Amended Pre-Registration: Ghana Financial Incentives Wave II

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Introduction

We designed and implemented the Tuberculosis Screening RCT to explore how cost calculations shape the decision to comply with public health measures. The study will be referred to as Wave IIa. This initial trial registration is AEARCTR-0013055 (`https://www.socialscienceregistry.org/trials/13055`). A draft of the initial results is available `https://raymondduch.com/files/Ghana-Tuberculosis-Screening_Oct-2024.pdf`. In this amended pre-registration we are proposing the implementation of additional data collection that would allow us to test more directly the effect of individualised messaging. This study will be referred to as Wave IIb.

Our initial interest was in the effect of a $3.00 financial incentive versus a telephone reminder on compliance when the costs of accessing the screening clinics were very low. In all of the 78 villages included in the study, we implemented pop-up tuberculosis clinics so that most villagers could walk to the clinics within minutes. In this context of very low access costs, we tested the effect of a health message, a health message with a $3.00 financial incentive, and a health message with a phone nudge reminding subjects of the date and location of the pop-up village screening clinic. The trial consisted of a video intervention that notified subjects of the tuberculosis screening clinic that would be set up in their village. The three treatment arms consisted of variations in this video intervention: The control consisted of simply the standard health message; a cash incentive arm informed treated subjects that they were eligible for a $3.00 payment if they attended the screening; and subjects in a third arm received a telephone reminder call regarding the village screening clinic. The primary pre-registered hypothesis was that the Cash treatment arm would have a significantly higher tuberculosis screening rate than the simple health message treatment arm (`https://doi.org/10.1257/rct.13055-1.3`).

Our relatively simple, inexpensive and scalable pop-up tuberculosis screening intervention resulted in average village tuberculosis screening rates of 7%. All treated subjects received a tuberculosis health message with an encouragement to attend the screening clinic. A third of the villages also received $3.00 financial incentive. This cash payment did not have a significant effect on tuberculosis screening rates – subjects in the financial treatment arm in fact had lower average screening rates than those with a simple health message. The third of the subjects randomly assigned to receive a phone message reminder also had screening rates statistically indistinguishable

from those in the simple Health Message arm.

Average tuberculosis screening rates for subjects in the Health Message only treatment arm was 10.6%. Subjects in the Health Message plus Cash arm actually had a lower average screening rate of 8.0% (difference from Health: -2.6; 95% CI: -0.6, 0.004; $P = .10$). The Health Message plus Phone Reminder has an average screening rate of 10.9 (difference from Health: 0.3; 95% CI: -0.03, 0.03; $P = .85$). Finally the average Health plus Phone Reminder screening rates were higher than those for the Health Message plus Cash (difference from Cash: 2.9; 95% CI: -0.001, 0.06; $P = .07$). We confidently concluded that neither the cash nor the telephone reminder treatment arms resulted in tuberculosis screening rates higher than those in the simple Health Message treatment arm. There is evidence that the health plus telephone messaging had a larger effect on screening uptake than the messaging with cash treatment arm.

Approximately 10% of the treated subjects attended the tuberculosis screening clinic while 6% of the non-treated villagers were screened. For every subject contacted in our sample of villages, we observed two non-treated villagers show up for the screening. A total of 4,836 non-treated villagers were screened. With our design we are not able to tease out the spillover effect on other village members of treating 26 subjects in each village with some version of the messaging video. This fraction of the screened non-treated subjects that can be attributed to spillover from the message intervention has important policy implications. If spillover is minimal then much of the impact on screening rates is generated by the pop-up clinics and the village-wide advertising efforts.

This amended pre-registration describes the implementation of a follow-up study that would facilitate the estimation of the spillover effect of the enumerator messaging interventions. The additional data collection adds a control arm with no enumerator messaging intervention. We will then implement a version of the original cluster randomized RCT that has only two arms: In the control arm, 30 villages are treated with a two-day pop-up clinic that includes broadcasting announcements of the clinic location and dates (identical to those employed in the original Wave IIa version of the RCT). In the treatment arm, administered to 25 villages, 26 randomly selected individuals in each village receive the identical health messaging plus telephone reminder treatment administered in the original Wave IIa trial. Recall the health message with with a telephone reminder registered the highest screening uptake in the original Wave IIa trial. In these villages we also implement a two-day pop-up tuberculosis screening clinic (with broadcast notifications)

identical to the Wave IIa trial version.

Design

Working with the local Health District officials, we organized two-day pop-up tuberculosis screening clinics in each of the 55 villages. For the villages in the messaging treatment arm the clinics are organized within one-week of the treatment interventions. The local screening clinics were advertised to the local village via conventional health information channels. This included broadcasting information to the village prior to the arrival of the TB health team and also broadcasting the information during the two days that the clinic takes place. The villages are relatively small and broadcasting was conducted via village loudspeakers and a mobile announcement vehicle. Its worth noting that the logistics and costs of implementing these clinics are not high and hence are well within the resources and capabilities of the local communities.

