

Changes in open defecation in rural north India: 2014 - 2018

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Since October 2014, the Government of India has worked towards a goal of eliminating open defecation by 2019 through the Swachh Bharat Mission (SBM). In June 2014, we reported the results of a survey of rural sanitation behaviour in north India. Here, we report results from a late 2018 survey that revisited households from the 2014 survey in four states: Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh. Although rural latrine ownership increased considerably over this period, open defecation remains very common in these four states. There is substantial heterogeneity across states in what the SBM did and how. Many survey respondents report that the SBM attempted to coerce latrine construction, including by withholding or threatening to withhold government benefits. ST and SC households were especially likely to face coercion. Variation in SBM coercion is correlated with variation in sanitation outcomes: in villages where more people report coercive SBM activities, more people also reported switching to latrine use. These outcomes suggest the need for transparent, fact-based public dialogue about the SBM: its costs and benefits, its accomplishments and means.

Keywords: sanitation, open defecation, India, development, environmental health, behaviour, Swachh Bharat Mission

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1. Introduction

Since October 2014, the Government of India has worked towards a goal of eliminating open defecation by 2019 through the Swachh Bharat Mission (SBM). In 2014, we reported a survey of rural sanitation behaviour in north India (Coffey et al., 2014). Here, we report results from a late 2018 survey that revisited households from the 2014 survey in four states: Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

Although rural latrine ownership increased considerably over this period, open defecation remains very common in these four states. Different statistical methods produce slightly different numbers, but a wide range of approaches agree that approximately 40 to 50% of rural people in these states defecated in the open in late 2018. This is reduced from about 70% of rural people in the 2014 survey. Much of the reduction in open defecation is a result of new latrine construction: nearly six in 10 households that did not own a latrine in 2014 acquired one by the 2018 survey. However, the fraction of people who own a latrine, but who nevertheless defecate in the open, did not change between 2014 and 2018: it was about 23% in both years.

The survey documents substantial heterogeneity across states in how the SBM was implemented and what its effects were. For instance, there was substantial cross-state variation in the proportion of households that newly acquired latrines, and in the proportion of latrines that were constructed by contractors rather than by households. Many respondents report that the SBM attempted to coerce latrine construction, and in some cases use, including by threatening fines or to withhold government benefits. Scheduled Tribe and Schedule Caste households were more likely than households from other social groups to report that they faced coercion. Variation in SBM coercion is correlated with variation in sanitation outcomes: in villages where more people report coercive SBM activities, more people also reported switching to latrine use, on average. In a setting in which respondents may have feared punishment for not building or using a latrine, however, the estimates of open defecation presented in this paper may understate true levels of open defecation in the region.

The survey reported here is well positioned to help us understand changes in rural open defecation during the period of the SBM. It provides an up-to-date assessment for the four states studied, even more so than the estimates available from the 2015-16 National Family Health Survey (NFHS)-4. We note, though, that relative to other states in India, rural open defecation is high in the states of Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh, so our results are not representative of rural India as a whole. These four states are nevertheless important because their rural populations constitute over two-fifths of India's rural population. We report quantitative, representative estimates based on sampling weights and demographic strategies that allow us to describe the rural populations of these four states, collectively. In this article, we will sometimes refer to "the focus states," "north

India,” or “the region;” these terms are used interchangeably to mean the rural population of these four states.

This paper details three main conclusions and the methodology behind them:

Much open defecation remains. In Coffey, *et al.* (2014), published in this journal, we computed a projection: if a latrine were provided for every rural household in these states, over 40% of the population would nevertheless defecate in the open. Our estimates from the 2018 data here cohere with that projection. Open defecation rates vary across north India, but, despite an active SBM implementation in many districts, open defecation has not been eliminated from any of the districts we studied. Throughout the region, the number of rural people who defecate in the open is nearly as large as the number of people who do not: the different estimation strategies we apply to the new survey data, which we detail below, suggest that between 42% to 57% of rural people over two years old defecate in the open, with a preferred estimate of 43%. These findings contrast with government claims that open defecation has been entirely or largely eliminated in these states (GoI 2018).

In its activities and its results, the SBM was diverse. The SBM implemented different activities in different states at different times. States differ in the extent to which households acquired latrines, as well as the extent to which households constructed latrines themselves or received them from contractors organised by local government officials.¹ This matters because people in households that received money to build their own latrine, rather than a government constructed latrine, were almost 10 percentage points less likely to defecate in the open. States also differ in how much officials encouraged latrine use in addition to construction.

There were commonalities in SBM implementation across states as well: timelines for latrine construction were time-bound and short. In Rajasthan and Madhya Pradesh, some villages are no longer implementing SBM (neither providing funds for toilet construction nor encouraging latrine use); in Uttar Pradesh and Bihar, SBM activities have not started in some villages and are ongoing in others. Throughout the region, involvement of village, block, and district officials in SBM program implementation has been more intensive than in prior sanitation programs.

If sustained, the SBM’s reduction in open defecation is likely to improve health, but it comes at a social cost: coercion and threats were commonplace and sanctioned by local officials, and violence sometimes occurred. The existing scientific literature strongly supports investment in reducing open defecation, even if it is not fully eliminated, as a way to improve health and to contribute to economic prosperity. These are important and worthy goals. But it is important to consider the costs at which improvements (which for reasons we discuss below, may not be sustained) were achieved. The SBM routinely used coercion and threats to achieve toilet construction, and in more limited cases, use. Coercion included harassment, fines, denial of public benefits, and in some cases even detention by

the police. We found that ST and SC households were more likely than households from other social groups to report experiencing coercion.

2. Fieldwork and sample design

Table 1 summarizes the number of villages and households that were surveyed in each state, as well as the number of people living in those households. The study revisited a random subset of 157 villages from the 2014 study, in eleven districts. The Rajasthan sample is smaller than the sample in other states because the survey only visited two districts in Rajasthan; it visited three districts in the other states. Of the 1,389 households that we attempted to re-interview in 2018, we were able to re-interview 1,224 (88%). The original sample of villages was randomly drawn using proportional-to-size sampling from a frame taken from the Government of India’s District Level Health Survey. Coffey et al., 2014 further discusses the sampling strategy for households in the 2014 survey.

Not all households in the 2018 survey are part of the panel that longitudinally revisited households from the 2014 survey. In each state, new households were added in one of three ways. First, if a household head from the 2014 survey passed away or migrated surveyors randomly selected a household to interview from among his sons who were living in the village. Second, if a household from the 2014 sample moved out of the village, one of the neighbouring households was randomly selected to be newly added to the sample. Third, when all re-interviews and all neighbour interviews were completed in the village, surveyors interviewed new households in parts of the village that had not been covered by the 2014 survey.ⁱⁱ These new households were selected using an in-field randomisation technique similar to the one used by Pratham’s Annual Status of Education Report survey. 21% of households in the 2018 survey were newly added to the sample.

