

Pre-Analysis Plan: Calling for Health: Can Mobile Phones Improve Health and Nutrition-Related Knowledge and Behavior?

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1 Introduction

1.1 Motivation

Despite advances in our understanding of appropriate health and nutrition practices and improvements in public health systems, health and nutrition outcomes in many low-income settings remain poor, particularly for women and children. One reason outcomes may not have improved more is household decision makers lack information about appropriate health practices. In countries like India, where women often have limited mobility due to conservative gender norms, women’s ability to access outside information may be particularly low. Lack of information among women could have significant consequences, since their health and nutrition behaviors can have long-term effects on children’s growth and development.¹ While the public health system is often charged with addressing these knowledge gaps through individual or community awareness raising, systems in low-capacity settings are often strained and cannot deliver this information at scale.

Fortunately, the rapid expansion of mobile technology in low-income settings presents a promising opportunity to equip households with information about appropriate health behaviors, provide them with information about how to access public health programs, and support broader behavioral change efforts linked to health and nutrition. In our study country of India, for example, it is increasingly possible for the government to directly share health-relevant information with low-income households through mobile technology: 24 percent of Indians had a smartphone in 2017, and ownership is expected to double to 48 percent by 2025 (GSMA, 2018). A key challenge to providing mobile-based health and nutrition information to Indian households is that women are typically closely involved with decisions relevant to these outcomes, but they are much less likely to have access to a mobile phone than men. Today in India, 71% of men own mobile phones, but only 38% of women do (GSMA, 2018). While economic barriers (e.g. cost or technical literacy) likely constrain women’s phone ownership or use, other barriers related to gender norms could also act as constraints.

Existing evidence suggests mobile information campaigns can improve public health outcomes. Such information has typically been provided through SMS and often supplements in-person approaches (such as learning sessions) - for example, to improve breastfeeding practices in Nigeria (Flax et al., 2014)), or to remind health workers or individuals of appropriate practices.²

¹See Adhvaryu et al. (2019); Currie (2009); Hoynes et al. (2016)

²See Zurovac et al. (2011), who sent SMS reminders to health workers to ultimately improve adherence to malaria treatment guidelines in Kenya and Dammert et al. (2014), who pushed SMS messages to households in Peru to remind them of best practices for dengue prevention and saw improvements in prevention behaviors and self-reported dengue symptoms.

In contrast, evidence on how providing citizens information about how to access government benefits, irrespective of medium, is mixed. Banerjee et al. (2018) show that providing information on entitlements under Indonesia’s rice subsidy program significantly increased benefits while reducing leakage. Conversely, Dutta et al. (2014) find that while information about rights and entitlements under India’s workfare program increased citizen knowledge, it had no impact on scheme participation or performance. In as much as health services require poor women and households to access public programs, it is unclear whether simply closing awareness gaps can improve access to healthcare.

Building on a major initiative by the Government of Chhattisgarh (GoCG), which distributed over 2 million smartphones to rural Chhattisgarhi women, we propose to test whether a gender-targeted phone-based information service can raise women’s knowledge and general awareness of appropriate health and nutrition-linked behaviors and increase take-up of health programs. We examine the role of this mobile phone service on women’s awareness of and access to several government programs, including national health-linked conditional cash transfer programs that provide cash to pregnant and post-partum women that comply with a set of conditions linked to prenatal care, delivery, and early investments in their children’s health. Information and enrollment gaps are a major challenge for both schemes.³ We also examine how information sent through the platform affects women’s knowledge of common health and nutrition problems as well as the COVID-19 pandemic.

This document summarizes the main tests that we intend to conduct for this study. We do not rule out the possibility of running other tests, and we will clarify in any paper that comes out of this intervention and analysis which estimations are specified in this pre-analysis plan and which are not (Duflo et al., 2020).

1.2 Study Description

Our study leverages an at-scale policy initiative led by the Government of Chhattisgarh (GoCG) that connected millions of rural women to Internet-enabled smartphones for the first time. In 2018, GoCG launched the Sanchaar Kranti Yojana (SKY) program and distributed over 2 million smartphones to rural Chhattisgarhi households. The program was gender-targeted, with phones distributed to female heads of households.

