SQUAT survey

sanitation quality, use, access, & trends

www.squatreport.in

SQUAT Research Brief No. 1 June 2014





ending **open defecation** requires **changing minds**

This Research Brief summarizes "**Revealed preference for open defecation: Evidence from a new survey in rural north India**," a research paper by Diane Coffey, Aashish Gupta, Payal Hathi, Nidhi Khurana, Dean Spears, Nikhil Srivastav, and Sangita Vyas. Read the full paper online at squatreport.in.

A new survey interviewed over 3,200 rural households and more than 22,000 people in villages in five states in India: Bihar, Haryana, Madhya Pradesh, Rajasthan, and Uttar Pradesh. The survey focused on sanitation preferences and behaviour. These states are home to 40% of the population of India, to 45% of households in India without a toilet or latrine, and to at least 30% of all people worldwide who defecate in the open.

summary of research findings:

- Rural households do not build inexpensive latrines of the sort that commonly reduce open defecation and save lives in Bangladesh, Southeast Asia, and sub-Saharan Africa.
- Many survey respondents' behaviour reveals a preference for open defecation: over 40% of households with a working latrine have at least one member who defecates in the open.
- Government latrines are particularly unlikely to be used. Most people who own a government-constructed latrine defecate in the open anyway.
- **Latrine construction is not enough:** If the government were to build a latrine for every rural household without one, without changing sanitation preferences, most people in our sample in the states where it is most common would still defecate in the open.
- Many respondents say there are benefits to defecating in the open: 47% of those that defecate in the open say they do so because it is pleasant, comfortable, or convenient.

what is SQUAT?

The SQUAT survey was a survey of Sanitation Quality, Use, Access and Trends in rural north India. From December 2013 to April 2014 we asked 3,235 rural households about their sanitation behaviour and beliefs, and collected data on the defecation practices of 22,787 people. We visited over 300 villages in 13 districts of Bihar, Haryana, Madhya Pradesh, Rajasthan, and Uttar Pradesh. What we found is surprising – and must be an important part of India's plan to eliminate open defecation.

why SQUAT?

Most people who live in India defecate in the open. Most people worldwide who defecate in the open live in India. Open defecation has dire consequences: it kills babies, impedes the physical and cognitive development of surviving children, and reduces the human capital of India's workforce. Open defecation is associated with significant negative externalities: it releases germs into the environment which harm the rich and poor alike—even those who use latrines.

As the rest of the world steadily eliminates open defecation, this behaviour stubbornly persists in India. Indeed, with 67% of rural households and 13% of urban households defecating in the open according to the 2011 census, India now accounts for 60% of the world's open defecation.[1]

Our study focuses on sanitation in rural India for several reasons. First, open defecation is far more common in rural India than in urban India. Second, about 70% of the Indian population lives in rural areas. Indeed, 89% of households without a toilet in the 2011 census were in rural areas. Finally, improving rural sanitation poses particular challenges. India has seen decades of government spending on latrine construction and sustained economic growth, but rural open defecation has remained stubbornly high.

Why do people in rural India defecate in the open in such large numbers? Answering this question requires understanding the preferences of hundreds of millions of people. We are aware of no prior study that is similarly broadly representative of sanitation views and behaviours in India.

[1] See the WHO/Unicef Joint Monitoring Programme database at http://www.wssinfo.org/

what did the survey find?

We find that households believe that a latrine worth using is expensive. However, the great majority of households that do not own a latrine could afford to build one of the simple, inexpensive latrines that are ubiquitous in Bangladesh and other countries that are poorer than India. Additionally, many people who live in households that own working latrines nevertheless defecate in the open. Open defecation despite latrine access is more common in households with government-constructed latrines than in households with privately constructed latrines. A simple model applied to our survey data predicts that if the government were to build a latrine for every household in Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh without changing anybody's preferences, most rural people that we talked to in these states would still defecate in the open. In short, we find that many people have a revealed preference for open defecation, such that merely providing latrine "access" without promoting latrine use is unlikely to importantly reduce open defecation.