Table 1: Description of fieldwork and sample

| | persons | households | households in 2014 sample | households not in 2014 sample | villages |
|----------------------------|---------|------------|---------------------------|-------------------------------|----------|
| focus states (full sample) | 9,812 | 1,558 | 1,224 | 334 | 120 |
| Bihar | 2,669 | 367 | 293 | 74 | 30 |
| Madhya Pradesh | 2,660 | 459 | 347 | 112 | 34 |
| Rajasthan | 1,539 | 241 | 172 | 69 | 25 |
| Uttar Pradesh | 2,944 | 491 | 412 | 79 | 31 |

We achieve representativeness of the rural population of these states by constructing weights based on the 2011 Census of India, which we describe below. One reason to be confident of our results is

that, within each state, using Census weights does not importantly change our summary statistics or estimates of open defecation.

Our fieldwork included a substantial qualitative component alongside quantitative data collection. This qualitative fieldwork was designed to understand how the SBM was implemented. The two leading co-authors of the paper conducted 156 qualitative interviews in the same villages and blocks as the quantitative interviews. Although we do not present tabulations of qualitative data from these interviews, they inform our interpretation of the statistics that we present.

Table 2: Summary of qualitative interviews in each state

| | Bihar | Madhya Pradesh | Rajasthan | Uttar Pradesh |
|--------------------------|-----------|----------------|-----------|---------------|
| pradhan/sarpanch/mukhiya | 9 | 11 | 6 | 14 |
| secretary/assistant sec. | 1 | 12 | 5 | 1 |
| ward member | 15 | 0 | 1 | 0 |
| health/nutrition worker | 2 | 9 | 6 | 2 |
| ration dealer | 0 | 3 | 5 | 1 |
| block official | 6 | 2 | 1 | 4 |
| swacchagarhi | 5 | 0 | 0 | 7 |
| chowkidar | 0 | 5 | 0 | 1 |
| rozghar sevak | 0 | 0 | 1 | 4 |
| other | 2 | 5 | 6 | 3 |
| <i>total</i> | <i>40</i> | <i>47</i> | <i>32</i> | <i>37</i> |

Finally, we also report results from a companion survey conducted in Udaipur, Rajasthan between April and June 2017 by Accountability Initiative (AI) of the Centre for Policy Research (Deshpande & Kapur, 2018). The objective of the study was to assess the outcomes of the SBM and attempt to trace them to the processes adopted by the administration. The 2017 AI study followed a larger assessment of SBM that AI did in December 2015, in which Udaipur was one among ten districts across five states. Although AI's 2015 and 2017 surveys did not revisit the same households, the fact that both visited Udaipur district at different points in time helps build understanding of the impacts of SBM in Udaipur and in Rajasthan.

AI's 2017 Udaipur survey interviewed 505 households in 19 villages, and 60 households in 2 census towns (a total of 565 households in ODF catchments). The survey was self-weighted to be representative of ODF panchayats in Udaipur. 171 households were from declared and "verified" ODF panchayats; the remaining households were from declared (but not verified) ODF panchayats. AI's 2017 Udaipur survey did not have the same survey questionnaire or sampling strategy as the principal survey reported in this paper; nor was Udaipur district one of the Rajasthan districts visited

by the principal survey. Data from AI's 2017 Udaipur survey are not included in the tables and figures, but we summarize findings from AI's survey at various points throughout the paper to show that complementary evidence, collected by multiple research teams, produces reinforcing conclusions.

3. How much open defecation remains? By how much did it change?

3.1. Three estimation strategies

In this section, we describe how we construct estimates of population-level open defecation for the focus states. Because villages and households were randomly selected, we can produce estimates that are representative of these states. There are multiple ways that a sample survey can extrapolate to estimates that are intended to be representative of the population. In any empirical study, each candidate estimation strategy has advantages and disadvantages. So, we report estimates of the overall fraction of people who defecate in the open using three complementary strategies:

- **Unweighted sample means.** This is the simplest strategy. We report the fraction of respondents in our sample who defecate in the open, without adjustments.
- **Census-weighted sample means.** This is our preferred strategy, and the one that we use as a default unless otherwise stated. We report the fraction of people in our sample who defecate in the open, weighted by age and sex to be representative of the population of the region. Here, the assumption is open defecation among people in our data is comparable to open defecation of people in the same state who match on age and sex, as recorded in the 2011 Census.
- **Weights from matched demographic survey data.** For this strategy, we conduct a person-level match – within each of the four states – to people in the 2015-16 NFHS-4 who match on demographic and socioeconomic categories. The categories we use combine age, sex, whether the person has been to school, and what combination of the following assets her household owns: a TV, a pressure cooker, a fan, a cooler, a mosquito net, a fridge, and a motorcycle. We assign each individual in the NFHS-4 the average open defecation rate among matched people like him or her in our survey data, then compute average open defecation. Here, the assumption is open defecation among people in our data is comparable to open defecation of people in the same state who match on these detailed demographic and socioeconomic characteristics.

We show results using three different strategies in order to emphasize that we draw the same general policy conclusions no matter which strategy is used: any survey's results depend on the

choice of weighting strategy, but our qualitative conclusions are robust to all three strategies. The 2018 survey questionnaire and Stata do files used to produce estimates from the 2018 survey are publicly available online at riceinstitute.org.

3.2. Estimates of open defecation among rural persons in the focus states in 2018

Table 3 presents estimates of the frequency of open defecation among rural people over two years old (rows labelled “all”) and among rural people over 18 years old (rows labelled “adults”) living in the focus states using each of the three strategies described above. Averaging over the entire region, and over people who do and do not own latrines, we compute that about 44% of people over age two defecate in the open, with our preferred Census-based sampling weights.

Table 3: Open defecation in rural north India, 2018

| Sample | Latrine owners | weight | focus states | Bihar | Madhya Pradesh | Rajasthan | Uttar Pradesh |
|---------|----------------|-------------|--------------|-------|----------------|-----------|---------------|
| All | Owners & not | no weight | 42% | 59% | 24% | 52% | 38% |
| All | Owners & not | Census | 44% | 60% | 25% | 53% | 39% |
| All | Owners & not | DHS weights | 57% | 77% | 29% | 62% | 53% |
| Adults | Owners & not | no weight | 41% | 57% | 23% | 52% | 38% |
| Adults | Owners & not | Census | 43% | 57% | 23% | 54% | 38% |
| Adults | Owners & not | DHS weights | 54% | 73% | 27% | 61% | 50% |
| All | Latrine owners | Census | 23% | 21% | 16% | 40% | 21% |
| Adults | Latrine owners | Census | 23% | 19% | 15% | 41% | 21% |
| Adult F | Owners & not | Census | 41% | 57% | 21% | 53% | 34% |
| Adult F | Latrine owners | Census | 20% | 18% | 13% | 39% | 17% |
| Adult M | Owners & not | Census | 44% | 56% | 25% | 56% | 41% |
| Adult M | Latrine owners | Census | 25% | 21% | 17% | 43% | 24% |

Note: F = Females. M = Males.

Notice the effect of the sampling weights in Table 3. Within states, moving from unweighted estimates to Census-weighted estimates makes little difference. For example, person-level open defecation for Uttar Pradesh is approximately 38% with or without weights. However, using Census weights at the region level (for the focus states as a whole) appropriately yields a large increase in the estimate of open defecation because open defecation is common in Uttar Pradesh and Bihar, and these states have larger populations.

