

# Shifting Social Norms to Reduce Open Defecation in Rural India

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## Abstract

Toilet ownership in India has grown in recent years, but open defecation can persist even when rural households own latrines. There are at least two pathways through which social norms inhibit the use of toilets in rural India: (i) beliefs/expectations that others do not use toilets or latrines or find open defecation unacceptable; and (ii) beliefs about ritual notions of purity that dissociate latrines from cleanliness. A survey in Uttar Pradesh, India, finds a positive correlation between latrine use and social norms at baseline. To confront these, an information campaign was piloted to test the effectiveness of rebranding latrine use and promoting positive social norms. The intervention, which made information about growing latrine use

among latrine owners more salient, reduced open defecation practices across all treatment households, with average latrine use score in treatment villages increasing by up to 11 percent, relative to baseline. Large improvements were also observed in pro-latrines beliefs. This suggests that low-cost information campaigns can effectively improve pro-latrines beliefs and practices, as well as shift perceptions of why many people still find open defecation acceptable. Measuring social norms as described can help diagnose barriers to reducing open defecation, contribute to the quality of large-scale surveys, and make development interventions more sustainable.

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## Introduction

Social norms and cultural beliefs are important drivers of economic development outcomes, affecting behavior in domains as varied as health practices, energy conservation, labor force participation, tax payments, rule following and corruption, productivity, and sanitation (Allcott and Rogers, 2014; Datta and Mullainathan, 2014; Dixit, 2017; Hallsworth et al., 2017; Herbst & Mas, 2015; World Development Report 2015; World Bank, 2018). For example, although anti-retroviral therapy is life-saving for HIV/AIDS patients and often available free of cost, treatment adherence is challenging (Shubber et al., 2016). One reason is that people living with HIV/AIDS expect that others will judge them when they reveal their illness and live in fear of the stigma (Buregyeya et al., 2017; Shubber et al., 2016; Takeda et al., 2014). Similarly, individuals might not provide sufficient protein to mothers and young children, enroll girls in school, or purchase life insurance, even when those goods are free or low-cost, because of the influence of social norms (Jacoby & Mansuri, 2011; LIMRA, 2016; Nguyen, et al., 2017; Sunstein, 1996). Households in South Asia and Africa have been observed to acquire latrines but not use them, partly as a result of social norms and cultural practices entailed in their use, as well as the absence of a social norm proscribing open defecation (Bicchieri, 2017; Coffey et al., 2015; Coffey et al., 2016; UNICEF, 2015).

This research develops a new technique for measuring social norms in the context of an important development challenge: reducing open defecation among rural households. The measurement approach disaggregates social norms into two types of beliefs—beliefs about what others do (social empirical expectations), and beliefs about what others believe to be normatively appropriate (social normative expectations). In this approach, social norms are understood to be socially conditional preferences to behave in a given way (Bicchieri 2012, 2016). We also draw on a conception in which social norms are more internalized and drive behavior through their incorporation into central cultural concepts (Brennan et al., 2013).

In rural Uttar Pradesh, between January-March, 2017, we first measured the relevant cultural and normative barriers to latrine use, conditional on latrine ownership. We then developed and tested behavioral interventions aimed at weakening those social norms and beliefs to increase latrine use. Our data were gathered across three rounds—focus group discussions to inform the development of the relevant norms and belief measurement instrument, a baseline norms measurement survey, and an endline survey following the pilot intervention.

Findings from the first two rounds confirmed our hypothesis that social normative and empirical expectations were, in fact, associated with individual behavior and influential elements of behavior change. People's, especially men's, normative beliefs were closely linked to what they expected others in their reference group to believe, even though they slightly underestimated the extent of pro-latrine norms (beliefs) among others. At the same time, narrative analysis revealed that reducing open defecation in the context of rural UP also requires direct confrontation with 'dirtiness' or "gandagi" (Coffey et al., 2016), and their subsequent associations with latrine use.

To address these barriers, we piloted two simple informational interventions and evaluated their impact, at least in the short term, on changing people's behavior and beliefs around latrine use. The interventions were focused on re-branding latrine use by associating it with cleanliness and updating empirical expectations by making information about growing latrine use among other latrine owners salient. Our results suggest that targeting mental models and "marketing" social norms can be an effective and low-

cost means of increasing awareness of the number of people engaging in open defecation and correcting misperceptions about the frequency of a behavior.

### **Social and economic context**

The adverse health effects of open defecation are well known: stunting and malnutrition, diarrhea and enteric parasite infection in young children, childhood death, and lower human capital (Ayalew, et al., 2018; Hammer & Spears, 2016; Mara, 2017; Patil, et al., 2014). Reducing open defecation requires access to improved sanitation facilities. Recent years have witnessed an increase in latrine construction and access among rural Indian households (Swachh Bharat Mission, 2019; National Annual Rural Sanitation Survey, 2017-18).<sup>1</sup> However, the transition from defecating in the open to using latrines appears to have been slower, at least in four north Indian states (Gupta, 2019).<sup>2</sup>

Among other factors, behavior change in the north Indian context may be influenced by social norms and cultural beliefs, especially those related to ritual purity and impurity (Coffey et al., 2015; Gupta, Coffey and Spears, 2016). These include the belief that open defecation is acceptable and harmless or that pits may require more frequent cleaning if all household members use the latrine, the cultural anxiety that building a latrine close to the house can make it “impure”, the social norm that pit cleaning is not only an unpleasant but also a demeaning (especially for higher caste members) and socially threatening job or that open defecation is a “masculine” activity (Coffey, et al., 2016). Similarly, when a sample of latrine owners in Uttar Pradesh were asked why they defecated in the open, 27% indicated that they were simply used to it, 23% did so because it has been practiced for generations, and 20% had simply never thought of defecating in latrines (SaniFOAM-UP, 2016). This suggests that behavior change in this context may also require changing people’s mental models about how they think about defecation practices. Latrine access requires supplementation with behavior change communication. Ending open defecation likely requires addressing the social, cultural, and normative barriers that may get in the way of improved sanitation practices vis-à-vis open defecation.

What forms should behavior change strategies take? The messages in communication strategies regarding open defecation and toilet use can take multiple forms, including efforts to highlight class aspirations, nationalism, ethnic or caste role and pride, gender roles, or urbanism and modernization, among others. In this paper, we test the content of two more generic messages – social empirical expectations, and the rebranding of cleanliness. We also test two modalities – pamphlets and the use of individuals who sit in center of village-level social networks, whom we call “norm entrepreneurs.” More generally, we aim to provide an empirical foundation for behavior change strategies used in the field.

### **Social Norms and Cultural Schema**

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<sup>1</sup> According to government estimates, since the commencement of the Swachh Bharat Mission in October 2014, nearly 92 million latrines have been built across rural India as of January 2019 (SBM, 2019). The 2017-18 National Annual Rural Sanitation Survey (NARSS) reported 77% toilet penetration across India.

<sup>2</sup> Estimates of regular toilet use in rural India vary. The NARSS 2017-18 found that 93.4% of people who had access to toilets used them regularly. A recent survey of rural north Indian states (Bihar, Madhya Pradesh, Rajasthan, and UP), completed in late 2018, found that the rate of open defecation among people who owned a latrine was at 23% (the same as four years prior), and that the overall open defecation rate among rural people across these states was 44% (Gupta et al., 2019).