Using a randomized control trial taking place in 212 SKY program villages in Raipur district in Chhattisgarh, we seek to answer the following research questions:

1. Does the provision of health-related information through the Mor Awaaz platform increase knowledge and awareness of good health practices and government health schemes?
2. Does information delivered through Mor Awaaz diffuse through the community?
3. Does increased knowledge translate into higher enrollment in public health programs or improved health behaviors?

The RCT involves multiple interventions. The first intervention is a service known as *Mor Awaaz*, which sends women weekly “push” calls with pre-recorded information on good health and nutrition practices and relevant government programs. The service also includes regular “pull calls”, where trained enumerators call women to conduct a short survey to measure women’s phone

³Although these CCTs (or variations on them) have been available for years, the most recent National Family Health Survey (NFHS) data suggest that one-quarter of rural women in Chhattisgarh did not receive financial assistance for their most recent delivery, and women in rural India remain poorly informed on how to access these government schemes, even in the presence of initiatives like the ASHA program, which aims to close information gaps.

usage and gather information through short phone surveys. Prior to enrolling in Mor Awaaz, all women underwent basic digital literacy training designed to build the skills they need to use phones to ensure they could engage effectively with the service.

Our second intervention builds on Mor Awaaz’s regular phone calls to directly test changes in knowledge, awareness and behavior as a result of the information sent through the platform. This intervention, which we call “Calling for Health”, randomizes the specific information sent to Mor Awaaz enrollees over a limited time period. Randomized messages cover topics including menstrual health, sickle cell anemia (prevalent in our study area), parasites, etc. After sending “push” calls with this information to women, respondents then are surveyed through Mor Awaaz’s pull call system to understand their knowledge on the topics sent to all participants enrolled in Mor Awaaz.

2 Experimental Design

2.1 Mor Awaaz: Sampling and Randomization

From a sample of 212 villages, we randomly selected 180 villages where women would be trained to use their mobile phones and invited to enroll in Mor Awaaz.⁴ Within each of the 180 treatment villages, 48 women pre-identified as our “core sample” were invited to participate in training on how to use their mobile phones; a randomly selected subset of 36 core sample women were additionally pre-selected to have the opportunity to enroll in Mor Awaaz.⁵ Training and enrollment took place in community “enrollment camps”; women invited to the camps were not informed of their treatment status *ex ante*; rather, they were told they had the opportunity to attend a group meeting where they could learn about useful things to do with their phone. Half of the 180 treatment villages were randomly selected to receive a “high saturation” version of treatment. In these villages, we also invited all other local women who were beneficiaries of the SKY program to participate in mobile phone training and enroll in Mor Awaaz. Thus, in high saturation areas a substantially larger share of women in the community was encouraged to engage with smartphones.

Finally, we individually randomized core sample women who were eligible to enroll in Mor Awaaz into an incentive treatment where we increased the individual returns to engaging with the Mor Awaaz platform on an ongoing basis. In both high and low saturation areas, half of the core sample women enrolled in Mor Awaaz were offered an in-kind incentive of Rs 100 (approximately \$1.40) for each pull call they answered.⁶

2.2 Calling for Health: Sampling and Randomization

To understand the impact of mobile information campaigns on women’s knowledge and behaviors, the 180 Mor Awaaz villages were randomly assigned to one of three information arms, stratified by Mor Awaaz saturation level. The groups are:

1. Group 1 (60 villages): Information Stream A is sent to all Mor Awaaz enrollees in the village.

⁴All randomization was conducted using Stata software. Village randomization was stratified based on whether a baseline survey we conducted took place before or after SKY phones were distributed in the village, an index of baseline community perceptions of women’s acceptable phone use, and the block, a local administrative unit. For more details on the design of the Mor Awaaz RCT, see the Mor Awaaz pre-analysis plan that describes it in detail.

⁵So 12 women were selected to receive training but were not invited to enroll Mor Awaaz.

⁶In a separate pre-analysis plan registered under AEA Registry AEARCTR-0005855 and available here, we describe the design of this randomized control trial in greater detail. Here, we focus on an additional information intervention we run using Mor Awaaz, and describe how we expect the platform and its arms (low vis-à-vis high saturation, non-incentivized women vis-à-vis incentivized women) to impact health and nutrition-related knowledge, attitudes, and behaviors.