Table 3 also reports estimates of open defecation using weights constructed by matching assets in the NFHS-4, as well as age and sex. These weights produce larger estimates of open defecation because the NFHS-4 sample is asset-poorer than our sample. Using these weights has the effect of up-weighting disadvantaged households.ⁱⁱⁱ

Although not reported in the table, we find that 40% of households with a latrine have at least one person who defecates in the open, and 56% of all households have at least one person who defecates in the open. This, too, coheres with the central finding of the Coffey, et al. (2014) paper, which finds that, in rural north India, open defecation is common even in latrine-owning households.

It is important to note that the estimates in Table 3 likely understate open defecation. Even though we designed the defecation behaviour questions to minimize social desirability bias,^{iv} the majority of respondents reported being aware of some form of coercion being used in the village to encourage latrine construction and use. We will elaborate on this finding in Section 5. In a setting in which people were told they could be punished for not using the latrine, it is likely that some respondents did not disclose open defecation despite surveyors' best attempts to encourage respondents to feel comfortable telling the truth.

3.3. Changes in open defecation, 2014-2018

Table 4 summarizes changes in open defecation and latrine ownership between the two surveys. It includes all observations in the 2018 survey (including newly added households) and all observations in the 2014 survey (including those that were not re-interviewed in 2014). All of the estimates in Table 4 use Census weights described above. For household-level statistics (latrine ownership), household-level census weights are the sum of the person-level census weights of people living in the household.

Table 4: Change in open defecation, 2014-2018

| | focus states | Bihar | Uttar Pradesh | Madhya Pradesh | Rajasthan |
|-------------------------------------|--------------|-------|---------------|----------------|-------------------|
| census-weighted means | | | | | |
| open defecation, 2018 | 44% | 60% | 39% | 25% | 53% |
| open defecation, 2014 | 70% | 75% | 65% | 68% | 76% |
| open defecation, change | 26pp | 15pp | 26pp | 43pp | 26pp |
| latrine ownership, 2018 | 71% | 50% | 73% | 90% | 78% |
| latrine ownership, 2014 | 37% | 29% | 42% | 43% | 31% |
| latrine ownership, change | 33pp | 21pp | 31pp | 47pp | 47pp |
| Kitawaga decomposition | | | | | |
| Δ OD due to behavior | 1pp | 1pp | 3pp | 7pp | -7pp ^v |
| Δ OD due to ownership | 25pp | 15pp | 23pp | 37pp | 30pp |
| <i>% of change due to ownership</i> | 96% | 97% | 89% | 84% | 130% |

Note: "pp" stands for "percentage points."

In 2018, at the state level, open defecation ranged from 25% in Madhya Pradesh to 60% in Bihar. These results contrast with government claims that these states are entirely or largely provided with

latrines and open defecation free (for example, Gol, 2018).^{vi} Nevertheless, we find important reductions in open defecation. In the region as a whole, open defecation declined from approximately 70% of people over two years old in 2014, to approximately 44% of people over two years old in 2018.

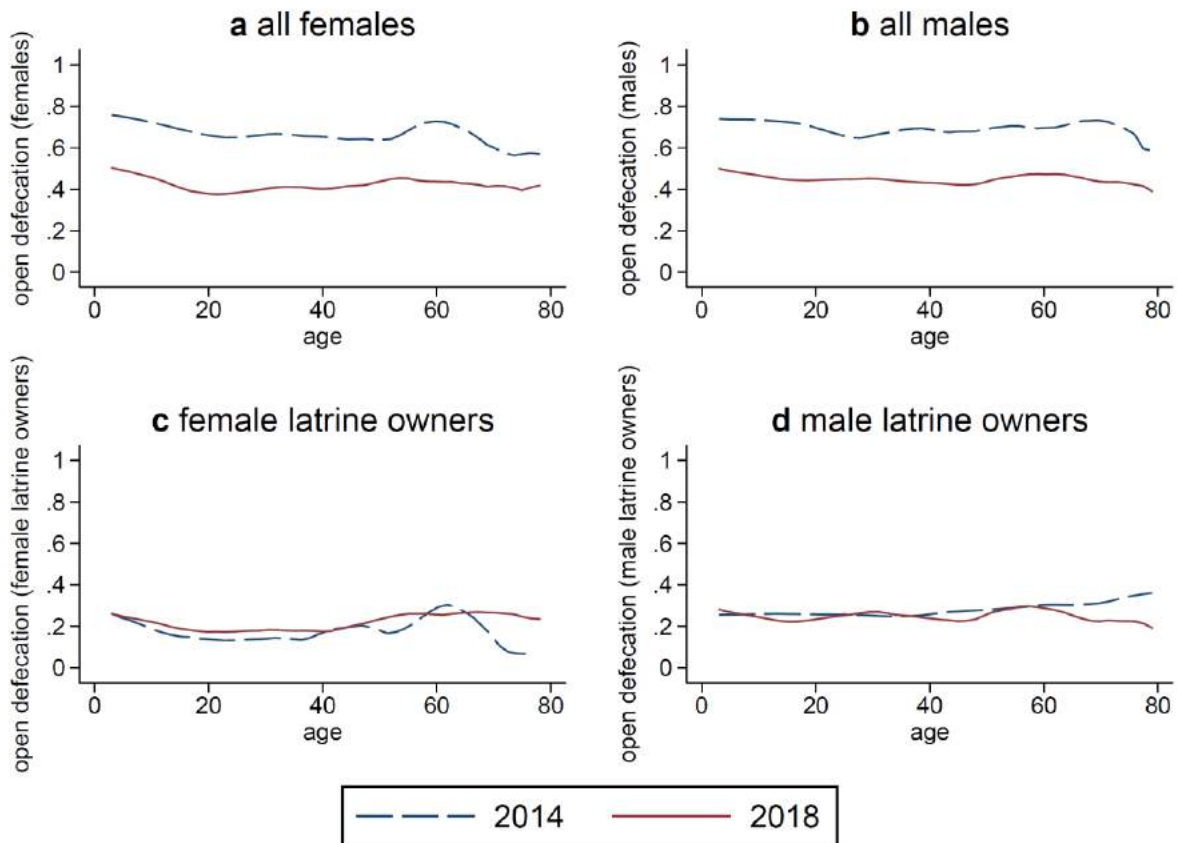
This 26 percentage point reduction in individual open defecation over a four year period (more than six percentage points per year) was rapid compared to the likely rate of decline in prior years. Although there are unfortunately no directly comparable data on *individual*-level open defecation data from prior surveys, the NFHS measures open defecation at the *household*-level (according to what people in the household usually do) and provides a roughly comparable estimate. It finds that household-level open defecation in the region declined at less than two percentage points per year (from about 87% of households to about 70% of households) between 2005 and 2015.

Where is the decline in open defecation coming from? How did it occur? The last three rows of Table 4 show the results of a Kitagawa decomposition of the decline of individual-level open defecation. Open defecation depends on two factors: latrine ownership, on the one hand, and behavior among latrine owners and non-owners, on the other hand. A Kitagawa decomposition is a tool in demography that separates a change in a weighted average into its two component factors – the weights and the conditional means (see Kitagawa, 1955). In this case, latrine ownership is the weight (what fraction of the population does and does not own a latrine) and behavior is the conditional expectation (what fraction of owners and non-owners defecate in the open). See the endnote^{vii} for the equations for this Kitagawa decomposition.

