNCTAD, 2009).

The well-known M-PESA case is a success example of how this widespread mobile technology can deliver essential goods (such as the provision of financial services) to isolated populations that would otherwise not have access to them. Despite the great success of the mobile payments experience in Kenya, the existing (mostly descriptive) evidence is only suggestive not only about the impact of mobile banking on household behavior, but even about the more basic features of supply and demand of mobile banking services, particularly in rural areas.

The expansion of mobile banking services to rural Mozambique that is currently taking place allowed us to design, in close coordination with the mobile service provider, a randomized impact evaluation of the provision of mobile banking services to rural households. Particularly, this project focuses on the role of urban-rural remittances for the success of mobile banking and devotes special attention to the motives for sending mobile remittances in detriment of other remittance channels - namely reduced remittance costs and increased trust in the mobile banking remittance channel. Lastly, this project will examine the consequences of these remittance flows in terms of household economic behavior.

## Country Background and Expected Relevance

In Mozambique there are around five million subscribers of mobile phone services (close to one fourth of the population), and geographical coverage extends to 80 percent of the population, through a competitive market composed by state-owned mCel and Vodacom (a subsidiary of the South-African multinational). A third operating license has recently been attributed to Movitel, a consortium majority-owned by Vietnamese Viettel.

In this thriving context, Mozambican authorities passed legislation in 2010 that allowed mobile operators to partner with financial institutions in order to provide mobile banking services. Under this legislation, mCel constituted a new company, *Carteira Movel*, which started offering *mKesh* (mobile banking services) in December 2010, mostly in urban areas in the Maputo province.

In this context, and after numerous conversations with Mozambican authorities and civil society, we sensed a high degree of interest in the fact that Mozambique is currently witnessing the introduction of mobile banking technology. The hope is that mobile banking can bring access to financial services to the large majority of the population who resides in rural settings without easy access to any banking services, as branches of traditional bank are limited to a few district capitals in Mozambique.

## Research Design

The first stage of the project's randomized intervention concerns the dissemination of the *mKesh* service in the rural communities. Extensive talks with the mobile banking service provider in Mozambique, *Carteira Móvel*, allowed the research team to randomly select the rural areas where this technology is being offered before the full roll-out of the mobile banking services to the whole country.

This dissemination was conducted by randomly introducing and disseminating the mobile banking service in half of the sampled rural areas. This procedure yielded two different groups in our rural sample:

- **Group 0 (control group):** 100 locations that are not subject to any intervention;
- **Group 1 (treatment group):** 100 locations that are subject to the mKesh dissemination intervention.

The impact of the experimental intervention on our outcome variables of interest in the rural areas will be measured by comparing treatment and control areas.

A second stage of the experimental design has the objective of examining the role of lower remittance costs and increased confidence in the remittance channel on the success of mobile banking. For this purpose, urban migrants of the families interviewed in the rural locations are contacted, and these urban migrants are then the subject of a second (individual-level) randomized intervention:

- **Group A (control):** 1/3 of urban migrants constitute a control group that is provided with specific information on how to register with and use the mobile banking service, namely how to send money to his/her family in the rural treatment locality;
- **Group B (treatment 1):** 1/3 of urban migrants are provided the same information as individuals in Group A, in addition they are also offered a promotional 50% reduced transfer fee for 6 months;
- **Group C (treatment 2):** 1/3 of urban migrants receive the same information as individuals in Group A, in addition they are also offered a £1 voucher to experiment the service.

Comparing take-up and usage outcomes between group A and each of groups B and C allows distinguishing between the effect of a reduction in mobile banking remittance costs and the effect of an increase in trust and experience using mobile banking services (by dissipating any safety concerns through using the £1 voucher in this trial process). Contrasting the effects of strategies B and C provides a better understanding of the mechanisms underlying mobile banking adoption, namely of the relative importance of the remittance cost reduction and of the trust improvement motives.

A follow up survey to be done up to 12 months after the initial mKesh dissemination intervention should allow measurement of the medium run impact of the experimental interventions.

## Project Implementation

### Sampling

The project's main efforts are concentrated in the rural areas of Mozambique, where the large majority of the population has no easy access to traditional forms of banking and also where the mobile banking technology was still to be introduced before the start of this project.

In particular, the study is focused on the provinces of Gaza, Inhambane, and Maputo, which have sizable rural populations as well as important stocks of emigrants. In addition, because of the relatively small distance to Maputo city and because most migrants born in these provinces head to the country's capital, doing fieldwork in these provinces allows us to focus on this single migration corridor and therefore minimizes costs and logistical burdens on the research team. Carrying out our study in these provinces has the additional advantage of allowing us to concentrate on what is arguably the most important mechanism underlying the success of M-PESA in Kenya as described, among others, by Mbiti and Weil (2010) and Jack and Suri (2011): urban-rural migrant transfers. This same potential success driver would seem to potentially operate in the Mozambican context: in addition to the large numbers of internal migrants in the southern provinces, we collected pilot evidence from urban migrants showing that high remittance fees (10% - 20% of remittance value) are charged by bus drivers; at the same time, migrants also express safety concerns relative to this important remittance channel, which constitutes the only alternative to having remittances brought in person to rural areas not served by commercial banks.

Our sampling framework is based on the 2007 population census excluding census areas that: (i) are not covered by the mCel mobile phone network (information provided to us by our partner, *Carteira Movel*, under a confidentiality agreement); or (ii) are located in a district where there is no bank branch (information provided to us by the Central Bank of Mozambique).

Accordingly, within the Gaza, Inhambane and Maputo Provinces, the research team excluded all districts without a branch for a commercial bank. The motive for this restriction is the need for the *mKesh* agent to make regular deposits in the bank - we

therefore needed the rural areas in our sample to be at a feasible distance from the nearest bank branch.

Even more binding was the restriction to have good mCel network coverage in the rural areas included in our study. We therefore obtained information from *Carteira Móvel* on the position and range of the network's antennas and consequently excluded all areas that did not have coverage according to the information provided.

At this point, using the above criteria and relying on the available data, the research team identified all eligible 174 localities according to the administrative division used in the 2007 Population Census and provided to us by the National Statistics Office (INE).

