Harnessing the Crowd to Improve Accountability for the Delivery of Public Services

Phase III: Implementation Plan and Pre-Analysis Plan

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Project Objectives

Please see Phase I and Phase II pre-analysis plans for details of the theoretical and practical goals of this research. More briefly, this project aims to generate reliable evidence about the provision, quality, and impact of citizen monitoring of public services via mobile phones. International development organizations fund projects around the world aimed at improving public services. As part of these projects, donors increasingly seek to leverage ubiquitous mobile technologies to engage beneficiaries in monitoring success at lower costs and with the potential to generate more useful data. Unfortunately, existing research — which tends to be conceptual or descriptive — has provided little guidance about whether mobile phones can facilitate regular, high-quality, and useful feedback about the quality of public services. We propose to conduct an experimental study on citizen monitoring of solid waste services that is uniquely suited to answer foundational questions about spatial citizen-reported data. Because solid waste services are visible, we can verify the quality and timeliness of reports. We can also assess how citizen monitoring affects service delivery over time.

Timing of Registration

This pre-analysis plan for the third phase of this field experiment is registered prior to any research activities in this phase, including baseline data collection in the experimental sample.

Scope of Work for Phase III

Activity 1. Build end-to-end citizen monitoring platform (June-October 2016).

To process citizen reports, we will employ a customized application of SMSOne procured by the KCCA and managed as an internal KCCA system. This platform offers a tested and convenient way to manage messages from mobile phones. We will work with a programmer to create an automated data flow that passes along incoming reports to relevant officials at the KCCA and their contractors about citizen concerns and citizen-reported data.

Activity 2. Baseline data collection and treatment (November-December 2016).

Sampling. We will randomly select 200 zones in Kampala from the pool of zones that were not selected for sampling or replacement in Phase I/II. We randomly select an additional 50 zones to use as replacements for zones that are inaccessible to our enumerators, are demolished at the time of enumeration, or for which at least two problematic waste piles cannot be identified by residents of the zone. Half of the experimental zones will be assigned to the citizen monitoring treatment using complete randomization.

A key consideration for the design of this experiment is that our partners at the KCCA must be *blinded* to the treatment assignment, since this design tests in part their ability to provide better oversight on the basis of citizen monitoring. Since the KCCA might re-direct attention to zones assigned to treatment regardless of the citizen monitoring in those zones if they were not blinded, we need to ensure that any response is a function of citizen monitoring.

Baseline measurement. We will measure the size, take a photograph, and record the exact GPS coordinates of four waste piles that residents identify as a concern for each zone in all 200 experimental zones, according to the measurement protocol in Annex 1. We will code these photographs by size and depth of the waste heap, evidence of burning, and the proximity of the waste heap to residences, active businesses, and public roads.

Treatment. For 100 zones that are randomly assigned to treatment, our enumeration team will attempt to recruit 50 reporters from the zone based on the random recruitment protocol in Annex 2. These reporters will subsequently be prompted for reports about solid waste conditions developed adaptively in partnerships with the KCCA.

Activity 3. Operation of citizen feedback and reporting platform (November 2016-May 2017).

We will operate the citizen monitoring platform for approximately seven months. During this time, we will send weekly prompts to reporters. Our project manager will ensure the continuous operation of the platform in collaboration with colleagues at the KCCA and with reporters.

Activity 4. Monitor solid waste outcomes at midline and endline (February, May 2017).

Midline measurement. After the monitoring platform has operated for three months, we will re-photograph the waste sites identified at baseline, so that treatment effects on waste severity and the accuracy of citizen reports can be assessed.

Endline measurement. After the monitoring platform has operated for seven months, we will re-photograph the waste sites identified at baseline, so that treatment effects on waste severity and the accuracy of citizen reports can be assessed. We are also attempting to raise fund to the implementation of an endline survey with non-reporter residents of the experimental zones to assess satisfaction with waste services and perceptions of the quality of services provided by the KCCA.

Activity 5. Data analysis and dissemination of results (June 2017). We will test whether citizen monitoring improves the provision of solid waste services and changes the way that the KCCA manages contracts with waste providers. In addition to the data that we collect through the feedback platform and fieldwork, we will poll a randomly selected set of officials and staff members at the KCCA and ask them to rate the usefulness of the information produced for each parish-zone for planning and management.