The outcome of interest is the proportion of subjects in each village who participated in the tuberculosis screening clinic. A screening consisted of a tuberculosis screening protocol administered by a District Health officials. Each village clinic maintained a complete list of all individuals participating in the two-day screening.

These lists were then shared with the trial team. In the case of the villages in the messaging treatment arm, the names will be matched against the names of treated subjects and the list of other household members that were collected by the trial enumerators. The list of screened individuals will be matched to the list of trial participants.

This is a cluster randomized trial in which village clusters are assigned to either the control arm or the arm with a health message and a telephone reminder. The Health Message treatment video is a 45-second standard health TB promotional and information video (modeled on the videos produced by English National Health Service). As part of the treatment arm these subjects receive a telephone call reminder of the screening clinic. They receive the reminder three days prior to when the TB screening clinics are scheduled for their villages and also on the day of the screening. Enumerators contact subjects in this treatment arm by phone. If the subject is contacted they receive a scripted reminder of the TB screening clinic in their village.

Treatment Assignment We randomly allocate 55 village clusters to be in one of the two treatment arms. We conduct the additional trial in two Districts: Asuogyaman and Akwapim South. Our District Health Office partners identified villages that could be feasibly enumerated (the primary consideration here was either road access or the quality of the road access). Villages are then ranked according to their population size. For the Asuogyaman District where we implement the two treatment arms, each of two consecutive villages on this population ranked list are designated a pair. The district has approximately 100 pairs. We randomly select 25 pairs, with probabilities weighted by the pair's share of the total population of the villages being considered in the district. Within each pair, villages are randomly assigned to be in the control arm (no enumerator intervention) or in the health message plus a telephone reminder treatment arm. Within each of these health message/telephone reminder villages we will randomly select 26 households and within households we will randomly select a single eligible subject (eighteen years or older). In Akwapim South we randomly select five villages from the list with probabilities weighted by the village's share of the total population. These five villages receive the control treatment.

Figure 1 provides an overall summary of treatment assignment for both Wave IIa and Wave IIb. The Wave IIb will result in a total sample of 55 communities (30 in the control treatment arm and 25 in the messaging/cash arm). There will be a total of 650 subjects receiving the video treatments from enumerators.

	Rural 1		Rural 2		Total Wave IIa		Rural 3		Rural 4		Total Wave IIb		Total Wave II	
	Subjects	Comm.	Subjects	Comm.	Subjects	Comm.	Subjects	Comm.	Subjects	Comm.	Subjects	Comm.	Subjects	Comm.
TB Health	338	13	338	13	676	26							676	26
TB Health + $3.00	338	13	338	13	676	26							676	26
TB Health + Text	338	13	338	13	676	26	650	25			650	25	1326	51
Control							0	25	0	5	0	30	0	30
Total	1014	39	1014	39	2028	78	650	50			650	55	2678	133

Figure 1: Treatment Assignments: Wave IIa and IIb

The outcome of interest here, as was the case in Wave IIa, is the decision to have a tuberculosis screening test. We observe the number of individuals in each village who get the TB screening test at the two-day pop-up tuberculosis testing clinic. Villages in this Wave IIb version of the RCT are assigned to one of two treatments: control which is simply the pop-up clinic versus villages that have the pop-up clinic in addition to the video messaging intervention for 26 randomly selected individuals in the village. The estimated total population for the 30 control villages is 4,500 and for the 25 villages in the health message/telephone reminder treatment it is 3,750.

Hypotheses The control arm will provide an estimate of village screening rates we can expect to see if health officials implement a two-day tuberculosis screening clinic with standard advertising. The treatment arm consists of the two-day tuberculosis screening clinic (including standard advertising) combined with a health messaging intervention (with telephone reminders) assigned to 25 individuals in each village. Our expectation is that average screening rates will be identical in the control and in the messaging treatment arms. A significant difference would suggest that there is an effect on village screening rates specific to the targeted intervention using enumerators. A null finding would be consistent with our speculation, based on the Wave IIa results, that the observed TB screening rates were primarily driven by facilitating access to tuberculosis screening by providing, and advertising, a two-day pop-up tuberculosis clinic in the village.

We are interested in estimating the magnitude of any spillover from our messaging treatment to untreated individuals in our sample of health message plus reminder villages. Spillover can be estimated by comparing the screening rates of the control villages with the uptake rate of untreated individuals (i.e., excluding the 25 individuals receiving the health message and reminder treatment) in the treated villages. Our expectation, based on the results from the initial Wave IIa trial, is that the magnitude of spillover will be correlated with village population.