It is important to understand whether a practice is motivated by social beliefs—i.e., whether people engage in a practice because of their beliefs about what others think and approve of. Social norms, which refer to widely shared beliefs about how others in our social group behave and how they ought to behave, are a product of human sociality. Arising from social interdependence, social norms involve both a rule for behavior and common knowledge of that rule. In other words, social norms consist of two parts: beliefs about what is appropriate to do (normative expectations), and beliefs about what people in our reference group, in fact, do (empirical expectations). Empirical expectations are informed by first-order expectations of what others in a reference group, which could include social, caste, gender or religious groups, are engaging in. Normative expectations are second-order expectations or beliefs about what others approve or disapprove of. Both empirical and normative expectations affect personal behavior when people believe that sufficient others in their reference group behave in a certain way and are willing to sanction those who do not (Bicchieri, 2012, 2016).

Individual behavior is also influenced by deeply internalized beliefs about how the world works, also known as schemata or mental models. These beliefs draw on shared, intersubjective concepts and understandings (Desai, Gauri, Woolcock 2014). The concepts are almost like the “operating system” for how people approach the world, affecting their interpretations of behavior often automatically and without deliberation (World Development Report, 2015).

Cultural schemas are developed through repeated interactions with people of the same culture within the same environment, and can shape perceptions and filter the “facts” people believe and are able to understand (Mandler, 1984). Cultural beliefs that are so internalized that they affect emotional responses, filter out dissonant information, and shape social practices, are sometimes referred to as “schemata” (DiMaggio, 1997). These schemata, or more loosely “mental models,” are used as tools to extract information from a given situation while exerting low effort (Rosch, 1978). Schemata filter out incoming information to aid interpretation, guide attention, miss in filling information, and provide default assumptions (World Development Report, 2015).

Social norms are closely tied to schemas. To explain how norms are activated, Bicchieri and McNally (2016) posit that when people encounter a given situation, they categorize the particular type of situation they are in, which, subsequently, triggers schemas or behavioral rules that are pertinent to that situation. When it comes to open defecation in India, schemas and norms can be influential. In India, the words “clean” and “dirty” have both ritualistic and physical meanings. Certain actions or objects can be both ritually and physically polluting or dirty, or ritually polluting but physically clean, or even ritually clean, but physically polluting (Khare, 1962). In the case of latrines, Coffey et al. (2016) find that they are viewed by many as ritually polluting, regardless of their physical state, i.e. clean or dirty. These schemas of latrines can activate detrimental norms, which, in turn, can negatively influence people’s decisions regarding whether or not to defecate in latrines.

In order to change any harmful practice, the first step is to understand what kind of beliefs reinforce that particular practice. If practices are motivated by social beliefs, changing empirical and/or normative expectations can shift people away from engaging in the practice. If information about positive practices and behaviors of others in one’s reference group can be highlighted (i.e. made salient), it can induce positive behavior change by updating people’s perceptions of what others do and what the social norms are within their reference group.

Similarly, when intersubjective concepts and associations underlie behaviors, inducing behavior change might require targeting those concepts and associations. An example from the battle against female

genital cutting (FGC) may be instructive. In Sudan, the term for an uncut woman was “ghalfa,” which suggested prostitution, promiscuity, and impurity. The deeply internalized cultural belief prevented parents from assimilating and accepting information presented in the numerous campaigns about the negative health consequences of FGC. They continued to cut their daughters because, for the girls and their families, becoming “ghalfa” was socially devastating. The term promoted a variety of cognitive processes, including confirmation bias, that made beliefs and behavior resistant to scientific communication. To address this, a social campaign was launched to rebrand uncut girls as “saleema,” an Arabic term that means whole, intact, healthy, pure, and in a God-given condition. The campaign successfully weakened a deeply internalized cultural belief by creating a new way of thinking about purity and impurity (Bicchieri and McNally, 2016; Helmore, 2012).

### Measuring Social Norms and Cultural Schema

If normative and empirical expectations are consistently reported in a social group, there is strong prima facie evidence that a social norm exists (Bicchieri, Lindemans, & Jiang 2014). Similarly, if a sufficient number of respondents express mutually consistent views about what others should do, normative expectations are strong. Identifying the existence of widely shared social and normative expectations is necessary, but not sufficient, for demonstrating the existence of a strong social norm. A strong social norm must also be shown to cause conformity, or change behavior, in sufficiently large numbers. To demonstrate the causal efficacy of the norm and see if individuals, in fact, do conform to the social norm, it is necessary to measure individual behavior in the presence of the and in the absence of the norm. (The last is difficult, and counterfactual vignettes are sometimes used.)

Our study in Uttar Pradesh roughly follows this framework and focuses on four key aspects of open defecation—defecation practices (latrine use or open defecation), acceptability of open defecation (including exceptions to latrine use that are considered acceptable), enforcement of latrine use, and ritual notions of purity/impurity that may prevent construction of latrines (see Table 1 below). This structure allows us to examine, for example, how closely associated our main outcome of interest—latrine use—is to first-order expectations of where others in one’s social group defecate, and second-order expectations of the acceptability of open defecation among others.

**Table 1. Measurement Framework**

<b>Personal behavior</b>	<b>Social empirical expectations</b>
<ul style="list-style-type: none"> <li>• <i>Where do you usually defecate?</i></li> <li>• <i>Have you ever objected when you saw someone in your village defecate in the open?</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Where do most men/women in your village usually defecate?</i></li> <li>• <i>Do people in your village object when a person in the village defecate in the open</i></li> <li>• <i>How many of your neighbors’ own latrines?</i></li> </ul>
<b>Personal normative expectations</b>	<b>Social normative expectations</b>
<p><i>Do you agree that:</i></p> <ul style="list-style-type: none"> <li>• <i>OD is shameful</i></li> <li>• <i>OD is bad, especially for women</i></li> <li>• <i>OD makes other people sick</i></li> <li>• <i>OD is okay when you go to check on your fields in the morning</i></li> <li>• <i>OD is okay if the latrine is occupied</i></li> </ul>	<p><i>Do most people in your village agree that:</i></p> <ul style="list-style-type: none"> <li>• <i>OD is shameful</i></li> <li>• <i>OD is bad, especially for women</i></li> <li>• <i>OD makes other people sick</i></li> <li>• <i>OD is okay when you go to check on your fields in the morning</i></li> <li>• <i>OD is okay if the latrine is occupied</i></li> </ul>

<ul style="list-style-type: none"> <li>• <i>OD is okay if you are going with friends</i></li> <li>• <i>OD is okay if you need to get some exercise</i></li> <li>• <i>OD is okay if no one sees you</i></li> <li>• <i>Having a latrine next to the house makes the house impure?</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>OD is okay if you are going with friends</i></li> <li>• <i>OD is okay if you need to get some exercise</i></li> <li>• <i>OD is okay if no one sees you</i></li> <li>• <i>Having a latrine next to the house makes the house impure?</i></li> </ul>
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Because social norms are driven by both empirical and normative expectations of what others in one’s social group do and believe, it is important to identify the relevant social network for the population in question when measuring norms (Mackie et al., 2015). This can be challenging. For example, when immigrants living in multicultural societies talk about others, their reference group of people whose expectations matter may include immigrants from the same country as well as communities in their “home-country” (in addition to, possibly, other immigrants and even communities in the host-country). Identifying these informal networks is thus essential to understand who the target group is whose expectations matter when it comes to behavior supported by a social norm. In the context of rural India, where caste distinctions can often determine whom individuals interact with on a daily basis and where they live, identifying the right social network can be very important. In addition to measuring social norms, our survey also includes a brief social network mapping module to understand who the “others” for our respondents might be.

Social desirability bias—the tendency of respondents to answer questions in a way that is “appropriate” or “correct”, rather than a true reflection of their beliefs—can be an issue in measuring sensitive beliefs. Our survey instrument utilizes two approaches to overcome social desirability bias and elicit accurate responses—*incentivizing survey responses about empirical and normative expectations*<sup>3</sup>, and posing vignettes, in addition to straightforward questions about one’s own beliefs or behavior, where respondents are asked indirectly about their preferences through short stories about hypothetical situations (very similar to their own), and asked what the fictitious character would do in that situation.