Within each census locality we then randomly selected one enumeration area (EA), in order to ensure representativeness of rural areas in these provinces with mobile phone coverage and at least one bank branch in the district.

Finally, similar areas were paired and it was randomly selected which area would receive the treatment, leaving the remaining one to be the control area. We thereby expect to achieve two overall treatment and control groups with no significant differences from each other, as is essential for the internal validity of the experiment.

Within each enumeration area our goal is to collect a representative sample of 10 individuals who own a mobile phone, to which we add an oversample of 10 individuals owning a mobile phone and whose household has at least one member residing in Maputo city. This oversample should guarantee a sample size with enough households potentially benefiting from domestic remittances, which, as discussed, we anticipate to be the main driver of mobile banking adoption when introducing this technology in rural areas.

### **Recruiting the *mKesh* Agents**

Having the sample already defined, the research team initiated, together with *Carteira Móvel*, the stage of identification of the future mKesh agents in the treatment areas. This phase of the project took place between August 2011 and January 2012. This initial work was essential to confirm (through the administration of a short questionnaire) that recruited mKesh agents had the motivation and critical

financial capacity to act as effective local mKesh providers. It also allowed the collection of all necessary documentation and signatures in the contract between the agent and *Carteira Móvel*.

While travelling in the field, the team realized that several enumeration areas initially included in the sample actually did not have reliable network coverage. In some cases there was no coverage at all, and in others the usage conditions were very precarious, with people having to climb up trees or to hang their cell phones in trees in order to make and receive phone calls. It was clear that the service could not operate in such conditions and therefore these enumeration areas were excluded from the sample.

All control areas were likewise visited in order to ascertain their network coverage conditions. The information collected on the quality of cell phone coverage and respective geographic coordinates of each area were shared with mCel. We expect this data to be helpful for the company future decisions regarding the placement of new antennas.

The team's decision to double the number of visited enumeration areas at this initial stage of the project increased considerably the time and financial resources spent relative to the initial research proposal. However, this effort was deemed essential to the successful implementation of the study given the differences found between network coverage according to data provided by the mobile phone company and actual conditions on the ground.

After visiting all the enumeration areas and ruling out those that did not comply with the required characteristics, the sample size was rescaled to 102 areas. As originally intended, in half of the sampled areas, the team recruited one *mKesh* agent and administered this person a small individual questionnaire with questions on basic characteristics of the individual, his shop and community. These questionnaires present an important source of preliminary data, which we discuss in detail below.

### **Preliminary Data Description**

In this section, we present a brief description of the data available at the moment. We start by depicting the geographical distribution of the enumeration areas in our sample across the three provinces included in the study. Next, descriptive statistics

of data collected through the *mKesh* agent survey and the baseline survey are presented separately. The following section, ‘Preliminary Findings’, will provide an in-depth analysis of data from both sources and draw some preliminary implications.

The Map in Appendix and Table 1 describe the geographic distribution of the enumeration areas that compose our sample. The final 102 enumeration areas are spread through the three southern provinces of Mozambique, Gaza, Inhambane and Maputo, in a non-uniform way. As can be seen in Table 1, more than half of the areas belong to Gaza Province and less than 14 per cent of sampled areas belong to Maputo Province. This uneven distribution is explained by the pre-defined requirements that all enumeration areas within our sample needed to have good network coverage and be located in a district with a commercial bank branch. This implies, therefore, that the uneven distribution of *mCel* antennas and of traditional bank branches limited not only the size of the sample but also its geographic distribution.

Note that one of the treatment-control pairs includes one enumeration area from Gaza and another from Inhambane, and that is the reason why we observe in Table 1 that one pair was made with one control area from Gaza and one treatment area from Inhambane. The enumeration areas in question are at the border between the two provinces and present very similar characteristics, hence no real objection can be made to this pairing except for crossing the administrative province boundaries.

**Table 1: Treatment and Control enumeration areas, by Province.**

	Province			Total
	Gaza	Inhambane	Maputo	
<b>Treatment areas</b>	29	15	7	51
<b>Control areas</b>	30	14	7	51
<b>Total</b>	59	29	14	102
<b>(%)</b>	(57.84%)	(28.43%)	(13.73%)	(100%)

### I. *mKesh* Agents Survey

As previously mentioned, the most extensive source of data available at this stage of research was collected through the survey conducted to *mKesh* agents. This

presents not only an important source of information on characteristics of the individual agent and his/her shop, but also provides some insight on the communities' characteristics.

Table 2 displays basic descriptive statistics of the data collected from interviewing the 51 *mKesh* agents who provide the mobile banking service in the treatment areas. As can be observed from Table 2, the median agent is male, completed a relatively high number of years of education, has a bank account and owns a cell phone which he uses several times a day for calls and texting.

The gender discrepancy towards male agents is in part explained by a strong sexist culture particularly in the southern provinces of Mozambique. In fact, although in some cases the actual manager who stays all day in the shop is a woman, the official owner who can make the decision to sign a contract with *Carteira Movel*, is the husband or another male family member.

Few *mKesh* agents reported to have ever used a computer, which is not unexpected since in the sampled rural areas this technology is not commonly available.

Concerning the financial exposure of the agents to banks, we observe that more than 90 per cent hold a bank account. In addition, although this information is not displayed in Table 2, some respondents with no bank account reported that their business partner actually holds a bank account and other respondents have shown strong interest in opening a bank account very soon. In fact, no *mKesh* contract was proposed to individuals who were not familiar with the way a traditional bank operates or did not know the location of the nearest bank agency.

From Table 2, we can also observe that 29 per cent of the respondents mentioned that individuals from the village had requested them, at least once, to deposit money in their bank account, using the opportunity that the respondent was himself visiting the bank. Moreover, 36 per cent of the agents had been asked to withdraw money from other people's account on their visits to the bank, which shows that individuals trust the agents with their money to at least some extent.