We find that nearly the entire change in open defecation between 2014 and 2018 comes from increases in latrine ownership, rather than from changes in behaviour (that is, differences in the proportion of owners and non-owners who defecate in the open). This finding is consistent with our qualitative interviews, which found that local officials were far more likely to stress latrine construction as a priority of the SBM than they were to stress use of latrines.

Figure 1 tells a similar story to the one told by the Kitagawa decomposition. It presents local polynomial regressions of open defecation on age (separately for men and women) for the 2014 data and the 2018 data. Panels (a) and (b) show relatively large declines in open defecation among both men and women between 2014 and 2018. Panels (c) and (d) show, as the decomposition did, that latrine use among latrine owners was essentially unchanged in 2018 relative to the 2014 survey.

Figure 1: Open defecation, by age and sex



Note: Computations in Figure 1 are weighted by the 2011 Census.

4. The SBM contains multitudes: Diverse inputs, diverse outcomes

The SBM was a national campaign, but sanitation policy in India is implemented through state bureaucracies. Drawing upon the 2018 quantitative survey data and qualitative interviews, and the 2017 AI Udaipur survey, this Section discusses how SBM implementation differed across the focus states.

4.1. Variation in latrine construction

As we have discussed above, the survey found large increases in latrine coverage in each of the focus states between 2014 and 2018. Yet, there was also considerable variation: Table 4 showed that increases in latrine ownership ranged from 21 percentage points in Bihar to 47 percentage points in MP and Rajasthan, and Table 5 shows that government support for latrine construction in the five years before the survey ranged from 19% of households in Bihar to 53% of households in MP.

Table 5: Latrine ownership, type, and provision by state, 2018

| | focus states | Bihar | Madhya Pradesh | Rajasthan | Uttar Pradesh |
|---|--------------|-------|----------------|-----------|---------------|
| Panel A: All households | | | | | |
| owns latrine | 71% | 49% | 90% | 78% | 74% |
| any government support | 39% | 19% | 53% | 46% | 43% |
| government money | 21% | 9% | 24% | 42% | 20% |
| government built | 14% | 9% | 25% | 2% | 16% |
| Panel B: Households that did not own a latrine in 2014 | | | | | |
| owns latrine | 57% | 37% | 83% | 65% | 61% |
| any government support | 42% | 18% | 66% | 37% | 55% |
| government money | 20% | 5% | 29% | 33% | 23% |
| government built | 17% | 11% | 33% | 2% | 22% |
| Panel C: Pit type, among households that own a latrine | | | | | |
| twin pit | 25% | 16% | 22% | 7% | 35% |
| single pit | 40% | 49% | 50% | 69% | 22% |
| containment chamber | 31% | 30% | 26% | 17% | 38% |
| other | 5% | 5% | 2% | 8% | 5% |
| Panel D: Pit type, among households that own a latrine and received government support | | | | | |
| twin pit | 42% | 33% | 32% | 11% | 61% |
| single pit | 34% | 40% | 51% | 64% | 13% |
| containment chamber | 21% | 26% | 16% | 22% | 21% |
| other | 3% | 1% | 1% | 4% | 5% |

Notes: Weighted by 2011 Census.

Table 5 shows state-level differences in the proportion of newly constructed latrines that were constructed by the households themselves and subsidized by the government (“government money”)

rather than built by a contractor (“government built”). In Rajasthan, households were almost exclusively subsidised for constructing their own latrines (including, in some cases, for latrines that existed before the SBM). In Bihar, Madhya Pradesh, and Uttar Pradesh, however, some households constructed their own latrines, while other households had latrines constructed for them by contractors hired by local government officials.

Whether a household built its own latrine or received a contractor-constructed latrine is of interest because contractor-constructed latrines are typically less well-constructed than latrines that households build for themselves. Both in the 2018 survey and in AI’s 2017 Udaipur survey, Adivasi households were more likely than households from other groups to receive government constructed latrines rather than a subsidy to construct their own latrines.^{viii}

There are several possible reasons for this difference. One is that local officials faced pressure to increase toilet coverage and households faced withdrawal of government benefits if they did not have a latrine. (See the following Section for evidence that Adviasis were more likely than people from other backgrounds to face coercion through the SBM.) Given that Adivasi households are poorer, on average, than other households, they are less likely to finance an expensive latrine on their own, and may have been more willing to accept a government constructed latrine. Local officials who organise contractors may also have had an easier time skimming funds off of latrine construction in Adivasi areas than non-Adivasi areas, giving them more of an incentive to organise contractor-built latrines in these areas.^{ix}

Latrines that households build for themselves are more likely to be used. Indeed, the 2018 survey found that people in households that received money to build their own latrine, rather than a government constructed latrine, were almost 10 percentage points less likely to defecate in the open.

Table 5 also shows differences in the types of latrine pits that households own by state. A “twin pit” is recommended by the government because, if it is constructed and used properly, it allows faecal sludge management to be done safely, sustainably, and inexpensively without resorting to manual scavenging. The faeces in the first pit can be allowed to decompose while the other is in use. Decomposed faeces are less biologically hazardous than fresh faeces and can be safely emptied by hand. “Single pit” latrines cannot be emptied safely (unless the household builds a second pit) because the faecal sludge would not have time to decompose before the pit is emptied. “Containment chambers” are typically the most expensive type of pit to construct, and when they fill up, they are typically emptied by a suction machine. This method of faecal sludge management is expensive and is done when faecal sludge is fresh. Because there are few sewage treatment plants in rural north India, sludge from containment chambers is typically disposed of unsafely.^x

Panel c of Table 5 shows the fraction of latrines with different pit types among all households that own latrines; Panel d restricts the sample to households that received any form of government support to build a latrine in the five years before the survey. A common finding across states is that only a minority of latrine-owning households have a twin pit latrine. However, government-supported latrines were more likely to be twin pit latrines than latrines that were not government-supported. In Uttar Pradesh, government-supported latrines were more likely to have twin pits than in other states. In the qualitative interviews, many local officials in UP reported that households needed to construct twin pit latrines in order to receive the Rs. 12,000 SBM subsidy. In contrast, this rule was not present in other states, where a higher fraction of households constructed or received single pits or containment chambers.

Our qualitative interviews found that many local government officials were aware that twin pit latrines are recommended by the government, knew how they worked, and understood why they are better for health and sustainability than containment chambers. This should be considered an accomplishment of the program. However, many local officials also admitted that households in their village either strongly preferred containment chambers or did not build twin pits in a way that would allow them to be emptied safely. In fact, among households that own twin pit latrines, 48% reported that both pits were in use at once, such as when the pits are connected to each other with a pipe. This modification to the twin pit design prevents faeces from decomposing before emptying, but permits households to have a subjectively “large” pit that takes more time to fill.

AI’s 2017 Udaipur survey also found that that twin pits were unpopular. In that survey, only 3 households reported having constructed twin pit toilets. Awareness of safe faecal sludge management was low: more than 60% households that owned toilets did not know how long it would take for their pits to fill. Less than 4% of households thought that members of their own community empty their own latrine pits, and 86% of households that owned latrines stated that they would employ manual scavengers for pit emptying. As we discuss in the last Section of the paper, there is unfortunately little evidence that the SBM, as actually implemented, has focused on the social attitudes towards untouchability and latrine pits that we have argued are at the core of rural north India’s enduring open defecation (Coffey et al., 2017).