While there is no standard framework to measure cultural schema or mental models, we rely on two types of measurements for this. The first are the set of normative and empirical questions that are reflective of one’s experiences in relation to their environment with regards to utilization and importance of latrines. The second is through analysis of free-form narrative responses. These implicitly rely on people’s own concepts and associations to interpret the world around them (Crossley, 2002; Bruner, 1990). Narrative responses can evoke the mental models that organize principles for choice and action (Sarbin, 1986).

## Data

Data for this study come from two rounds of survey data—baseline and endline—which were preceded by a qualitative diagnostic round comprised of focus group discussions with two groups of latrine owners—users and non-users—split by gender. Because the objective of this study was to examine how social norms and cultural schema influence latrine usage among rural latrine owners, we sampled a cluster of villages where latrine penetration was higher than average (based on data from SaniFOAM-UP, 2016). Our survey sample came from five villages in the Ghazipur District of Uttar Pradesh—Adelabad, Gauspur, Jhakrauli, Keshopur, and Saleempur. Latrine penetration rates in the sample villages ranged from 31.5%

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<sup>3</sup> Prior to asking questions about social empirical and social normative expectations, respondents were told that the three people who give the most accurate answers (i.e. closest to the actual number of people engaging in the behavior) will receive a prize of Rs. 500 a few weeks after the survey is completed.

in Saleempur to 66.7% in Gauspur, with slightly over 50% of households owning improved structures with septic tanks. 34.7% households had pits with lining and slab, while 11.4% had simple pit latrines. 12% of the households in the sample received some amount of SBM subsidy to cover the cost of latrine construction.

We conducted multiple focus group discussions with four distinct groups of latrine owners—female users, female non-users, male users, and male non-users. Each focus group discussion was conducted with a group of 6-8 individuals from a particular village or *tola* (neighborhood within the village), and discussed the current state of latrine access and use, barriers—structural, attitudinal, and normative—that influence or impede latrine use (own and for others), and notions of cleanliness (and its importance) and *gandagi*.

The baseline survey was administered at the household level, across 204 households that owned latrines, between January to February 2017. Households were identified by enumerators with the help of key individuals in the village and through a snowball sampling method. Standard in-field randomization (following a “right-hand” rule) was initially used to select a sample of eligible households for the survey. However, given the difficulty in finding households with latrines where at least one male or female adult was available, this method of selection was adapted when necessary. Table 2 summarizes key demographic characteristics of households and respondents (one from each household) at baseline.

**Table 2. Demographic Characteristics**

Variables	Average		Observations
<i>Caste</i>			
General	5%		
Minority	14%		
Other Backward Classes	60%		204
Scheduled Castes	21%		
Average HH income (Rs.)	11,444		
Latrine being used (observed)	89%		
	<u>Male</u>	<u>Female</u>	
Gender	67%	33%	204
Average age	47 years	33 years	204
Married	84%	69%	204
Education: below high school	38%	47%	204
<i>Usually defecate in latrines</i>			
All HH members	76%	84%	1564
Respondents only	66%	71%	204

The baseline survey measured socio-economic characteristics, latrine access and use, structural barriers, beliefs and social norms regarding open defecation, narratives around cleanliness and purity/impurity, and the social reference network of respondents in each village. The last involved asking respondents about specific individuals with whom they interacted on a regular basis as well as about individuals in the village whom they considered influential. To elicit the relevant reference groups in the area, respondents were also asked about the frequency with which they interacted with people from their own *tola*, village, and caste group. In addition to self-reported data on latrine use (which also included place and time of last defecation to capture variability), visual inspections by enumerators, including photographs, were also used to gauge the functionality, use, and cleanliness of latrines.

The endline survey was conducted immediately following the pilot intervention (in March 2017). While the baseline survey had both qualitative and quantitative elements to gauge beliefs and behaviors around latrine use, the endline survey used primarily quantitative measures to identify changes in individual behavior and beliefs, as well as changes in social empirical and normative expectations. A total of 252 households were surveyed at endline. However, only 156 of these respondents were common across both rounds, as respondents from some baseline households could not be reached or located at endline. The analysis of the pilot intervention results is thus restricted to these 156 households.

Respondents were asked to answer questions using Likert scales—answers to questions about where people defecate ranged from “Always defecate in latrine” to “Always defecate in the open” (five options), while questions about beliefs were posed as agree-disagree statements (agree, neither agree nor disagree, disagree). Scores were coded on a scale of 0 to 1, with 1 being the most pro-latrine answer in each case and 0 being the least. For example, when asked where respondents usually defecate, those answering “Always in the latrine” were given a score of 1 and those answering “Always defecate in the open” a score of 0. Answers in between—“Usually defecate in latrine”, “Sometimes in the latrine, sometimes in the open”, and “Usually defecate in the open” —received a score of 0.75, 0.5 and 0.25, respectively. Negative statements (e.g. “It is okay to defecate in the open if no one sees you”) were reverse-coded using the same Likert scale coding method to ensure all pro-latrine behaviors or beliefs were similarly coded. Questions regarding norm enforcement were binary variables, with positive enforcement behavior receiving a score of 1.

Normative statements (both about respondents’ own beliefs and social normative expectations) were grouped together into three indices—whether open defecation is bad (bad, harmful and shameful), whether exceptions are not okay, and a combination of both to reflect overall favorability of latrines over open defecation. An additional index was created for all social norms (inclusive of both social normative and social empirical expectations). Indices reflect the average of scores across all relevant questions. All indices report relatively high internal consistency within their respective scales, with Cronbach’s alphas ranging from 0.70 to 0.85 (see Table 3 below).

**Table 3. Alpha Scores**

<b>Index</b>	<i>Alpha</i>
<i>Personal normative beliefs</i>	
OD is bad (3 items)	0.7016
Exceptions not okay (5 items)	0.8092
All norms (8 items)	0.7696
<i>Social normative expectations</i>	
OD is bad (3 items)	0.7422
Exceptions not okay (5 items)	0.8512
All normative beliefs (8 items)	0.7858
All social norms (9 items)	0.7807

**Baseline Findings**

Our baseline survey closely follows the framework of social norms measurement outlined above to elicit four key aspects of latrine use—what respondents do, what they think others do, what respondents believe is appropriate behavior, and what respondents think others believe is appropriate behavior. The reported levels of latrine usage at baseline are slightly higher for our respondents compared to the average across UP (which is not surprising given that the latrine penetration in these villages is also higher than average), with 76% of male respondents and 84% of female respondents reporting that they usually defecate in latrines, and 68% and 82% respectively reporting that they last defecated in a latrine. However, to account for nuances in the frequency of latrine use, our key outcome variable (where respondents usually defecate), which we use for the remainder of the section, provides a wider range of frequency options (always, usually, or sometimes).

Table 4 (below) summarizes the key findings from the baseline survey. The average latrine use score across our survey sample was 0.74, with men scoring slightly higher (0.79) than women (0.72) on average. This indicates that while latrine use is fairly common among this group, some deviation is likely. Normative beliefs of respondents, however, show much more variation. While beliefs about the negative aspects of open defecation—whether it is bad, harmful, or shameful—are strong, with a score of 0.83 on average across all respondents, latrine use is not considered essential. Both men and women believe that it is acceptable to engage in open defecation under various extenuating circumstances. Scores on the “exception not okay” index were 0.58 for men, and only 0.39 for women. The low score for women is especially surprising when one takes into consideration that women, across studies, tend to report lower rates of open defecation relative to men. However, given the mobility restrictions women face in rural UP, as well as the risk and shame associated with the lack of privacy when defecating in the open, their choice of using latrines may be more a product of convenience than conviction about the normative importance of latrine use. Women, similarly, tend to associate latrines with impurity, and score lower (0.32) than men (0.77) on questions about whether latrines make the house impure (reverse-scored)—once again, suggesting that their beliefs may not be the main driver of their behavior.

