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Supplementary Materials for

Encouraging sanitation investment in the developing world: A cluster-randomized trial

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Encouraging Sanitation Investment in the Developing World: A Cluster-Randomized Trial

Supplementary Materials

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S1 Materials and Methods

S1.1 Sample selection and enrollment

This study was conducted in 2012 in four relatively densely populated rural "unions" (local administrative unit) in Tanore district, Rajashi division, in northwest Bangladesh, with followup data collected in 2013. These sites were chosen in consultation with VERC and WaterAid for three primary reasons: (1) the low level of sanitation coverage relative to other rural areas in Bangladesh; (2) neither VERC nor WaterAid had conducted sanitation interventions in these areas previously; (3) to our knowledge there were no recent, ongoing or planned sanitation interventions by government agencies or other NGOs. We do not name the specific unions to preserve confidentiality. Each union consists of about 25 villages, and each village contains 150-200 households on average. The sample consisted of 107 villages, or 380 neighborhoods (locally known as "paras") within those villages, totalling 18,254 households at baseline.

All villages in these 4 unions were enrolled in the trial. We worked with the local government ("union parishad") in each union to liase with the villages, e.g. to obtain permission to work in the villages and to arrange the timing and location of intervention activities.

In villages with multiple neighborhoods, treatments were implemented at the neighborhood level. Neighborhoods are not formal administrative units, but in most cases informal neighborhood divisions were common knowledge within the village, and we followed these conven-

tions. If there were not well-defined neighborhoods in a village, or if a neighborhood needed to be divided because of its size, we used natural divisions such as rivers or roads where such existed, and grouped households into simple, contiguous clusters if such natural divisions did not exist or were not practical.

We conducted a complete enumeration of all households in study communities. All households in communities receiving an LPP treatment were invited to participate in LPP activities and all households in communities assigned to a Supply treatment were linked to the Latrine Supply Agent in that community. In villages assigned to a Subsidy treatment, households in the bottom 75% of the wealth distribution were designated as eligible to receive subsidies. We used landholdings, reported in an initial census, as a proxy for wealth. Land is the most important component of wealth in rural Bangladesh, has the practical advantages of being objective, almost always precisely known by the household, and simple to collect quickly and cheaply. The 75th percentile of landholdings varied from village to village, but typically was approximately 50 decimals, or half an acre (2023 m^2) of land. Approximately 35% of households were "landless," meaning that they had no landholdings aside from their homestead, and in particular had no agricultural land. All landless households were classified as eligible.

We obtained permission to work in each village from the village's representative to the union parishad before the randomization of treatments. We obtained informed consent from the head of each household during the census, i.e. also before randomization of treatments.

Summary statistics for the sample, by treatment, are provided in Table S1.

S1.2 Detailed Description of Interventions

In collaboration with WaterAid Bangladesh and VERC, we designed three different interventions that were implemented in various combinations in the different treatment groups: (1) community motivation and information through the Latrine Promotion Program (LPP); (2) subsidies for the purchase of hygienic latrines; (3) supply-side market access and information. These treatments were implemented at the neighborhood level. The three interventions are described below. Figure S1 provides a timeline of the interventions and surveys for a typical village.

S1.2.1 Latrine Promotion Program (LPP)

The Latrine Promotion Program (LPP) was a multi-day, neighborhood-level exercise designed to raise awareness about the problems caused by open defecation (OD) and non-hygienic latrines, and to motivate the community to reduce open defecation and increase coverage of hygienic latrines. The primary activities are similar to those of Community-Led Total Sanitation (CLTS), which was developed by VERC in Bangladesh and subsequently implemented in many countries in Asia and Africa. CLTS programs inform households about the health threats associated with open defecation (OD) and the economic benefits associated with latrine investments, attempt to make the health and disease transmission risks more salient through demonstration, and encourage all members of the community to make a joint commitment to invest and become open defecation free (*1*).

The standard sequence of events in LPP was as follows:

1. VERC hires and trains a group of staff who conduct the LPP exercises at the neighborhood level. The training lasts for four full days, and takes place at VERC headquarters in Savar, outside of Dhaka.

2. The trained staff are deployed to project areas in Tanore, and the staff member assigned to the neighborhood calls all community members to a "mobilization meeting" to start a "Participatory Rural Appraisal" (PRA) in collaboration with the neighborhood residents.

3. The PRA includes a "social mapping" to identify where all community members live, the subset of those households that have latrines, and the prevalence of open defecation in the community. VERC staff then conduct a "transect walk" with community members, including visits to open defecation sites so that everyone present understands the scale of the problem.

4. The PRA also includes focus group discussions on disease pathways (how faeces can pollute the food chain through flies, fields, fluids and fingers, or bad hygiene/hand-washing practices) and behaviors that can prevent transmission. The staff members do a faeces calculation to make the scale of this public health problem salient for community members. The definition, characteristics and benefits of a hygienic latrine are also described.

5. The PRA ends with community members typically recognizing the importance and scale of the public health challenge associated with inadequate sanitation. The community typically makes a joint public commitment to address the challenge. This

process is often referred to as "ignition" in the CLTS literature.

6. A Water-Sanitation (WATSAN) Action Committee of at least 7 people (and at least 50% women) who are socially active and engaged is elected by community members. The WATSAN committee conducts follow-up meetings that involve Community Cleaning Exercises, Health and Hygiene Education Sessions, and Children's Infomation sessions. VERC staff stay engaged during these follow-up sessions.

The key differences between LPP and CLTS are:

1. While the main goal of CLTS is to end open defecation without regard to the type of latrine used, LPP emphasizes the adoption and use of hygienic latrines in particular.

2. The timeline for "ignition" in CLTS is open-ended, and typically takes up to 5 days of meetings. In LPP, we fixed the length of the intervention, such that the initial period leading to ignition lasted 2 days, with a fixed schedule of follow-up visits thereafter. This was to maintain comparability between the LPP components of the LPP Only and LPP + Subsidy treatments. Without a fixed timeline, the intervention might go on for longer in LPP Only villages, meaning that the comparison between LPP Only and LPP + Subsidy would no longer represent the marginal effect of subsidies.

Although limiting LPP to 2 days does represent an important difference from a standard CLTS intervention, we worked closely with WaterAid Bangladesh and VERC to make LPP as complete and effective as possible within the constraints imposed by our implementation schedule and the need to standardize the intervention across communities. There are three key features of LPP that were intended to mitigate the limitations caused by this accelerated schedule. First, the initial 2-day intervention contains the same activities that VERC would conduct in an intervention not constrained to 2 days, just compressed into a tighter schedule. Second, after the initial two-day core intervention, VERC staff conducted at least two one-day follow-up visits to every community. Third, the WATSAN Action Committee conducted several activities in the weeks and months following the initial LPP intervention to continue to promote latrine adoption.

S1.2.2 Subsidy Treatments and Latrine Models

The neighborhoods where subsidies were provided were further randomized into one of three sub-treatments which varied the share of eligible households assigned the subsidy vouchers. We call these "Low", "Medium" and "High" intensity, corresponding to approximately 25%, 50% and 75% of eligible households receiving vouchers.

The latrine vouchers offered a 75% discount on the components of any of three models of hygienic latrine. All models included a ceramic pan, lid and water seal, and met the standard criteria for hygienic if properly installed and maintained. The models were:

1. Model 1: single pit, 3 ring. Subsidized price US$ 5.5; unsubsidized price US$ 22. On average, a household will fill a three-ring pit in 2-3 years.
2. Model 2: single pit, 5 ring. Subsidized price US$ 6.5; unsubsidized price US$ 26. On average, a household will fill a three-ring pit in 4-5 years.
3. Model 3: dual pit, 5 ring. Subsidized price US$ 12; unsubsidized price US$ 48. After filling the first pit, the household seals the first pit and redirects waste to the second pit. After remaining in the sealed pit for a period of time, the waste becomes safer and easier to remove, and in fact can be safely used as fertilizer.

See Figure S2 for diagrams of the three models.

Households were responsible for delivery and installation costs of approximately US$ 7-10. The vouchers could be redeemed at any of the 11 latrine suppliers in the project area for a period of approximately 6 weeks after the neighborhood lottery.

VERC conducted a two-day training with all 11 suppliers to set quality standards for the three sets of latrine materials covered by the vouchers and to provide instruction on how to meet these quality standards. VERC also hired one retailer aide per supplier to collect subsidy vouchers, maintain records, verify that vouchers were redeemed only by the assigned winner households, and monitor the supplier. Ineligible households and eligible households without a voucher could purchase any of the three models at the unsubsidized price, and all households were free to purchase individual components or other models without a set price.

S1.2.3 Supply

It was not feasible to randomize an intervention directly with latrine suppliers. First, there were only 11 in the project area. Second, there was no clear correspondence between communities and suppliers. Instead, we designed a community-level intervention intended to improve the functioning of the sanitation market. VERC identified, trained and hired individuals in randomly chosen neighborhoods to work as Latrine Supply Agents (LSAs) in that neighborhood. VERC recruited residents who worked in fields such as masonry, construction or carpentry, and therefore were likely to have adequate technical ability and knowledge.

VERC trained LSAs to act as technical and sales agents, in particular to:

1. Provide information about where an improved latrine can be purchased
2. Enable households to assess the quality of latrines offered for sale
3. Assist with delivery and installation
4. Provide technical support after installation, e.g., for maintenance, repairs and improvements.

LSA assistance was available to all residents of designated neighborhoods, regardless of voucher eligibility or winning status. LSAs were hired for 12 weeks, including the 6 weeks during which households could redeem their vouchers, plus additional time to assist with installation. LSAs were instructed to provide information only about purchase, installation and maintenance, and not about the benefits of latrine use. VERC paid LSAs a flat salary.