Hypotheses and outcome measures

Objective impact (main hypothesis)

H1. Zones assigned to citizen monitoring will experience a larger decrease in solid waste accumulation in the piles measured at than zones assigned to control.

> Measures (from photographs and field measurements)
> - **Estimated area of total waste accumulation (primary outcome)**
> - Estimated area of unmanaged waste accumulation
> - Estimated amount of burning
> - Estimated amount of non-organic waste

Subjective impact (secondary hypothesis)

H2. Zones assigned to citizen monitoring will experience a larger increase in resident satisfaction about solid waste services than zones assigned to control.

> Measures (from household surveys)
> - **Satisfaction with waste services (primary outcome)**
> - Satisfaction with KCCA in terms of service provision
> - Trust in government
> - Severity of solid waste accumulation in the zone
> - Frequency of waste collection service
> - Availability of managed waste locations for residents
> - Amount of burning of waste in the zone

Covariate Measures

Per our zone-level analysis of outcomes, we will measure the following covariates about each zone and include them in the estimating equation:
- Area
- Population
- Length of improved roads per area
- Zone-level luminosity

Our hypotheses will be tested by regressing the zone-wise change in solid waste outcomes on the treatment status and zone-level covariates, with standard errors computed via randomization inference and 10,000 permutations of our complete randomization procedure. The core estimating equation for measures with both baseline and endline values is:

$$\Delta Y_j = \alpha + \tau M_j^+ + \boldsymbol{\beta} \mathbf{X}_j + \nu_h + \varepsilon_h \qquad (1)$$

Where ΔY_j is the change in the solid waste outcome, τ is the estimated treatment effect, M^+ is an indicator variable that indicates whether monitoring is applied at the zone level, $\boldsymbol{\beta}$ is a vector of coefficients, $\mathbf{X}_i$ is a matrix of zone-level covariates specified above, ν_h is a division fixed effect for city divisions h, and ε_h is an error term clustered at the division level. We will also report treatment effect for a modification of (1) that drops covariates $\mathbf{X}_i$ from the estimating equation.

For outcomes where no baseline value is available or for which the baseline and endline outcomes values have a negative bivariate correlation (unlikely), we will estimate the treatment effects based on the outcome at endline only:

$$Y_{j,t=e} = \alpha + \tau M_j^+ + \boldsymbol{\beta} \mathbf{X}_j + \nu_h + \varepsilon_h \qquad (2)$$

Implementation and Analysis Contingencies

Implementation failures

We will drop from the analysis any zone that we did not successfully reached at baseline or that was included at baseline outside of the zone replacement protocol.

Non-compliance with treatment assignment

As our past experience indicates that non-compliance due to implementation failures is very low, we will conduct all analyses as intent-to-treat, without regard for actual delivery of the treatment. We will drop any reporters from receiving prompts who were included in the reporting platform outside the treatment assignments (i.e, reporters in zones assigned to control).

Corrections for multiple comparisons

We have specified one primary outcome for each of the hypotheses and will report on that hypothesis without adjustment for multiple comparisons. We will also report the results of all outcome measures for a single hypothesis with the Benjamini–Hochberg–Yekutieli procedure applied to control false discovery.

Annex 1: Waste Pile Location & Measurement Protocol

Each team asks a resident of the zone (preferably the LC1 Chairperson) to describe the boundaries of the zone. Upon identifying the boundaries, the team divides up the zone into four fairly equal sections or cells. Each cell is assigned the letter A, B, C or D.