even if the government were to build a latrine for every household in Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh without changing anybody's preferences, most rural people in these states would still defecate in the open

The findings of our survey have clear implications for sanitation policy in India: programs must concentrate on behaviour change and promoting latrine use, rather than building latrines. Although building latrines could be part of a successful policy package, little will be accomplished by planning to build latrines that will go unused. Latrine construction is not enough. Instead, if the Government is to achieve its goal of eliminating open defecation by 2019, it must concentrate on building demand in rural India for latrine use.

the international context

This paper is far from the first to emphasize the importance of latrine use, and to point beyond policies of latrine construction. Many of our conclusions will be familiar to sanitation professionals who have struggled for years to promote behaviour change in India and worldwide. Yet, the magnitude of resistance to latrine use in rural north India might surprise even experts: we find that even among the demographic sub-groups in our survey who are most likely to use a toilet, open defecation is still more common than among the populations of some of the poorest countries in the world.

table 1: open defecation in the international context, 2012 JMP data

country	% open defecation	% unimproved or shared	% improved sanitation	GDP per capita (int'l $)
India (Census)	49.8			
India (JMP)	48	16	36	5,050
Pakistan	23	29	48	4,360
Haiti	21	55	24	1,575
Ghana	19	67	14	3,638
Senegal	17	31	52	2,174
Zambia	16	41	43	2,990
Afghanistan	15	56	29	1,892
Swaziland	14	29	57	5,912
Kenya	13	57	30	2,109
Nicaragua	10	38	52	4,254
DRC	9	60	31	451
Uganda	8	58	34	1,134
Malawi	7	83	10	739
Cameroon	6	59	45	2,551
Myanmar	5	18	77	-
Bangladesh	3	40	57	2,364
Burundi	3	50	47	737
Rwanda	3	33	64	1,379
Gambia	2	38	60	1,565
Vietnam	2	23	75	4,912
China	1	34	65	10,771

sources: sanitation data from JMP http://www.wssinfo.org/; GDP from World Bank

Table 1 reports the fraction of people who defecate in the open according to UNICEF-WHO Joint Monitoring Programme (JMP) data for a set of countries and regions that we have selected for illustration. Open defecation is much more common in India than it is in many of the poorest countries of the world, such as the Democratic Republic of the Congo, Malawi, Burundi, and Rwanda – to say nothing of richer countries that are still much poorer than India, such as Afghanistan, Kenya, and Bangladesh.

The statistics in Table 1 are important to our analysis because even the sub-groups within our rural Indian sample that are *most likely* to use latrines report higher rates of open defecation than the JMP does for many of these countries. For example, we will see that the fraction of males *in households that own latrines* who defecate in the open in our sample is greater than the percent of all people in sub-Saharan Africa or Haiti who defecate in the open, latrine owners or not. A larger fraction of females in our sample *in households that own latrines* defecate in the open than do people in Afghanistan, Swaziland, or Kenya, to say nothing of some even more deeply impoverished countries.

missing middle rungs on the sanitation ladder

Many international sanitation professionals and experts describe a "sanitation ladder": ranging from open defecation up to flush toilets with a piped sewer. Successive rungs on the ladder represent more hygienic and more expensive sanitation options. However, the sanitation ladder in India appears to be missing its middle rungs, with no intermediate steps on which households climb gradually up from open defecation.

Table 1 splits the population into three categories: open defecation, unimproved or shared sanitation, and improved sanitation. The data for India show a "missing middle:" no country listed has a smaller "middle" fraction of unimproved or shared sanitation. Many countries, in contrast, have both a lower fraction of the population defecating in the open and a lower fraction with improved sanitation.

In India, only 16% of the population is on a middle rung, compared with 40% in Bangladesh, and 45% in sub-Saharan Africa overall. Although the table only presents country-level statistics, in rural India the contrast is even starker: only 6% of rural Indians are in a middle category. In many countries, proceeding up the sanitation ladder was not only the path out of open defecation, but also an important step towards improved health and human capital. For India to follow this path, policy-makers must learn how to convince rural Indians to use "middle" alternatives to open defecation.