S1.2.4 Deviations from design

The only significant deviation from the initial design was the duration of the LSA contracts. Political instability delayed implementation in some neighborhoods, so the length of time between LSA training and the beginning of LPP and subsidies was not as uniform as we had anticipated. In cases where implementation was delayed, we extended LSAs' contracts so that they were under contract for at least 8 weeks after subsidies were awarded.

S1.3 Randomization Design

The treatments described in Section S1.2 were randomized in a two-stage design: first, communities were randomly assigned to treatments; then, within Subsidy communities, eligible households participated in household-level lotteries for subsidy vouchers. The cluster design was chosen for two primary reasons. First, most policies and interventions are conducted at the community level, so this design provides policy-relevant information. Second, behavioral spillovers would likely contaminate an individual-level randomization, and in fact measuring these behavioral spillovers was an important objective of our study. For example, randomizing the share of households who receive subsidy vouchers by neighborhood allows us to study demand spillovers.

The cluster randomization stage itself contained two levels: village and neighborhood. In the first level, villages were assigned to Control, LPP Only, LPP + Subsidy and Supply only. This high-level randomization was done by village rather than by neighborhood-within-village for several reasons. First, if LPP was randomized at the neighborhood level, it would be difficult to avoid contamination of non-LPP neighborhoods within the same village. Second, our implementation partners expressed concern that offering subsidies to some neighborhoods but not others in the same village would be difficult to implement, primarily because unsubsidized neighborhoods would perceive it as unfair. Third, randomizing subsidies at the neighborhood level could have caused bias from anticipation effects.[1] The research team and our implementation partners with contextual knowledge and experience were confident that villages were sufficiently separate that such concerns would not apply at the village level.

In the second level of cluster randomization, neighborhoods in LPP + Subsidy villages were randomized into a 2x3 set of subtreatments. The first dimension was the Supply treatment, i.e. neighborhoods were assigned to LPP + Subsidy (without Supply) or LPP + Subsidy + Supply. The second dimension was the intensity of subsidy treatment, i.e. Low, Medium or High, where the proportion of lottery-winning households was varied. The resulting design is displayed in Figure S3.

Since there are a few combinations of treatments we did not include, e.g. Subsidy without LPP or Subsidy + Supply without LPP, this is a fractional factorial design rather than a full factorial design. We excluded those potential treatments because the evidence suggests that subsidy without some sort of education and motivation is not a useful policy (*2*). We overweighted the subsidy arms (LPP + Subsidy, with and without Supply) because the analysis of demand spillovers involves comparing across the High, Medium and Low intensity subtreatments within the subsidy treatments. We conducted power calculations for each type of analysis we intended to report (comparing across Control, LPP, Subsidy and Supply, but also across High, Medium, Low intensity neighborhoods), and the distribution of villages and neighborhoods assigned to the treatments resulted from these calculations.

While assignment to the broad categories of Control, LPP Only, Supply Only and Subsidy was done at the village level, the interventions were conducted at the neighborhood level. To

[1]Suppose Neighborhood A receives the LPP Only treatment, while Neighborhood B in the same village receives LPP + Subsidy. If residents of Neighborhood A believe that they may receive subsidies in the future, they may rationally defer investment even if LPP Only is highly effective at motivating investment. This means that comparing investment rates in Neighborhood B with those of Neighborhood A would not be a valid estimate of the marginal effect of subsidies, since the presence of subsidies in Neighborhood B depresses investment in Neighborhood A. Formally, this is a violation of the stable unit treatment value assumption (SUTVA).

keep the proportion of neighbhorhoods assigned to each treatment as close as possible to the village allocation proportions discussed above, the village-level randomization was stratified by the number of neighborhoods in the village. The median number of neighborhoods per village was 2, so villages were divided into two strata, the first with 1 or 2 neighborhoods, the second with 3 or more neighborhoods. Latrine subsidy vouchers were randomized at the household level, and were awarded through a lottery held publicly in each village.

S1.4 Randomization Implementation

S1.4.1 Cluster randomization

The cluster-level stratified randomization was conducted by the researchers using Stata 11.2 (StataCorp, College Station, TX) statistical software. The resulting list, assigning villages and neighborhoods to treatment categories, was transmitted to VERC and WaterAid field staff for implementation. This process was conducted after enrollment, consent and the baseline survey, so the allocation was concealed from subjects and from implementers.

S1.4.2 Household randomization

In subsidy clusters, household subsidy vouchers were allocated by a public lottery. Each eligible household's representative would draw one token from a box, with replacement. The distribution of winning vs. losing tokens was varied according to the intensity of subsidy treatment assigned to that neighborhood (low, medium, high). This lottery was with replacement. The boxes were sealed until the time of the lottery, so the distribution was concealed from both the implementation staff and the subjects.

S1.4.3 Blinding

Given the nature of the intervention, it was not possible to blind participants or implementers to cluster-level or household-level treatment status. Survey enumerators were not informed of the status of clusters or households.

S1.5 Definitions of outcome variables

S1.5.1 Open Defecation

Open defecation (OD) is the use of open spaces, bushes or a hanging latrine.[2] We classify a household as engaging in OD if the respondent reports that at least one adult in the compound regularly uses one of these methods. This corresponds to the "open defecation free" standard used in the sanitation policy community. Our questionnaire inquired about latrine use and OD practice separately for adult males, adult females and children, because behavior varies across these demographic groups.

S1.5.2 Any Latrine

Our definition of "any latrine" includes all types of latrines, both hygienic and non-hygienic, except hanging latrines. This includes unhygienic and unimproved latrine types such as uncovered pit latrines and open pits.

S1.5.3 Hygienic Latrine

A hygienic latrine safely confines feces in order to prevent disease transmission (*3*). To accomplish this in our context requires a seal to block flies and insects and a sealed pit to store fecal matter for safe disposal. We classify a latrine as hygienic if it (1) has an intact slab, (2) has a functional seal, and (3) conveys feces to a sealed pit. The following types of latrines are included, provided they satisfy the three criteria above: direct pit latrine (slab directly above the pit); offset single pit latrine (pit is offset from the slab); offset double pit latrine.

This definition is based on the Government of Bangladesh's (GoB) 2005 National Sanitation Strategy, which defines a hygienic latrine as "a sanitation facility the use of which effectively breaks the cycle of disease transmission" (*4*). This requires the confinement of feces (i.e. a sealed pit) and a sealed passage between the squat hole and the pit, blocking insect vectors. Our definition differs from the GoB definition in two ways: first, we do not require a vent pipe; and second, the GoB definition excludes latrines shared by more than two households, while we do not.

[2]Hanging latrines are platforms emptying directly into a field, marsh, river or pond.

S1.5.4 Latrine Access and Ownership

Households were asked to describe the primary latrine or toilet facility used by household members the majority of the time. Households that reported using any type of latrine or a hygienic latrine are defined as having access to these facilities. Latrine ownership is defined as the sole or joint ownership of the facility. Latrine ownership is a strict subset of latrine access: there are no households that report owning a latrine but not having access to it, nor are there any households that report owning a hygienic latrine but not having access to it.

S1.6 Empirical Methods

S1.6.1 Community-level impacts

To estimate the overall impact of the treatments on latrine access, latrine ownership, and OD or hanging toilet usage, we estimate

$$\begin{aligned} y_{hnvu} = {} & \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ & + \beta_3 \left(\text{LPP} + \text{Subsidy}_{nvu}\right) + \beta_4 \left(\text{LPP} + \text{Subsidy} + \text{Supply}_{nvu}\right) + \delta_u + \varepsilon_{hnvu}, \end{aligned} \tag{1}$$

where y_{hnvu} is the outcome of interest for household h in neighborhood n of village v in union u and the treatment status of neighborhood n in village v is given by the mutually exclusive indicators LPP Only$_{vu}$, Supply Only$_{vu}$, LPP + Subsidy$_{nvu}$ and LPP + Subsidy + Supply$_{nvu}$. Union fixed effects, added to increase precision by absorbing union-level baseline variation in covariates such as poverty rates, are represented by δ_u, and ε_{hnvu} is an error term. Control villages are the excluded category, so the coefficients β are interpreted as effects relative to the controls.

Because of the baseline imbalance in latrine coverage in Supply Only villages, we also estimate

$$\begin{aligned} y_{hnvu} = {} & \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ & + \beta_3 (\text{LPP+Subsidy}_{vu}) + \beta_4 \left(\text{LPP+Subsidy}_{vu} + \text{Supply}_{nvu}\right) + \delta_u + \gamma \bar{y}^{BL}_{nvu} + \varepsilon_{hnvu}, \end{aligned} \tag{2}$$

which augments Equation (1) by controlling for $\bar{y}^{BL}_{nvu}$, the baseline level of the outcome variable in neighborhood n.

Table S2 reports estimates of equations 1 and 2, where the dependent variable is either access

to any latrine (columns (1)-(2)), or ownership of any latrine (columns (3)-(4)), or access to a hygienic latrine (columns (5)-(6)), or ownership of a hygienic latrine (columns (7)-(8)). Estimation is by OLS (linear probability model) and inference is robust to clustering at the village (v) level.

The estimated coefficients represent the effect of residing in a community assigned to the corresponding treatment, not the household's particular status. This is important in interpreting the estimated effects of the subsidy program: on average, only approximately half of eligible households in Subsidy communities received subsidy vouchers. As discussed in the text, we consistently observe: (a) LPP Only does not increase access or ownership; (b) Supply Only does not increase access or ownership once we have corrected for the imbalance at baseline; (c) LPP + Subsidy consistently increases access and ownership; (d) there is no complementarity between Supply and Subsidy, in that LPP + Subsidy with Supply is no more effective than LPP + Subsidy without Supply. Figures 1a-1c present coefficients from estimating Equation 2.

