Public Service Delivery, Free Riding and Public Health: Experimental Evidence from India

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A pressing issue in global health

- In 2020, an estimated 3.6 billion people worldwide lacked access to safely-managed sanitation services, roughly half.

- Open defecation is often practised by these populations, imposing externalities:
  - Infectious diseases and mortality [Geruso and Spears, 2018; Coffey et al., 2018; Mara et al., 2010].
  - Damaged environmental quality [Greenstone and Jack, 2015].

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Financing quality sanitation services

How to ensure access to quality sanitation services that are financially sustainable?

- Challenges to service delivery exacerbated in **overcrowded** slums where demand for basic services is beyond capacity [Bryan et al., 2020; UN, 2022].

- Non-compliance with user **fees** or **tax collection** [Besley and Persson, 2013; Weigel, 2020; Burgess et al., 2020; Jensen, 2022].
  
  - Effective prices of provision can fall below its marginal cost.
  - Under-provision and inadequate service delivery.

- Enforcement can lead to **user exclusion**, against our quest to provide sanitation services for all (SDG 6).

- Limited understanding of mechanisms behind this dilemma.
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This paper

Experimental evidence on how an exogenous boost in the maintenance quality of public services impacts the behavior of providers and users.

- **Context**: access to WASH in slums of India
  - Where only 37% of the 0.48 billion people living in urban areas have access to safely-managed sanitation services [WHO, 2021].

- Centered around community toilets (CTs)
  - Present across the country and financed by user fees, a model that characterizes the provision of most essential services in LMICs and is often the largest share of overall tax burden [see, e.g., Paler et al., 2017].
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1 Study context

2 Research design

3 Results
Study context

- Field experiment in the two largest cities of **Uttar Pradesh, India**
- CTs serving slum residents
- Poor quality of service delivery
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A. Share of CTs with positive detections

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>0.98</td>
</tr>
<tr>
<td>Bacillus</td>
<td>0.96</td>
</tr>
<tr>
<td>Mold</td>
<td>0.85</td>
</tr>
<tr>
<td>Staphyl.</td>
<td>0.61</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>0.55</td>
</tr>
<tr>
<td>Salmonella</td>
<td>0.26</td>
</tr>
</tbody>
</table>

B. Distribution fit of E. coli count (CFU per cm²)

- **Samples from CTs**
- **Samples from main source of water**

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Service provider

- Community toilets are public or PPPs (e.g. Sulabh NGO)
- Managed by a caretaker
  - In charge of collecting fees and maintenance → multi-tasking problem
  - Fixed monthly salary → agency problem
  - Maintenance inputs are a function of the fees collected → resource constraint
Users: Non-payment

Share of CTs

Share of users not paying

WTP (INR per CT use)
1 Study context

2 Research design

3 Results
Field experiment in Uttar Pradesh, India

110 CTs randomly allocated to:

1. **Control** group (40)

2. **Maintenance** group (70) → intervention to boost quality in public service delivery
Maintenance intervention

Two components

1. **Grant period**: one-off grant for structural maintenance
   - Caretaker(s) chose between different packages
   - ≈ 90% of monthly O&M cost of adequate-quality CT

2. **Incentive period**: financial rewards for routine maintenance
   - Paid to caretakers conditional on objective cleanliness
   - 40% of average monthly x 4 payments (≈ 13% annual salary)
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## Data 1: public service delivery

1. **Surveys** (BL + 5 follow-ups): 110 CTs

2. **Objective measurements:**
   - Survey to caretaker: routine maintenance, time allocation
   - Observations: number of users and payment, structural quality and cleaning status
   - Laboratory tests for bacteria presence

### Timeline:

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Jun.</td>
<td>Census: HH and CT</td>
</tr>
<tr>
<td>2018</td>
<td>0</td>
<td>Baseline: HH and CT</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Follow-up 1: HH and CT</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Follow-up 2: CT</td>
</tr>
<tr>
<td>2019</td>
<td>6</td>
<td>Follow-up 3: HH and CT</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Follow-up 4: CT</td>
</tr>
<tr>
<td>2019</td>
<td>12</td>
<td>Follow-up 5: HH and CT</td>
</tr>
</tbody>
</table>

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Data II: users and potential users

Creating a sampling frame around all pay-to-use CTs in Lucknow and Kanpur

- Slum borders in each CT catchment area + census of residents within
- Eligible households: using the CT or practising OD
- Sample restricted by proximity to facility