In addition, Table 2 presents some evidence concerning the characteristics of the shop where the mobile banking service is provided: only 53 per cent have electricity. Alternative energy sources used in the area are generators, solar panels, battery and petroleum. Further, shops have on average 47 costumers per day, who spend each

an average of 112MZN (approximately £2,5) in products each time they visit the shop. However, one must be aware of the considerable heterogeneity of the characteristics of the shops in our sample, which is evident from the high standard deviation of both the “*usual number of clients*” and “*usual clients expenditure per sale*” variables. Despite the guidelines followed by the field team to choose the most thriving shop within each enumeration area, it would be unrealistic to expect that recruited shops would be exactly alike since each area has its own commercial situation and general economic characteristics. But the similarity between treatment and control groups should nevertheless be ensured by the pairing of similar areas used to randomize the treatment intervention.

**Table 2: Descriptive statistics on *mKesh* agents and their shops.**

	Mean	Std. Dev.	Min	Max
Gender (1 = male)	88.24%	0.33	0	1
Age	41.88	11.55	23	64
School attainment (in years)	6.45	2.76	2	12
Owns a cell phone	100.00%	0.00	1	1
Cell phone usage (calls + sms)				
many times a day	90.20%	0.30	0	1
a few times a day	3.92%	0.20	0	1
very few times a day	5.88%	0.24	0	1
Ever used a computer	23.53%	0.43	0	1
Holds a bank account	92.16%	0.27	0	1
Usual transport to the bank:				
Car	54.35%	0.50	0	1
Foot	4.35%	0.21	0	1
Bus	41.30%	0.50	0	1
Deposits money in the bank for others	28.89%	0.46	0	1
Withdraws money from the bank for others	35.56%	0.48	0	1
Shop has electricity	52.94%	0.50	0	1
Usual number of clients (per day)	47.41	37.55	8	200
Usual clients expenditure per sale (in MZN)	112.40	132.69	20	700

The agent survey also allowed us to assemble information on the main features of the enumeration areas, which is briefly summarized in Table 3. Although the survey was administered to the *mKesh* agents who, by definition, are only located in treatment areas, one can expect that information from these data may be generalized to the entire sample to the extent that the experiment design should

ensure that treatment and control groups are not significantly different.

**Table 3: Descriptive statistics on enumeration areas (from agent survey).**

	Mean	Std. Dev.	Min	Max
Time to nearest bank by bus (min)	44.07	23.61	5	90
Time to nearest primary school by foot (min)	8.95	7.85	1	35
Secondary school available in the EA	27.45%	0.45	0	1
Medical services available in the EA	33.33%	0.48	0	1
Share of households (HH) in the EA with bank accounts				
EA where very few HH have a bank account	44.44%	0.50	0	1
EA where some HH have a bank account	6.67%	0.25	0	1
EA where half the HH have a bank account	20.00%	0.40	0	1
EA where many HH have a bank account	28.89%	0.46	0	1
Share of households in the EA with at least one member in Maputo				
EA where a few HH have at least 1 migrant	28.00%	0.45	0	1
EA where half the HH have at least 1 migrant	12.00%	0.33	0	1
EA where many HH have at least 1 migrant	50.00%	0.51	0	1
EA where almost all the HH have at least 1 migrant	8.00%	0.27	0	1
EA where all the HH have at least 1 migrant	2.00%	0.14	0	1
Share of households in the EA with at least one member in South Africa				
EA where a few HH have at least 1 migrant	24.00%	0.43	0	1
EA where half the HH have at least 1 migrant	12.00%	0.33	0	1
EA where many HH have at least 1 migrant	54.00%	0.50	0	1
EA where almost all the HH have at least 1 migrant	10.00%	0.30	0	1
Most used remittance channel to send money to the EA by Maputo migrants				
Bank	26.00%	0.44	0	1
Bus drivers	68.00%	0.47	0	1
Family or friends	6.00%	0.24	0	1
Most used remittance channel to send money to the EA by SA migrants				
Bank	18.37%	0.39	0	1
Bus drivers	61.22%	0.49	0	1
Family or friends	8.16%	0.28	0	1
Transport companies	12.24%	0.33	0	1

Information concerning distance to the nearest bank and primary school is provided

in Table 3. Individuals within the studied communities, have to face a 44 minute average travel time to get to the closest bank by bus, which involves not only a high cost in terms of time but also the payment of a transport fee. In terms of “*time to nearest primary school*”, we observe that in most cases there is a primary school in the community and is on average at a 9-minute walk. The problems arise when children finish primary school and intend to enroll in secondary school. Since less than a third of the villages have a secondary school, students usually need to either live in residences during the class period, which demands a considerable financial effort from the parents, or travel long distances every day, which is a high demand on students and still imposes a financial burden on parents to cover the travel expense. Not having the financial resources to pay for student residences or for transportation is reported to lead to a massive drop out of school after children complete primary education whenever the closest secondary school is outside the village. In addition, the rural areas included in our study lack medical facilities that provide basic nursing services. Indeed, the variable “*medical services available in the EA*” shows that only one third of the communities have a medical aid station with a qualified medical or nursing professional.

The following set of variables presented in Table 3 relates to the exposure of households to traditional financial services. Analyzing the variable “*share of households in the EA with bank accounts*” we observe that when asked about how many individuals in the community hold a bank account, 44 per cent of the agents report that only a few of their neighbors hold a bank account. Further, in communities where agents report that a large group of the village inhabitants hold a bank account the field team realized that these individuals work on some local company and opened the bank account to receive their salaries. For example, a sugar production company operates in the Xinavane district (Maputo province) and employs people from some of the enumeration areas within our sample. As a consequence, in these areas we observe that the average fraction of individuals with a bank account is higher than the sample average. Hence, the existence of large companies that operate and recruit employers from the communities within our sample is going to be controlled for while analyzing the impact of mobile banking dissemination.

Considering the overall level of economic development of the country and the fact that the areas in our sample were chosen exactly because of the potential

intervention impact created by its rural and remote characteristics, the realization that these communities face limited access to secondary education, lack basic medical services and most of its population has no access to traditional financial services is according to our expectations and comes to no surprise.