2. Group 2 (60 villages): Information Stream B is sent to all Mor Awaaz enrollees in the village.
3. Group 3 (60 villages): Mor Awaaz enrollees are randomly assigned such that half of enrolled women within the village receive Stream A information and half of women within the same village receive Stream B information.

In Group 3 villages, the individual-level randomization to information stream A versus information stream B was stratified on

- Village - so the same number of women within the same village receive stream A versus stream B.
- Core sample - recall that 48 women were selected to be part of our "core" sample and therefore eligible to be surveyed at endline. In high saturation villages, an additional sample of women were invited to enroll in Mor Awaaz (referred to as non-core sample). So the stratification ensured that the same number of core and non-core women received stream A vs. stream B.
- In-kind incentives - recall that half of the core sample women invited to enroll in Mor Awaaz also received an in-kind incentive for picking up "pull" calls.

Each round of this intervention will last for a period of four weeks.⁷ For each of the four weeks, beneficiaries in both streams are sent distinct messages on themes relevant to their life stage and household members' life stage. As an example, women who report they are pregnant may be randomly assigned to receive specialized messages on pre-natal nutrition best practices and their eligibility to enroll in a government-run conditional cash transfer program for pregnant women. During the pull call round following this period, women will be asked questions that will allow us to understand whether their knowledge of these topics is in line with the health messages sent.

3 Hypotheses

3.1 Impact of Direct Information: Calling for Health and Mor Awaaz

Research Question 1: Does the provision of health-related information through the Mor Awaaz platform increase knowledge and awareness of good health practices and government health schemes? Here we hypothesize that women internalize Mor Awaaz informational content and will have greater knowledge of topics covered in push calls they receive. We can test this hypothesis by comparing training-only women to Mor Awaaz women, and comparing women sent information stream A versus B as part of the Calling for Health sub-experiment. However, spillovers may attenuate some of these estimates. We address this in our next research question.

Research Question 2: Does information delivered through Mor Awaaz diffuse through the community? Here we hypothesize that information transfer will take place from women who received specific messages to those who did not. We can measure the extent of diffusion by comparing knowledge of topics in stream A among women who received stream B in group 2 (no possible spillover) to women who received stream B in group 3 (where there may be spillovers) and vice versa. We also hypothesize that Mor Awaaz saturation levels may matter: in high-saturation villages where more women are enrolled in Mor Awaaz, women may have more social contacts who

⁷As of the date of writing, we have conducted one round of this information intervention. Conditional on receipt of additional funding, we may conduct additional rounds.

can potentially transmit the messages. Our prior is therefore that information transmission will be higher in high saturation areas. On the other hand, if the information is not valued, or is seen as less novel in high saturation villages, the opposite may be true. The extent to which saturation matters is ultimately an empirical question.

Research Question 3: Does increased knowledge translate into higher enrollment in public health programs or improved health behaviors? Knowledge changes could, but may not necessarily, result in improved health-seeking behaviors or increases in health service enrollment. While we hypothesize that such behavior changes are likely preceded by changes in knowledge and awareness, first-stage changes in knowledge and awareness may not be necessary across all women to change behaviors. For example, women’s health-seeking behaviors may change through other indirect mechanisms, such as peer effects or social learning, as women watch more informed village women attend well visits.

4 Empirical Approach

4.1 Data

Baseline Data We conducted our Mor Awaaz baseline survey from August to November 2018 in Raipur district in Chhattisgarh. We developed the survey sampling frame using 2011 Indian Socioeconomic and Caste Census (SECC) data; at the time of the baseline, we pre-identified 48 core sample women, 8 of which were randomly selected to belong to the baseline sample. Using this baseline sample, we surveyed 8 women and their husbands per study village.⁸

In each village, we surveyed 8 core sample SKY-eligible married women and their husbands for a total of 1,696 households across 212 villages. The baseline survey collected information from women and their husbands about individual mobile phone usage, gender norms and attitudes, women’s roles in health and nutrition decision-making in the household, and a module that measures the size of women’s social networks.

Mor Awaaz Monthly “Pull Call” Phone Surveys: We will collect outcome data from the sample of Mor Awaaz enrollees by conducting monthly phone surveys that gather information on health-related knowledge and behaviors. These surveys will begin approximately one month after the beginning of the randomly assigned push call information intervention messages are sent to women.