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![Map of sampling frame](image-url)
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![Map with sampling frame and red markers]
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Data II: users and potential users

1. **Surveys** (BL + 3 follow-ups): 1500 potential CT users

2. **Lab-in-the-field experiment:**
   - List randomization to measure outside option → OD is a sensitive behaviour
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![Timeline Diagram]

- **Census:** HH and CT
- **Baseline:** HH and CT
- **Follow-up 1:** HH and CT
- **Follow-up 2:** CT
- **Follow-up 3:** HH and CT
- **Follow-up 4:** CT
- **Follow-up 5:** HH and CT

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Specification

Focus on maintenance ($T_j$) vs control comparison

$$Y_{ij,t} = \beta_0 + \beta_1 T_j + \beta_x X_{ij} + \delta_t + \epsilon_{ij,t}$$

- Separate estimates for three periods: BL, Grant period and Incentive period ⇒ assumes $\beta_1$ is constant within these periods.
- Pool follow-up measurements to reduce noise [McKenzie, 2012].

Robustness

- Baseline balance in all observables
- Attrition orthogonal to treatment allocation
- IPW, ANCOVA, double-post LASSO, causal forests
- Multiple hypothesis testing
1 Study context

2 Research design

3 Results
Results

- Exogenous boost to maintenance improves **quality** of community toilets.
  - Mechanisms: better **routine maintenance** and **monitoring** of fee payment.
  - Reduction in **non-payment**.
  - Unintended consequences: **user exclusion** due to **price effect > quality effect**.
    - Drop in service use on the intensive margin.
    - Resort to outside option → OD.
    - Jeopardizing public health.
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Quality of service delivery: overall quality

Quality index using objective measurements of structural quality and cleanliness

- Higher-quality provision ↑ 66% over control mean
- Shift towards the top of the distribution

A. Higher quality

![Graph showing treatment effects over time for higher quality]

Figure 3: Grant versus incentive periods: a comparison of treatment effects

Note.
Each panel presents estimates of treatment effects based on OLS regressions using equation (1) at the CT level or at the respondent level. Confidence intervals are built using statistical significance at the 10% level.

Baseline includes the measurement at baseline, Grant period includes the measurement from follow-up 1, and Incentive period pools all subsequent follow-up measurements. See Section 1 for details about each intervention. When the regression is based on a single measurement period, robust standard errors are used for CT-level outcomes, and standard errors clustered at the catchment area are used for respondent-level outcomes. When multiple measurement periods are pooled, standard errors are clustered at the catchment area for CT-level outcomes, and at the catchment area by collection round for respondent-level outcomes. All specifications include indicator variables for data collection rounds, and strata indicators for the city and the provider of the CT. For outcomes at the respondent-level, gender is also included as a control variable. Additional details about the variables are presented in Appendix A. Estimates pooling all post-baseline measurements are presented in Tables 1–5.

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A. Comparison control vs. maintenance treatment
Quality of service delivery: inputs

The effect on inputs is strongly reliant on intervention features:

- **Structural** maintenance ↑ with grant only
- **Routine** maintenance ↑ during incentive period

![Graphs showing treatment effects](image-url)

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17% ↓ in non-payment over control mean.

- **Non-payment**
- **D. Non-payment**

![Graph showing treatment effects for non-payment]

- **Grant period**
- **Incentive period**

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Providers’ response

- Caretakers respond to incentives by increasing monitoring (7.5%).
- Greater enforcement of payment in CTs with initially high non-payment.
- Together suggest user exclusion from the service.

![E. Monitoring graph](image-url)
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<th>Incentive period</th>
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<tbody>
<tr>
<td>0</td>
<td>-0.15</td>
<td>-0.10</td>
</tr>
<tr>
<td>1</td>
<td>-0.10</td>
<td>-0.05</td>
</tr>
<tr>
<td>3</td>
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<td>0.15</td>
</tr>
<tr>
<td>12</td>
<td>0.20</td>
<td>0.25</td>
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Self-reported service use