If not simple latrines, what *do* rural Indians want?

In our survey, over 78% of respondents who do not have a latrine also cite the cost of a latrine as an important reason for why they defecate in the open. How can this perception be understood, in comparison with the international context? We find that respondents have a very expensive notion of what constitutes a latrine. We asked male respondents to enumerate for us what features an inexpensive, but usable latrine would have and how much each of the parts would cost. The latrines that they described cost more than Rs. 21,000, on average, and in many cases much more. Given these large estimates, it is no surprise that people perceive cost as a barrier to building a latrine. What this suggests is not that these respondents could not afford to build latrines that safely contain faeces, but rather that there is a widely held belief that latrines are expensive assets, perhaps even luxuries.

In fact, a usable latrine that safely contains faeces could be built much less expensively, and such a latrine could importantly improve health relative to open defecation. Indeed, the simple latrines that have been used to essentially eliminate open defecation in Bangladesh cost around Rs. 3,000: much less than the Rs. 10,000 allocated for latrine construction by the Indian Government, and of course even less than the Rs. 21,000 which our respondents imagined.

Buying a toilet for each of the 123 million households that lacks one at our respondents' estimated price of 21,000 rupees would cost Rs. 256,000 crore, or approximately one-sixth of the annual total expenditure of the Government of India in 2012-2013. This is therefore not a serious policy alternative to building demand for simple, "middle-rung" latrines.

Survey and Sampling Methodology

The SQUAT survey was designed to be representative of the rural open defecation challenge in four plains states of north India: Bihar, Haryana, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

The states of Bihar, Uttar Pradesh, Rajasthan, Madhya Pradesh and Haryana are home to 40% of the population of India, and to 45% of households in India without a toilet or latrine. At least 30% of all people worldwide who defecate in the open live in these five Indian states. Our results, therefore, are relevant not merely to sanitation policy in India, but also to addressing the global sanitation challenge.

The survey used a four-stage sampling strategy:

1. **Districts:** Districts were selected to match the state-level trend in rural household open defecation rates between 2001 and 2011.
2. **Villages:** We sampled from the list of villages prepared by the Government of India's DLHS-2 survey. Villages were randomly selected using probability proportionate to population size sampling to ensure a representative sample.
3. **Households:** Households were randomly selected using a similar in-field randomization technique to the one used in Pratham's ASER survey.
4. **Persons:** After completing the roster of household members, one person was randomly selected to complete the individual interview privately.

The survey was specially designed to capture the sanitation beliefs and behaviours of men and women living in north Indian villages. We asked detailed questions to understand how people prioritize latrine use, what they think is healthy, where they defecate, why they defecate the way they do, and what they think are the advantages and disadvantages of open defecation versus latrine use.

We also paid careful attention to minimizing social desirability bias—bias that occurs when survey respondents say what they think interviewers want to hear. We trained the interviewers and wrote questions in a balanced way so as not to suggest any response was more desirable.

For more information on the survey methodology, please see the complete research paper. Our survey instrument was written in Hindi. The original Hindi survey instrument and an English translation are available at squatreport.in.

survey finding 1: many people with access to latrines defecate in the open

Measuring sanitation behaviour at the household-level has created a blind spot for many studies in the literature: in rural north India, many households include some people who use a latrine and some people who defecate in the open. Unlike other widely cited data sources, our survey asked about usual sanitation behaviour for each person in the household. Therefore, we know both who lives in households with a latrine, and who usually uses one. In particular, we asked whether each person over 2 years old usually defecates in the open or in a latrine.