4.2. Variation in personnel and payments

Different village-level officials were more likely to be involved in publicising the SBM in different states. In Bihar and Uttar Pradesh, where SBM activities were ongoing at the time of the survey, swacchagrahis had been recruited. Swacchagrahis tried to convince people to build toilets and assisted with filing paperwork and geotagging for the release of subsidies. In Madhya Pradesh and Rajasthan, where SBM activities had for the most part concluded by the time of the survey, swacchagrahis had not been hired. Rather, in these two states, it was common for block officials to

ask panchayat officials to form “nigrani samitis” or “vigilance committees” consisting of the sarpanch, secretary, village health and nutrition workers (ASHA and AWW), chowkidars or other village officials. Nigrani samiti members were expected to explain the subsidy program, convince people to build toilets, and stop and/or shame people who defecated in the open. Some nigrani samiti members, especially ASHAs and AWWs who are also responsible for implementing other government schemes, were disgruntled about the amount of unpaid time they were expected to commit to this work. AI’s 2017 study similarly found that, in Udaipur, the SBM was implemented through the existing frontline bureaucracy with little or no capacity augmentation. Even though the SBM guidelines recommend a full time sanitation officer for each block, neither these block-level positions nor recommended district-level positions were found to be filled.

Different village-level officials were also involved in managing verification of latrine construction and applications for subsidies in different states. Whereas in Rajasthan, Madhya Pradesh, and Uttar Pradesh, sarpanches/pradhans and secretaries were relied upon for providing and processing the forms for latrine subsidies, in Bihar, this task fell primarily to ward members. Those officials whose signatures were required for applying for the latrine subsidy were often able to collect informal payments from households. Although we encountered instances of corruption in all states, it was most evident in Bihar, where a 2,000 rupee bribe to the ward member, much of which was likely passed on to higher-level officials, was almost uniformly required to secure a subsidy transfer.

In Bihar, Madhya Pradesh, and Rajasthan, subsidy payments were almost uniformly made to beneficiary accounts; whereas in Uttar Pradesh, pradhans and secretaries wrote checks to beneficiaries. In Uttar Pradesh, these village officials had substantial discretion over which households received subsidy payments. When contractor latrines were built in Uttar Pradesh, village officials could also pay contractors without routing funds through beneficiary accounts; in other states, when contractors built latrines, local officials typically collected the subsidy money from households after they received it in their bank accounts. In Bihar, local officials often mentioned a rule, which had been revoked a few months before the survey, that subsidies could not be disbursed in a particular ward until approximately 75% of households in that ward had constructed latrines. In their opinion, this rule made it very difficult to convince people to build latrines.

4.3. Commonalities in implementation across states

An important commonality in SBM implementation across states was that local, block, and district level officials were far more actively engaged in SBM implementation than in the implementation of prior sanitation schemes. Village officials reported working long hours to publicize the subsidy and process forms in order to facilitate the construction of latrines. Table 5 shows that across the focus states 39% of all households, and 42% of households that did not own a latrine in 2014 received government support to construct a latrine in the five years before the survey. In 2014, many fewer

households in these states – less than 10% – reported having received government support for a latrine.^{xi}

This active engagement of government officials with the SBM typically stopped at latrine construction; it focused little on latrine use. Officials said the goal of the SBM was to make the village “open defecation free.” Despite the fact that the literal meaning of these words is something quite different, officials explained that this phrase refers to latrine coverage in a village. Many elected leaders and village secretaries readily stated that block and district officials expected them to fill out the paperwork claiming “open defecation free” status when about 80% of the households owned latrines. Given this focus, it is not surprising that the analyses described above find little difference in use among latrine owners in 2014 and 2018.

Across the states we studied, village officials were given tight deadlines for latrine construction that they often felt that they could not reasonably meet. Our qualitative interviews, as well as results from AI’s 2017 Udaipur survey^{xii} suggest that rapid timelines for latrine construction imposed on local officials by block and district officials were part of the reason that coercion was such a widely used tool in SBM implementation. We discuss the use of coercive tactics in the next Section.

5. What are the costs?: Coercion and threats

If sustained, the estimated reduction in open defecation of approximately 26 percentage points over four years of the SBM could imply important improvements for child health and economic prosperity. But it came at a social cost: coercion and threats by local officials were commonplace. Violence and bullying sometimes occurred, as documented by journalistic accounts (Indian Express, 2017; Singhal, 2017).

In the 2018 survey, we asked about several forms of coercion: whether people were prevented from defecating in the open or harassed while doing so, whether people lost or were threatened with the loss of public benefits (such as food rations)^{xiii} if they did not comply with the SBM, and whether people were fined or threatened with fines if they did not comply with the SBM.

We recognize that these forms of coercion vary both in how ethical or unethical they are, and in whether or not they can be lawfully used. We also note that although coercion was primarily used to convince people to *build* latrines, in Madhya Pradesh, and to a certain extent in Uttar Pradesh, it was sometimes also used to convince people who owned latrines to *use* them. We hope that the analysis we present here and the questions we raise will encourage others to analyse these tactics more carefully than we are able to given limited space of this article.

For each form of coercion, we ask whether it happened to the respondent's household, and whether the respondent was aware of it happening in his or her village.

Table 6: Survey reports of threats, fines, and coercion

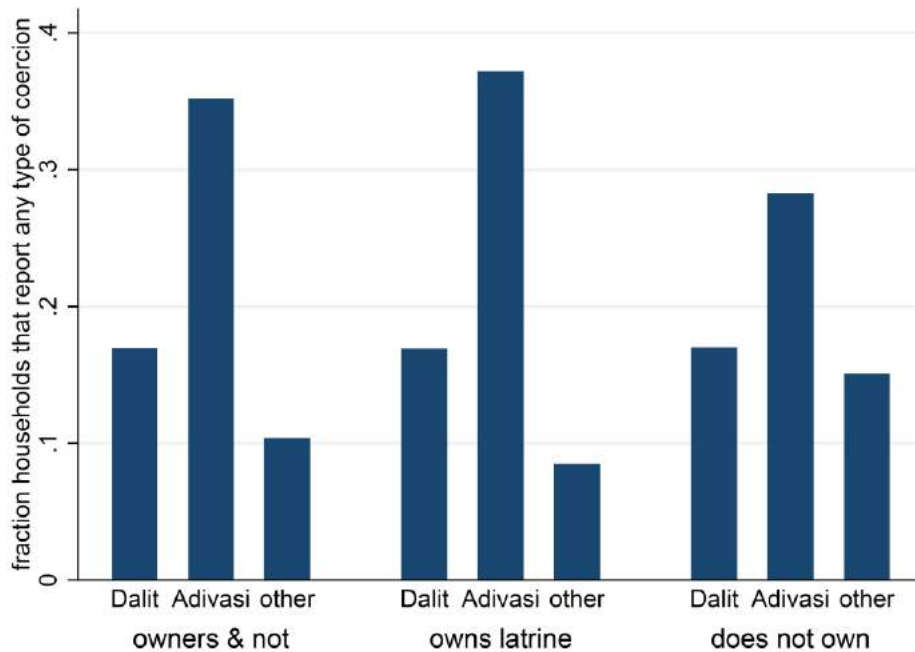
| coercive state action | | focus states | Bihar | Madhya Pradesh | Rajasthan | Uttar Pradesh |
|-----------------------|---------------------|--------------|-------|----------------|-----------|---------------|
| stopped from OD | own household | 9% | 11% | 11% | 11% | 6% |
| stopped from OD | aware of in village | 47% | 40% | 67% | 54% | 42% |
| benefits threatened | own household | 5% | 3% | 9% | 13% | 3% |
| benefits threatened | aware of in village | 25% | 9% | 47% | 42% | 20% |
| fine threatened | own household | 2% | 1% | 6% | 1% | 2% |
| fine threatened | aware of in village | 26% | 14% | 47% | 25% | 28% |
| any of these three | own household | 12% | 12% | 17% | 19% | 9% |
| any of these three | aware of in village | 56% | 47% | 78% | 68% | 50% |