- ↓ frequency of CT use

<table>
<thead>
<tr>
<th>Dep. variable:</th>
<th>Times used CT</th>
<th>Times used other practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular CT users (1)</td>
<td>Other (2)</td>
</tr>
<tr>
<td>Maintenance (T)</td>
<td>-0.110 (0.047)</td>
<td>-0.194 (0.094)</td>
</tr>
<tr>
<td>Mean (control group)</td>
<td>1.382</td>
<td>0.761</td>
</tr>
<tr>
<td>Observations</td>
<td>2400</td>
<td>878</td>
</tr>
<tr>
<td>Catchment areas</td>
<td>109</td>
<td>102</td>
</tr>
<tr>
<td>Observation rounds</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Regular CT users (3)</td>
<td>Other (4)</td>
</tr>
<tr>
<td></td>
<td>0.033 (0.044)</td>
<td>0.114 (0.099)</td>
</tr>
<tr>
<td></td>
<td>[0.46]</td>
<td>[0.25]</td>
</tr>
<tr>
<td></td>
<td>0.222</td>
<td>0.802</td>
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<td>102</td>
</tr>
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<td></td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Open defecation

**OD prevalence:** list randomization on behavior in the previous day

- Randomly allocated to short or long list of statements.
- Difference in average number of items between B and A gives prevalence.

<table>
<thead>
<tr>
<th>Short (A)</th>
<th>Long (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- I cooked yesterday</td>
<td>- I cooked yesterday</td>
</tr>
<tr>
<td>- I bought milk yesterday</td>
<td>- I bought milk yesterday</td>
</tr>
<tr>
<td>- I watched TV yesterday</td>
<td>- I watched TV yesterday</td>
</tr>
<tr>
<td></td>
<td>- I defecated in the open yesterday</td>
</tr>
</tbody>
</table>
Open defecation

OD prevalence: list randomization on behavior in the previous day

- OD almost doubles

- Switch from CT use to OD over time (self-reported) correlates significantly with poverty

<table>
<thead>
<tr>
<th>Share practicing OD</th>
<th>Control</th>
<th>Maintenance (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.100</td>
<td>0.465</td>
</tr>
<tr>
<td></td>
<td>0.206</td>
<td>0.391</td>
</tr>
<tr>
<td></td>
<td>0.312</td>
<td>0.317</td>
</tr>
</tbody>
</table>

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Public health

- ↑ 7% in positive curative expenditures in past month wrt control.
- Positive effect (insignificant) on reporting at least one HH member with diarrhoea or fever in past 2 weeks.
- Effects during same period as the measured increase in OD.

**Positive curative expenditures**

<table>
<thead>
<tr>
<th>Months from baseline</th>
<th>Treatment effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0.05</td>
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Sensitization campaign among potential users

- 35 (out of 70 treated catchment areas) randomly allocated to sensitization campaign

- Raise awareness about the **externalities of unsafe sanitation** and **payment** to support maintenance

1. Door-to-door campaign
2. Distribution of leaflets
3. Posters placed in CTs
4. Monthly reminder voice messages (M)

![Graph showing sensitisation timeline and incentives](image-url)
Awareness of health externalities from OD

Awareness of externalities

- Maintenance
- Maintenance only
- Maintenance + sensitization

Graph showing treatment effect over months from baseline.
Summary

- Exogenous boost to maintenance increases quality (↑66%), mostly after financial incentives to providers.

- Reduction in non-payment: ↓ 17%

- Mechanisms: better routine maintenance (↑5.6%) and monitoring of fee payment (↑7.5%)

- Unintended consequence: user exclusion
  - Resort to outside option → OD (↑90%)
  - Health externalities → positive curative health expenditures (↑7%)
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Contributions

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   - Highlight the unintended consequences of a well-intended policy → greater monitoring of fee payment leads to user exclusion.

2. **Constraints to infrastructure maintenance** [Duflo et al., 2012]
   - First to study the behavioural responses of providers and users when releasing such constraints.

3. ‘**Last-mile**’ problem, particularly adoption of safe WASH [Guiteras et al., 2015; Ashraf et al., 2016; Lipscomb and Schechter, 2018; Berry et al., 2020; Gertler et al., 2022]
   - Focus on shared technologies, rigorous measurement of the outside option (OD) and quantification of the negative welfare consequences in an important and understudied setting – slums
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   - Focus on shared technologies, rigorous measurement of the outside option (OD) and quantification of the negative welfare consequences in an important and understudied setting – slums
Contributions

1. **Financing public service** delivery: users fees or subsidies? [McRae, 2015; Burgess et al., 2020; Coville et al., 2021]
   - Highlight the unintended consequences of a well-intended policy → greater monitoring of fee payment leads to user exclusion.