figure 1:
open defecation and latrine use in the same household

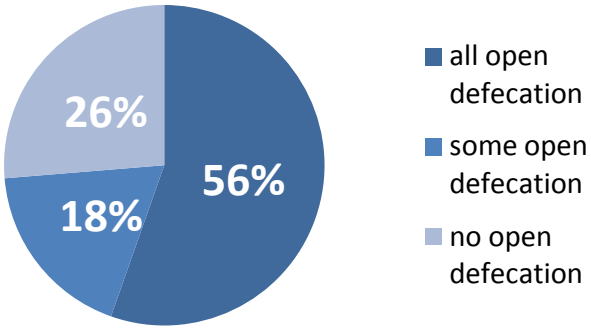


Figure 1 divides the households in our sample into three groups: those in which everybody defecates in the open, those in which no one defecates in the open, and those in which some people defecate in the open but some do not. The third category is a considerable 18% of households. This suggests that estimates of person-level open defecation rates based on the number of households who own latrines may importantly underestimate exposure to open defecation. Moreover, for many people "access" to sanitation is clearly not sufficient to prevent open defecation: some people defecate in the open even though a working latrine is available.

Table 2 details an important finding of our survey: latrines are owned by *households*, but open defecation is a behaviour of *persons*. In our four focus states, 80% of all interviewed households had at least one member who defecates in the open. Strikingly, in these states, 45% of households with a latrine user also had at least one household member who defecates in the open. Person level statistics illustrate what is missed by household counts of latrine ownership. 57% of households in our sample do not own a latrine, but 64% of people defecate in the open. This gap is because many people in households with latrines do not use them.

table 2: latrines are owned by households, open defecation is a behavior of persons

statistic	sub-sample	all 4 states	Bihar	MP	Rajasthan	UP
Panel A: Person-level averages						
defecates in the open	all persons over 2 years old	70.4%	75.0%	67.5%	76.7%	65.0%
ODs, despite HH owning latrine	in households with latrine	23.4%	22.5%	25.6%	30.5%	19.7%
ODs, despite user in HH	in households with user	23.7%	29.3%	17.7%	37.7%	18.4%
male OD, despite latrine	in HH owning a latrine	27.8%	26.4%	30.1%	33.6%	24.8%
female OD, despite latrine	in HH owning a latrine	18.6%	18.1%	20.8%	27.1%	13.4%
Panel B: Household-level averages						
owns latrine	all households	34.7%	27.4%	40.3%	28.3%	39.1%
any member ODs	all households	79.8%	84.1%	75.6%	87.6%	76.2%
any OD, despite latrine	households with latrine	42.9%	43.8%	41.9%	57.4%	38.5%
any OD, despite a user	households with user	44.7%	51.6%	35.8%	64.2%	39.8%

note: OD = open defecation. HH = household. All person-level statistics are for persons over 2 years old. Haryana omitted for space.

survey finding 2: government latrines are less likely to be used than latrines that households construct themselves

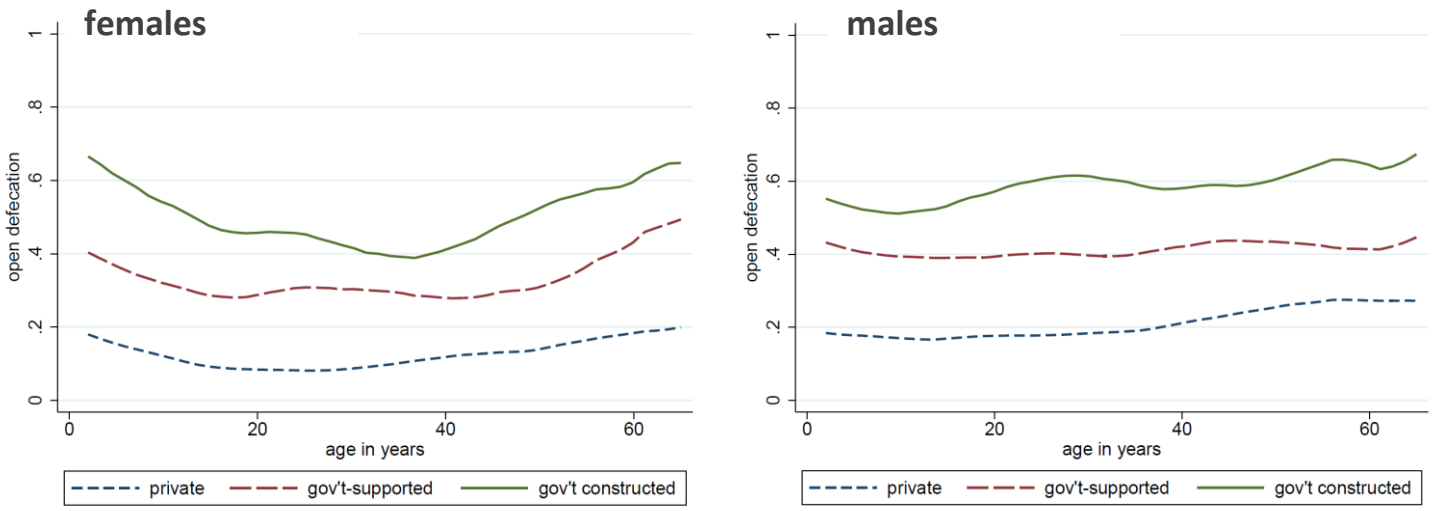
Media coverage of sanitation in India often emphasizes the need for the government to provide "access" to sanitation. As we have seen, "access" is an importantly incomplete description of the sanitation challenge for rural India, where demand for latrine use is a key barrier. Here, we focus on a key question: Were the latrines that are being used provided by the government?