Further information was collected concerning the remittance phenomena in the villages. As shown in Table 3, several questions were asked to the *mKesh* agent about his perception on the share of households in the village with at least one member currently living in Maputo city or in South Africa. Variables “*share of households in the EA with at least one member in Maputo*” and “*share of households in the EA with at least one member in South Africa*” assort the enumeration areas according to the fraction of resident families that have urban migrants in Maputo and South Africa (SA), respectively. The two following variables depict the most common remittance channel used by migrants in Maputo and migrants in South Africa to send money to their families in the rural village. From the analysis of these four variables, it is evident that a large share of households in the studied areas has at least one family member currently working in Maputo or in South Africa. In both cases, migrants usually send money home via bus drivers. Both these observations support the initial motivation of this study to focus on the potential of mobile banking to serve as an alternative to the ‘bus drivers’ channel which is deemed expensive and unsafe by the rural populations. Moreover, it reassures the research team that the southern provinces where the project is being implemented observe indeed large remittances flows, which we expect will play an essential role to the success of mobile banking in these areas.

## II. Baseline Survey

Following the *mKesh* agent recruitment phase which allowed to collect the data presented previously, the research team started conducting a baseline survey in the 102 treatment and control areas included in the sample. In this section, we will briefly analyze the data collected to date from the baseline survey, which is still in a preliminary stage of analysis.

Table 4 displays some descriptive statistics of variables of interest from the baseline survey. Half of the respondents are female, they have on average 42 years of age

and only 18 per cent attended classes higher than primary school. Also worth mentioning is that only 45 per cent of the interviewed individuals can speak Portuguese, the official language used in Mozambique for official documents and all sorts of written material (as marketing campaigns, contracts, etc) provided by governments, banks and also the mobile banking provider, mCel. This underlines the special care that must be taken during the mKesh dissemination stage since menus and marketing information of the mobile banking service are only available in Portuguese.

More encouraging results concern the ease in using cell-phones - 68 per cent of individuals in the sample have no problems operating cell phones. The remainder 32% are still able to use them, and report problems mostly linked to not being able to use some functionalities such as texting, which may be the result of illiteracy rather than actual difficulties with phone usage - even though it could of course be expected that both are related.

Regarding the household characteristics in terms of usage of financial services, less than 14 per cent of the survey respondents report holding a bank account. But even though all respondents stated 'not having enough money' as the main reason for not holding a bank account, 19 per cent of households reported using informal saving methods ('xitique'). This fact, together with the very low number of individuals who has never taken a formal loan, leads us to believe that, in addition to supply deficiencies, the lack of financial literacy is a major constraint to the usage of financial services. The research team therefore concluded that some type of financial literacy intervention needed to be included as a part of the overall mKesh dissemination strategy. We will elaborate on this idea in the next section.

Finally, Table 4 provides information on respondents' usual patterns of travelling to the place where the nearest bank is located. The usual transport method used by the population is the bus, which requires the payment of an average fee of 49 MZN (a little over £1), which helps understanding the survey evidence that more than half of respondents had not travelled to the nearest bank location in the 30 days previous to the survey. Hence, high transportation costs seem to also be an important barrier to formal banking, in addition to the lack of financial literacy.

Table 4: Preliminary descriptive statistics from baseline survey.

	Mean	Std. Dev.	Min	Max
Gender (1 = male)	50.00%	0.51	0	1
Age	42.32	11.84	24	64
Completed Education				
None	13.64%	0.35	0	1
Primary	68.18%	0.48	0	1
> Primary	18.18%	0.39	0	1
Can Speak Portuguese	45.45%	0.51	0	1
Religion				
Catholic	22.73%	0.43	0	1
Zionist	27.27%	0.46	0	1
O. Christian	13.64%	0.35	0	1
No religion	9.09%	0.29	0	1
Muslim	0.00%	0.00	0	0
Goes to church at least once a week	77.27%	0.43	0	1
Number of household members	7.91	3.21	4	14
Amount spent per month by the household (in MZN)	2844.44	2379.87	200	9000
Capacity to use the cell-phone without limitations				
Very good	54.55%	0.51	0	1
Good	13.64%	0.35	0	1
Bad	4.55%	0.21	0	1
Very bad	27.27%	0.46	0	1
Holds a bank account	13.64%	0.35	0	1
Saves money with informal group savings ("xitique")	19.05%	0.40	0	1
Has a formal loan	4.55%	0.21	0	1
Has a loan from family/friends	40.91%	0.50	0	1
Travels to nearest bank location by bus	95.24%	0.22	0	1
Bus fee for a two-way travel to the nearest bank (MZN)	48.64	29.85	15	80
Number of times individual travelled to nearest bank location in past 30 days				
0	58.82%	0.51	0	1
1	29.41%	0.47	0	1
2	5.88%	0.24	0	1
3	5.88%	0.24	0	1

## Preliminary Findings

The objective of the previous section was to briefly present descriptive data from the two data sources available at present: the agents' survey and the baseline survey. In the current section we propose to bring together the data available from both surveys in order to draw a few overall preliminary findings.

- From the information presented in Table 3 regarding the share of families with migrants in Maputo, we observe that in 72 per cent of the areas at least half the households have a member currently living in Maputo city. In addition, it can be observed that in 60 per cent of these areas the vast majority of households (>75%) have at least one migrant in the city. This evidence is in line with the preliminary information we gathered from the Census 2007 on the ***large incidence of rural-urban migration from the southern Mozambican provinces to Maputo city.***
- As can be learned from Table 3, ***sending money with bus drivers is the most commonly used remittance channel*** both from Maputo city and from South Africa. The preference for this channel is especially high when considering transfers made by migrants in Maputo: in 68 per cent of the areas 'bus drivers' was reported as the main remittance channel used by these migrants to send money back home. Since bus drivers demand high fees of at least 10 per cent of the remittances value, we expect the *mKesh* service to be highly competitive in this regard.
- Still in Table 3, we observe that banks, and not bus drivers, are the most used channel for families to receive money from their family in Maputo in 26 per cent of the areas. We should note that, although not included in Table 3, in several enumeration areas respondents mentioned that the bank transfers were not sent directly to the family, but to the account of one of the few individuals holding a bank account in the community. This information is consistent with individual data presented in Table 4, which shows that only 14 per cent of the households hold a

banking account. In this context, ***using the bank as a remittance channel may have hidden costs, such as a compensation to the account holder and (perhaps most importantly) a loss in confidentiality of the transfer.*** Indeed, in rural and small communities, where borrowing from neighbors is a common practice, the confidentiality factor might play a particularly important role when receiving money transfers.