2. **Constraints to infrastructure maintenance** [Duflo et al., 2012]
   - First to study the behavioural responses of providers and users when releasing such constraints.

3. ‘**Last-mile’ problem**, particularly adoption of safe WASH [Guiteras et al., 2015; Ashraf et al., 2016; Lipscomb and Schechter, 2018; Berry et al., 2020; Gertler et al., 2022]
   - Focus on shared technologies, rigorous measurement of the outside option (OD) and quantification of the negative welfare consequences in an important and understudied setting – *slums*
Thank you!
How to finance quality improvements?

1. Full payment
2. Free access to public service
Cost of improved services are 1.3–2.8x current cost → fully covered by eradicating non-payment at the market fee.

Mediation analysis on the effect of the interventions on non-payment.

While supply-side mediators mainly ↓ non-payment, demand-side factors ↑.
Intervention - CT

- One-off CT grant scheme
- Example of deep cleaning:
One-off CT grant scheme

Example of repair:
Intervention - sensitization

- Door-to-door information campaign
Distribution of leaflets

- Sensitization
- Distribution of leaflets
- Posters placed in CTs

---

**Antonella Bancalari (IFS)**

---

**Intervention - sensitization**

---
Creating a sampling frame around all pay-to-use CTs in Lucknow and Kanpur: restrict by proximity to facility
Creating a sampling frame around all pay-to-use CTs in Lucknow and Kanpur: restrict by proximity to facility
## Baseline balance: CT characteristics

### Additional analysis

#### D.1 Balance in observable characteristics

Tables D2 and D1 presents the balance test for a number of variables at the household and CT levels. Columns (1) present the mean and the standard deviation of each variable for the whole sample and when the sample is restricted to the control group, respectively. Columns (3)–(5) report estimated differences with the control group using an OLS regression of the correspondent variable on the treatment indicator. Column (3) reports differences between any treatment group and the control group, while columns (4)–(5) reports differences separately for each treatment group. Column (6) presents p-values of a test of joint-significance of the differences presented in columns (4)–(5).

<table>
<thead>
<tr>
<th></th>
<th>Descriptive statistics</th>
<th>Differences from control group, by treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (1)</td>
<td>Control (2)</td>
</tr>
<tr>
<td>Year of construction</td>
<td>1997.11</td>
<td>1995.26</td>
</tr>
<tr>
<td></td>
<td>[8.81]</td>
<td>[9.29]</td>
</tr>
<tr>
<td>Distance to closest CT</td>
<td>0.54</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>[0.45]</td>
<td>[0.67]</td>
</tr>
<tr>
<td>Surrounding: Market</td>
<td>0.33</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>[0.47]</td>
<td>[0.49]</td>
</tr>
<tr>
<td>Surrounding: Road</td>
<td>0.83</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>[0.37]</td>
<td>[0.34]</td>
</tr>
<tr>
<td>Surrounding: Government office</td>
<td>0.25</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>[0.44]</td>
<td>[0.41]</td>
</tr>
<tr>
<td>Single caretaker</td>
<td>0.80</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>[0.40]</td>
<td>[0.39]</td>
</tr>
<tr>
<td>% Woman caretaker</td>
<td>0.18</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>[0.37]</td>
<td>[0.39]</td>
</tr>
<tr>
<td>Caretaker is cleaner</td>
<td>0.27</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>[0.45]</td>
<td>[0.46]</td>
</tr>
<tr>
<td>Caretaker from community</td>
<td>0.44</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>[0.50]</td>
<td>[0.51]</td>
</tr>
<tr>
<td>Months caretaker in CT</td>
<td>125.28</td>
<td>129.91</td>
</tr>
<tr>
<td></td>
<td>[103.45]</td>
<td>[109.34]</td>
</tr>
<tr>
<td>% Time collecting fees</td>
<td>0.35</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>[0.11]</td>
<td>[0.11]</td>
</tr>
<tr>
<td>% Time cleaning</td>
<td>0.20</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>[0.06]</td>
<td>[0.06]</td>
</tr>
<tr>
<td>Clean frequently</td>
<td>0.86</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>[0.35]</td>
<td>[0.34]</td>
</tr>
</tbody>
</table>

