



# Measuring open defecation in India evidence from a randomized survey experiment

This Policy Brief seeks to inform researchers and practitioners on best practices for measuring open defecation in a large population survey. We summarize results from “Measuring open defecation in India using survey questions: evidence from a randomized survey experiment” published in *BMJ Open*. You can read the full paper online at <https://bmjopen.bmj.com/content/9/9/e030152>”

## key findings:

- This is the first study that experimentally tests the difference in open defecation estimated from different survey questions.
- The study provides evidence that the India’s Demographic and Health Survey, which asks about the defecation behavior of everyone in the household in one question, substantially underestimates open defecation in India.
- The study shows that measuring open defecation at the individual level is feasible in a large household survey, and finds more open defecation than household level questions.

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## background

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Exposure to open defecation has important consequences for child mortality, health, and human capital development. Because rural India is home to more than half of the world's open defecation, large reductions in open defecation in India will be essential to meeting the Sustainable Development Goals. Towards this end, the Indian government launched the Swachh Bharat Mission (SBM), a national sanitation campaign that aimed to eliminate open defecation in India by 2019. Yet, the effect the SBM has had on reducing open defecation is still unknown. Monitoring progress towards reducing open defecation in India is therefore essential.

India's Demographic and Health Survey (DHS) estimates that 54% of households in rural India defecated in the open in 2015-2016, down from 75% in the 2005-2006 DHS. This measure is based on a household-level question that asks about the behavior of everyone in the household in the same question. Recent evidence from independent research studies carried out in different parts of India suggests, however, that it is common for individuals living in households with latrines to nevertheless defecate in the open.

Because open defecation is an individual behavior, an individual-level survey question may be able to more accurately measure it compared to a household-level question, particularly among households with latrines.

This study asks: what types of questions that can be asked in a large population survey generate more accurate estimates of open defecation in rural India. The study seeks to inform researchers and practitioners on best practices for measuring open defecation.

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## research design

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This study randomly assigned latrine-owning households to receive one of two survey modules measuring open defecation. The study was conducted in rural parts of Bihar, Odisha, Karnataka and Gujarat. It used as its sampling frame the study areas of 3ie's [Promoting Latrine Use in Rural India Thematic Window](#), which funded four sanitation projects in different states. The study areas are spread across India, representing different contexts and varying levels of rural open defecation.

### box 1: individual and household-level questions

**Individual Level Question:** *I have seen that some people defecate in the open, and some people use latrine. Now I want to ask about where you and your family members defecate. The last time [NAME of the member] defecated, did [NAME] defecate in the open or use latrine?*

**Household Level Question:** *What kind of toilet facility do members of your household usually use?*

Box 2 shows the two ways of asking about open defecation that we used. Roughly half of the households were randomly assigned the household level question while the other half were randomly assigned the individual level question.

The individual level questions asked for every household member, aged 5 or older, whether the individual defecated in the open or used the latrine. It had two parts: a priming statement followed by questions on individual behavior. Because the priming statement and the behavior questions include both open defecation and latrine use, they are balanced between the two different behaviors and could reduce social desirability bias.

The household level question is the same as in India's DHS, and asked about the behavior of all household members in one question.

There are three main factors that differ between the two types of latrine use survey modules: the level of aggregation, the reference period and the presence of a priming statement. Therefore, the differences in reported open defecation that we observe reflect the fact that the two sets of questions vary on all of these factors combined.

**table 1: number of households assigned individual-level and household-level questions**

	Individual	Household
<b>Bihar</b>	326	313
<b>Odisha</b>	293	288
<b>Karnataka</b>	297	296
<b>Gujarat</b>	309	319
<b>Total</b>	1215	1216

Households that were assigned the individual-level questions exhibited similar characteristics to households that were assigned the household-level question. Households in both groups had approximately the same number of household members, fraction female, fraction Hindu, educational attainment of the household head, and asset ownership of 13 assets. Samples were also balanced on religious composition, private investment in latrine construction, and pit size. Balance on these three characteristics is particularly important because previous studies have documented their importance for latrine use in rural India.

## key findings

### individual-level questions find more open defecation than household-level questions

Figure 1 shows means and 95% confidence intervals from the individual-level (shown as dashed red bars) and the household-level

(shown as solid blue bars) questions, for the full dataset and for different sub-samples.