Only a minority of all households in the survey – merely 9% – report having received either money or materials from the government for latrine construction; 32% of households in the survey own a toilet that was built without any government support, and the rest do not own a latrine. Thus, the large majority of households with latrines – 79% – received neither money nor materials (under which we include receiving a complete latrine) from the government to build their latrine.

Focusing only on households that own a latrine, figure 2 shows open defecation according to whether the household received government support to build its latrine or not. People who live in households with a latrine that was built with government support are more than twice as likely to defecate in the open than are people who live in households with a latrine that was constructed by the household itself. Indeed, over 60% of households which received latrine materials from the government have at least one member who defecates in the open. As the figure shows, this lower probability of using government latrines is seen for both men and women, at all ages.

a government-constructed latrine, now out of use

figure 2: open defecation among latrine owners, by government or household latrine construction



note: observations are all persons aged 2-65 in households with a latrine. "Government supported" latrines are latrines which were constructed with any government money or materials; "government constructed" latrines were fully government-constructed.

Fully government-constructed latrines are the least likely to be used. A majority of people who live in households with a fully government constructed latrine defecates in the open; and one-third of such latrines are not usually used by anyone at all. In households with a fully government-constructed latrine, even a majority of women in their 20s – a demographic group particularly likely to use latrines when one is available – defecate in the open.

These differences in use according to private or government construction reflect several possible mechanisms. First is selection: households that build their own latrines are, on average, households that have more demand for latrines, possibly because of higher socioeconomic status, better education, or a greater awareness of the health benefits of latrine use. However, we find that wealth is not the whole story: among both rich and poor households, those who built their own latrine are more likely to be using it than those with a government latrine.

fully government constructed latrines are the least likely to be used

Second is quality: households that build their own latrines may choose to build a more expensive latrine, or one that more closely matches their own preferences. One important issue is latrine pit size. People are much more likely to use latrines with very large pits, and many households construct very large pits or septic tanks when they build their own latrines. The pits that the government builds are much smaller. In fact, the average pit that the government constructs for a latrine is less than one-fifth the size of the average pit that a household constructs for itself and uses. In qualitative interviews, people suggested that concerns about pit emptying importantly reduce use of latrines with smaller pits. Very large pits are perceived to last a family at least a generation.