In the main text, we focus on estimates and p-values for the LPP + Subsidy treatments relative to the control group. The marginal effect of providing subsidies is obtained by comparing the LPP + Subsidy treatments to the LPP Only treatment. The p-values provided in Table S2 show that the difference between the LPP + Subsidy and LPP Only treatments is statistically significant.

Table S3 reports the same set of estimates with open defecation (OD), which includes hanging latrine use, as the outcome variable. Results for all adults are reported in columns 1-2, with results estimated separately for men in columns 3-4 and women in columns 5-6. See Section S2.1 for further discussion.

S1.6.2 Lottery Outcomes and Social Multipliers

This sub-section provides additional detail on the estimation of social multipliers discussed in Section 4.2 of the main text. The thought experiment is to compare the behavior of a household that has won the subsidy lottery and lives in a low-intensity neighborhood (where 25% of eligible households win vouchers) with the behavior of a winning household in a medium-intensity (50% win) or high-intensity (75% win) neighborhood. Similarly, we compare the behavior of households that lost the subsidy lottery across L, M and H neighborhoods. For each of these comparisons, the price that the household faces is constant, because the lottery outcome is held constant, so the only systematic difference is the share of neighbors who have won vouchers. Because this share was randomly assigned, we can interpret differences

in behavior as the causal effect of the intensity of treatment (i.e. the share of others in the neighborhood subsidized), separate from the direct effect of winning (losing) a subsidy voucher.

The basic regression equation is

$$\begin{aligned} y_{hnvu} = {} & \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ & + \beta_{L,L}\text{Lost}_{hnvu} \times \text{Low}_{nvu} + \beta_{L,M}\text{Lost}_{hnvu} \times \text{Med}_{nvu} + \beta_{L,H}\text{Lost}_{hnvu} \times \text{High}_{nvu} \\ & + \beta_{W,L}\text{Won}_{hnvu} \times \text{Low}_{nvu} + \beta_{W,M}\text{Won}_{hnvu} \times \text{Med}_{nvu} + \beta_{W,H}\text{Won}_{hnvu} \times \text{High}_{nvu} \\ & + \delta_u + \varepsilon_{hnvu}. \end{aligned} \tag{3}$$

As in Section S1.6.1, y_{hnvu} is the outcome of interest for household h in neighborhood n of village v in union u, LPP Only$_{vu}$ and Supply Only$_{vu}$ indicate that village v has been assigned to the LPP Only or Supply Only treatment, δ_u are union dummies, and ε_{hnvu} is an error term. Lost$_{hnvu}$ and Won$_{hnvu}$ indicate the lottery outcome for household h. (Both are zero for households not in Subsidy villages.) Low$_{nvu}$, Med$_{nvu}$ and High$_{nvu}$ are indicators for the share of households in neighborhood n that received vouchers. Control villages are the excluded category, so coefficients are interpreted as effects relative to the controls. The coefficients of interest are $\beta_{L,L}$, $\beta_{L,M}$, $\beta_{L,H}$, which represent, respectively, the effect of being a lottery loser in an Low-intensity neighborhood, a Medium-intensity neighborhood and a High-intensity neighborhood, and $\beta_{W,L}$, $\beta_{W,M}$, $\beta_{W,H}$, which are the corresponding effects on lottery winners. Standard errors on village-level coefficients (β_1, β_2) are robust to arbitrary correlation within village; standard errors on neighborhood-level coefficients ($\beta_{L,L}$, ..., $\beta_{W,H}$) are robust to arbitrary correlation within neighborhood.

We also estimate a variant of Equation (3) with added controls for the baseline level of the outcome variable:

$$\begin{aligned} y_{hnvu} = {} & \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ & + \beta_{L,L}\text{Lost}_{hnvu} \times \text{Low}_{nvu} + \beta_{L,M}\text{Lost}_{hnvu} \times \text{Med}_{nvu} + \beta_{L,H}\text{Lost}_{hnvu} \times \text{High}_{nvu} \\ & + \beta_{W,L}\text{Won}_{hnvu} \times \text{Low}_{nvu} + \beta_{W,M}\text{Won}_{hnvu} \times \text{Med}_{nvu} + \beta_{W,H}\text{Won}_{hnvu} \times \text{High}_{nvu} \\ & + \delta_u + \gamma \bar{y}^{BL}_{nvu} + \varepsilon_{hnvu}, \end{aligned} \tag{4}$$

where $\bar{y}^{BL}_{nvu}$ is defined as in Equation 2. In all cases, the sample is restricted to Eligible households.

Results are presented in Table S4, estimating Equations (3) and (4) for each of the following

outcome variables: access to any latrine; ownership of any latrine; access to a hygienic latrine; ownership of a hygienic latrine. The estimates discussed in the main text and the results presented in Fig. 2a-2b come from columns (4) (ownership of any latrine) and (8) (ownership of a hygienic latrine), and correspond to estimates of Equation (4).

Table S5 reports the same set of estimates with OD, which includes hanging latrines use, as the outcome variable. Results are reported for all adults in columns (1)-(2) and separately for men and women in columns (3)-(4) and (5)-(6), respectively. The estimates plotted in Fig. 2c in the main text correspond to column (2) of Table S5.

S2 Supplementary Text

S2.1 Gender Differences in Open Defecation

We collected information on OD separately by gender, because men and women follow different work schedules in Tanore (women typically work inside the home, while men work in fields), which leads to different sanitation practices. Despite this fact, we find simliar effects among men and women in out study.

The overall effects of the community-level interventions are summarized in Figure S4. The LPP Only and Supply Only treatments do not have statistically significant effects on OD. Relative to LPP Only, adding subsidies to LPP reduces OD rates among males by 8.4 pp ($p < .001$) and among females by 6.8 pp ($p < .001$). These effects represent 22% and 20% decreases in open defecation relative to the control group, respectively. There is no detectable interaction between subsidies and the supply treatment. See Table S3 for additional detail.

The OD behavior of men and women responds similarly to the intensity of subsidy treatment in their communities, as summarized in Figure S5. Open defecation among adult males in lottery-winning households in low, medium and high intensity neighborhoods falls by 6.3 pp ($p = .02$), 13.3 pp ($p < .001$) and 11.2 pp ($p < .001$) relative to adult males in eligible households in control communities. Reductions for adult women are similar: 7.7 pp ($p < .001$), 11.5 pp ($p < .001$) and 10.2 pp ($p < .001$) in low, medium and high intensity neighborhoods, respectively. These represent reductions of 15% – 35% relative to the control group mean. This reduction in OD also spills over to eligible households that lost in the voucher lottery, with reductions of 1.7 pp ($p = .51$), 8.3 pp ($p < 0.001$) and 8.3 pp ($p < 0.001$) among adult males in lottery losing households in low, medium and high intensity villages,

respectively, and reductions of of 1.4 pp ($p = .52$), 6.6 pp ($p = 0.01$) and 4.9 pp ($p = 0.04$) among adult women. See Table S5 for additional detail.

S2.2 Effects on Ineligibles

In this section, we study the behavior of "Ineligible" households, the least-poor quartile of households who were not eligible for subsidies. These households were included in all non-subsidy aspects of the interventions (e.g. participation in LPP activities, access to the Latrine Supply Agent), so their behavior is informative about the effects of these interventions among households with higher baseline levels of latrine ownership, but also greater resources for new investment. Furthermore, while these households were not eligible to receive subsidies, their behavior may be influenced by that of their neighbors, so they provide another test for the existence of a social multiplier.

S2.2.1 Community Level Interventions

To estimate the effect of the community-level interventions on the behavior of ineligibles, we estimate Equations (1) and (2) on the sample of ineligible households. Results are presented in Figure S6, with details in Table S6. As with Eligibles, LPP Only did not increase ownership relative to other ineligibles (i.e. of comparable wealth) in Control communities (any -0.8 pp, $p = .77$; hygienic -4.1 pp, $p = .44$). There is some indication of increased latrine ownership for this less-poor group in the supply-only treatment villages (any $+4.6$ pp, $p = .20$; hygienic $+8.8$ pp, $p = .13$), but the results are not statistically significant.

S2.2.2 Social Multiplier

To test whether Ineligibles were influenced by the behavior of their poorer neighbors, we estimate

$$\begin{aligned} y_{hnvu} = \beta_0 + \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ + \beta_{I,L}\text{Low}_{nvu} + \beta_{I,M}\text{Med}_{nvu} + \beta_{I,H}\text{High}_{nvu} + \delta_u + \varepsilon_{hnvu}. \end{aligned} \tag{5}$$

This is similar to Equation (3) except that since ineligibles did not participate in the subsidy lottery, there is no need to interact neighborhood intensity with household lottery status. As above, our preferred estimates are from regression models that include union fixed-effects

and control for baseline levels, i.e.

$$\begin{aligned} y_{hnvu} = \beta_0 &+ \beta_1 \text{LPP Only}_{vu} + \beta_2 \text{Supply Only}_{vu} \\ &+ \beta_{I,L}\text{Low}_{nvu} + \beta_{I,M}\text{Med}_{nvu} + \beta_{I,H}\text{High}_{nvu} \\ &+ \delta_u + \gamma \bar{y}^{BL}_{nvu} + \varepsilon_{hnvu}. \end{aligned} \tag{6}$$

Inference is robust to arbitrary correlation at the level of the treatment assignment.

Ineligibles are more likely to invest in hygienic latrines increases when a larger share of their neighbors are offered subsidies. Relative to Ineligibles in LPP Only neighborhoods, hygienic latrine ownership increases among Ineligibles in Low-, Medium- and High-intensity subsidy neighborhoods by 6.3 pp ($p = .09$), 9.7 pp ($p = .01$) and 10.4 pp ($p = .01$), respectively. We focus on latrine ownership rather than access, since access could depend directly on neighbors' investment decisions if latrines are shared across households. We focus on hygienic latines, because coverage with any latrine is high enough at baseline and in the controls in this less-poor group, such that impacts might be constrained by ceiling effects in some areas. Full results for all outcomes are presented in Table S7.