**Table 4. Baseline Findings**

<b>Variables</b>	<b>Male</b>	<b>Female</b>	<b>All</b>	<b>Observations</b>
<b><i>Behavior</i></b>				
Last defecated in latrine (binary)	68%	82%	73%	204
Usually defecates in latrines	0.72 (0.37)	0.79 (0.33)	0.74 (0.35)	204
Admonishes open defecation (binary)	0.56 (0.50)	0.38 (0.49)	0.50 (0.50)	201
<b><i>Personal normative beliefs</i></b>				
OD is bad/harmful	0.84 (0.30)	0.80 (0.30)	0.83 (0.30)	204
Exceptions not okay	0.58 (0.35)	0.39 (0.37)	0.52 (0.37)	204
Latrine doesn't make home impure	0.77 (0.41)	0.32 (0.47)	0.62 (0.48)	203
<b><i>Social empirical expectations</i></b>				
Where others of same gender usually defecate	0.37 (0.23)	0.39 (0.27)	0.38 (0.25)	204

Expects others to admonish	0.63 (0.48)	0.42 (0.50)	0.57 (0.50)	200
Owens latrines	0.57 (0.29)	0.57 (0.25)	0.57 (0.27)	201
Use latrines within village (1-10)	5.27 (2.15)	5.29 (1.77)	Not asked	136/65
Use latrines within caste (1-10)	5.14 (2.87)	4.67 (2.70)	4.99 (2.15)	201
<b><i>Social normative expectations</i></b>				
OD is bad/harmful	0.81 (0.33)	0.74 (0.33)	0.79 (0.33)	201
Exceptions not okay	0.55 (0.37)	0.24 (0.33)	0.45 (0.38)	199
Latrine doesn't make home impure	0.68 (0.44)	0.38 (0.48)	0.58 (0.47)	196

*Standard deviation in parentheses*

So how well do people's behaviors and beliefs correlate with social empirical and social normative expectations? With regard to social normative expectations, our data suggest one main finding. People's normative beliefs tend to be closely linked to perceived beliefs of others in their reference group, indicating that social normative expectations may be powerful determinants of people's own beliefs. But correlations between personal normative beliefs and social normative expectations appear to vary substantially between men and women. While for men, both OD indices show strong correlation between personal and social normative beliefs, for women, the association is much weaker for the "OD is bad" index. On the other hand, women's beliefs about latrines making the house impure appear to be more correlated with their social normative expectations than that of men, even though the average difference between the two (as seen in Table 5) was substantially large. Across both groups, we find no strong correlation between actual behavior and perceived pro-latrine normative beliefs of others.

With regard to social empirical expectations, individuals sharply underestimate latrine use among others in their reference group, both among men and women (estimated frequencies of 0.37 and 0.39 for men and women, respectively). It is important to recall that the reference group includes both latrine owners and non-owners, which may explain why people sharply underestimate actual latrine use in their reference group. Still, we believe that this may be indicative of a situation of pluralistic ignorance, where private beliefs or behaviors (in this case latrine use) are underestimated, leading to misperceived social norms. In situations of pluralistic ignorance, revealing private behaviors or beliefs can change behavior. That is the intervention we designed in this study. We based the intervention on the suspicion that people project the wider open defecation behavior in the village even onto those who do own latrines because open defecation is, quite literally, a more visible and salient action compared than latrine use, which takes place behind a closed door.

Enforcement behavior (how often others admonish open defecation) also appears to be associated with social empirical expectations, with a correlation coefficient of 0.43. This is further evidence that an

incipient social norm against open defecation in the villages may exist, but is not yet widely perceived or shared.

**Table 5. Correlations**

	Variables	SN: OD bad	SN: No Exceptions	PB: OD Bad	PB: No Exceptions	SB: Latrine not impure
<b>All</b>	<i>PB: OD bad</i>	0.5643				
	<i>PB: No Exceptions</i>		0.7359			
	<i>PB: Latrine not impure</i>					0.4666
	<i>Usually use latrines</i>	0.2070	0.2579	0.2155	0.4164	
<b>Male</b>	<i>PB: OD bad</i>	0.6300				
	<i>PB: No Exceptions</i>		0.7596			
	<i>PB: Latrine not impure</i>					0.2999
	<i>Usually use latrines</i>	0.2517	0.3876	0.2084	0.5048	
<b>Female</b>	<i>PB: OD bad</i>	0.3269				
	<i>PB: No Exceptions</i>		0.6473			
	<i>PB: Latrine not impure</i>					0.5122
	<i>Usually use latrines</i>	-0.0290	0.2027	0.0873	0.4350	

What about the relationship between perceived social norms and behavior? Our social norms framework hypothesizes a positive relationship between personal behavior (latrine use) and social expectations (both empirical and normative). Equation (1) below regresses reported latrine use behavior on social norms (i.e. combined index of both social empirical and social normative expectations around latrine use), controlling for gender, education, income, and age. Equation (2) splits social norms into its component parts and regresses latrine use behavior on indices of social empirical expectations of latrine use and social normative expectations of the unacceptability of open defecation, with the same control variables.

$$(1) \text{ Latrine use} = \beta_0 + \beta_1 \text{social\_norms\_index} + \beta_i X_i + \varepsilon_i$$

$$(2) \text{ Latrine use} = \beta_0 + \beta_1 \text{social\_empirical\_expectations\_index} + \beta_2 \text{social\_normative\_expectations\_index} + \beta_i X_i + \varepsilon_i$$

Standardized independent variables and indices were used in the regression analysis to produce standardized coefficients for simpler interpretation. Our results show a statistically significant positive relationship between latrine use behavior and social norms (see Table 6 below). Pro-latrine norms, which include both social and empirical expectations, are strong predictors of pro-latrine behavior, with a one standard deviation increase in the pro-latrine norms score increasing the personal latrine usage score by 11.9% on average (Column 1). This relationship holds when social norms are broken down into social normative and social empirical expectations (Column 2). A one standard deviation increase in the social normative expectation score is associated with an 8.9% increase in the latrine usage score on average, while the same increase in the social empirical expectation score is associated with an average 7.5% increase in the latrine usage score. All of this strongly support our hypothesis that social norms do matter in the context of latrine use (over open defecation)—latrine use behavior is closely linked to social expectations of whether others in one’s reference group use or own latrines, and to what extent one believes others find open defecation to be acceptable. Lastly, education and gender appear to be

important predictors of latrine use behavior. While being male is linked to lower latrine use, education consistently shows a positive relationship with pro-latrine behavior.

**Table 6. Regression: Latrine Use Behavior**

VARIABLES	(1) Use latrines	(2) Use latrines
Social norms (SN+SE)	0.119*** (0.025)	
SN: Pro-latrine use		0.089*** (0.026)
SE: Pro-latrine use		0.075*** (0.023)
HH income/month	0.000 (0.000)	0.000 (0.000)
Age	0.001 (0.002)	0.001 (0.002)
Education	0.042*** (0.015)	0.040*** (0.015)
Male	-0.193*** (0.059)	-0.166*** (0.060)
Constant	0.591*** (0.120)	0.574*** (0.120)
Observations	201	198
R-squared	0.210	0.231

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Each respondent was also presented with 4 vignettes. The situations depict a typical village and varied either social empirical expectations (most people in the village defecated in the open or used a latrine) or social normative expectations (most people found it acceptable to defecate in the open or found this to be wrong). The vignette then asked where a typical resident (matched to the gender of the respondent), who had access to a latrine, would defecate. Vignettes, in this case, were used to test a counterfactual—norms of latrine use vs. norm of open defecation. This survey experiment is used to measure how social empirical and social normative expectations affect behavior. In this case the behavior is another villager, rather than the respondent him or herself, in order to mitigate social desirability bias in the responses. The survey experiment with vignettes provides further evidence on the existence of a social norm beyond the correlations in the regression table above.