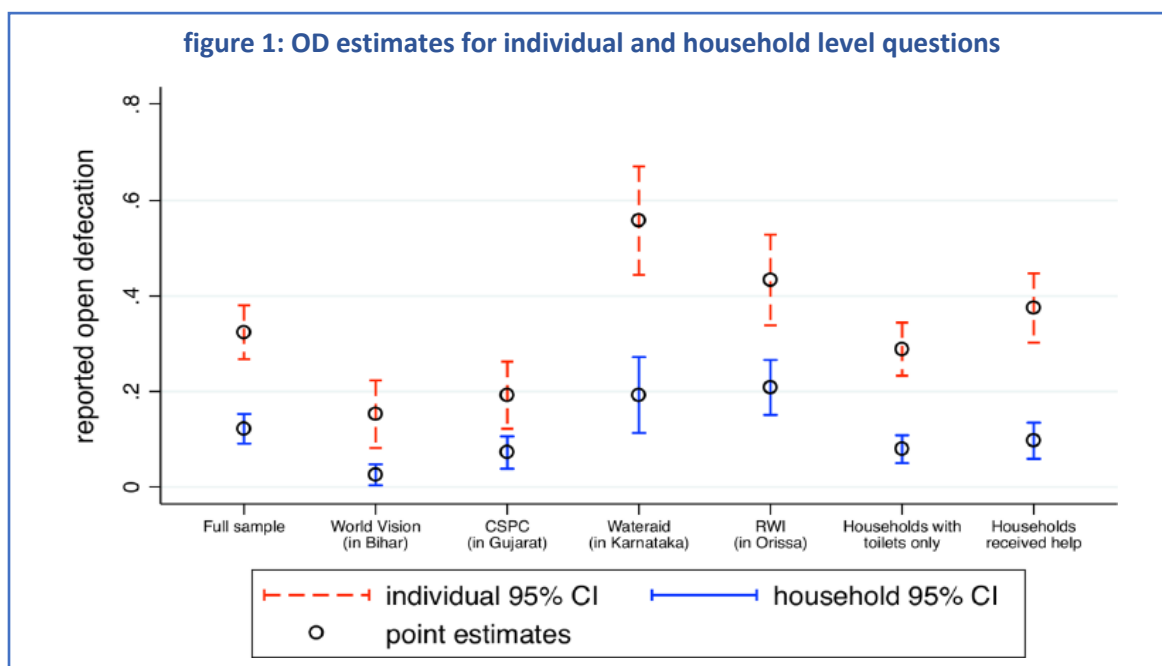
Observations are individuals for the individual-level estimates, and households for the household-level estimates. In the full sample, and in all sub-samples analyzed in this figure, the individual questions find more open defecation than the household question. Moreover, the size of the difference in reported open defecation between question types is large and consistent.

The first set of estimates shown in the figure uses the full sample. The second, third, fourth, and fifth sets of estimates break the sample up by project area. The sixth set of estimates uses only households with latrines.

In the full sample, the balanced individual-level questions find 21 percentage points more open defecation than the household-level question. This difference is quantitatively large and statistically significant. We compute this difference by assigning the response to the household-level question to every individual in the household, and then taking the difference in reported open defecation by question type. We get a very similar answer if instead, we calculate mean open defecation among individuals in a household to get a household-level value, and then calculate the difference in reported open defecation by question type.

### individual-level questions understate open defecation by less than household-level questions among those that received help to construct their latrines

The seventh set of estimates shown in Figure 1 show reported open defecation from individual- and household-level questions among households that received help to construct their latrines. Comparing columns 7 and 6 show that the difference in reported open defecation between the two question types is greater for



households that received help to construct their latrines. Indeed, the difference in measured open defecation between the two question types is 18-19 percentage points larger among households that received help to construct their latrines compared to households that did not. Individuals in households with latrines constructed through government support are more likely to defecate in the open than individuals in households with privately constructed latrines, and individual-level questions are better able to capture this open defecation than household-level questions.

### household-level questions underestimate open defecation by more among males compared to females

The individual questions find 23 percentage points more open defecation than the household question among males, and 19 percentage points more among females. Conditional on latrine ownership, males are more likely to defecate in the open compared to females, and individual-level questions understate the difference in open defecation between the two sexes by less.

## conclusions

### nationally representative surveys like India's DHS underestimate open defecation

This study presents compelling evidence that India's DHS, which provides the most recent nationally representative estimates of open defecation for rural India, and other surveys that ask household-level questions, greatly underestimate open defecation among households with latrines. Moreover, since many households have received government assistance for latrine construction through the Swachh Bharat Mission, household-level questions are even less accurate at estimating open defecation.

### measuring open defecation at the individual level is feasible in a household survey

Our survey team's experience suggests that adding the balanced, individual-level questions on use to a survey that already contains a household roster increases survey time by about 2 minutes, on average.