References

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3. S. Hanchett, M. H. Khan, L. Krieger, C. Kullmann, presented at the The future of water sanitation and hygiene: Innovation, adaptation and engagement in a changing world. Loughborough, UK: 35th WEDC International conference, http://wedc.lboro.ac.uk/resources/conference/35/Hanchett-S-1036.pdf (visited on 09/04/2014).
4. Government of Bangladesh, "National Sanitation Strategy 2005", tech. rep. (Local Government Division, Ministry of Local Government, Rural Development and Cooperatives, 2005), http://www.dphe.gov.bd/pdf/MR11_SanitationStrategy.pdf (visited on 10/08/2014).

Figures

Fig. S1: Timeline for Typical Village

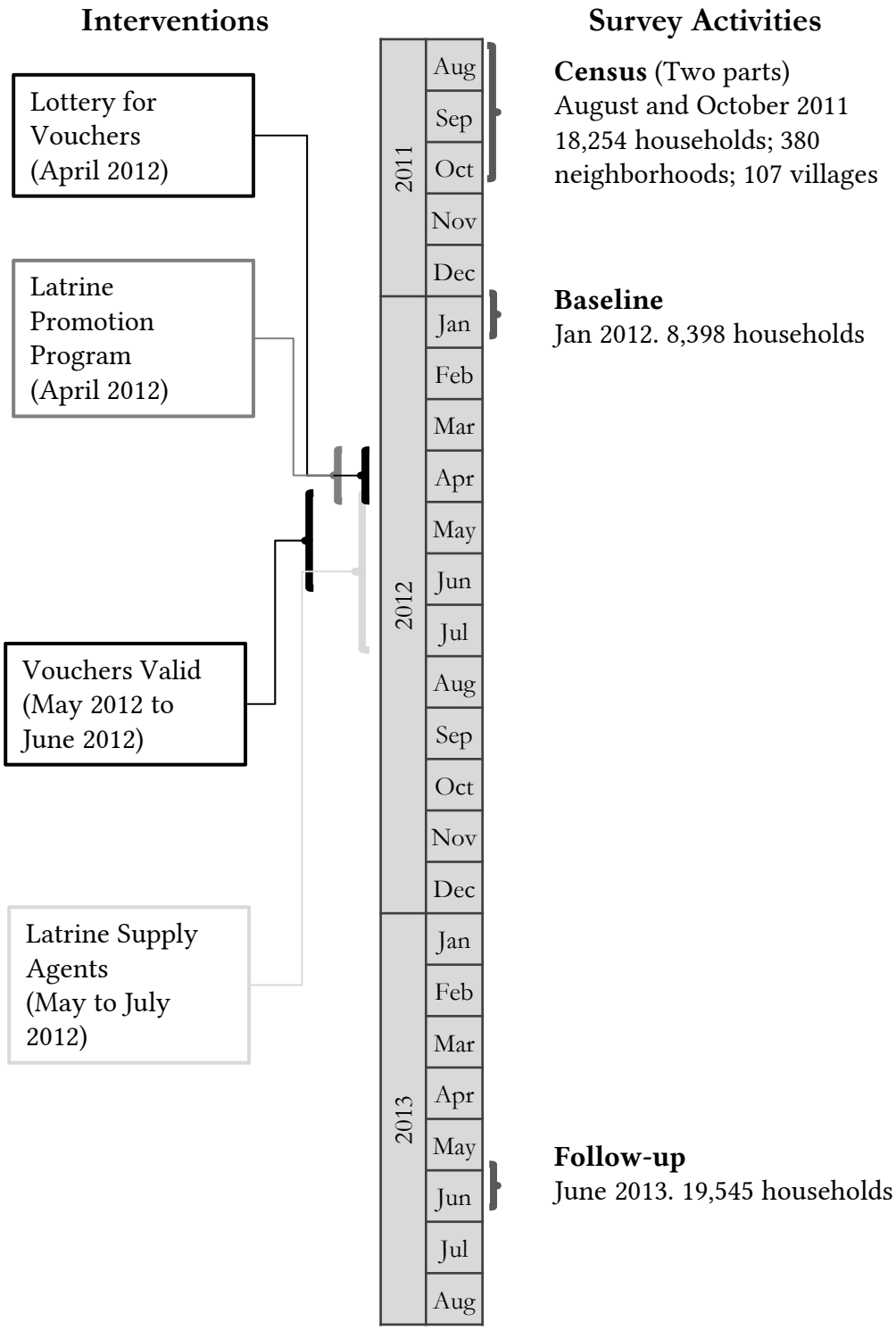
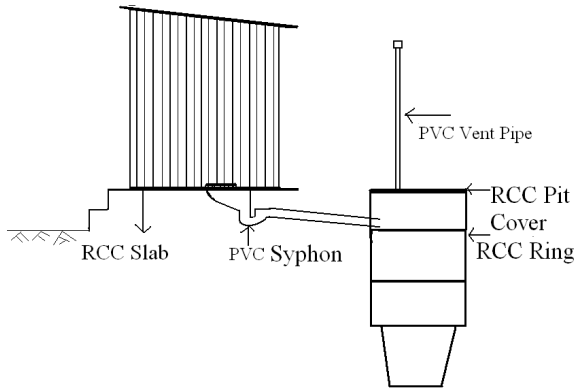
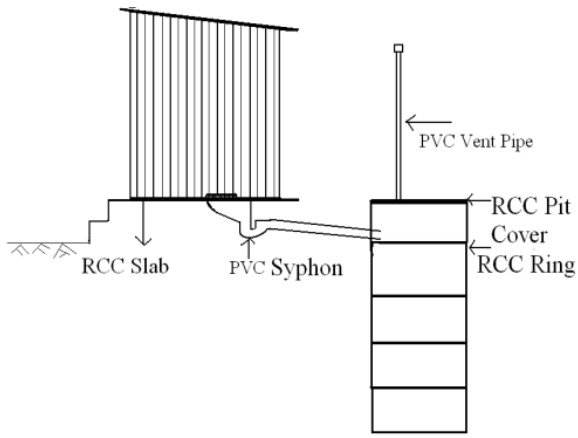