We conduct simple factorial analysis without interaction effects, representing each of the above factors with a dummy variable. Simple regression results are shown in Table 7. The results suggest that the likelihood of latrine use on the part of a villager would increase by 18.9% if he or she moved to a village where most people used latrines, and by 21.7% if most people in the village found it wrong to defecate in the open. We also test for robustness using a multilevel model with a random intercept, since each individual is asked to respond to 4 vignettes. The results were similar. Overall, the analysis of the vignettes confirms the importance of both social normative and social empirical expectations for individual behavior.

**Table 7. Regression: Vignettes**

Variables	(1)	(2)
	Latrine use (baseline survey)	Latrine use (endline survey)
Most use latrine	0.138*** (0.0211)	0.143*** (0.0173)
Most think OD is wrong	0.158*** (0.0211)	0.160*** (0.0173)
Constant	0.729*** (0.0122)	0.776*** (0.00998)
Observations	812	1,010

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

We also explored mental models by asking narrative questions, for example, associations that respondents made with the word “ganda” (dirty). Analysis at baseline suggest a strong association of the word “ganda” with latrines. For example, a word frequency count showed that latrine was the third most mentioned word, after feces and drainage, when people were asked to talk about things that they considered “ganda”. Topic modeling using latent dirichlet allocation showed that the word latrine appeared frequently in three of the top five topics, along with words such as feces, garbage, drains, etc. This demonstrates the importance of changing social norms but also mental models regarding latrine use.

### Intervention

Social norms appear to matter when it comes to beliefs and behaviors regarding open defecation in rural UP. While the majority of latrine owners use latrines, and do so frequently, individuals do not necessarily know this (perhaps because latrine use is a less visible practice than open defecation). They may also be making inferences about latrine use on the part of latrine owners from the observed behavior of non-latrine owners. This points to a potential mismatch between empirical expectations and reality, where updating the former could have the effect of communicating to people who continue to defecate in the open that they are, in fact, deviating from the norm. Similarly, our findings confirm that weakening social norms and changing mental models that get in the way of a permanent shift away from open defecation require direct confrontation with “gandagi” and related terms regarding impurity and dirtiness, insofar as they relate to latrines. To address these behavioral barriers, we piloted two simple informational interventions and evaluated their short-term impact people’s behavior and beliefs around latrine use.

The goals of the interventions were to: i) re-brand latrine use by associating it with cleanliness; and ii) make information about growing latrine use among latrine owners salient. Three types of messages were delivered—the first cued empirical expectations about open defecation and latrine use by informing people about prevalent norms among latrine owners in order to update their beliefs about latrine use within their appropriate reference groups; the second and third challenged existing mental models that automatically associate latrines with *gandagi* by highlighting the relative desirability of latrines vis-à-vis open defecation through direct association of latrine use with cleanliness and other “clean” practices.

These messages were delivered via two outreach channels over a period of one week: i) individually delivered pamphlets by key individuals in the community, or “norm entrepreneurs (NEs)” (Treatment 1); or ii) mass communication campaign involving community events, posters at key locations around the village (entry, exit, schools, community halls and markets), as well as NE-delivered pamphlets (Treatment 2). While T2 ensured maximum outreach, T1 utilized personalized delivery through individuals who are well connected or highly central to the village social network, and who could play an influential role in the creation of a new social norm around latrine use and act as the positive norm enforcers within their respective communities (see Appendix 1 for detailed theory of change).

Treatment was randomly assigned at the village level. Two of the five baseline villages were assigned to T1 and the remaining three to T2—covering a total of 225 households with latrines across all five villages. In addition, 10% of the households (25) in the T1 villages were randomly selected to receive no intervention (and serve as a control group).

## **Results**

The interventions targeted change in latrine use behavior through two pathways—change in beliefs about the importance of using latrines via its association with cleanliness, and updating empirical expectations about the norms of latrine use in the community. A follow-up survey was conducted in all baseline villages following the weeklong interventions to evaluate the impact of the interventions on latrine use behavior and related personal and normative beliefs. Of 204 households surveyed at baseline, 156 (76%) were included in the follow-up survey. The attrition was due to the enumerators’ inability to resurvey the baseline respondents within the short follow-up survey period. (Since beliefs and behaviors are subjective, baseline respondents could not be replaced with other members of the household.) The control group for this pilot was also very small given the small sample size of the overall study. In addition, because control group households were sampled from T1 villages, there was high risk of spillover due to information diffusion from treatment to control households and presence and activity of norm entrepreneurs in the villages. As a result, comparisons between the treatment and control groups could not be made in our analysis.

The endline data show relatively large changes in both behavior and attitudes in favor of latrine use, relative to the baseline. Given the small sample size, our study was underpowered to detect significant effects, but a simple difference in means test between baseline and endline outcomes shows large and statistically significant differences in both behavior and beliefs related to latrines across both treatment arms (see Appendix 2 for detailed results).

**Figure 1.**

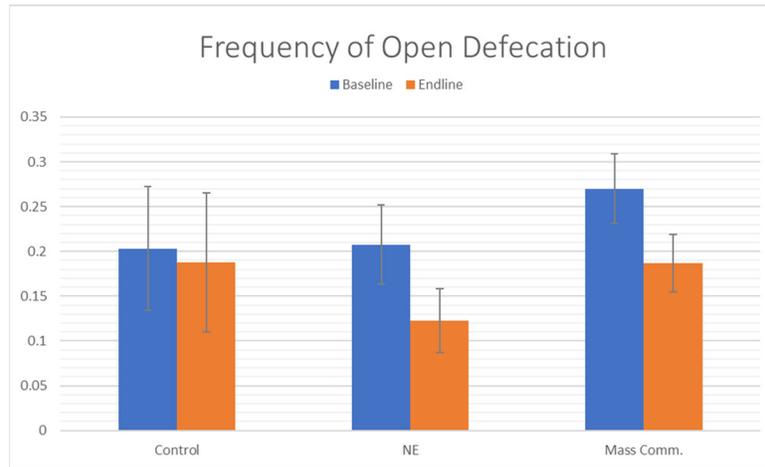


Figure 1 shows that following the intervention, latrine use scores went up by 0.08 on average ( $p < 0.01$ ) in both treatment villages relative to baseline (which represents a 10% increase in average latrine use score in T1 villages and 11% increase in T2 villages). This indicates that latrine owners in treatment villages either started using latrines if they were not previously doing so or increased their frequency of latrine use over open defecation during this period. Personal normative beliefs also moved in a more pro-latrine direction relative to baseline, with scores increasing by 0.22 (32%) and 0.16 (28%) on average in T1 and T2 villages respectively relative to baseline (see Table 8. below). We also observe evidence of a shift in mental models vis-à-vis the association of latrines with impurity. In addition to changes in personal normative beliefs in favor of latrine use, respondents' score on the question "Having a latrine next to the house makes the house impure" improved in the pro-latrine direction by as much as 0.23 points (37%) on average in T1 villages, and 0.16 points (29%) on average in T2 villages.