- In addition, sending remittances to rural households via bank transfer is associated with significant monetary and time costs due to the distance individuals have to travel to collect the money. Data presented in Table 3 shows that the closest bank to the treatment areas in our sample is on average at a 44-minute drive from the *mKesh* agent. Travelling this distance requires the payment of a fee between 15MZN and 80MZN (£0.35 to £1.84) to the bus drivers, as shown in Table 4. These amounts represent a considerable financial effort for the families in our sample, for whom the average monthly expenditure is approximately 2,844 MZN<sup>1</sup> (£65.5). Consistent with this observation we also find evidence that 59 per cent of respondents had not travelled a single time to the area where the closest bank is located during the 30 days prior to our survey. Furthermore, the field team collected community member testimonials on the characteristics of the process of using bank services (such as making withdrawals or deposits). This process was described as very time-consuming, mainly due to long lines and waiting periods. In conclusion, due to the ***high money and time costs associated with travelling to and using the closest bank branch***, we expect that having the mobile banking agents placed within the communities constitutes an important advantage of this service relative to traditional banks.
- Since the universally reported reason for not having a bank account was ‘not having enough money’ (see Table 4), we expect *mKesh*, which has no deposit requirement, to be very attractive to those without an account. But even though all respondents stated ‘not having enough money’ as the main reason for not

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<sup>1</sup> See Table 4. Moreover, note that since one household has on average nearly 8 members, the average monthly individual expenditure is 359.6 MZN (£8.3).

holding a bank account, 19 per cent of households reported using informal saving methods ('xitique'). This fact, together with the very low number of individuals who has never taken a formal loan, leads us to believe that, in addition to supply deficiencies, the **lack of financial literacy is a major constraint to the usage of financial services**. The research team therefore concluded that some type of financial literacy intervention needed to be included as a part of the overall mKesh dissemination strategy.

- For the declared purpose of the study, namely examining the role that trust in the remittance channel has on adoption and usage of the mobile banking service, it is essential to determine respondent perception of the actors involved in the remittance phenomena. Each individual trusts banks, bus drivers, and shop owners differently and it is expectable that the way individuals see (and value) these actors will ultimately contribute to defining their choice of remittances channel. It is therefore necessary to **measure as accurately as possible the determinants of adoption of mobile banking services: Is it the trust in the provider (mCel) or is it the trust in the agent (shop owner) that matters? How much do people trust the alternative remittance channels, such as bus drivers and banks?** In order to address these questions in a precise manner, the research team introduced anchoring vignettes in the baseline survey so that a single scale could be used to compare the subjective trust levels reported by different individuals. This technique was firstly introduced by King et al. (2003) and has been broadly used on a wide range of social studies ever since. Four different questions and respective anchoring vignettes were asked to baseline respondents in order to evaluate and compare their level of trust in the different remittance channels:
  - i. Friends and family, including different kinds of relationship with the person that brings the money;
  - ii. Different bus driver services, with varying characteristics such as the time since it the service started to operate and hypothetical friendship or family connection with the bus driver;
  - iii. Transfers made through different banks, public-owned vs. small and unknown banks, banks where a family member or friend works there, and also different

- banks created by each of the three network provider companies;
- iv. mKesh, considering different distances from the locality, being provided by a store and having a friend or family member working there.

At the present stage of data collection and analysis, it is not yet possible for the research team to present definite conclusions from the trust measurement exercise that was conducted. We can, however, present preliminary results using the anchoring vignettes to produce a simple adjustment to avoid subjective bias on individual trust reports.

The variable 'reported trust' displays the original trust level reported by respondents when asked the questions of interest concerning the four alternative remittance channels (i. to iv.), with answers ranging from 1 (fully distrusts) to 7 (fully trusts). As previously mentioned, the direct use of this variable does not account for individual subjective evaluation scales of trust. For this reason, we want to weigh the individual reported level of trust by individuals' average attitudes in terms of trust. In order to measure this typical attitude, a new variable 'average trust' was created, which is the average for each individual of the answers to the anchoring questions on trust. Hence, for each one of the four remittances channel, the question of interest (which we shall label  $j$ ) was normalized using the average level of trust reported in the respective anchoring answers, using the following expression:

$$normalized\_trust_j = reported\_trust_j + \frac{(reported\_trust_j - average\_trust_j)}{2} \quad (1)$$

In this way we ensure that individuals who report high levels of trust relative to the variables of interest but also high levels of average trust will end up with a lower normalized level of trust, and vice-versa. Hence, a 'normalized trust' measure is created that accounts for the different pre-disposition of individuals to generally trust or distrust each channel.

In order to allow for an easy and direct interpretation, the 'normalized trust' variable was rescaled to obtain a trust index (ranging from 0 to 100) for each question of interest  $j$ , using the following expression:

$$trust\_index_j = \frac{normalized\_trust_j + 2}{12} \times 100 \quad (2)$$

A zero value for the index depicts the lowest possible trust scenario: this would be the case for an individual who completely distrusts the remittance channel in question (value 1 in the 1-7 scale of the original 'reported trust' variable) although being on average a very trusting individual (value 7 in the 1-7 scale of the 'average trust' variable). Following the same reasoning, the index upper limit 100 represents the highest possible trustiness feeling towards a specific remittance channel: this would be the case of an individual who, although highly distrustful in general (value 1 in the 1-7 scale of the 'average trust' variable), reports a high level of trust in the channel (value 7 in the 1-7 scale of the original 'reported trust' variable).