Power Given the estimated population sizes of the villages in the study and assuming a significance level of 0.05, the power calculations for different effects sizes (difference in screening uptake rates between control and messaging villages) are presented in Figure 2. We expect to be powered to detect effect sizes of a least 0.015.

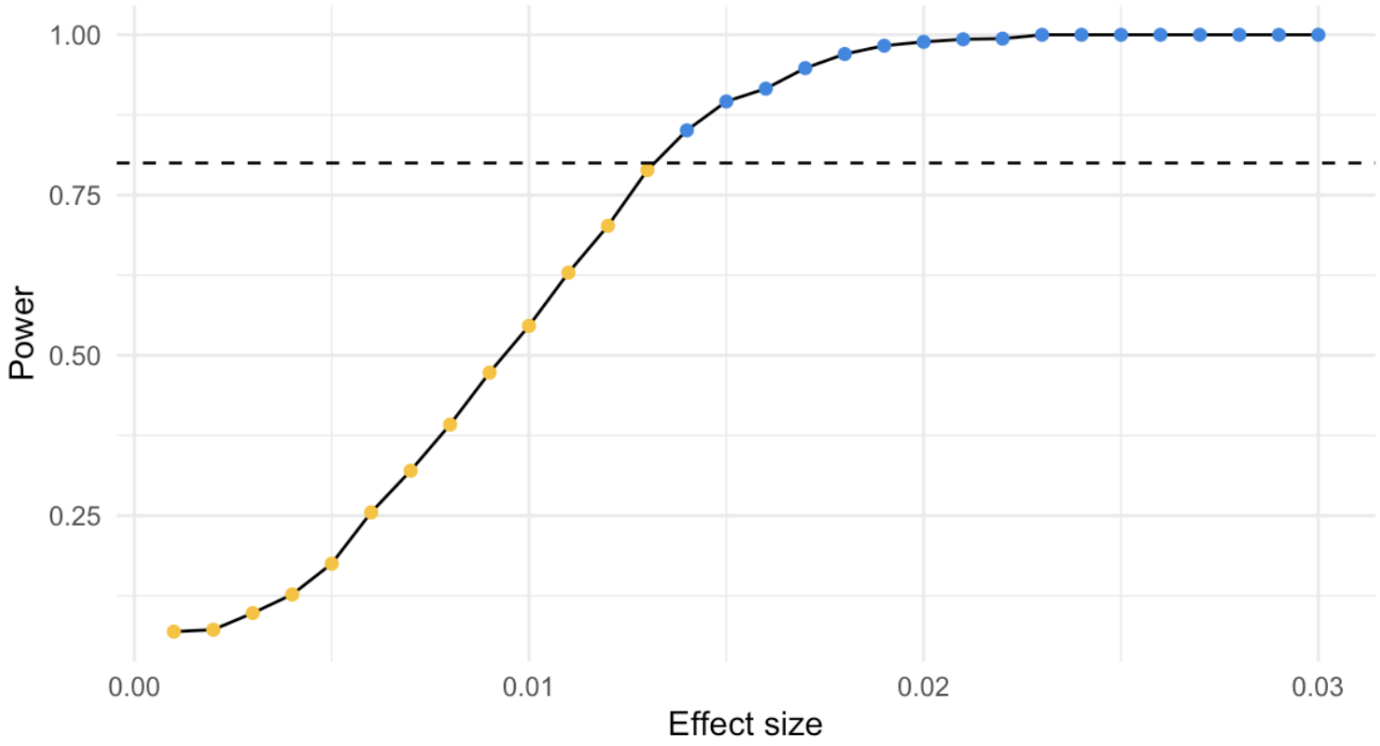

Figure 2: Power Calculations for Ghana Wave IIb

Analysis

Main Analysis

We will test whether clinic access versus clinic access plus targeted health messaging and telephone reminder affect rates of tuberculosis screening. We model the proportion of individuals in a village receiving a tuberculosis test as a function of the treatment condition, with demographic controls to account for differences in village composition:

$$\text{Screenings}_j = \beta_0 + \beta_1(\text{Health + Telephone})_j + \omega \mathbf{X}_j + \epsilon_j. \quad (1)$$

where:

- Screenings_j is the proportion of individuals receiving a tuberculosis screening during the two-day clinic in village j
- β_0 is the average proportion of tuberculosis screenings in villages that had a pop-up tuberculosis clinic but no enumerator interventions;
- β_1 is the treatment effect of a targeted intervention of the Health message about tuberculosis testing with a telephone reminder;
- $\mathbf{X}_j$ are covariate controls such as village population, age, gender and education at the village level;
- ϵ_j is the error term that is i.i.d. with zero mean.

To identify a spillover effect, we estimate Equation 1 with village screening rates that exclude subjects directly treated with the the health message plus reminder treatment. We will estimate a version of Equation 1 that includes village treatment status interacted with village population. The expectation is that spillover will be negatively correlated with village population size.