**Table 8. Difference in Means**

VARIABLE	Group	n	Baseline	Endline	T-test for difference of means			
					Difference	t	df	p-value
Latrine use score	Control	16	0.80 (0.07)	0.81 (0.08)	0.02 (0.08)	0.1939	15	0.8489
	NE	53	0.79 (0.04)	0.88 (0.04)	0.08*** (0.03)	3.1574	52	0.0026
	Mass comm.	87	0.73 (0.04)	0.81 (0.03)	0.08*** (0.03)	3.0506	86	0.0030
SE: Latrine use score	Control	16	0.45 (0.07)	0.39 (0.06)	0.06 (0.06)	1	15	0.3332
	NE	53	0.42 (0.03)	0.43 (0.03)	0.02 (0.03)	0.5737	52	0.5687
	Mass comm.	87	0.35 (0.03)	0.45 (0.03)	0.11*** (0.03)	3.3406	86	0.0012
PB: Pro-latrine score	Control	16	0.67 (0.06)	0.78 (0.06)	0.11* (0.06)	2.0676	15	0.0564
	NE	53	0.69 (0.03)	0.90 (0.03)	0.22*** (0.03)	6.5860	52	0.0000

	<i>Mass comm.</i>	87	0.58 (0.03)	0.74 (0.03)	0.16*** (0.03)	5.2510	86	0.0000
<b>SN: Pro-latrine score</b>	<i>Control</i>	15	0.67 (0.07)	0.79 (0.06)	0.12** (0.05)	2.5463	14	0.0233
	<i>NE</i>	52	0.62 (0.04)	0.79 (0.03)	0.18*** (0.04)	4.4327	51	0.0000
	<i>Mass comm.</i>	86	0.50 (0.03)	0.69 (0.03)	0.18*** (0.03)	5.7268	85	0.0000
<b>PB: Latrine not impure score</b>	<i>Control</i>	16	0.50 (0.13)	0.65 (0.12)	0.16 (0.13)	1.2322	15	0.2369
	<i>NE</i>	53	0.63 (0.07)	0.86 (0.05)	0.23*** (0.08)	2.9919	52	0.0042
	<i>Mass comm.</i>	86	0.55 (0.05)	0.72 (0.05)	0.16*** (0.06)	2.6925	85	0.0085
<b>SN: Latrine not impure score</b>	<i>Control</i>	15	0.57 (0.13)	0.73 (0.12)	0.17 (0.11)	1.4349	14	0.1733
	<i>NE</i>	49	0.53 (0.07)	0.62 (0.07)	0.09 (0.08)	1.2196	48	0.2286
	<i>Mass comm.</i>	85	0.55 (0.05)	0.72 (0.04)	0.18*** (0.06)	2.8511	84	0.0055

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

These results are consistent with our hypothesis that one of the pathways through which latrine use can be increased is by challenging the mental models around the association of latrines and cleanliness. However, the role of the second mechanism we identified—updating empirical expectations about norms of latrine use in the community—is less clear. Empirical expectations of the extent to which others in one’s community use latrines showed significant improvements in T2 villages, but the change was small and statistically insignificant in the T1 villages despite improvements in latrine use practices. There could be two factors to consider here. The first has to do with the measurement itself. While at baseline we only asked respondents where others in their village usually defecate, at endline we introduced a more nuanced measure by asking directly about practices of other latrine owners as well. This may have influenced the reference group considered by respondents in answering this question, making the comparison between baseline and endline outcomes less valid. However, since we did see significant changes in one treatment group and not the other, a potential explanation could be related to the differences between these two groups at baseline. T2 households were worse off on average across most variables, including empirical expectations and normative expectations about pro-latrine beliefs, compared to both T1 and control group households at baseline. As a result, updating empirical expectations in these villages may have led to larger changes because the difference between expectations and reality was more pronounced, and hence more impactful.

Though improvements are observed across both treatment groups, the effectiveness of the delivery channel (NE vs mass communication) seemed to vary between personal and social outcomes. The mass communication treatment was associated with larger changes in social empirical and normative expectations, while the norm entrepreneur-delivered treatment was more effective at influencing personal beliefs. This suggests that while personalized delivery might allow for quicker internalization of

positive beliefs, mass communication methods, which target the community as a whole, might be more effective at changing normative expectations because people believe others to have internalized the same views that they have (as a result of being exposed to the same information through the intervention). Mass communication may be more likely to change not only personal beliefs but common knowledge of personal beliefs.

## **Discussion and Conclusion**

Our study points to two important aspects of latrine use behavior. The first is that the decision to use latrines for defecation and, relatedly, attitudes towards open defecation, are influenced by a range of factors. Clearly, high rates of latrine construction and latrine ownership are not sufficient conditions to eliminate open defecation among members of latrine-owning households. In the context of rural India, where people's identities are closely tied to their community identity and where cultural practices and beliefs potentially exert powerful influence on their own beliefs and practices, tackling collective practice problems such as open defecation could benefit from an understanding of the underlying psychological and social barriers, as well. Our measurement tool, which was designed to identify such barriers, demonstrates that to reduce open defecation in rural India, it might be necessary to change cultural schema or mental models that associate latrines with "gandagi", as well as to change social expectations of prevalent norms and behavior around latrine use.

The second, based on findings from our pilot study, is that mental models and social norms are malleable, and, when challenged, can lead to behavior change. Our study shows that measurable behavior change can be achieved relatively quickly and at low cost using behaviorally-informed information interventions. Our study tested two low-cost delivery channels, both utilizing local resources and personnel. Both interventions were relatively successful at influencing practices and beliefs around latrine use. It is worth noting that both delivery channels were relatively low cost. Posters (used in the mass communication treatment villages) have very low marginal cost and can be scaled up easily to reach a wide audience. NEs, once recruited, can deliver in-person messages to additional households at low marginal cost. In our intervention, the NEs were unpaid. Community events may have relatively higher marginal cost but offer greater visibility and diffusion potential to reach a wider audience and spark conversations. Our results suggest that community-level delivery methods may be more effective at changing norms relative to individual delivery methods, but the latter is more influential at changing personal beliefs.

Our study had some important limitations in terms of its ability to measure and detect significant effects and attribute observed impact to the treatments. The sample size was relatively small. The restricted timeline limited our ability to measure the impact of these interventions over the longer term to see if the changes were sustained over time. Our measures of social norms could be improved by improving the specification of the relevant reference groups. The Government of Uttar Pradesh was, around the same time, implementing Community-Led Total Sanitation and other anti-open defecation campaigns and triggering exercises; these may have prepared the ground for the social norms pilot we conducted.

However, the systematic approach to measuring behavior that we introduce in this study can be utilized to effectively diagnose barriers to latrine use as well as to design and evaluate larger-scale studies that measure the actual impact of such interventions. Given the massive effort the Government of India is undertaking to tackle the problem, a systematic approach to measuring and addressing social norms could contribute significantly to completely and sustainably eliminating the practice of open defecation.