Notes: Weighted by 2011 Census.

Table 6 estimates that more than half of households in the focus states are aware of some form of coercion in their village. This coerciveness is at odds with the SBM's claims that switching to latrine use occurred through a bottom-up "true people's movement" (DD News, 2017). Especially troubling is that about one in four households said that they had heard of government benefits being withdrawn from those that did not have latrines.

Coercion followed familiar patterns of social disadvantage. Figure 2 shows that, both among latrine owners and among latrine non-owners, Dalit and Adivasi households were more likely than households from other social groups to report that they personally experienced one of these three forms of coercion. Among households that own a latrine, Dalits are over twice as likely as others to report that their own household received one of these three forms of coercion and Adivasis were almost three times as likely. Although not shown in Figure 2, these comparisons are quantitatively unchanged if computations are made *within* villages -- a finding which suggests that variation in SBM coerciveness was not merely about variation across the geography of India, but that local officials were systematically more likely to target disadvantaged groups within villages. Moreover, these basic findings are unchanged if the sample is restricted only to households that did not own a latrine in 2014, so they cannot be explained away by the fact that Dalits and Adivasis are poorer than households from other backgrounds and therefore less likely to own latrines.

Figure 2. Dalits and Adivasis were more likely than other groups to report that their own household experienced SBM coercion

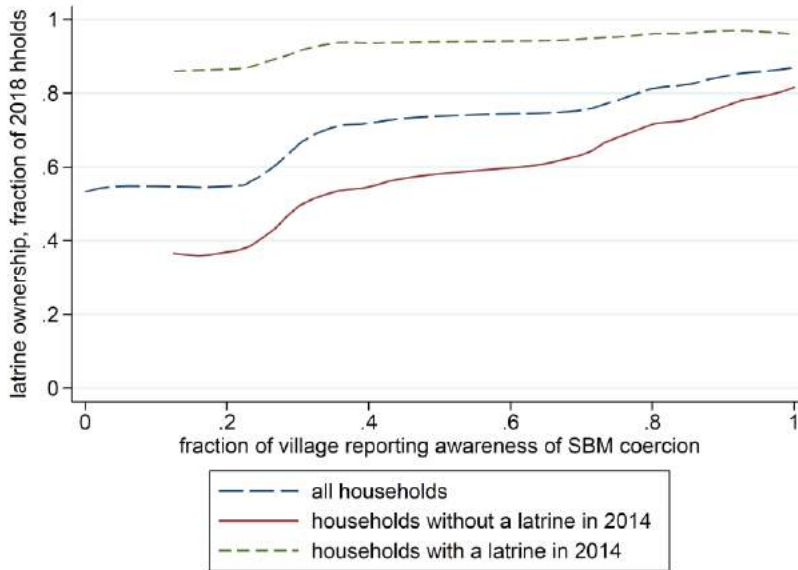


In addition to variation within villages, the coerciveness of the SBM varied across villages. Figure 3 shows that the village-level coerciveness of the SBM is an important predictor of latrine ownership (panel a), and, through its effect on latrine ownership, of reported open defecation (panel b). In both panels of Figure 3, observations are villages (the explanatory variable varies at the village level); villages are weighted by the sum of person-level weights from the 2011 Census. Latrine ownership (the vertical axis of panel a) and open defecation (the vertical axis of panel b) are representative of rural persons in the focus states.

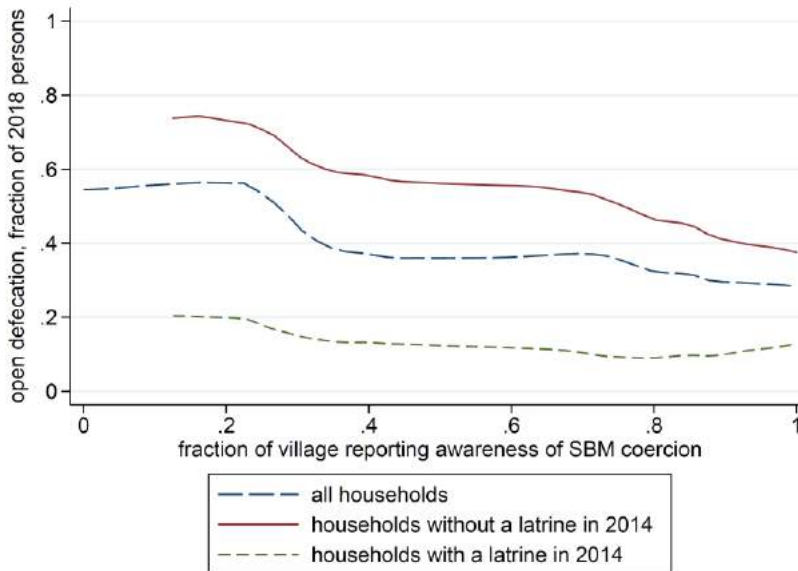
Figure 3, combined with our qualitative interviews and with evidence from AI's 2017 Udaipur study, provides strong evidence that coercion was central to what the SBM did in practice.^{xiv} Indeed, although many local SBM implementers said that they had been trained on talking points about benefits of latrine use, they were also familiar with a variety of coercion tactics, which were routinely shared and encouraged through meetings and WhatsApp groups. Very few local officials expressed the view that such tactics were inappropriate or extreme. The qualitative interviews, combined with evidence from AI's 2017 Udaipur study, suggest that the use of coercion and threats, rather than sustained persuasion and outreach, were relied upon heavily and that village officials were pressured by block, district, and state officials to achieve toilet construction targets in unreasonably short periods of time.

Figure 3: Village-level reported SBM coerciveness strongly predicts sanitation outcomes

panel a. Latrine ownership



panel b. Open defecation



These findings raise uncertainty about whether latrine use among new latrine owners will be sustained when the environment of enforcement and coercion diminishes. AI's 2017 Udaipur survey provides evidence that it may not. The survey, which was done many months after SBM implementation, found that only 45% of people in households where the primary reason for building a latrine was pressure from village officials used it, compared with about 80% latrine use among

people in households where convenience or lack of open spaces was the primary cause for construction.