Mor Awaaz Administrative Data: Process monitoring data also allows us to view call pick-up and listening rates for respondents, which proxy for the extent to which women listened to the information in the calls; we expect these to be orthogonal to the randomly assigned information stream.

Supplementary Call Survey: We plan on conducting at least one round of “supplementary calls”, which will be made to all women who participated in the baseline, as well as all core sample

⁸To ensure we reached our necessary sample size of 8 wives and husbands per village, we constructed a list of 8 “initial targets” per village, along with a buffer of potential respondents when the initially-assigned woman could not be reached for surveying. The individual sample was also stratified by literacy status. Eligible women were under age 40, married, had one SKY-eligible woman in the household, and were present in both our SECC and SKY administrative datasets. For the full description of our sampling protocol, see the pre-analysis plan for the Mor Awaaz RCT.

women who attended the Mor Awaaz enrollment camps. (Prior to the submission of this PAP, we verified that core women’s camp attendance rates are unrelated to treatment status). A first wave of calls will target baseline sample women and use phone numbers collected at baseline. A second wave of calls will target camp attendees using phone numbers collected during the camps. We plan on collecting data on gender attitudes, mental health, government benefit receipt, and women’s knowledge of good health and nutrition practices during these calls.

Endline Data: For our Mor Awaaz endline, we aim to survey all women (and their husbands) who participated in the baseline, as well as an additional 8 core sample couples per village. Thus the endline will cover a sample of 6,784 individuals: 3,392 women and their husbands.

The endline will cover the same topics as the baseline, along with additional questions to collect data on women’s social connections. We will also collect data on gender attitudes, mental health, and well being. Finally, the endline will collect additional data on access to information, health knowledge and behaviors, knowledge of government programs, and economic activities.

4.2 Empirical Strategy

4.2.1 Regression Specifications

We will use different empirical approaches to (1) analyze the overall effect of Mor Awaaz (as compared to just receiving mobile phone training or compared to outcomes in pure control villages) and (2) assess the extent of information spillovers within Mor Awaaz communities. To assess overall effects, we will utilize the following fully-saturated specification, run among core sample women in control and treatment villages:

$$y_{iv} = \alpha_0 + \alpha_{1v}train_v + \alpha_2MA_{iv} + \alpha_3Incentives_{iv} + \alpha_4train_v \times HS_v + \alpha_5MA_{iv} \times HS_v + \alpha_6Incentives_{iv} \times HS_v + \mathbf{z}_{iv}'\nu + \epsilon_{iv} \quad (1)$$

where y_{iv} is the outcome of interest, $train_v$ denotes a core sample woman was selected for training (and therefore lives in a non-control area), HS_v means the village is a high saturation village, MA_{iv} denotes random assignment to the Mor Awaaz use case at the individual level, and $Incentives_{iv}$ denotes random assignment, again at the individual level, to receive incentives for engaging with Mor Awaaz. Finally $\mathbf{z}_{iv}$ is a vector that includes our randomization strata, and ϵ_{iv} an error term. If we find that we are imbalanced along important predetermined covariates, we will also use PDS Lasso (Belloni et al., 2014) to select additional covariates to include in $\mathbf{z}_{iv}$.

We also may use more parsimonious regression specifications (e.g. a version of the above equation where the high saturation effect is constrained to be the same for women in training, Mor Awaaz only, and Mor Awaaz and incentive arms) in our analysis to focus our discussion and maximize statistical power. Our choice of regression specification will be informed by results of the fully saturated model. If we do this, we will make “long model” results available in an online appendix. For regressions that include indicators of village treatment assignment, we will cluster standard errors at the village level; if we include specifications that only include individual-level randomization, we will include heteroskedasticity robust standard errors.

When studying the “Calling for Health” sub-experiment, we will utilize the following specification:

$$y(s)_{iv} = \beta_0 + \beta_1Sat\ Info(s)_{iv} + \beta_2Rand\ Info(s)_{iv} + \beta_3Rand\ Info(!s)_{iv} + \mathbf{z}_{iv}'\nu + \epsilon_{iv} \quad (2)$$

where the outcome $y(s)_{iv}$ is an indicator of, for example, an individual woman’s knowledge of topics provided through information stream $s \in \{A, B\}$. $!s$ is the complementary information stream to s . So if $s = A$, $!s = B$ and vice-versa.