**Note.** Columns (1)–(2) report sample mean and standard deviation in brackets for the whole sample and control group, respectively. Column (3) reports the difference with the control group with all treatment groups pooled together using an OLS regression of the correspondent outcome on the treatment indicator. Columns (4)-(5) report the difference with the control group for each treatment group. Standard errors clustered at slum level are reported in parentheses. Column (6) present a joint test of significance of the coefficients for each treatment dummy.
Table D2: Household characteristics at baseline, by treatment group

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Control</th>
<th>Any treatment</th>
<th>Improvement</th>
<th>Improvement + sensitization</th>
<th>P-value joint test (4)-(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Head, age</td>
<td>45.43</td>
<td>46.02</td>
<td>-0.93</td>
<td>-0.96</td>
<td>-0.90</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>[12.82]</td>
<td>[13.42]</td>
<td>(0.84)</td>
<td>(1.00)</td>
<td>(0.94)</td>
<td></td>
</tr>
<tr>
<td>Head, male</td>
<td>0.75</td>
<td>0.73</td>
<td>0.03</td>
<td>0.05</td>
<td>0.01</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>[0.43]</td>
<td>[0.44]</td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td></td>
</tr>
<tr>
<td>Head, educ &lt; primary</td>
<td>0.54</td>
<td>0.56</td>
<td>-0.03**</td>
<td>-0.09**</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>[0.50]</td>
<td>[0.50]</td>
<td>(0.04)</td>
<td>(0.05)</td>
<td>(0.04)</td>
<td></td>
</tr>
<tr>
<td>Head, married</td>
<td>0.77</td>
<td>0.76</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>[0.42]</td>
<td>[0.43]</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td></td>
</tr>
<tr>
<td>Number of children below 6 years old</td>
<td>0.47</td>
<td>0.50</td>
<td>-0.05</td>
<td>-0.04</td>
<td>-0.06</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>[0.77]</td>
<td>[0.82]</td>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td></td>
</tr>
<tr>
<td>Number of adult members</td>
<td>4.47</td>
<td>4.44</td>
<td>0.05</td>
<td>0.04</td>
<td>0.06</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>[1.83]</td>
<td>[1.92]</td>
<td>(0.11)</td>
<td>(0.14)</td>
<td>(0.12)</td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>0.17</td>
<td>0.12</td>
<td>0.08*</td>
<td>0.11*</td>
<td>0.06</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>[0.37]</td>
<td>[0.32]</td>
<td>(0.04)</td>
<td>(0.06)</td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td>General caste</td>
<td>0.07</td>
<td>0.05</td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>[0.26]</td>
<td>[0.23]</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td>Asset index</td>
<td>0.53</td>
<td>0.53</td>
<td>0.00</td>
<td>0.01</td>
<td>-0.00</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>[0.15]</td>
<td>[0.16]</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td>Piped water</td>
<td>0.71</td>
<td>0.70</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.04</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>[0.45]</td>
<td>[0.46]</td>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td></td>
</tr>
<tr>
<td>Private toilet</td>
<td>0.08</td>
<td>0.07</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>[0.27]</td>
<td>[0.26]</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td>CT expense</td>
<td>180.53</td>
<td>173.42</td>
<td>11.20</td>
<td>-2.50</td>
<td>24.23</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>[244.52]</td>
<td>[221.41]</td>
<td>(22.92)</td>
<td>(22.57)</td>
<td>(31.01)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Columns (1)–(2) report sample mean and standard deviation in brackets for the whole sample and control group, respectively. Column (3) reports the difference with the control group with all treatment groups pooled together using an OLS regression of the correspondent outcome on the treatment indicator. Columns (4)-(5) report the difference with the control group for each treatment group. Standard errors clustered at slum level are reported in parentheses. Column (6) present a joint test of significance of the coefficients for each treatment dummy.
### Random attrition and replacements

<table>
<thead>
<tr>
<th></th>
<th>Follow-up interviews per baseline household</th>
<th>Interviewed at baseline and not re-interviewed in ...</th>
<th>Replacements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Follow-up 1</td>
<td>Follow-up 2</td>
<td>Follow-up 3</td>
</tr>
<tr>
<td>Maintenance (T1)</td>
<td>0.029</td>
<td>0.004</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td>(0.011)</td>
<td>(0.022)</td>
</tr>
<tr>
<td></td>
<td>[0.69]</td>
<td>[0.73]</td>
<td>[0.57]</td>
</tr>
<tr>
<td>Maintenance + sensitization (T2)</td>
<td>0.013</td>
<td>0.008</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.078)</td>
<td>(0.014)</td>
<td>(0.021)</td>
</tr>
<tr>
<td></td>
<td>[0.87]</td>
<td>[0.54]</td>
<td>[0.87]</td>
</tr>
<tr>
<td>T1 = T2 (p-value)</td>
<td>0.807</td>
<td>0.754</td>
<td>0.678</td>
</tr>
</tbody>
</table>