Of course, this does not mean that the government should be constructing large and expensive pits – this would simply not be feasible on the scale required. Instead, policy-makers must explore ways to promote the use of simpler latrines – with smaller pits – of the type commonly used in other countries around the world.

survey finding 3: government latrine construction will not be enough to eliminate open defecation, without a revolution in latrine use

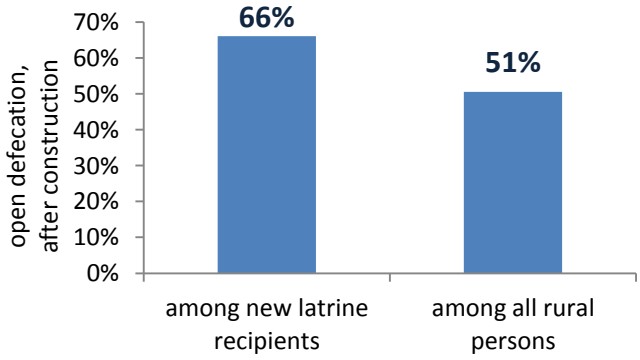
Prominent policy-makers have recently suggested that the Indian government should build a latrine for every household without one. How much open defecation would remain if the government indeed built a latrine for every household in our survey that did not have one, but did nothing to change preferences about open defecation?

We cannot answer this question precisely because to do so would require knowing what people living in households without a latrine *would* do if they had a latrine. Obviously, this is something that our survey cannot directly observe. Moreover, because latrines were not randomly assigned in our data, owners and non-owners are likely to be different: people who have a latrine are more likely to want one than people who do not.

However, figure 3 offers an approximate answer by applying a simple demographic model to people who live in households that have a government-provided latrine, and using it to predict how much open defecation would remain after the government built a latrine for every household without one, assuming that the program did nothing to change sanitation preferences.

figure 3: construction is not enough

SQUAT data predict that more than half of people in the survey population would still defecate in the open in Bihar, MP, UP, and Rajasthan, even after the government built a latrine for every household



survey finding 4: many rural north Indians believe that open defecation is more pleasant, healthy, and wholesome

Our respondents explain that there are many pleasant advantages of open defecation, and that using a latrine is probably no healthier for neighbouring children than going outside. We asked an open-ended question, so villagers could volunteer their explanations of what is good or bad about open defecation and latrine use. Of people who defecate in the open, 47% explain that they do so because it is pleasurable, comfortable, or convenient. Of individuals who defecate in the open despite having access to a latrine in their household, fully 74% cite these same reasons. Open defecation is not generally considered unhealthy: among adults who defecate in the open, fully 51% report that widespread open defecation would be at least as good for child health as latrine use by everyone in the village. In a companion qualitative research project, many respondents explained that open defecation is part of a healthy, wholesome way of life.

what can the SQUAT survey tell policy makers?

Open defecation in rural India is a unique human development emergency. Standing in contrast to the importance of reducing open defecation are the preferences for open defecation that the SQUAT survey found. Few households build affordable latrines; many people who own latrines nevertheless defecate in the open; and people who own government-built latrines are particularly likely to defecate in the open.

Latrine construction alone is not enough to substantially reduce open defecation in the northern plains states where it is concentrated. However, the insufficiency of building latrines does not excuse the government from responsibility. India needs a large scale campaign to promote latrine use.

for further reading…

If you only read these eight pages, you're missing out! This Research Brief has offered only a peek at the evidence and conclusions in the full research paper, "Revealed preference for open defecation: Evidence from a new survey in rural north India," available online at squatreport.in. Although there is not space in these few pages to fully cite all of the important prior work on which this study builds, we acknowledge the following works with gratitude, and we suggest them to a reader interested in better understanding the challenges that substantially reducing open defecation in the plains states of rural north India will have to overcome:

- Arnold, *et al*. 2010. Causal inference methods to study nonrandomized, preexisting development interventions.
- Barnard, *et al*. 2013. Impact of Indian Total Sanitation Campaign on Latrine Coverage and Use. *PLOS ONE.*
- Galbraith and Thomas. 2009. Community Approaches to Total Sanitation. UNICEF.
- Patil, *et al*. 2013, A randomized, controlled study of a rural sanitation behavior change program in MP, India.
- Perez, *et al*. 2012. What does it take to scale up rural sanitation? WSP: World Bank.

the SQUAT team

rice
research institute for compassionate economics

riceinstitute.org

contact@riceinstitute.org

facebook.com/riceinstitute

@riceinstitute