Fig. S2: Latrine Models

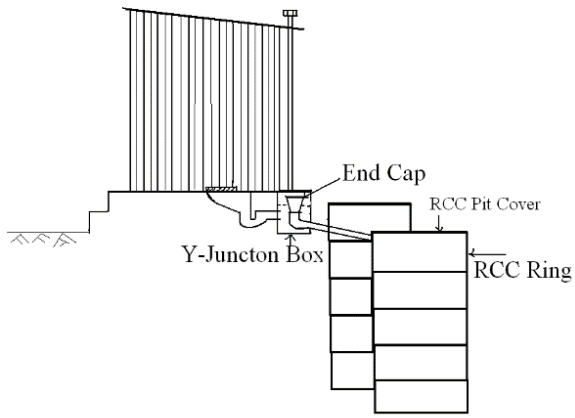
(a) Model 1: Single Pit, Three Rings



(b) Model 2: Single Pit, Five Rings

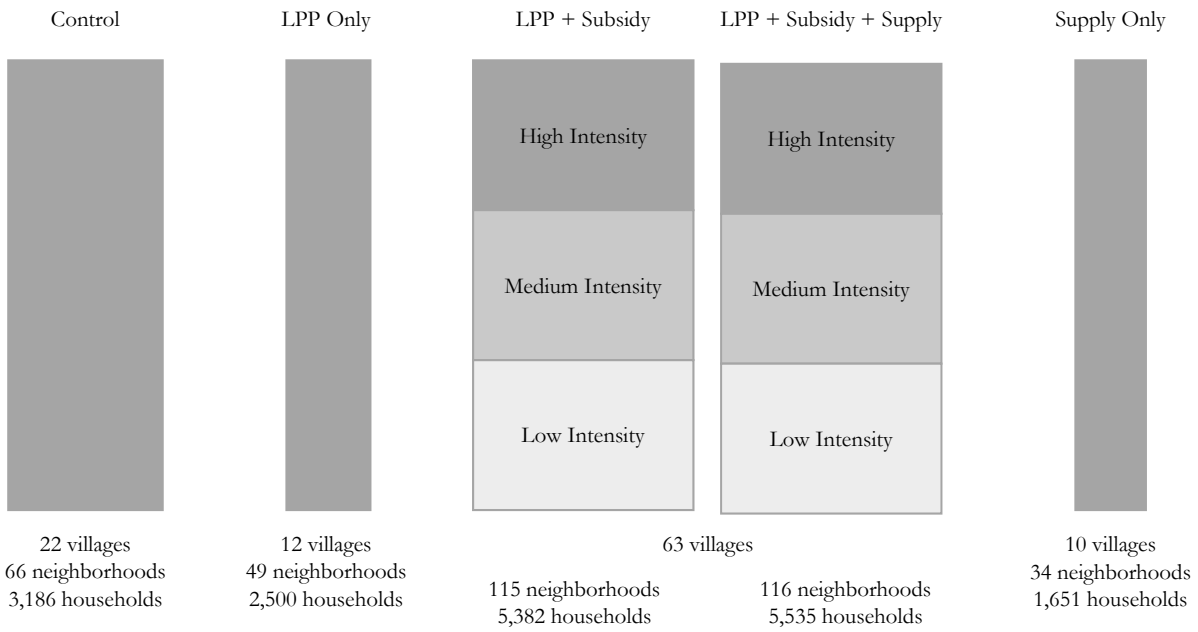


(c) Model 3: Dual Pit, Five Rings per Pit



Notes: Diagrams courtesy of VERC

Fig. S3: Experimental Design



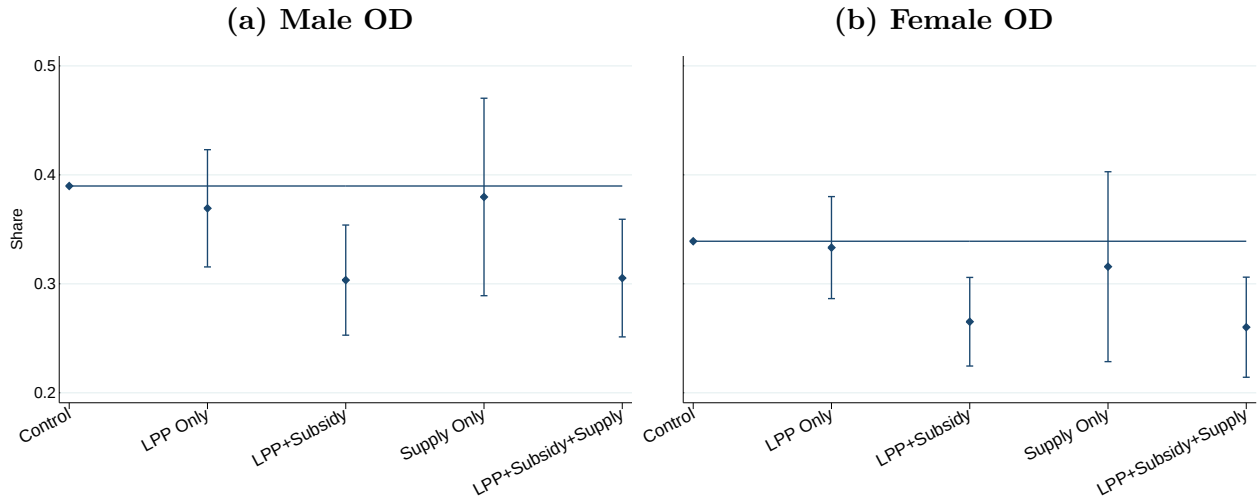


Fig. S4: Effects of community-level treatments on open defecation for those eligible for subsidies by gender. Displays the sum of the estimated coefficients and the control group means found in columns (4) and (6) of Table S3.

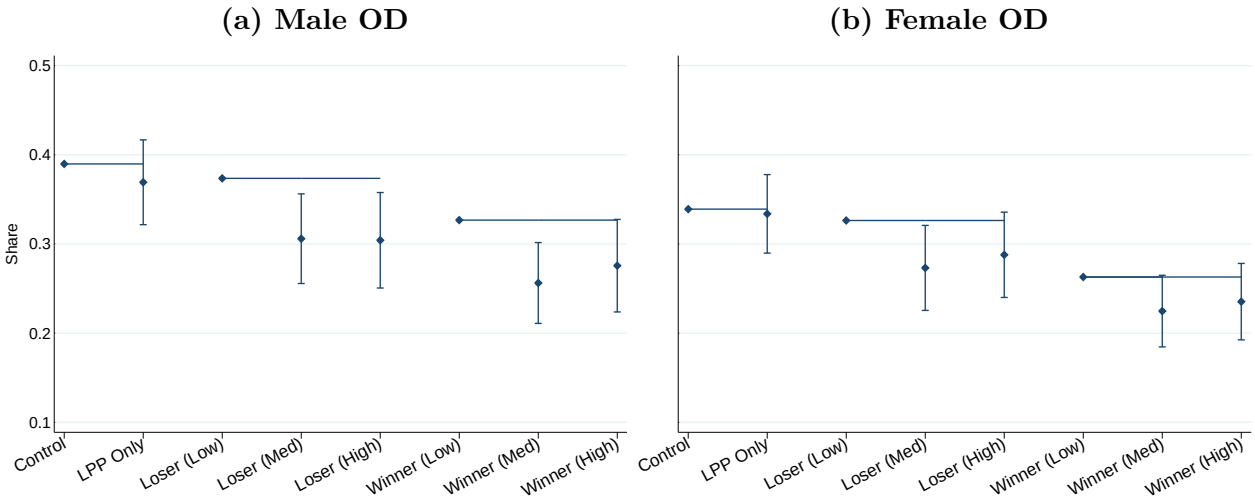


Fig. S5: Effects of the proportion of community treated on latrine ownership and open defecation for those eligible for subsidies by gender. Displays the sum of the estimated coefficients and the control group means found in columns (4) and (6) of Table S5.

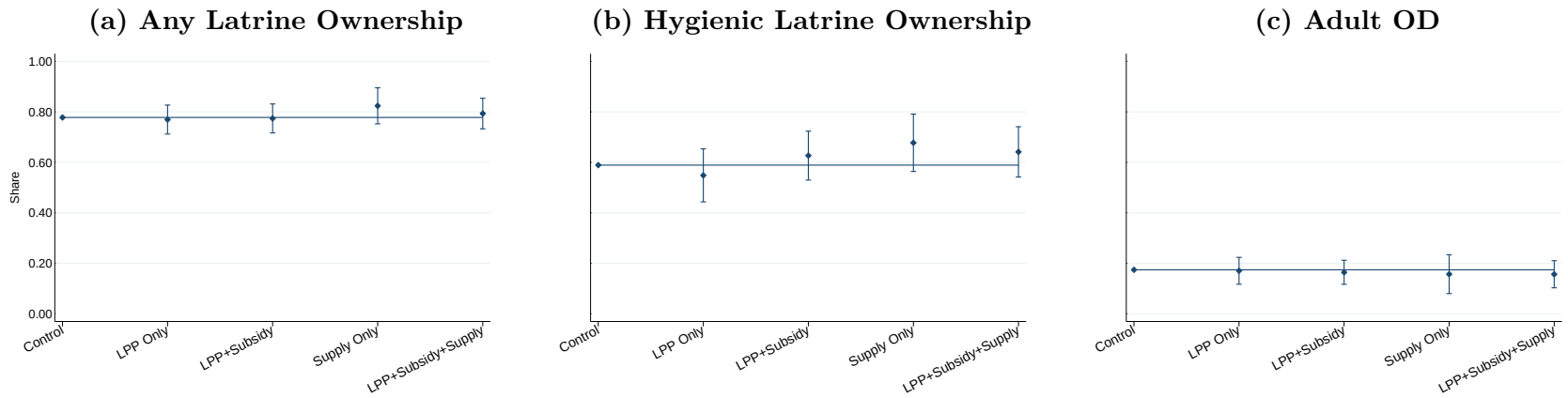


Fig. S6: Effects of supply and demand treatments on latrine access and open defecation for those ineligible for subsidies. Displays the sum of the estimated coefficients and the control group means found in columns (2) and (6) of Table S6 and column (2) of Table S8.

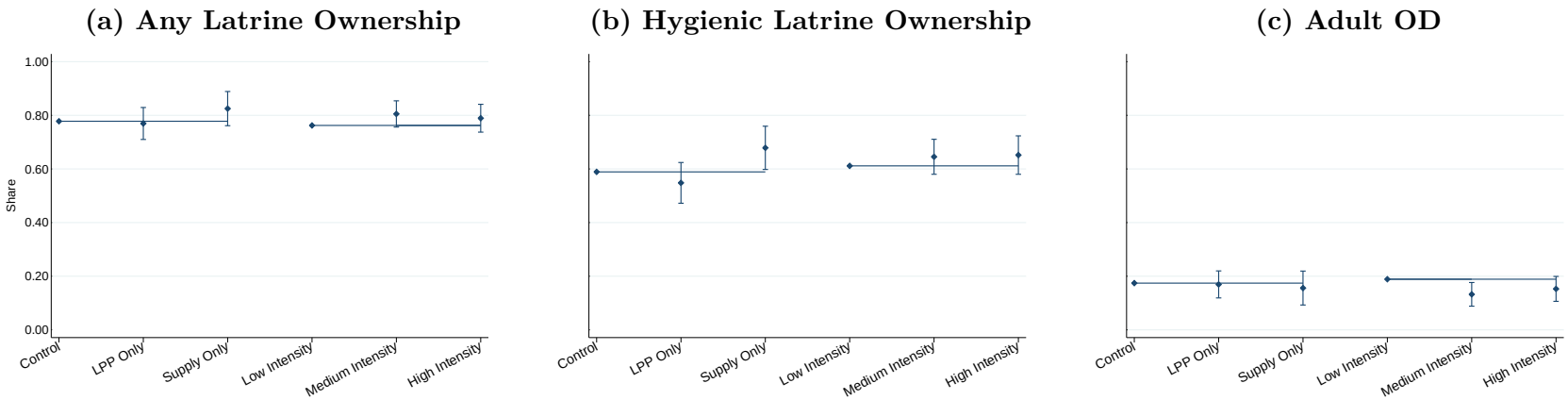


Fig. S7: Effects of the proportion of community treated on latrine ownership and open defecation for those ineligible for subsidies. Displays the sum of the estimated coefficients and the control group means found in columns (4) and (8) of Table S7 and column (2) of Table S9.