**Note.** Figure B2 provides the timing of each follow-up survey. Dependent variables by column: (1) indicator variable equal to 1 if the household was interviewed at baseline and was not re-interviewed in any of the follow-ups, and zero otherwise; (2) indicator variable equal to 1 if the household was interviewed at baseline and was not re-interviewed in two out of three follow-ups, and 0 otherwise; (3)–(5) indicator variable equal to 1 if the household was interviewed at baseline and was not re-interviewed at follow-up 1 or follow-up 2 or follow-up 3, and 0 otherwise; (6) indicator variable equal to 1 if the household is part of the replacement sample (it was interviewed in any of the follow-ups, but it was not interviewed at baseline), and 0 otherwise. In columns (1)–(5), the sample is restricted to baseline observations, while in column (6) the sample is restricted to follow-up observations. All specifications include strata indicators for city and the provider of the CT. Standard errors clustered by catchment area are presented in parenthesis in columns (1)–(5). Standard errors clustered by catchment area and follow-up round are presented in parenthesis in column (6).
Heterogeneity of effect on non-payment

Conditional ATE of the maintenance treatment on non-payment computed using the causal forest procedure of Basu et al. (2018) and Athey and Wager (2019)

A. Distribution of CATE

B. Average CATE by facility
Heterogeneity of effect on non-payment

Conditional ATE of the maintenance treatment on non-payment computed using the causal forest procedure of Basu et al. (2018) and Athey and Wager (2019)

C. CATE by main baseline characteristics

By service quality

By non-payment

By caretaker's motivation

Estimated CATE

Quality

Non-payment

Pro-social motivation for the cause
OD prevalence, by gender

A. Female

Open defecation

B. Male

Open defecation
Private valuation of the service: WTP

- Incentive-compatible method → Multiple Price List
- Random draw from 13 questions and payment based on corresponding choice
- Market price = Rs. 5 → CT expenditure ≈ to 8% of HH income

<table>
<thead>
<tr>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 tickets</td>
<td>0 Rs</td>
</tr>
<tr>
<td>10 tickets</td>
<td>5 Rs (giving up 0.5 Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>10 Rs (giving up 1Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>15 Rs (giving up 1.5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>20 Rs (giving up 2Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>25 Rs (giving up 2.5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>30 Rs (giving up 3Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>35 Rs (giving up 3.5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>40 Rs (giving up 4Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>45 Rs (giving up 4.5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>50 Rs (giving up 5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>55 Rs (giving up 5.5Rs/ticket)</td>
</tr>
<tr>
<td>10 tickets</td>
<td>60 Rs (giving up 6Rs/ticket)</td>
</tr>
</tbody>
</table>
Demand for public intervention

Voice-to-the-people cards

- Provided anonymous cards to select the most pressing issue in the slum.
- Responses aggregated and provided to the city’s municipal corporation.
- Two relevant issues in random order:
  - Improvements in the quality of CTs
  - OD and externalities
- Other issues: poor health of children, limited water availability, poor quality of roads, lack of trash collection, absence of jobs, limited access to healthcare and poor lighting at night.
एक पहल: लोगों के लिए आवाज

हम लोग आपके मोहल्ले में लोगों से सबसे बड़ी समस्या के बारे में यून रहे हैं और यह जानकारी बिना किसी के नाम के साथ ही जान ही जा रही है, जिससे बाहर बाहर से किसी को नहीं पता लगेगा। जो भी आपकी मोहल्ले के लोग देखें वह जानकारी नहीं निगम को दी जाएगी, जिससे वह अपने अधिकारों इस इलाके की मुख्य समस्या के बारे में सही हो सकेगा। नदी आप अपनी राय देना चाहते हैं तो ये कई बर दीजिए, हमारी दीन आपके घर से कुछ देर बाद आकर से लेनी और बाहर कर्म से समझ देंगी, इससे ये नहीं पता लगेगा कि आपने क्या राय ली है। आपकी राय बहुत महत्वपूर्ण है।