**Table 5: Trust in alternative remittance channels and shops**

	Mean	Std. Dev.	Min	Max
Trust index for different remittance channels				
(i) Friends and family	65.08	19.46	26.39	87.50
(ii) Bus drivers	56.69	21.47	16.67	93.75
(iii) Banks	76.53	8.27	45.14	89.58
(iv) mCel	70.58	10.68	53.47	89.58
Trust index for shops	53.42	32.11	8.33	88.54

Table 5 presents the descriptive statistics for the 'trust index' measure corresponding to the four different remittance channels. It shows that the most used remittance channel, the bus drivers, produces the lowest level of trust in respondents, especially when compared with the most trusted alternative: banks. Hence, the common use of the bus drivers channel by urban migrants would seem to be associated to a lack of alternatives rather than to a preference in itself. Indeed, the lack of trust on bus drivers as a remittance channel is the most

common reason given by respondents for relying so much on bank transfers. This result reinforces our expectation for the potential of introducing an alternative remittance channel that is located within the communities and that permits tracing electronically the transfer flows.

When analyzing the 'trust index' corresponding to family and friends acting as the remittance channel from the urban to rural areas, we conclude that it generally takes moderate values, which are significantly lower than those relative to bank transfers. The value of the trust index for friends and family is the second lowest within the four possible alternatives, being significantly less trusted than mCel. This evidence points towards the possibility that, in addition to users of bus drivers as remittance channels, also those who use family and friends to send transfers could be willing to adopt the mobile banking system once it is implemented. Note that, revisiting Table 3, in 6 per cent of the treated areas, friends and family are the main remittance channel used by migrants in Maputo. Interestingly, when answering the anchoring questions, some respondents reported more trust on transfers via some not-close acquaintance than through a close family member. The explanation given in these cases was that the family member might use the money instead of delivering it and not feel sufficiently pressured to pay it back later on.

Although bank transfers are unsurprisingly the most trusted channel to send money, the trust individuals have on the mobile banking provider is also considerably high. Presenting a scenario where the government-owned cell phone company, provides this financial service, sending money through mCel would be the second most trusted remittance alternative. This channel would reportedly be only slightly less trusted than traditional financial services. From our survey, where different hypothetical alternative services were presented, we can also tell that if mCel's competitor Vodacom presented an identical financial service, it would only be marginally less trusted than the one provided by state-owned company, so that it would seem that the provision of mobile banking services in rural Mozambique has a general significant potential for success.

***The evidence collected concerning the high level of trust on banking transfers in general and the fact that mCel is highly trusted within the***

**population provides reason to expect high levels of trust on the mobile banking service, mKesh.** This is in fact corroborated by the enthusiastic reception of the product during the various field trips made by our team.

- Having measured the levels of trust relative to the four alternative remittance channels, it remains to ascertain how much individuals trust shopkeepers. Theoretically, it is conceivable that despite the general trust in the mobile network provider, there could be mistrust relative to the local provider of the service, which could undermine the service uptake and usage. A set of anchoring vignettes was therefore also introduced in the questionnaire in order to provide a reliable measure of the population's level of trust for shopkeepers. We applied the same normalization procedures described in (1) and (2) to the resulting data. The descriptive statistics of the 'trust index' for shops is likewise displayed in Table 5. It is evident that the index of trust takes rather low values, even when compared with the bus drivers category. Despite the low average values taken by the trust index for shops', it is worthwhile mentioning that it is the variable with the highest standard deviation in Table 5, ranging within a wide interval. This evidence of high heterogeneity of trust levels across the sample, motivated the research team to devote special attention to this group of anchoring questions, which comprises different hypothetical types of stores. Although the variable of interest does not present encouraging evidence regarding shopkeepers image in general, the anchoring vignettes provide additional insight on this trust phenomenon. Analysis of these questions suggests that characteristics such as store size, amount of products and number of years the shop has been operating are fundamental factors to determine the level of trust inspired by shopkeepers. When presented with different hypothetical stores, almost all respondents display high levels of trust in the ones with considerable stocks of products and which are open for at least a few years. Since these factors correspond to the specific characteristics our field team looked for when deciding which store would be chosen to provide the mobile banking service, we then expect that **although shopkeepers in general do not inspire high levels of trust, the specific mKesh agents that were recruited are respected and trusted within the community**, since they have the characteristics individuals value.

## Dissemination Activities

Dissemination activities of the mKesh mobile banking services in the 51 selected treatment enumeration areas were conducted between February and June 2012. These dissemination activities included several distinct components, namely at the mKesh agent level, at the community level and at the individual client level.

First, each mKesh agent was subject to an intensive day-long training session, including the opportunity for practical experimentation, on the usage and technical features of the mobile banking service. This component of the dissemination activities is of crucial importance as the mKesh agent is not only responsible for delivering the mKesh service to all clients in his/her community, but also to generally support mKesh usage by these clients.

Second, the baseline respondents, their families and the community in general were invited to a locality-wide marketing campaign. This intervention included playing the mKesh jingles (that are also heard in the radio in mKesh radio ads) in the open air, in the vicinity of the mKesh agent shop. A second component of the community-level dissemination intervention included holding popular theatres near the mKesh agent shop. The theatre play script included scenes adapted to the rural setting from mKesh TV commercials (which most of the rural locations in our sample have never watched as they lack the electrical infrastructures normally necessary for TV access). These theatre scenes emphasized different aspects such as the security and simplicity of saving money with mKesh; or the convenience, the reliability and low cost of transferring money via mKesh.

Finally, after the community level presentation, the study participants were subject to an individual level treatment intervention. Each respondent to our survey was lectured on all tasks that can be performed using mKesh following a script that we prepared jointly with Carteira Movel. This script and the corresponding hard copy leaflet summarizing all information provided was left with each individual for future reference. In addition, to allow some practical experimentation and learning, each respondent received approximately £2 to experiment the different *mKesh* services. Specifically, project participants were required to auto-register (which amounts to opening a mKesh account), to make a deposit, and to purchase a good from the

mKesh agent's shop. Survey respondents were also offered the opportunity to finally make a withdrawal of the mKesh value remaining in their mobile phone. All of these activities were performed with the support of our research team.