Tables

Table S1. Summary Statistics - Balance Check

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Control	LPP Only		LPP + Subsidy		Supply Only		LPP + Subsidy + Supply		F-test		
	Mean SD	Mean SD	Diff SE	Mean SD	Diff SE	Mean SD	Diff SE	Mean SD	Diff SE	F-stat	P-val	N
Household Head (HHH) Characteristics												
Female	0.10	0.09	-0.01	0.09	-0.00	0.09	-0.01	0.09	-0.00	0.43	0.79	18,213
	0.29	0.28	0.01	0.29	0.01	0.28	0.01	0.29	0.01			
Age	42.34	42.03	-0.31	42.49	0.15	42.28	-0.06	42.23	-0.11	0.50	0.73	18,229
	13.88	14.00	0.48	13.59	0.43	13.39	0.53	13.53	0.44			
Years of Schooling	5.84	6.51	0.68*	6.40	0.57*	6.16	0.32	6.14	0.31	1.34	0.26	18,151
	5.13	5.36	0.35	5.45	0.30	5.20	0.39	5.36	0.34			
Muslim	0.86	0.88	0.02	0.86	-0.00	0.83	-0.03	0.85	-0.02	0.13	0.97	18,198
	0.34	0.33	0.06	0.35	0.04	0.37	0.07	0.36	0.05			
Bengali	0.89	0.93	0.04	0.91	0.02	0.86	-0.03	0.88	-0.01	0.73	0.57	18,198
	0.32	0.25	0.04	0.28	0.04	0.35	0.06	0.33	0.04			
Works in Agriculture	0.70	0.71	0.01	0.70	0.00	0.75	0.05	0.70	0.00	0.68	0.61	18,212
	0.46	0.45	0.02	0.46	0.03	0.43	0.03	0.46	0.03			
Household Characteristics												
Decimals of land owned	48.16	54.49	6.33	55.47	7.32	50.94	2.78	50.68	2.52	0.76	0.55	18,181
	104.30	121.14	5.07	114.85	5.09	111.41	6.93	108.11	4.97			
Eligible for subsidies	0.76	0.75	-0.01	0.74	-0.02	0.76	-0.00	0.76	-0.00	0.54	0.71	18,254
	0.43	0.43	0.02	0.44	0.02	0.43	0.03	0.43	0.02			
Eats proper meals during Monga	0.63	0.69	0.06	0.59	-0.04	0.59	-0.05	0.60	-0.03	1.64	0.17	18,161
	0.48	0.46	0.05	0.49	0.04	0.49	0.05	0.49	0.04			
Member has had diarrhea in last week	0.05	0.05	0.01	0.05	0.00	0.04	-0.00	0.06	0.01	0.63	0.64	18,254
	0.21	0.22	0.02	0.22	0.01	0.20	0.01	0.23	0.01			
Owns a cell phone	0.57	0.59	0.02	0.63	0.06**	0.64	0.07	0.62	0.04	1.40	0.24	18,178
	0.49	0.49	0.04	0.48	0.03	0.48	0.04	0.49	0.03			
Has electricity	0.59	0.53	-0.06	0.65	0.06	0.62	0.03	0.62	0.03	0.86	0.49	8,276
	0.49	0.50	0.09	0.48	0.06	0.49	0.09	0.49	0.06			
Always has access to piped water or tube well	0.92	0.90	-0.01	0.90	-0.01	0.90	-0.01	0.87	-0.04	0.45	0.77	18,138
	0.28	0.30	0.03	0.30	0.03	0.29	0.04	0.33	0.03			
Latrine Usage/Ownership:												
Owns any latrine	0.61	0.62	0.01	0.65	0.04	0.70	0.10**	0.64	0.03	1.64	0.17	7,943
	0.49	0.49	0.04	0.48	0.04	0.46	0.04	0.48	0.04			
Has access to any latrine	0.78	0.84	0.07	0.83	0.06	0.87	0.10**	0.81	0.03	1.49	0.21	8,275
	0.42	0.36	0.04	0.37	0.04	0.33	0.05	0.39	0.04			
Has access to hygienic latrine	0.49	0.45	-0.04	0.53	0.04	0.49	-0.00	0.50	0.01	0.52	0.72	8,275
	0.50	0.50	0.07	0.50	0.06	0.50	0.06	0.50	0.06			
Owns a hygieinc latrine	0.39	0.32	-0.06	0.42	0.03	0.41	0.02	0.41	0.03	1.37	0.25	7,943
	0.49	0.47	0.05	0.49	0.05	0.49	0.05	0.49	0.05			
Adults ever open defecate	0.30	0.27	-0.03	0.31	0.01	0.33	0.02	0.33	0.03	0.20	0.94	8,274
	0.46	0.45	0.08	0.46	0.05	0.47	0.09	0.47	0.04			
Village Characteristics												
Number of households	144.82	210.75	65.93	165.63	20.81	165.10	20.28	181.82	37.00	1.45	0.22	107
	138.13	187.69	61.15	152.68	39.10	109.28	45.05	133.13	38.71			
Median landholdings	21.54	7.08	-14.46	8.76	-12.78	9.30	-12.24	7.09	-14.45	0.60	0.66	107
	46.47	6.53	10.15	9.55	9.99	9.23	10.40	6.15	9.95			
Share of landless households	0.30	0.34	0.03	0.35	0.05	0.41	0.11*	0.38	0.08	1.08	0.37	107
	0.17	0.13	0.05	0.13	0.04	0.15	0.06	0.15	0.05			
Share with <5 decimals land	0.23	0.24	0.01	0.22	-0.02	0.18	-0.05	0.21	-0.02	0.52	0.72	107
	0.12	0.08	0.03	0.08	0.03	0.15	0.05	0.10	0.03			
Share with electricity	0.59	0.55	-0.04	0.61	0.02	0.53	-0.05	0.60	0.01	0.40	0.81	107
	0.26	0.21	0.08	0.26	0.07	0.33	0.12	0.22	0.07			

Note: *** p<0.01, ** p<0.05, * p<0.1. Columns 1, 2, 4, 6 and 8 show mean and standard deviation of household and village indicators by treatment type. Columns 3, 5, 7 and 9 display the difference from control and standard error of the estimated difference. Standard errors are clustered by village to account for randomization at the village level. Columns 10-11 display the result of an F-test of joint significance for all treatment indicators. Column 12 displays the total sample number for each indicator.

Table S2. Effects of Community-level Treatments on Individual Latrine Ownership and Access

	Any Latrine				Hygienic Latrine			
	Access		Ownership		Access		Ownership	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPP Only	0.042	-0.005	0.035	0.027	0.028	-0.006	0.022	0.017
	(0.037)	(0.021)	(0.033)	(0.022)	(0.042)	(0.033)	(0.032)	(0.028)
LPP+Subsidy	0.121***	0.073***	0.139***	0.121***	0.178***	0.143***	0.153***	0.141***
	(0.032)	(0.018)	(0.024)	(0.018)	(0.044)	(0.035)	(0.031)	(0.029)
Supply Only	0.118**	0.027	0.072**	0.020	0.098	0.030	0.037	0.002
	(0.051)	(0.030)	(0.029)	(0.023)	(0.066)	(0.056)	(0.041)	(0.042)
LPP+Subsidy+Supply	0.104***	0.078***	0.138***	0.128***	0.160***	0.141***	0.157***	0.150***
	(0.036)	(0.020)	(0.028)	(0.022)	(0.045)	(0.033)	(0.033)	(0.030)
Baseline Latrine Access Rate		0.670***				0.492***		
		(0.039)				(0.048)		
Baseline Latrine Ownership Rate				0.394***				0.265***
				(0.051)				(0.054)
Observations	13127	13127	13095	13095	13127	13127	13095	13095
Control Mean	0.681	0.681	0.467	0.467	0.319	0.319	0.224	0.224
No. of Neighborhoods	380	380	380	380	380	380	380	380
No. of Villages	107	107	107	107	107	107	107	107
R-squared	0.0329	0.124	0.0191	0.0413	0.0349	0.0707	0.0283	0.0395
Intracluster Correlation	0.179	0.179	0.0812	0.0812	0.141	0.141	0.0924	0.0924
P-val: LPP Only = LPP+Subsidy	0.00648	4.54e-05	0.000421	2.99e-05	2.07e-05	3.47e-06	6.46e-06	8.38e-06
P-val: LPP+Subsidy = LPP+Subsidy+Supply	0.501	0.720	0.940	0.677	0.494	0.936	0.880	0.647
P-val: LPP Only = LPP+Subsidy+Supply	0.0610	6.12e-05	0.00202	7.83e-05	0.000193	9.01e-07	1.18e-05	2.67e-06

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing latrine access or ownership on village-level treatment type. Standard errors are clustered by village to account for village-level randomization of LPP, Supply and Subsidy treatments. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the bottom 75% of their neighborhood in terms of land ownership (i.e. those eligible for subsidies).

Table S3. Effects of Community-level Treatments on Open Defecation

	Open Defecation (OD) or Hanging Toilet Usage					
	All Adults		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
LPP Only	-0.069*	-0.021	-0.070*	-0.020	-0.058	-0.006
	(0.039)	(0.026)	(0.040)	(0.027)	(0.040)	(0.024)
LPP+Subsidy	-0.140***	-0.090***	-0.137***	-0.086***	-0.127***	-0.074***
	(0.039)	(0.024)	(0.040)	(0.025)	(0.035)	(0.021)
Supply Only	-0.119**	-0.025	-0.105*	-0.010	-0.125**	-0.023
	(0.058)	(0.042)	(0.061)	(0.046)	(0.061)	(0.044)
LPP+Subsidy+Supply	-0.117***	-0.090***	-0.113**	-0.085***	-0.107***	-0.079***
	(0.043)	(0.026)	(0.045)	(0.027)	(0.040)	(0.023)
Baseline Latrine Access Rate		-0.692***		-0.692***		-0.742***
		(0.051)		(0.052)		(0.044)
Observations	13124	13124	12177	12177	13070	13070
Control Mean	0.396	0.396	0.390	0.390	0.339	0.339
No. of Neighborhoods	380	380	380	380	380	380
No. of Villages	107	107	107	107	107	107
R-Squared	0.0426	0.126	0.0435	0.129	0.0294	0.136
ICC Coef.	0.114	0.114	0.118	0.118	0.113	0.113
P-val: LPP Only = LPP+Subsidy	0.0112	0.00352	0.0139	0.00589	0.0241	0.00197
P-val: LPP+Subsidy = LPP+Subsidy+Supply	0.451	0.979	0.439	0.930	0.506	0.771
P-val: LPP Only = LPP+Subsidy+Supply	0.146	0.00727	0.179	0.0131	0.163	0.00244

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing an indicator for use of open defecation (OD) or hanging latrines on village-level treatment type. Baseline access rate and latrine ownership rate are calculated at the neighborhood level. Indicator is equal to one if any adult (or any male or female adult, depending on specification) reports ever open defecating or using a hanging latrine. Standard errors are clustered by village to account for village-level randomization of LPP, Supply and Subsidy treatments. Columns 2, 4 and 6 include additional controls for neighborhood-level latrine access rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the bottom 75% of their neighborhood in terms of land ownership (i.e. those eligible for subsidies).