$Sat\ info(s)_{iv}$ is a dummy variable equal to one if the woman lives in a village in which everyone was selected to receive stream s . $Rand\ info(s)_{iv}$ identifies women in “mixed stream” (group 3) villages selected to receive stream s , and $Rand\ info(!s)_{iv}$ identifies women in “mixed stream” villages randomly selected to receive stream $!s$. Thus, the omitted group is women living in villages where all women were selected to receive stream $!s$.

$\mathbf{z}_{iv}$ is a vector that includes our randomization strata. Since we can stack observations for streams A and B, $\mathbf{z}_{iv}$ may also include an individual fixed effect (μ_i) to examine within-woman differences in outcomes across arms. We will also explore only including village-level fixed effects; we expect to present our results using the specification that lends most precision. All standard errors in this specification will be clustered at the village level.

Mapping our hypotheses to the regression model, we will test hypotheses 1 and 3 by testing whether $\beta_1 > 0$ or $\beta_2 > 0$. To identify spillover effects - hypothesis 3- we will test $\beta_3 > 0$.

To understand whether information transmission is different across low and high saturation villages, and across women with higher incentives to participate in Mor Awaaz, we also plan to augment our main specification with controls for our Mor Awaaz RCT treatment arms.

4.2.2 Outcomes

In our analysis, we will focus on the following sets of outcomes:

Health and Nutrition Knowledge and Awareness: These outcomes will be structured to ascertain whether Mor Awaaz calls improve women’s understanding of the topics covered by Mor Awaaz calls, including good nutrition practices, menstrual hygiene, and COVID-19 awareness.

Health and Nutrition-Related Behaviors: Behavioral outcomes will include self-reports of health and nutrition-related behaviors of women and their households, and women’s reports of recent health-seeking behaviors. We will also gather information about women’s enrollment in and use of public health and nutrition services and programs explained through Mor Awaaz.

Targeted Calling for Health Outcomes: For the spillover analysis, we will form health knowledge and behavior indices specific to streams A and B. Components of these indices will include knowledge of topics covered in a given stream, and utilization of services covered in a given stream.

To minimize concerns related to multiple hypothesis testing, we will aggregate outcomes within the same family into standardized indices using the approach featured in King et al. (2009).

4.2.3 Heterogeneity

We expect to explore heterogenous treatment effects to better understand if these interventions are more effective for particular subgroups, and to understand the channels through which impact occurs. We plan to study heterogeneity along the following dimensions:

- *Capacity to understand and use health-related information:* Women’s ability to understand and utilize health-related information may vary by their baseline literacy levels. While Mor Awaaz messages do not require any specialized education or information to understand, and they are designed to appeal to women regardless of their education level, we may explore whether literacy levels relate to our primary outcomes. Mor Awaaz’s impact on health and nutrition behaviors may also depend on how much decision-making power our respondents

have over these areas in the household. We will therefore also study heterogeneity by baseline levels of health and nutrition-related decision-making power.

- *Norms related to phone use:* We may also extend heterogeneity analysis to explore strata based on norms related to phone engagement and other variables we identify as important to women’s ability and interest to engage with Mor Awaaz and specific information shared on the platform.
- *How connected a woman is in her community:* We expect to explore heterogeneity by how networked a woman is in the village. Women’s self-help groups, for example, are an important vehicle for transmission of health information (and information more generally). How affected a participant is by the treatment, both directly and indirectly (i.e., through spillovers), may vary by how likely she is to engage with other women and discuss health and nutrition issues outside of Mor Awaaz.

5 Pre-PAP Statistical Analyses

This PAP was drafted after Mor Awaaz had been active for a number of months, and after the first round of randomized information calls (through “Calling for Health”) were made to enrolled women. While our team conducted monitoring of some Mor Awaaz outcomes prior to posting this pre-analysis plan (see the main Mor Awaaz pre-analysis plan for details), we did not conduct statistical analysis of data related to the Calling for Health treatment arms prior to posting our analysis plan.

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