These findings suggest the need for transparent, fact-based public dialogue about the SBM: its costs and benefits, its accomplishments and means. Reducing open defecation offers a benefit for the health of children and others who would be otherwise exposed to faecal germs. Through improvements in health, reduction in open defecation will also likely improve long-run economic prosperity. Subsidized provision of latrines also benefit people who would like to use a latrine but who are not able to build one for themselves – especially older and disabled people (Coffey and Spears, 2017). Yet, as we found, the SBM was coercive. Worse still, threats and sanctions were most likely to fall on ST and SC families. It also matters whether citizens can trust what the government claims. Our findings contrast with official insistence that open defecation has been nearly eliminated by widespread, voluntary behavior change. Finally, another cost is the opportunity cost. When officials were working on the SBM, they were not serving citizens in other ways. Of course, our data cannot fully resolve whether the benefits of the SBM were worth its costs. But we hope that our data can inform public debate on this question.

6. The continued importance of social forces and expensive latrine pits for sanitation in rural north India

Open defecation is far more prevalent in rural India than in other, poorer countries because of social forces: ideas of ritual purity and pollution related to untouchability and the caste system, and realized in fears about latrine pits filling up and needing emptying. In this journal, we have written about how these factors combine with high population density to make open defecation a potent threat to health and well-being in rural India (Coffey et al., 2017).

The new survey data suggests that the SBM unfortunately did not focus on addressing these social attitudes and ideas about latrine pits. If it had, it may have achieved a more sustainable decline in open defecation, and may also have done a better job laying the groundwork for safe and sustainable faecal sludge management practices in the future. However, Figure 4, below, reveals that some of the most important social predictors of latrine use, documented in 2014, remain in 2018.

Figure 4: Open defecation among latrine owners, by pit size and religion, 2018

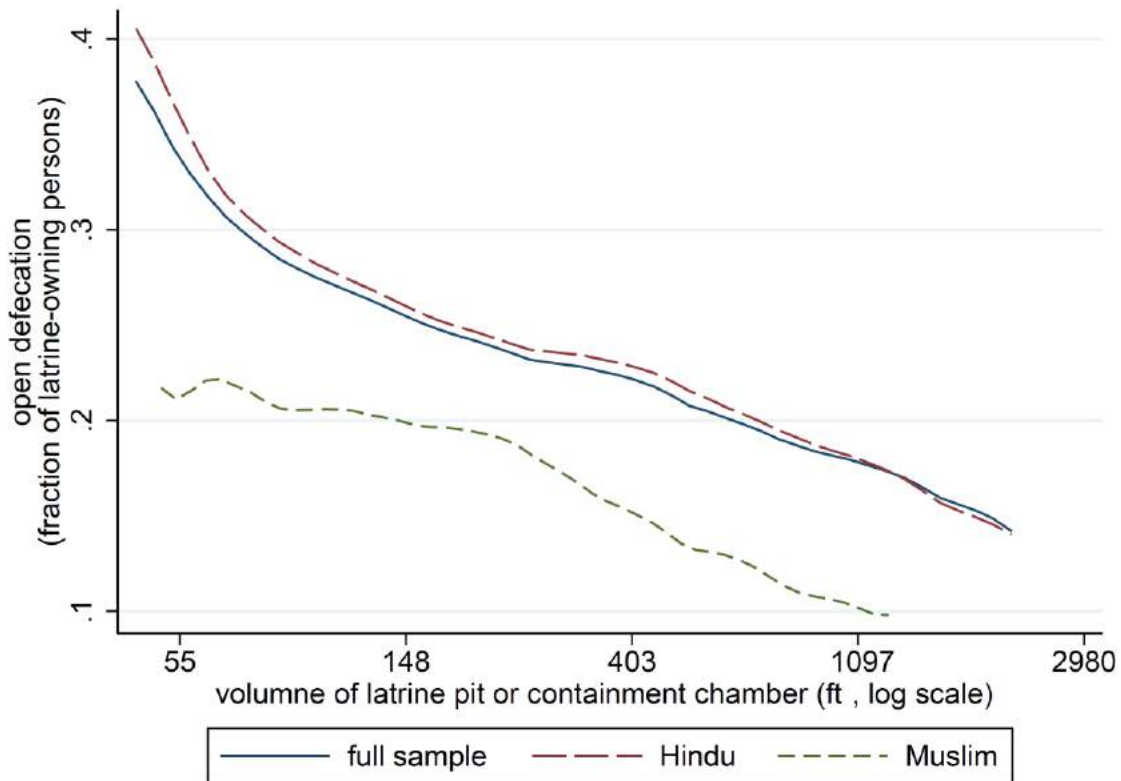


Figure 4 plots the prevalence of open defecation among latrine owners against the volume of their latrine pits or containment chamber. Households are split by religion: across the distribution, Hindus in latrine-owning households are more likely to defecate in the open than Muslims in latrine-owning households.^{xv} It finds that open defecation is much less common in households with larger latrine pits, especially among Hindu households. One reason for this pattern is that smaller pits are perceived to require frequent emptying, an activity which is associated with caste impurity. Large pits, in contrast, do not require emptying as frequently, and therefore their use does not invoke the same worries about contact with faeces or hiring a manual scavenger. Figure 4 replicates a graph that we first made using the 2014 data (see Coffey et al., 2014).

Latrines with large pits are substantially more expensive than the Rs. 12,000 provided by the SBM subsidy. Indeed, the average cost of a latrine that a household built on its own in the 2018 survey was about Rs. 34,000. The difference between the amount of the subsidy and the cost of a latrine that is considered worth using in part explains why many households either did not build latrines or needed to be coerced into latrine construction even in places where the subsidy was relatively easier to access. Although some SBM information, education, and communication activities, such as an ad featuring Akshay Kumar emptying a twin-pit latrine, did attempt to teach people about affordable

latrines and safe faecal sludge management, these activities were neither sufficiently widespread nor sufficiently prominent. Efforts to convince people in villages to use more affordable latrines and manage faecal sludge disposal properly should be at the centre of the next rural sanitation policy.

7. Conclusion: The next rural sanitation policy

Our 2018 survey documents that open defecation declined more rapidly over the past five years than it did before the SBM. This is because more latrines were built: latrine use among latrine owners is similarly common as it was five years ago. However, SBM latrine construction was far from universal in Uttar Pradesh and Bihar, two states which, due to their population sizes, are quantitatively influential in determining India's overall open defecation rate. Further, latrine construction was often accomplished through coercion. It remains to be seen whether latrine use achieved through coercion will be sustained.

Despite claims to the contrary, open defecation unfortunately is still a pressing problem in rural India. The health of children is still threatened by the germs in the faeces around them, so it matters enormously what rural sanitation policies are tried next. A wide literature now documents the roots of rural north India's open defecation in casteism and untouchability, and especially in the implications of these social ideas for latrine pit emptying and use. In our new data, we can see that well-studied predictors and patterns of latrine use which reflect these causes remain intact and that relatively few households have built the sorts of latrines that allow faecal sludge to be managed safely and sustainably.

The next rural sanitation policy for north India could choose a different course. To eliminate open defecation from rural India, coercive tactics should be stopped and latrine use should be encouraged alongside efforts to transform the social attitudes that have made open defecation so prevalent and challenging to address in the past.