We expect that, by trying the service by themselves just after the product presentation, individuals get a good sense on how to use the mobile banking service and that, at the same time, they also understand all of its potential. In addition, this trial session provided further practice to the agent on the different operations he/she was being trained before, with the advantage of having one of our team members available to help solving any unexpected problems or doubts.

An important note is required to underline that financial literacy components were included at all stages of the mKesh agent, individual and community dissemination activities. This financial literacy element aims at clarifying basic concepts (such as basic notions on savings, investments and the nature of financial institutions) that could, otherwise, work as barriers to adoption.

A final note to underline that we understand the dissemination activities described above as a first step, but by no means the final step, in our experimental intervention. We will necessarily continue dissemination and support activities in the months to follow the initial dissemination effort described above to ensure that adoption processes work as smoothly as possible.

### **Summary of findings and directions forward**

Despite the preliminary nature of the results presented in this paper, we have reasons to be confident about the success of the implementation of the mobile banking system in rural Mozambique.

The data we collected on the high prevalence of households with a family member in Maputo city confirms the importance of the migration corridor from the southern provinces to the capital and of the remittance flows it generates. Furthermore, our data show that the remittance channel most commonly used (bus drivers) is expensive and not trusted by the remittance recipients in the rural areas, especially when compared with electronic bank transfers. Further inquiry also showed that the mobile phone company providing the mobile banking service is well known and trusted within the rural communities. Lastly, we observe high transportation and time

costs faced by individuals in rural areas to travel to the nearest bank. This is associated with an insufficient supply of traditional banking services in these areas and translates into a very limited number of individuals who hold a bank account, within the studied areas. In order to magnify the potential impact of introducing the mobile banking service on the number of rural households using formal savings, we conduct a financial literacy intervention as part of the mobile banking service dissemination activities. In this way the intervention design simultaneously addresses what seem to be the two major barriers to using financial services: the high time and money costs associated to going to the nearest bank, since *mKesh* agents are placed inside the communities; and the lack of savings habits and knowledge, which may be improved by the financial literacy interventions carried out by our research team.

The follow up survey to be administered in the rural areas in our sample will be conducted sometime between January and August 2013. The precise timing for this survey will depend on the rates of adoption of the *mKesh* service, which are monitored by our field team using monthly data collected from the *mCel* central services and through a short phone questionnaire to be administrated periodically. This follow up survey will allow us to measure the medium term impact of the interventions we are conducting.

### **Policy Implications**

This impact evaluation study is of general interest to the Mozambican authorities, but of particular interest to the Central Bank of Mozambique, the regulator of the provision of mobile banking services in Mozambique.

At a broad level, the randomized impact evaluation methodology used in this project should provide the Central Bank with convincing evidence on the potential economic development and social benefits created by the mobile banking technology, as well as on adoption and usage patterns of mobile banking services using alternative dissemination strategies. These results would highlight the importance of drafting supportive regulation that enables the provision of quality mobile banking services within Mozambique.

The findings of this study could serve, in addition, to motivate the discussion and eventual creation of a legal framework to allow Mozambican emigrants in South Africa to send remittances via mobile banking to their families in Mozambique.

Even though remittances have been decreasing in importance as the number of migrants to South African mines falls, miner remittances are still a crucial inflow for external finance of Mozambique and historically they have also been an essential source of funding for agriculture and new business formation (Castel-Branco, 2002). In addition to compulsory repatriation of 60% of the miners' earnings, evidence points to a large volume of voluntary remittances in addition to this compulsory deferred payment.

In this context of large international remittances from South Africa to Mozambique, the potential magnification of the effects identified in our study by a policy allowing for international mobile banking could therefore be very important. This significant magnification of effects would happen not only because of the magnitude of the resources available to international migrants, which is much larger than that of the urban internal migrant transfers, but also because sending migrant remittances from South Africa to Mozambique is classified by the World Bank as one of the most costly remittance corridors in the world (5<sup>th</sup> most expensive in the world, charging an average fee of nearly 20% or 38\$ to remit 200\$). In this context, introducing mobile banking, with its reduced operating costs and low remittance fees, should increase the potential for migrants to send even more voluntary remittances than previously estimated.

In addition, the largest part of the Mozambican population to whom remittances may be sent from either urban areas or from abroad lives in rural areas without access to traditional banks, even though much of this population has access to mobile phone technology. Hence the relevance of studying mobile banking activities that raise the opportunity of bringing important financial services to rural areas isolated from financial markets, in line with the Central Bank of Mozambique's declared priority of expanding the reach of financial services.

From our preliminary data, we observe that only 13 per cent of the rural households in the studied areas hold a bank account. In this context, we expect that the adoption of mobile banking will represent an initial step towards a more intensive use of

traditional financial services, reducing in the medium-run the share of unbanked population in these rural areas.

First, our project will measure the extent to which an appropriate dissemination of the mobile banking services can promote financial literacy and an increase in the intensity of usage of financial services as sought by the Central Bank. And we should note that financial literacy in this context refers to the component provided by our intervention, but also resulting directly from usage of the *mKesh* service. Furthermore, the simultaneous combination of financial literacy and usage of mKesh should contribute to a part of the rural population eventually graduating into the use of traditional banking services, as their confidence and needs grow, both in terms of magnitude or complexity of operations, in a direction that surpasses the offer provided by the mobile banking service.

In line with this idea, we believe that a successful uptake of *mKesh* will signal to the banks the existence of an unmet demand for financial services and should motivate new investments in these remote areas, which is especially important since long travel distances to the bank and associated money and time costs are reported to be an important obstacle to opening a bank account. Hence, in order to ensure the regular and expeditious use of financial services by the rural population, considerable investment is required on new infrastructures in areas currently not served by a traditional bank, as well as on additional equipment and staffing in places where bank agencies already operate.

A practical consequence of our work is related to the very limited network coverage encountered in rural areas. Facing these limitations in the field led to the realization that the information the network provider possesses on the extension and quality of their cell phone coverage throughout the country is highly inaccurate. After visiting approximately 174 rural communities, our field team was able to gather detailed information that may assist our partner cell phone company, mCel, in improving the coverage of their cell phone network. Since this is the country's largest cell phone network provider, we expect to contribute in this way to improve the overall cell phone coverage, at least in the areas of Mozambique where our project operates.