## References

- Allcott, H. & Rogers, T. (2014). The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation. *The American Economic Review*, 104(10): 3003–3037.
- Ayalew, A.M., Mekonnen, W.T., Abaya, S.W. & Mekonnen, Z. A. (2018). Assessment of Diarrhea and Its Associated Factors in Under-Five Children among Open Defecation and Open Defecation-Free Rural Settings of Dangla District, Northwest Ethiopia. *Journal of Environmental and Public Health*, vol. 2018, Article ID 4271915, 8 pages.
- Basaza, R., Criel, B. & Van der Stuyft, P. (2008) Community health insurance in Uganda: Why does enrolment remain low? A view from beneath. *Health Policy*, 87(2):172–184.
- Bicchieri, C. (2012). *Social Norms, Social Change*. Penn-UNICEF Lecture, July 2012.
- Bicchieri, C., Lindemans, J. W., & Jiang, T. (2014). A structured approach to a diagnostic of collective practices. *Frontiers in psychology*, 5.
- Bicchieri, C. & McNally, P. (2016). Shrieking Sirens. Schemata, Scripts, and Social Norms: How Change Occurs. *PPE Working Papers 0005*. Philosophy, Politics and Economics, University of Pennsylvania.
- Bicchieri, C. (2016). *Norms in the Wild*. Oxford, UK: Oxford University Press.
- Bicchieri, C., Ashraf, S., Das, U., Kohler, H., Kuang, J., McNally, P., Shpennev, A. & Thulin, E. (2017). Phase 1 Project Report. Social Networks and Norms: Sanitation in Bihar and Tamil Nadu, India. Penn Social Norms Group (PennSoNG). 16. Retrieved from <https://repository.upenn.edu/pennsong/16>.
- Brennan, G., Eriksson, L., Goodin, R.E., & Southwood, N. (2013). *Explaining Norms*. Oxford, UK: Oxford University Press.
- Bruner, J. (1990) *S. Acts of Meaning*. Cambridge, MA: Harvard University Press.
- Buregyeya, E., Naigino, R., Mukose, A., Makumbi, F., Esiru, G., Arinaitwe, J., Musinguzi, J., & Wanyenze, R. K. (2017). Facilitators and barriers to uptake and adherence to lifelong antiretroviral therapy among HIV infected pregnant women in Uganda: a qualitative study. *BMC pregnancy and childbirth*, 17(1), 94.
- Coffey, D., Gupta, A., Hathi, P., Spears, D., Srivastav, N., & Vyas, S. (2015). Culture and the health transition: Understanding sanitation behavior in rural North India. *IGC Working Paper*.
- Coffey, D., Gupta, A., & Spears, D. (2016). Purity, pollution, and untouchability: challenges affecting the adoption, use, and sustainability of sanitation programmes in rural India. *Sustainable Sanitation for All: Experiences, challenges, and innovations*. P. Bongartz, N. Vernon and J. Fox (eds.) Sustainable Sanitation for All: Experiences, Challenges, and Innovations, Practical Action Publishing, Rugby.
- Crossley, M. (2002). Introducing Narrative Psychology. In C. Horrocks; N.Kelly; B. Roberts; D. Robinson (Eds.): *Narrative, Memory and Life Transitions*. University of Huddersfield, pp. 1-13.

- Datta, S. & Mullainathan, S. (2014). Behavioral Design. A New Approach to Development Policy. *Review of Income and Wealth*, 60(1), 7-35.
- De Allegri, M., Sanon, M. & Sauerborn, R. (2006). To enrol or not to enrol? A qualitative investigation of demand for health insurance in rural west Africa. *Social Science & Medicine*, 62(6):1520–1527.
- DiMaggio, P. (1997). Culture and Cognition. *Annual Review of Sociology* 23(1), 263–87.
- Dixit, A. (2017). Fighting Corruption by Altering Equilibrium in An Assurance Game. Preliminary draft. Retrieved from <http://www.princeton.edu/~dixitak/home/AssurAntiCorr.pdf>.
- Dror D.M., Hossain S.A.S., Majumdar, A., Koehlmoos, T.L.P., John, D. & Panda PK. (2016). What factors affect voluntary uptake of community-based health insurance schemes in low- and middle-income countries? A systematic review and meta-analysis. *PLoS ONE*, 11(8):1–31.
- Elster, J. (1989). *The Cement of Society*. Cambridge, U.K.: Cambridge University Press.
- Gupta, A., Khalid, N., Desphande, D., Hathi, P., Kapur, A., Srivastav, N., Vyas, S., Spears, D., & Coffey, D. (2019). Changes in Open Defecation in Rural North India: 2014-2018. *IZA Discussion Paper No. 12065*. Bonn, Germany: IZA Institute of Labor Economics.
- Hallsworth, M., List, J.A., Metcalfe, R.D., & Vlaev, I. (2017). The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148: 14-31.
- Hammer, J. & Spears, D. (2016). Village sanitation and child health: Effects and external validity in a randomized field experiment in rural India. *Journal of Health Economics*, 48: 135-148.
- Helmore, K. UNFPA, (2012). In Sudan: Changing labels, changing lives. Retrieved from United Nations website: <https://www.unfpa.org/public/home/news/pid/11223>.
- Herbst, D. & Mas, A. (2015). Peer effects on worker output in the laboratory generalize to the field. *Science*, 350(6260): 545-549.
- Jacoby, H., Mansuri, G. (2011). *Crossing Boundaries: Gender, Caste and Schooling in Rural Pakistan*. World Bank, Washington.
- Khare, R. (1962). Ritual purity and pollution in relation to domestic sanitation. *The Eastern Anthropologist*, 15 (2), 125–139.
- LIMRA. (2016). *The Mysteries of Life: Life Insurance Ownership and Behavioral Economics*. LIMRA.
- Mackie, G., Moneti, F., Denny, E., & Shakya, H. (2015). What are social norms? How are they measured. *University of California at San Diego-UNICEF Working Paper*, San Diego.
- Mandler, G. (1984). *Mind and Body: The Psychology of Emotion and Stress*. New York: Norton.

Mara, D. (2017). The elimination of open defecation and its adverse health effects: a moral imperative for governments and development professionals. *Journal of Water, Sanitation and Hygiene for Development*, 7(1): 1-12.

National Annual Rural Sanitation Survey (NARSS) 2017-2018. Retrieved from [https://mdws.gov.in/sites/default/files/NARSS\\_2017\\_18.pdf](https://mdws.gov.in/sites/default/files/NARSS_2017_18.pdf).

Nguyen, P. H., Sanghvi, T., Kim, S. S., Tran, L. M., Afsana, K., Mahmud, Z., Aktar, B. & Menon, P. (2017). Factors influencing maternal nutrition practices in a large scale maternal, newborn and child health program in Bangladesh. *PloS one*, 12(7), e0179873.

NITI Aayog. (2018). SDG India Index- Baseline Report, 2018. NITI Aayog. Retrieved from [http://niti.gov.in/writereaddata/files/SDX\\_Index\\_India\\_21.12.2018.pdf](http://niti.gov.in/writereaddata/files/SDX_Index_India_21.12.2018.pdf).

Patil S.R., Arnold B.F., Salvatore A.L., Briceno B., Ganguly S., Colford J.M Jr, & Gertler P.J. (2014). The Effect of India's Total Sanitation Campaign on Defecation Behaviors and Child Health in Rural Madhya Pradesh: A Cluster Randomized Controlled Trial. *Plos Med.* e1001709.

Takada, S., Weiser, S.D., Kumbakumba, E., Muzoora, C., Martin, J.N., Hunt, P.W., Haberer, J.E., Kawuma, A., Bangsberg, D.R. & Tsai, A.C. (2014). The dynamic relationship between social support and HIV-related stigma in rural Uganda. *Ann. Behav. Med.* 48, 26–37.

Rosch, E. (1978). Principles of categorization. *Concepts: core readings*. 189-206.

Sarbin, T. R. (1986). The narrative as root metaphor for psychology. In T. R. Sarbin (Ed.), *Narrative psychology: The storied nature of human conduct* (pp. 3-21). New York: Praeger. (19 sider).

Shubber, Z., Mills, E. J., Nachega, J. B., Vreeman, R., Freitas, M., Bock, P., Nsanzimana, S., Penazzato, M., Appolo, T., Doherty, M., & Ford, N. (2016). Patient-Reported Barriers to Adherence to Antiretroviral Therapy: A Systematic Review and Meta-Analysis. *PLoS medicine*, 13(11), e1002183.

Sunstein, C. (1996). Social norms and social roles. *Columbia Law Review*, 96: 903-968.