In each cell, the team asks at least 4 residents about the locations the most problematic waste pile within the cell. For each person who says there is no location, the team is required to probe. When probing, the team informs the respondent of the possible locations where solid waste may be found. The examples they are required to give include:

- Drainage channels
- Communal rubbish heaps
- Locations where the garbage truck parks (sometimes there's spillage)
- Litter on the roadside or public places
- "Secret" locations where people dump rubbish at night

The interaction between the research team and people from whom they are asking for the possible locations of solid waste piles is guided by the following questions:

1. Do you know of any problem waste pile location in this section of the zone? *(Describe the section basing on how you divided it up.)*
    A. Yes
    B. No **(SKIP TO Q5)**

2. Is it one location or are there more than one?
    A. One *(Proceed to Q3)*
    B. More than one *(Skip to Q4)*

3. Can you please direct me (or take me) the waste pile location?
    FOLLOW DIRECTIONS TO LOCATION

4. Can you please direct me (or take me) to the most problematic location?
    FOLLOW DIRECTIONS TO LOCATION

5. Can't you think of any place which has rubbish e.g. drainage channel, rubbish heap, litter on the road side, or a place where people often dump their rubbish?
    A. No (PROCEED TO NEXT PERSON)
    B. Yes (GO BACK TO QUESTION 2)

For each waste pile located, the team records a map with detailed directions using a mapping app called Geo tracker. The team then fills in the *KCCA_Phase3_WastePileAudit* survey in KoboCollect.

If all the four people they speak to affirm that there is no waste pile location within the cell, the team still fills in the *KCCA_Phase3_WastePileAudit* survey in KoboCollect indicating no waste pile was identified.

Annex 2: Reporter Recruitment Protocol

The recruitment of reporters within the zone begins after the waste pile audits. The minimum requirement for a zone to qualify for recruitment is that at least two waste pile locations are found in the zone.
For any individual to qualify to be recruited as a citizen monitor, they have to meet certain criteria. The basic criteria is:

- They should be 18 years or above
- They should be residents of the recruitment zone
- They should possess a mobile phone
- They should be capable of reading and writing SMS text messages (or have access to someone who can assist them)
- They should be willing to become a citizen monitor

The recruitment method for the citizen monitors is random recruitment. This means that anyone the research team meets, who satisfies the recruitment criteria is eligible for recruitment. To eliminate recruiter bias, the team is required to implement a random walk pattern when looking for people to recruit.

The random-walk pattern is described below:
1) Find an intersection in each of assigned cells in the zone. An intersection is the crossing of any road, path, or alley that leads to the entrance of residential dwellings. The starting intersection should be located by walking several minutes into the assigned cell.
2) Assign each direction leading from the intersection a number. Roll the dice and move in the direction selected randomly.
3) Any time you reach another intersection, assign each direction that moves forward from your walk path a number and roll the dice, moving in the direction selected randomly. You should only turn around if you reach a dead end or the edge of the assigned cell.
4) The only reason that the randomly chosen direction should not be an option is if you have already been down a path and you know that it leads to a dead end.

The team is required to follow the random walk pattern for 3 minutes, and attempt to recruit the next person they find. When recruiting people, the team members must introduce themselves, the program, and ascertain whether the person is interested in being recruited as a citizen monitor. If the person is interested, the team then reads to them the *Reporter Recruitment Flyer* (see Annex III).

For every person who agrees to be recruited, the team is supposed to interview them and record their responses in the *KCCA_Phase3_ReporterSignUp* survey in KoboCollect. Upon completing the interview, the team is supposed to thank the respondent, and leave them with a copy of the *Reporter Recruitment Flyer*.

Annex 3: Reporter Recruitment Flyer

Invitation to Report on Solid Waste Collection in Your Neighborhood!

We are an independent research group working with the Kampala Capital City Authority on a project that will allow residents of Kampala to use SMS to report on waste management issues in their neighborhoods. Your input is very valuable and we hope you will participate in making Kampala a cleaner and more livable city. We are asking you to join the platform.

If you sign up to be a reporter, we will send you 2-3 messages per week over 7 months asking you to report on the solid waste conditions and services in your neighborhood. Each week there will be a lottery to win airtime.

All messages that you send and receive from us will be toll-free and will not reduce your airtime. If you ever have questions, you can send the message "HELP" to 7010. Someone will contact you to answer your questions. You can also send the message "STOP" to 7010 at any time to stop receiving messages.

Your responses will be used to inform the Kampala Capital City Authority about which areas of Kampala require better waste management services. Please contact Polycarp Komakech (0791436088) if you have any questions or concerns about the program.