Beyond Central Bank objectives and regulation of the provision of mobile banking services, our results could also prove instrumental in designing rural development

policies. This objective could be achieved in a context where the introduction of mobile banking services prompted an additional inflow of private migrant transfers to the rural economy, which could be channelled toward productive rural investment. This could be facilitated not only because of the general availability of mobile costs and the fact that remittances would become very cheap and immediate, but also because these transactions could now remain confidential much more easily, which would be helpful for the recipients to avoid social pressure to spend on immediate consumption needs. In addition, it could also allow freeing public resources from traditional subsidization policies to other priority investments.

In summary, despite the early current stage of the project, it is already possible to identify preliminary policy contributions arising from this project. First, by following the implementation of the mKesh dissemination, it can potentially identify regulatory needs. Second, this work promotes financial literacy, both the component directly provided by our intervention, and also the learning resulting directly from usage of the *mKesh* service. This increased literacy should contribute to intensifying demand for traditional banking services, as is the objective of the Central Bank, which may promote additional investment by the traditional financial sector. Third, increased migrant transfers via mobile banking can generate new productive investment in rural areas that would otherwise not take place due not only to low remittance costs and immediate availability of the amount transferred, but also to the confidentiality of transfers that mobile banking allows. Finally, any effects identified by the project may be possibly magnified by allowing international mobile banking operations, namely between Mozambique and South Africa. The remittance flows that cross this border are very significant and could have a positive growth effect in Mozambique.

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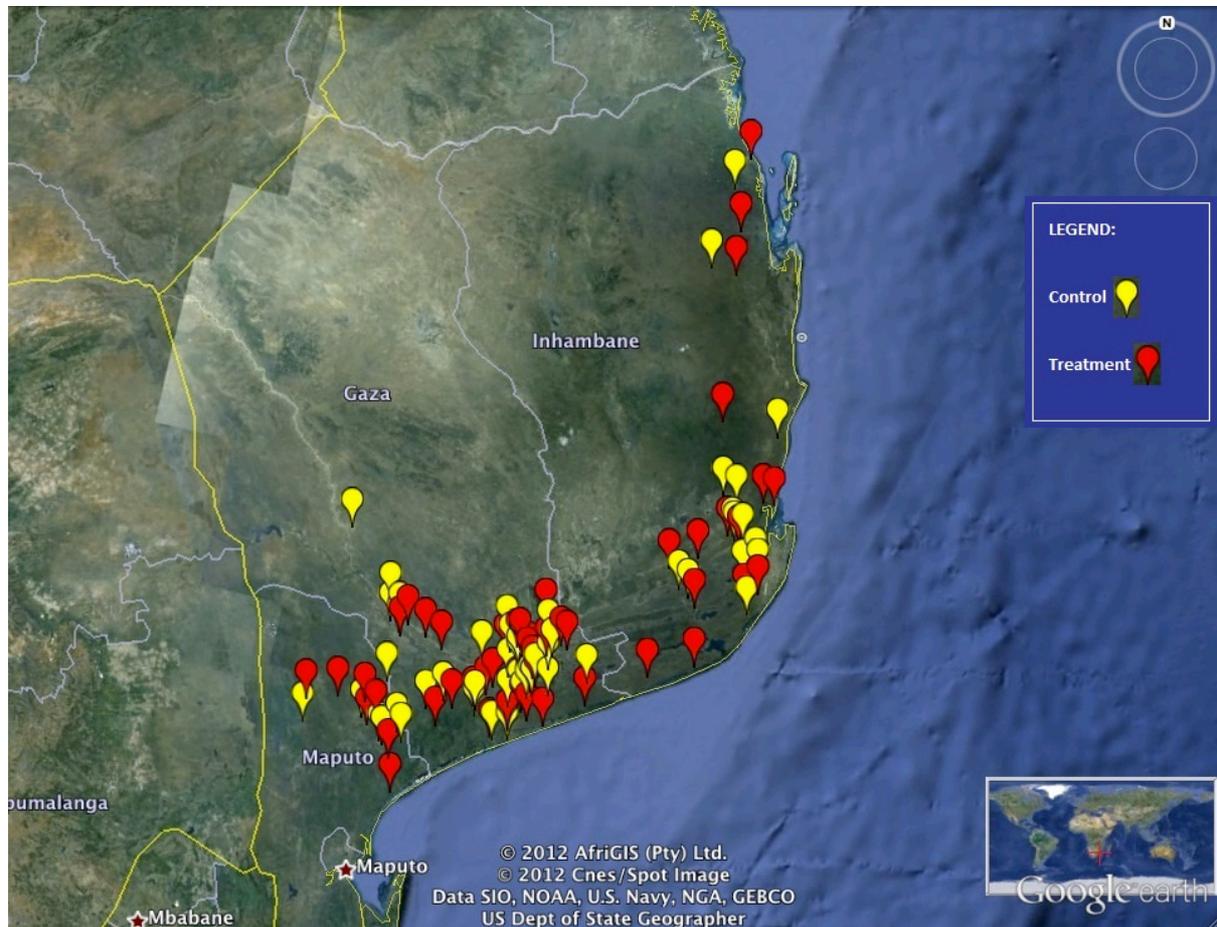
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## Appendix I

Map showing the geographical location of treatment and control areas in the sample.



## **Appendix II – Expected Timeline**

### **August 2011 – January 2012:**

Randomization and follow-up of mKesh agents.

*Funding Sources:* IGC.

### **February 2012 – June 2012:**

Baseline survey, mKesh dissemination and follow-up on sampled individuals.

*Funding Sources:* IGC and INOVA.

### **July 2012 – September 2012:**

Measurement of mKesh adoption patterns on sampled individuals.

*Funding Sources:* INOVA.

### **November 2012:**

*Output:* Research paper based on preliminary mKesh adoption findings.

### **October 2012 – April 2013 (TBD):**

Follow-up survey.

*Funding Sources:* TBD.

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