Swachh Bharat Mission-Gramin, Ministry of Drinking Water and Sanitation. Retrieved January 31, 2019, from <http://swachhbharatmission.gov.in/sbmcms/index.htm>.

Tomasello, M. (2014). *A Natural History of Human Thinking*. Cambridge, MA: Harvard University Press.

UNICEF. (2015). Using Social Norms Theory to Strengthen CLTS in Southern Madagascar. Eastern and Southern Africa Sanitation and Hygiene Learning Series: WASH Field Note: November 2015. Retrieved from <https://www.unicef.org/esaro/UNICEF-FN-CLTS-Madagascar-low-res.pdf>.

The Water and Sanitation Program, The World Bank. (2016). SaniFOAM- UP. Unpublished raw data.

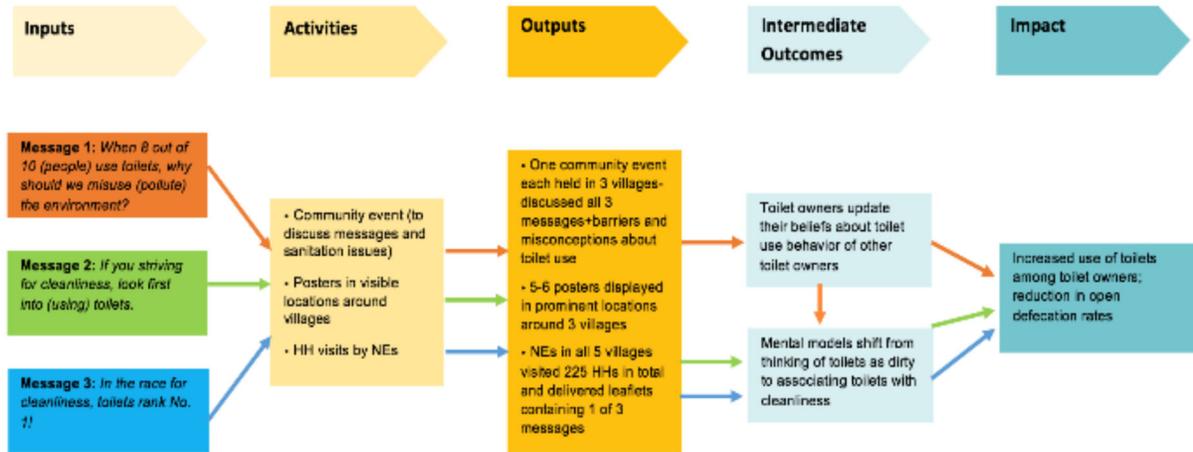
World Bank Group. (2015). *World Development Report 2015: Mind, Society, and Behavior*. Washington, DC: World Bank.

World Bank Open Data. (2015). Washington, D.C.: The World Bank.

The World Bank Water. (2016). *Sanitation Framework of Opportunity, Ability and Motivation Survey: 2016 Update*. Water and sanitation program. Washington, D.C.: World Bank Group.

World Bank. (2018). *Hashemite Kingdom of Jordan – Understanding How Gender Norms in MNA Impact Female Employment Outcomes (English)*. Washington, D.C.: World Bank Group.

## APPENDIX 1: Theory of Change



**Appendix 2. Full Results (Difference in Means)**

VARIABLE	Group	n	Baseline	Endline	T-test for difference of means			
					Difference	t	df	p-value
Latrine use	<i>Control</i>	16	0.80 (0.07)	0.81 (0.08)	0.02 (0.08)	0.1939	15	0.8489
	<i>NE</i>	53	0.79 (0.04)	0.88 (0.04)	0.08*** (0.03)	3.1574	52	0.0026
	<i>Mass comm.</i>	87	0.73 (0.04)	0.81 (0.03)	0.08*** (0.03)	3.0506	86	0.0030
SE: Latrine use	<i>Control</i>	16	0.45 (0.07)	0.39 (0.06)	0.06 (0.06)	1	15	0.3332
	<i>NE</i>	53	0.42 (0.03)	0.43 (0.03)	0.02 (0.03)	0.5737	52	0.5687
	<i>Mass comm.</i>	87	0.35 (0.03)	0.45 (0.03)	0.11*** (0.03)	3.3406	86	0.0012
PB: Pro-latrine	<i>Control</i>	16	0.67 (0.06)	0.78 (0.06)	0.11* (0.06)	2.0676	15	0.0564
	<i>NE</i>	53	0.69 (0.03)	0.90 (0.03)	0.22*** (0.03)	6.5860	52	0.0000
	<i>Mass comm.</i>	87	0.58 (0.03)	0.74 (0.03)	0.16*** (0.03)	5.2510	86	0.0000
SN: Pro-latrine	<i>Control</i>	15	0.67 (0.07)	0.79 (0.06)	0.12 (0.05)	2.5463	14	0.0233
	<i>NE</i>	52	0.62 (0.04)	0.79 (0.03)	0.18*** (0.04)	4.4327	51	0.0000
	<i>Mass comm.</i>	86	0.50 (0.03)	0.69 (0.03)	0.18*** (0.03)	5.7268	85	0.0000
PB: OD is bad	<i>Control</i>	16	0.98 (0.02)	1 (0.00)	0.02 (0.02)	1	15	0.3332
	<i>NE</i>	53	0.90 (0.03)	0.99 (0.01)	0.09** (0.03)	3.4548	52	0.0011
	<i>Mass comm.</i>	87	0.75 (0.04)	0.96 (0.02)	0.20*** (0.04)	5.5308	86	0.0000
SN: OD is bad	<i>Control</i>	15	0.92 (0.05)	1 (0.00)	0.08 (0.05)	1.6846	14	0.1142
	<i>NE</i>	52	0.84 (0.04)	0.98 (0.01)	0.14*** (0.04)	3.4378	51	0.0012
	<i>Mass comm.</i>	86	0.71 (0.04)	0.91 (0.02)	0.21*** (0.04)	5.3270	85	0.0000
PB: No exceptions	<i>Control</i>	16	0.48 (0.09)	0.65 (0.10)	0.17* (0.09)	1.8489	15	0.0843
	<i>NE</i>	53	0.55 (0.05)	0.85 (0.04)	0.29*** (0.05)	6.4883	52	0.0000

	<i>Mass comm.</i>	87	0.47 (0.04)	0.61 (0.04)	0.14*** (0.04)	3.2631	86	0.0016
<b>SN: No exceptions</b>	<i>Control</i>	15	0.52 (0.10)	0.67 (0.10)	0.15* (0.07)	2.0602	14	0.0585
	<i>NE</i>	50	0.48 (0.06)	0.68 (0.05)	0.20*** (0.05)	3.8781	49	0.0003
	<i>Mass comm.</i>	86	0.38 (0.04)	0.55 (0.04)	0.17*** (0.05)	3.6746	85	0.0004
<b>PB: Latrine not impure</b>	<i>Control</i>	16	0.50 (0.13)	0.65 (0.12)	0.16 (0.13)	1.2322	15	0.2369
	<i>NE</i>	53	0.63 (0.07)	0.86 (0.05)	0.23*** (0.08)	2.9919	52	0.0042
	<i>Mass comm.</i>	86	0.55 (0.05)	0.72 (0.05)	0.16*** (0.06)	2.6925	85	0.0085
<b>SN: Latrine not impure</b>	<i>Control</i>	15	0.57 (0.13)	0.73 (0.12)	0.17 (0.11)	1.4349	14	0.1733
	<i>NE</i>	49	0.52 (0.07)	0.62 (0.07)	0.09 (0.08)	1.2196	48	0.2286
	<i>Mass comm.</i>	85	0.55 (0.05)	0.72 (0.04)	0.18*** (0.06)	2.8511	84	0.0055

Appendix 3. Informational materials presented to villages