Table S4. Effects of the Proportion of the Community Treated on Individual Latrine Ownership and Access

	Any Latrine				Hygienic Latrine			
	Access		Ownership		Access		Ownership	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPP Only	0.042	-0.004	0.035	0.027	0.028	-0.006	0.022	0.016
	(0.035)	(0.021)	(0.030)	(0.022)	(0.031)	(0.026)	(0.023)	(0.021)
Supply Only	0.118**	0.029	0.072**	0.022	0.098**	0.033	0.037	0.003
	(0.046)	(0.031)	(0.028)	(0.024)	(0.044)	(0.037)	(0.028)	(0.027)
Loser (Low)	0.054*	0.020	0.056**	0.042*	0.050	0.025	0.034	0.025
	(0.032)	(0.018)	(0.026)	(0.023)	(0.032)	(0.025)	(0.024)	(0.022)
Loser (Med)	0.112***	0.061***	0.112***	0.085***	0.091***	0.054**	0.061**	0.043*
	(0.033)	(0.023)	(0.027)	(0.023)	(0.030)	(0.026)	(0.024)	(0.022)
Loser (High)	0.088***	0.042*	0.096***	0.082***	0.126***	0.092***	0.095***	0.085***
	(0.032)	(0.023)	(0.028)	(0.024)	(0.034)	(0.029)	(0.027)	(0.026)
Winner (Low)	0.102***	0.083***	0.139***	0.134***	0.163***	0.148***	0.157***	0.153***
	(0.032)	(0.021)	(0.027)	(0.023)	(0.033)	(0.025)	(0.026)	(0.023)
Winner (Med)	0.165***	0.113***	0.190***	0.166***	0.265***	0.226***	0.242***	0.225***
	(0.028)	(0.019)	(0.023)	(0.019)	(0.029)	(0.025)	(0.024)	(0.023)
Winner (High)	0.139***	0.099***	0.185***	0.175***	0.229***	0.200***	0.227***	0.220***
	(0.033)	(0.020)	(0.027)	(0.022)	(0.033)	(0.028)	(0.027)	(0.025)
Baseline Latrine Access Rate		0.660***				0.484***		
		(0.041)				(0.044)		
Baseline Latrine Ownership Rate				0.383***				0.259***
				(0.041)				(0.040)
Observations	12980	12980	12948	12948	12980	12980	12948	12948
Control Mean	0.681	0.681	0.467	0.467	0.319	0.319	0.224	0.224
No. of Neighborhoods	374	374	374	374	374	374	374	374
No. of Villages	107	107	107	107	107	107	107	107
R-Squared	0.0381	0.123	0.0261	0.0466	0.0504	0.0835	0.0470	0.0575
ICC Coef.	0.174	0.174	0.0780	0.0780	0.140	0.140	0.0922	0.0922
P-val Losers: Low = Medium	0.0693	0.0612	0.0545	0.109	0.197	0.281	0.291	0.448
P-val Losers: Low = High	0.280	0.313	0.171	0.144	0.0307	0.0228	0.0332	0.0228
P-val Winners: Low = Medium	0.0251	0.152	0.0515	0.165	0.00175	0.00392	0.00231	0.00449
P-val Winners: Low = High	0.265	0.461	0.127	0.112	0.0594	0.0721	0.0188	0.0135
P-val Loser (Low) = LPP Only	0.736	0.253	0.495	0.561	0.509	0.262	0.614	0.704
P-val Loser (Med) = LPP Only	0.0471	0.00875	0.0161	0.0271	0.0438	0.0347	0.112	0.255
P-val Loser (High) = LPP Only	0.197	0.0647	0.0606	0.0444	0.00575	0.00155	0.00957	0.00932
P-val Winner (Low) = LPP Only	0.0863	0.000279	0.00110	5.88e-05	0.000107	7.13e-08	6.54e-07	1.47e-08
P-val Winner (Med) = LPP Only	0.000104	6.24e-08	7.95e-08	4.62e-09	0	0	0	0
P-val Winner (High) = LPP Only	0.00713	5.16e-06	3.48e-06	3.15e-08	6.95e-09	0	0	0

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing latrine access or ownership on neighborhood-level treatment type in conjunction with household-level lottery status. The proportion of lottery winners was randomized at the neighborhood level, while winning or losing the lottery was randomized at the household level. To account for the neighborhood level randomization of intensity, standard errors are clustered by neighborhood. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the bottom 75% of their neighborhood in terms of land ownership (i.e. those eligible for subsidies).

Table S5. Effects of the Proportion of the Community Treated Open Defecation

	Open Defecation (OD) or Hanging Toilet Usage					
	All Adults		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
LPP Only	-0.070*	-0.022	-0.070*	-0.021	-0.058	-0.006
	(0.036)	(0.024)	(0.037)	(0.024)	(0.038)	(0.022)
Supply Only	-0.119**	-0.027	-0.105*	-0.012	-0.124**	-0.025
	(0.055)	(0.044)	(0.057)	(0.046)	(0.056)	(0.044)
Loser (Low)	-0.056	-0.021	-0.051	-0.017	-0.052	-0.014
	(0.040)	(0.025)	(0.041)	(0.026)	(0.039)	(0.022)
Loser (Med)	-0.141***	-0.088***	-0.138***	-0.083***	-0.123***	-0.066***
	(0.036)	(0.025)	(0.036)	(0.026)	(0.035)	(0.024)
Loser (High)	-0.128***	-0.081***	-0.133***	-0.083***	-0.100***	-0.049**
	(0.034)	(0.025)	(0.037)	(0.027)	(0.035)	(0.024)
Winner (Low)	-0.092**	-0.072***	-0.085**	-0.063**	-0.098***	-0.077***
	(0.036)	(0.027)	(0.037)	(0.028)	(0.037)	(0.023)
Winner (Med)	-0.192***	-0.138***	-0.189***	-0.133***	-0.173***	-0.115***
	(0.032)	(0.022)	(0.033)	(0.023)	(0.032)	(0.020)
Winner (High)	-0.157***	-0.116***	-0.154***	-0.112***	-0.146***	-0.102***
	(0.037)	(0.025)	(0.038)	(0.026)	(0.036)	(0.022)
Baseline Latrine Access Rate		-0.680***		-0.678***		-0.732***
		(0.048)		(0.050)		(0.045)
Observations	12977	12977	12037	12037	12923	12923
Control Mean	0.396	0.396	0.390	0.390	0.339	0.339
No. of Neighborhoods	374	374	374	374	374	374
No. of Villages	107	107	107	107	107	107
R-Squared	0.0503	0.128	0.0518	0.131	0.0355	0.136
ICC Coef.	0.208	0.208	0.213	0.213	0.208	0.208
P-val Losers: Low = Medium	0.0341	0.0197	0.0287	0.0200	0.0612	0.0457
P-val Losers: Low = High	0.0599	0.0313	0.0384	0.0250	0.190	0.168
P-val Winners: Low = Medium	0.00247	0.0186	0.00152	0.0140	0.0221	0.115
P-val Winners: Low = High	0.0847	0.139	0.0694	0.109	0.187	0.305
P-val Loser (Low) = LPP Only	0.735	0.979	0.631	0.875	0.867	0.753
P-val Loser (Med) = LPP Only	0.0506	0.0190	0.0606	0.0255	0.0755	0.0248
P-val Loser (High) = LPP Only	0.103	0.0342	0.0903	0.0345	0.253	0.105
P-val Winner (Low) = LPP Only	0.536	0.0897	0.677	0.162	0.290	0.00629
P-val Winner (Med) = LPP Only	0.000205	4.34e-06	0.000329	9.95e-06	0.000526	3.49e-06
P-val Winner (High) = LPP Only	0.0222	0.000806	0.0304	0.00136	0.0177	6.69e-05

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing an indicator equal to one if any adult in the household reports OD or using hanging latrines on neighborhood-level treatment type in conjunction with household-level lottery status. The proportion of lottery winners was randomized at the neighborhood level, while winning or losing the lottery was randomized at the household level. To account for the neighborhood level randomization, standard errors are clustered by neighborhood. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the bottom 75% of their neighborhood in terms of land ownership (i.e. those eligible for subsidies).