References

- Coffey, D., Gupta, A., Hathi, P., Khurana, N., Spears, D., Srivastav, N. and Vyas, S., 2014. Revealed preference for open defecation. *Economic & Political Weekly*, 49(38), p.43.
- Coffey, D., Gupta, A., Hathi, P., Spears, D., Srivastav, N. and Vyas, S., 2017. Understanding open defecation in rural India: Untouchability, pollution, and latrine pits. *Economic & Political Weekly*, 52(1), pp.59-66.
- Coffey, D. and Spears, D., 2017. *Where India Goes: Abandoned Toilets, Stunted Development and the Costs of Caste*. Harper Collins.
- Coffey, D. and Spears, D., 2018. Open Defecation in Rural India, 2015–16: Levels and Trends in the NFHS-4. *Economic & Political Weekly*, 53(9), p.11.
- DD News. 2017. 'Swachh Bharat Abhiyan' is truly becoming a people's movement: PM. 11 April 2017. <http://ddnews.gov.in/national/swachh-bharat-abhiyan-truly-becoming-peoples-movement-pm>
- Deshpande D. and Kapur, A. 2018. Unpacking the process of achieving open defecation free status: A case study of Udaipur, Rajasthan. Research Report, Accountability Initiative, Centre for Policy Research.
- Geruso, M. and Spears, D., 2018. Neighborhood sanitation and infant mortality. *American Economic Journal: Applied Economics*, 10(2), pp.125-62.
- Government of India (Gol), Ministry of Drinking Water and Sanitation. 2018. "Lok Sabha Unstarred Question No.1818, To Be Answered on 20-12-2018: Allocations and Utilisations Under SBM-G." <http://164.100.47.190/loksabhaquestions/annex/16/AU1818.pdf>
- Hathi, P., Spears, D. and Coffey, D., 2016. Can collective action strategies motivate behaviour change to reduce open defecation in rural India? *Waterlines*, 35(2), pp.118-135.
- Indian Express, Editorial Board. 2017. "No coercion, please." 27 September 2017. <https://indianexpress.com/article/opinion/editorials/swachh-bharat-mission-sbm-narendra-modi-sanitation-no-coercion-please-4862785/>
- Kitagawa, E. 1955. Components of a difference between two rates. *Journal of the American Statistical Association*. 50(272):1168-1194.
- Routray, P., Schmidt, W.P., Boisson, S., Clasen, T. and Jenkins, M.W., 2015. Socio-cultural and behavioural factors constraining latrine adoption in rural coastal Odisha: An exploratory qualitative study. *BMC Public Health*, 15(1), p.880.
- Singhal, Akanksha. 2017. "Coercive measures under Swachh Bharat Mission impinging on people's freedom. Down to Earth. 20 June 2017.

<https://www.downtoearth.org.in/news/governance/coercive-measures-under-swachh-bharat-mission-impinging-on-people-s-freedom-58129>

Vyas, S. and Spears, D., 2018. Sanitation and Religion in South Asia: What Accounts for Differences across Countries? *The Journal of Development Studies*, 54(11), pp.2119-2135.

Endnotes

ⁱ There was also substantial variation in SBM implementation across districts within the same state.

ⁱⁱ Where the 2014 study had covered all parts of the village, new households were sampled using a list of random numbers and a randomly selected 2014 survey as a reference point.

ⁱⁱⁱ The fact that households in the NFHS-4 are asset-poorer than households in our sample suggests that we may have oversampled better-off households. If so, open defecation is probably more common in the full population than among our sample households. Another possible reason for the discrepancy may be because of differences in timing of the NFHS-4 (2015-16) and our sample (2018) – i.e., wealth, electricity, and other dimensions of well-being improved over those 30 months – but given the magnitude of the difference it is likely that much of the discrepancy occurs due to oversampling of better-off households.

^{iv} The preface to the defecation behavior questions was: “We have seen that some people use a latrine to defecate in, and some people like to defecate in the open. Now I want to ask you about where you and your family members defecate.” Then, for each individual in the household, the surveyor asked the following question, and filled the response into a household roster: “Does ____ usually defecate in the open or use the latrine?”

^v The Kitagawa decomposition has a negative component for Rajasthan because open defecation conditional on ownership increased for both latrine owners and non-owners.

^{vi} Bihar is an exception among these states. The sbm.gov.in dashboard reported “ODF Coverage” of Bihar at “47.70%” on 2 January 2019. Official claims do not always distinguish between open defecation behavior (ODF stands for “open defecation free”) and latrine ownership. In the case of Lok Sabha Unstarred Question No. 1818, where these are clearly distinguished, “Sanitation Coverage as on 17.12.2018” for Bihar is 90.75%, which is intended as a measure of households with latrines. Note that we find 49% household latrine ownership in Bihar. For MP, Rajasthan, and UP, Sanitation Coverage of “100.00” is claimed.

^{vii} Let OD^{2014} and OD^{2018} be the fraction of the population that defecates in the open in those years. These are each weighted averages. For example: $OD^{2018} = OD_L^{2018}L^{2018} + OD_{NL}^{2018}(1 - L^{2018})$, where L^{2018} , which serves as a weight, is the fraction of people who own a latrine in 2018 and OD_L^{2018} and OD_{NL}^{2018} are conditional open defecation among latrine owners and non-owners, respectively. Note that all of these variables are fractions between 0 and 1. Then, the Kitagawa decomposition into the fraction due to open defecation behavior change, conditional on latrine ownership, is:

$$\Delta OD^{due\ to\ behavior} = (OD_L^{2014} - OD_L^{2018}) \left(\frac{L^{2018} + L^{2014}}{2} \right) + (OD_{NL}^{2014} - OD_{NL}^{2018}) \left(\frac{2 - L^{2018} - L^{2014}}{2} \right).$$

A Kitagawa decomposition has no residual, so the fraction due to latrine ownership is the remainder of the total fraction:

$$\Delta OD^{due\ to\ latrine\ ownership} = OD^{2014} - OD^{2018} - \Delta OD^{due\ to\ behavior}.$$

^{viii} In fact, in AI's 2017 Udaipur study, only one in five ST households in villages visited by the survey received a monetary subsidy to construct a toilet.

^{ix} Conditional on receiving government support for a latrine, Dalit households were not more likely than non-Dalit, non-Adivasi households to receive a contractor-built latrine.

^x See Coffey and Spears, 2017 for more on latrine pits in north India.

^{xi} This refers to latrines that were present at the time of the survey; it does not include latrines that households had received but did not report because they had been taken apart or become defunct.

^{xii} As a part of the efforts to publicize SBM implementation in Udaipur and build momentum, 30 GPs were declared ODF in a period of 30 days.

^{xiii} Other examples include old age and widows' pensions, NREGA work, Bhamashah entitlements (in Rajasthan), electricity, and other programs that would require the cooperation of panchayat officials.

^{xiv} Indeed, the SBM turned out to be more active than some of us predicted (e.g. Coffey and Spears, 2017). This is because we anticipated the focus on latrine construction, but did not expect that the SBM would have the political motivation or organization to implement coercion on as wide a scale as actually occurred in the focus states.

^{xv} This pattern has also been documented elsewhere (Geruso and Spears 2018; Vyas and Spears 2018).