CTID: 94

1 ही आवेदन

A. बच्चे जल्दी-जल्दी बीमार होते हैं
B. पानी की समस्या है
C. मोहल्ला ग्राम नहीं
D. सड़कें की हालत खराब है
E. नाले उपजने की क्षति नहीं
F. समृद्धि शैक्षणिक मलबा है
G. नींदियों नहीं है

1. तमाम बच्चों की क्षति अपनी नहीं है
Attitudes towards the public service

- ↑ 53% in demand for improvements in the quality of CTs
- ↓ 17% in OD and externalities

<table>
<thead>
<tr>
<th>Dep. variable:</th>
<th>WTP for service use</th>
<th>Awareness of externalities</th>
<th>Demand for public intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance (T)</td>
<td>-0.042 (0.074) [0.57 ; 0.57]</td>
<td>0.031 (0.018) [0.10 ; 0.20]</td>
<td>0.051 (0.026) [0.05 ; 0.12] -0.076 (0.037) [0.04 ; 0.12] -0.021 (0.024) [0.38 ; 0.40]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean (control group)</th>
<th>1.149</th>
<th>0.660</th>
<th>0.098</th>
<th>0.432</th>
<th>0.844</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>8635</td>
<td>4793</td>
<td>1551</td>
<td>1551</td>
<td>1551</td>
</tr>
<tr>
<td>Catchment areas</td>
<td>110</td>
<td>110</td>
<td>109</td>
<td>109</td>
<td>109</td>
</tr>
<tr>
<td>Observation rounds</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Level of analysis</td>
<td>Respondent</td>
<td>Household</td>
<td>Household</td>
<td>Household</td>
<td>Household</td>
</tr>
<tr>
<td>Incentivized measurement</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note. Estimates based on respondent- and household-level OLS regressions using equation (1). Standard errors clustered by catchment area are reported in parentheses. P-values are presented in brackets, the first from individual testing, the second adjusting for testing that each treatment is jointly different from zero for all outcomes presented in the table (see Section 5 for details). Dependent variables by column: (1) WTP for service use: incentivized willingness to pay for a single CT use (in Rupees), elicited for a bundle of ten tickets and divided by 10 to get at single use WTP; (2) Awareness of externalities: indicator variable equal to 1 if the respondent reports that OD generates a health externality for their family, and 0 otherwise; (3) Quality of the basic service: indicator variable equal to 1 if the household asks for public intervention in the CT's O&M as incentivized through the voice-to-the-people initiative (Appendix S.4.8), and 0 otherwise; (4) OD: indicator variable equal to 1 if the household asks for public intervention in keeping the community OD free as incentivized through the voice-to-the-people initiative (Appendix S.4.8), and 0 otherwise; (5) Other issues: indicator variable equal to 1 if the household asks for public intervention in any other issues in the community captured on the 'voice-to-the-people' cards as incentivized through the voice-to-the-people initiative (Appendix S.4.8), and 0 otherwise. All specifications include indicator variables for data collection rounds, and strata indicators for the city and the provider of the CT. Specifications where the level of analysis is the respondent also include gender. Additional details about the variables are presented in Appendix A.
### Sensitization campaign

- The campaign was **effective at reaching individuals**

<table>
<thead>
<tr>
<th></th>
<th>Recall of WASH campaign</th>
<th>Voice messages Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interactive activities</td>
<td>Posters at CT</td>
</tr>
<tr>
<td>Maintenance only (T1)</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td>0.023</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.030)</td>
</tr>
<tr>
<td></td>
<td>[0.33]</td>
<td>[0.58]</td>
</tr>
<tr>
<td>Maintenance + sensitization (T2)</td>
<td>0.083</td>
<td>0.158</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.029)</td>
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<td>[0.00]</td>
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<tr>
<td>T1 = T2 (p-value)</td>
<td>0.014</td>
<td>0.000</td>
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<tr>
<td>Mean (control group)</td>
<td>0.645</td>
<td>0.327</td>
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<td>Std. dev. (control group)</td>
<td>0.479</td>
<td>0.469</td>
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<td>Observations</td>
<td>4793</td>
<td>3301</td>
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<td>Catchment areas</td>
<td>328</td>
<td>218</td>
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<tr>
<td>Observation rounds</td>
<td>3</td>
<td>2</td>
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