Table S6. Effects of Community-level Treatments on Individual Latrine Ownership and Access
Ineligible Sample

	Any Latrine				Hygienic Latrine			
	Access		Ownership		Access		Ownership	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPP Only	0.018	-0.003	-0.014	-0.008	-0.029	-0.053	-0.048	-0.041
	(0.023)	(0.019)	(0.032)	(0.029)	(0.056)	(0.051)	(0.054)	(0.053)
LPP+Subsidy	0.018	0.001	-0.001	-0.004	0.063	0.044	0.041	0.038
	(0.022)	(0.017)	(0.029)	(0.029)	(0.050)	(0.044)	(0.048)	(0.049)
Supply Only	0.056*	0.025	0.071**	0.046	0.131**	0.095*	0.120**	0.088
	(0.031)	(0.025)	(0.035)	(0.036)	(0.055)	(0.053)	(0.054)	(0.057)
LPP+Subsidy+Supply	0.018	0.014	0.015	0.015	0.068	0.064	0.052	0.052
	(0.027)	(0.021)	(0.031)	(0.031)	(0.052)	(0.044)	(0.049)	(0.050)
Baseline Latrine Access Rate		0.448***				0.516***		
		(0.072)				(0.072)		
Baseline Latrine Ownership Rate				0.238***				0.307***
				(0.072)				(0.083)
Observations	4454	4454	4451	4451	4454	4454	4451	4451
Control Mean	0.862	0.862	0.778	0.778	0.641	0.641	0.589	0.589
No. of Neighborhoods	368	368	368	368	368	368	368	368
No. of Villages	106	106	106	106	106	106	106	106
R-Squared	0.0146	0.0568	0.0111	0.0203	0.0293	0.0569	0.0238	0.0348
ICC Coef.	0.0484	0.0484	0.0331	0.0331	0.0765	0.0765	0.0621	0.0621
P-val: LPP Only = LPP+Subsidy	0.967	0.758	0.634	0.846	0.0318	0.0163	0.0432	0.0443
P-val: LPP+Subsidy = LPP+Subsidy+Supply	0.968	0.477	0.535	0.411	0.868	0.460	0.748	0.617
P-val: LPP Only = LPP+Subsidy+Supply	0.997	0.322	0.316	0.338	0.0276	0.00386	0.0286	0.0217

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing latrine access or ownership on village-level treatment type. Standard errors are clustered by village to account for village-level randomization of LPP, Supply and Subsidy treatments. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the top 25% of their neighborhood in terms of land ownership (i.e. those not eligible for subsidies).

Table S7. Effects of the Proportion of the Community Treated on Individual Latrine Ownership and Access
Ineligible Sample

	Any Latrine				**Hygienic Latrine**			
	Access		Ownership		Access		Ownership	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPP Only	0.018	-0.003	-0.013	-0.008	-0.028	-0.052	-0.048	-0.041
	(0.023)	(0.022)	(0.031)	(0.030)	(0.040)	(0.037)	(0.039)	(0.039)
Supply Only	0.056*	0.026	0.071**	0.047	0.131***	0.096**	0.120***	0.090**
	(0.029)	(0.028)	(0.032)	(0.032)	(0.043)	(0.042)	(0.041)	(0.041)
Ineligible (Low)	-0.007	-0.019	-0.012	-0.016	0.044	0.029	0.027	0.022
	(0.021)	(0.020)	(0.025)	(0.025)	(0.037)	(0.034)	(0.036)	(0.035)
Ineligible (Med)	0.045**	0.034*	0.028	0.027	0.082**	0.069**	0.057*	0.056*
	(0.019)	(0.019)	(0.025)	(0.025)	(0.034)	(0.031)	(0.033)	(0.033)
Ineligible (High)	0.025	0.014	0.012	0.011	0.079**	0.067*	0.064*	0.063*
	(0.022)	(0.021)	(0.027)	(0.026)	(0.038)	(0.035)	(0.036)	(0.036)
Baseline Latrine Access Rate		0.435***				0.502***		
		(0.063)				(0.072)		
Baseline Latrine Ownership Rate				0.228***				0.296***
				(0.062)				(0.068)
Observations	4438	4438	4435	4435	4438	4438	4435	4435
Control Mean	0.862	0.862	0.778	0.778	0.641	0.641	0.589	0.589
No. of Neighborhoods	364	364	364	364	364	364	364	364
No. of Villages	106	106	106	106	106	106	106	106
R-Squared	0.0181	0.0565	0.0125	0.0209	0.0312	0.0562	0.0253	0.0353
ICC Coef.	0.127	0.127	0.0809	0.0809	0.139	0.139	0.107	0.107
P-val Ineligible: Low = Medium	0.0106	0.00388	0.0854	0.0638	0.214	0.177	0.338	0.265
P-val Ineligible: Low = High	0.187	0.0924	0.339	0.264	0.320	0.255	0.283	0.217
P-val Ineligible (Low) = LPP Only	0.299	0.433	0.972	0.805	0.0564	0.0258	0.0547	0.0862
P-val Ineligible (Med) = LPP Only	0.232	0.0811	0.186	0.235	0.00188	0.000392	0.00406	0.00616
P-val Ineligible (High) = LPP Only	0.796	0.432	0.420	0.519	0.00605	0.00145	0.00411	0.00657

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing latrine access or ownership on neighborhood-level treatment type in conjunction with household-level lottery status. The proportion of lottery winners was randomized at the neighborhood level, while winning or losing the lottery was randomized at the household level. To account for the neighborhood level randomization of intensity, standard errors are clustered by neighborhood. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the top 25% of their neighborhood in terms of land ownership (i.e. those not eligible for subsidies).

Table S8. Effects of Community-level Treatments on Open Defecation
Ineligible Sample

	Open Defecation (OD) or Hanging Toilet Usage					
	All Adults		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
LPP Only	-0.027	-0.004	-0.032	-0.010	-0.016	0.007
	(0.025)	(0.027)	(0.024)	(0.027)	(0.024)	(0.019)
LPP+Subsidy	-0.029	-0.010	-0.033	-0.015	-0.017	0.002
	(0.026)	(0.024)	(0.026)	(0.024)	(0.024)	(0.018)
Supply Only	-0.053	-0.017	-0.054	-0.020	-0.051	-0.016
	(0.037)	(0.039)	(0.037)	(0.040)	(0.034)	(0.027)
LPP+Subsidy+Supply	-0.022	-0.018	-0.027	-0.023	-0.012	-0.008
	(0.031)	(0.027)	(0.032)	(0.028)	(0.029)	(0.021)
Baseline Latrine Access Rate		-0.502***		-0.479***		-0.505***
		(0.072)		(0.075)		(0.068)
Observations	4455	4455	4298	4298	4435	4435
Control Mean	0.174	0.174	0.173	0.173	0.139	0.139
No. of Neighborhoods	368	368	367	367	367	367
No. of Villages	106	106	106	106	105	105
R-Squared	0.0279	0.0718	0.0295	0.0707	0.0149	0.0673
ICC Coef.	0.0643	0.0643	0.0666	0.0666	0.0539	0.0539
P-val: LPP Only = LPP+Subsidy	0.939	0.755	0.978	0.779	0.958	0.741
P-val: LPP+Subsidy = LPP+Subsidy+Supply	0.793	0.724	0.845	0.739	0.827	0.593
P-val: LPP Only = LPP+Subsidy+Supply	0.821	0.532	0.844	0.562	0.867	0.394

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.Displays results from regressing an indicator for use of open defecation (OD) or hanging latrines on village-level treatment type. The indicator is equal to one if any adult (or any male or female adult, depending on specification) reports ever open defecating or using a hanging latrine. Standard errors are clustered by village to account for village-level randomization of LPP, Supply and Subsidy treatments. Columns 2, 4 and 6 include additional controls for neighborhood-level latrine access rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the top 25% of their neighborhood in terms of land ownership (i.e. those not eligible for subsidies).

Table S9. Effects of the Proportion of the Community Treated on Open Defecation
Ineligible Sample

	Open Defecation (OD) or Hanging Toilet Usage					
	All Adults		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
LPP Only	-0.028	-0.005	-0.033	-0.011	-0.017	0.006
	(0.024)	(0.026)	(0.024)	(0.026)	(0.023)	(0.022)
Supply Only	-0.053*	-0.018	-0.054*	-0.021	-0.052*	-0.017
	(0.032)	(0.032)	(0.032)	(0.033)	(0.031)	(0.029)
Ineligible (Low)	0.000	0.015	-0.005	0.009	0.008	0.022
	(0.025)	(0.024)	(0.025)	(0.024)	(0.022)	(0.020)
Ineligible (Med)	-0.055**	-0.042*	-0.061***	-0.048**	-0.041**	-0.028
	(0.022)	(0.022)	(0.023)	(0.024)	(0.020)	(0.019)
Ineligible (High)	-0.033	-0.021	-0.036	-0.026	-0.021	-0.010
	(0.025)	(0.024)	(0.025)	(0.024)	(0.023)	(0.021)
Baseline Latrine Access Rate		-0.489***		-0.464***		-0.493***
		(0.065)		(0.066)		(0.063)
Observations	4439	4439	4282	4282	4419	4419
Control Mean	0.174	0.174	0.173	0.173	0.139	0.139
No. of Neighborhoods	364	364	363	363	363	363
No. of Villages	106	106	106	106	105	105
R-Squared	0.0319	0.0721	0.0338	0.0710	0.0182	0.0667
ICC Coef.	0.148	0.148	0.151	0.151	0.142	0.142
P-val Ineligible: Low = Medium	0.0167	0.00560	0.0170	0.00924	0.0189	0.00518
P-val Ineligible: Low = High	0.201	0.0950	0.221	0.114	0.230	0.113
P-val Ineligible (Low) = LPP Only	0.259	0.412	0.259	0.412	0.311	0.464
P-val Ineligible (Med) = LPP Only	0.259	0.104	0.248	0.123	0.293	0.0930
P-val Ineligible (High) = LPP Only	0.850	0.469	0.892	0.521	0.865	0.460

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Displays results from regressing an indicator equal to one if any adult in the household reports OD or using hanging latrines on neighborhood-level treatment type in conjunction with household-level lottery status. The proportion of lottery winners was randomized at the neighborhood level, while winning or losing the lottery was randomized at the household level. To account for the neighborhood level randomization, standard errors are clustered by neighborhood. Columns 2, 4, 6 and 8 include additional controls for neighborhood-level latrine access or ownership rate at baseline, to account for imbalances at baseline. All specifications include union fixed effects. Analysis sample includes only those households in the top 25% of their neighborhood in terms of land ownership (i.e. those not eligible for subsidies).